

## **CHAPTER 7 SITUATION OF PROCUREMENT AND PRICES**

### **7.1 Procurement**

#### **7.1.1 Construction Condition**

More than one 1,500 Iraqi Construction Companies are registered with the Ministry of Construction and Housing. However, only about 20 companies operate as contractors (see Appendix V, Table 7.1.1, List of Iraqi Private Construction Companies). Additionally, there are some state-owned companies under the Ministry of Construction and Housing, Ministry of Transportation, and Ministry of Water Resources. As per the local consultant's report, the technical capacities of these state-owned companies are comparatively more reliable than private companies. See Appendix V, Table 7.1.2, List of State-Owned Construction Companies.

According to a local consultant's report, construction contracts have no official price, and there is no price ceiling. Prices in Iraq are based on a "cost estimate" for all projects and depend on the area, time allowed for completion, and availability of raw materials. Lump sum contracts are not common. It is important to prepare storage space in a safe place within a secure site due to the prevailing security situation. See some construction cost in Appendix V, Table 7.2.4, Major Construction Costs.

Basically, existing laws and regulations will be applied to construction business. However, according to the order of the civil administrator for Iraq issued on 17 June 2003, and restated by the Ministry of Justice in the Iraqi gazette, that "unless suspended or replaced by the CPA or superseded by legislation issued by democratic institutions of Iraq, laws in force in Iraq as of April 16, 2003 shall continue to apply in Iraq insofar as the laws do not prevent the CPA from exercising its rights and fulfilling its obligations, or conflict with the present or any other regulations issued by the CPA". In this regard, before the start of actual business, it is necessary to carefully study the laws, regulations and orders.

#### **7.1.2 Situation of Procurement of Materials**

Basic living goods and almost all construction materials are available in Iraq. But almost all materials except sand, gravel, and lime are imported. It is recommended that architectural finishings, such as ceramic tile, doors & windows, glass, hardware, fittings, and electrical appliances, be imported directly from the viewpoint of quality, availability, and price. It is possible to directly import these materials from Turkey, Kuwait, Jordan and Dubai. It is not recommended to purchase these materials from Kuwait because they are also imported to Kuwait. Dubai is one of the major market

places for such materials in the Middle East.

## **7.2 Price and Cost**

### **7.2.1 Material Price**

It is possible to purchase nearly all construction materials in Iraq. However, there is no market price and sometimes there are large differences in prices among shops and at different times of purchase. Specifications, varieties, and quantities could be limited. Price fluctuations are also large so that procurement should be done with care. Portland cement, which was exported in the past, is now imported. Production of local materials such as sand, gravel, and marble is limited and concentrated in just some areas in the northern part of Iraq so that prices are higher in southern than in northern part. See Appendix V, Table 7.2.1, Construction Material Price List.

### **7.2.2 Procurement of Construction Equipment**

Construction equipment is available in Iraq, but the majority is old and dilapidated. Recently, many machines have been imported from Kuwait, Jordan and Dubai in expectation of reconstruction demand. It should not be difficult to procure or lease equipment because there are large markets for both new and second-hand equipment in Dubai. See Appendix V, Table 7.2.2, Equipment Rental Price List.

### **7.2.3 Wage Rate**

Wage rates declined in the period between the 1992 Gulf War and the recent Iraq War due to UN economic sanctions. Recently though, wage rates have begun increasing reflecting the demand for workers for reconstruction.

Average wage rates at present are \$900– \$3,000/month for a senior engineer, \$600– \$1,500/month for technicians, \$25– \$60/day for skilled workers and \$7– \$20/day for unskilled workers. Based on the Iraqi custom, it is necessary to add some fringe benefits, such as social security, medical care, and transportation, and the cost sometimes reaches 70% of the base salary. Basically, more than one year contract is to be considered for hiring of monthly salary-based engineers. See Appendix V, Table 7.2.3, List of Wage Rates.

## CHAPTER 8 GEOGRAPHIC INFORMATION AND GIS

### 8.1 Current Situation of Geographic Information and GIS

#### 8.1.1 Collection and Arrangement of Existing Paper/Analogue Maps

##### (1) Situation of Existing Maps in Iraq

In recent periods, it has been difficult to obtain existing “analogue” (paper) maps related to Iraq. In this study, only two monochrome maps, both copied, were obtained through the local consultant. (Furthermore, only limited information relating to the geography of Iraq was available in Japan as well as in Iraq.) These difficulties in obtaining existing paper maps were due to the following reasons:

- (i) Previous Iraqi governments did not generate maps nor, due to military reasons, were they made available to the general public
- (ii) Mapping was monopolized or hidden by various personnel
- (iii) Mapping was retained by a limited number of responsible people
- (iv) Mapping was lost or scattered during past wars
- (vi) The study team was unable to find either the maps or those retaining them

Based on information provided by a local consultant contracted to the study team, the first reason (i) is likely to be the dominant cause.

Notwithstanding, many maps associated with Iraq can be viewed and downloaded from the Internet. In general, most existing (topographic) maps of Iraq appear to have been generated by foreign countries, e.g. (former) Soviet Union, United Kingdom or United States of America.

Table 8.1.1 outlines the list of websites as of March, 2004 that include downloadable maps of Iraq.

Several international organizations also appear to have been producing or providing maps or GIS data of Iraq since the declaration of the end of the 2003 Iraq War.

However, most existing maps are targeted at a regional level or cover the entire area of Iraq. Therefore, the number of more detailed maps/map data sets that are appropriate and useful for actual projects or planning is still limited.

Moreover, high-resolution satellite images taken after the 2003 war appear to be banned and unavailable to the general public. It was not possible to obtain post-war

imagery, including that covering the central area of Baghdad, from the suppliers of IKONOS satellite images.

**Table 8.1.1 Websites Concerning Maps or GIS Data on Iraq**

Organization	Maps/GIS data	URL
CIA	Maps	<a href="http://www.cia.gov">http://www.cia.gov</a> <a href="http://www.cia.gov/cia/publications/factbook/">http://www.cia.gov/cia/publications/factbook/</a>
DigitalGlobe	Satellite Imagery (QuickBird selling agency)	<a href="http://www.digitalglobe.com">http://www.digitalglobe.com</a>
ERSDAC	Satellite Imagery (ASTER, etc.)	<a href="http://www.ersdac.or.jp/">http://www.ersdac.or.jp/</a>
FAO	GIS data, Maps	<a href="http://www.fao.org">http://www.fao.org</a> <a href="http://www.fao.org/WAICENT/FAOINFO/SUSTDEV/EIIdirect/gis/EIgis000.htm">http://www.fao.org/WAICENT/FAOINFO/SUSTDEV/EIIdirect/gis/EIgis000.htm</a>
Geo Community	GIS data	<a href="http://www.geocomm.com">http://www.geocomm.com</a> <a href="http://data.geocomm.com">http://data.geocomm.com</a>
Geography Network	GIS data	<a href="http://www.geographynetwork.com">http://www.geographynetwork.com</a>
Global Security	Maps (General maps, City plan maps, etc.)	<a href="http://globalsecurity.org/military/world/iraq/images/">http://globalsecurity.org/military/world/iraq/images/</a>
HIC	Maps (General maps, City plan maps, Thematic maps, Historical maps, etc.)	<a href="http://www.hiciraq.org">http://www.hiciraq.org</a> <a href="http://www.hiciraq.org/mapcentre/">http://www.hiciraq.org/mapcentre/</a> <a href="http://www.humanitarianinfo.org/iraq/maps/">http://www.humanitarianinfo.org/iraq/maps/</a>
NASA	Satellite Imagery (LANDSAT, etc.) Digital Elevation Model	<a href="http://www.nasa.gov">http://www.nasa.gov</a> <a href="https://zulu.ssc.nasa.gov/mrsid/mrsid.pl">https://zulu.ssc.nasa.gov/mrsid/mrsid.pl</a> <a href="http://www2.jpl.nasa.gov/srtm/">http://www2.jpl.nasa.gov/srtm/</a>
NIMA	GIS data, Maps, Seller	<a href="http://www.nima.nl">http://www.nima.nl</a> <a href="http://geoengine.nima.mil/">http://geoengine.nima.mil/</a>
RESTEC	Satellite Imagery (Distributor)	<a href="http://www.restec.or.jp/">http://www.restec.or.jp/</a>
Space Imaging	Satellite Imagery (IKONOS selling agency)	<a href="http://www.spaceimaging.com">http://www.spaceimaging.com</a>
SPOT IMAGE	Satellite Imagery Distributor (SPOT selling agency)	<a href="http://www.spotimage.com">http://www.spotimage.com</a>
UNEP	GIS data	<a href="http://www.unep.net">http://www.unep.net</a> <a href="http://www.grida.no/">http://www.grida.no/</a>
University of Texas	Maps	<a href="http://www.utexas.edu">http://www.utexas.edu</a> <a href="http://www.lib.utexas.edu/maps/iraq.html">http://www.lib.utexas.edu/maps/iraq.html</a>
UNOSAT	Maps, Satellite Imagery	<a href="http://unosat.org">http://unosat.org</a> <a href="http://unosat.org/freeproducts/iraq/">http://unosat.org/freeproducts/iraq/</a>
USGS	GIS data, Satellite Imagery	<a href="http://www.usgs.gov">http://www.usgs.gov</a> <a href="http://edc.usgs.gov/geodata/">http://edc.usgs.gov/geodata/</a>

CIA: Central Intelligence Agency (U.S.)  
ERSDAC: Earth Remote Sensing Data Analysis Center (Japan)  
FAO: Food and Agriculture Organization of the United Nations  
HIC: Humanitarian Information Center  
NASA: National Aeronautics and Space Administration (U.S.)  
NIMA: National Imagery and Mapping Agency (U.S.)  
RESTEC: Remote Sensing Technology Center of Japan  
UNEP: United Nations Environment Programme  
USGS: United States Geological Survey

(2) Situations on Human Resources Concerning GIS

It is considered that few Iraqi nationals have more than basic knowledge of GIS technology. There are few people who have either mastered or have a knowledge of the application of GIS.

Because of this situation, an American private company named ESRI (the largest developer of GIS software), announced on 22 December, 2003 that it would provide training to Iraqi nationals from the Ministries of Planning; Mines; Housing and Construction; and Water Resources in support of the country's redevelopment efforts.

In addition, ESRI also announced that it had decided to donate software and supplemental training materials to Iraq so that the trainees could return to their respective ministries and support the national GIS initiative by training additional GIS technicians.

GIS initiatives in Iraq have been spearheaded by the Humanitarian Information Center (HIC). HIC was established by UN offices for the coordination of humanitarian affairs and operates in cooperation with a number of humanitarian groups.

**8.1.2 Preparation of Geographic Information and GIS Data**

As mentioned, existing maps or geographic information currently available are limited.

Therefore, the study team procured high-resolution satellite images from which GIS data sets were generated as base maps to be used in future supporting efforts for Iraq. In this study, areas of interest extended over eight cities that had been proposed by JICA beforehand. Table 8.1.2 lists the targeted cities selected.

**Table 8.1.2 List of Eight Targeted Cities in the Study**

1	Baghdad
2	Basrah
3	Karbala
4	Kut (Al Kut)
5	Najaf
6	Nasiriyah (An Nasiriyah)
7	Samawah (As Samawah)
8	Umm Qasr

(1) Geographic Information Prepared by JICA Study Team

(a) High-Resolution Satellite Imagery and Outputs

High-resolution satellite images acquired by QuickBird (a satellite) were procured in the study. The satellite images, which cover seven cities (shown in Figure 8.1.1), were used in the study for the following purposes:

- (i) To prepare basic GIS data sets to be used for planning in the future
- (ii) To identify buildings or facilities damaged in the previous wars
- (iii) To record geographic data/information collected during the field reconnaissance performed by the local consultant in Iraq

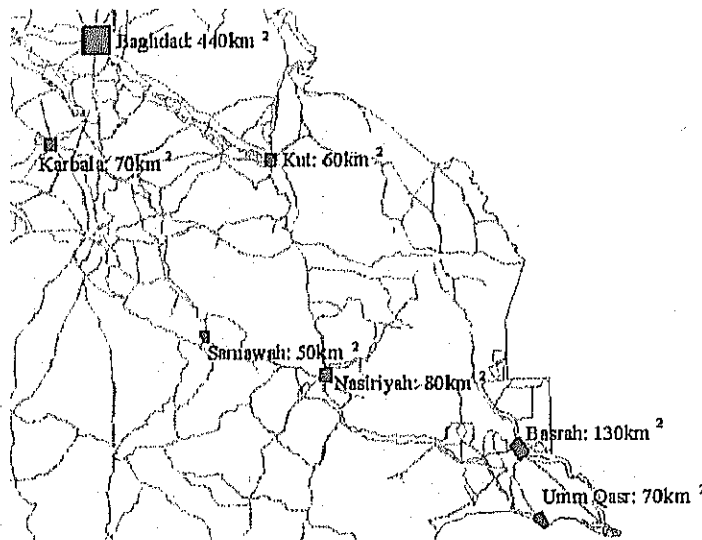


Figure 8.1.1 Coverage Map of Procured QuickBird Image

High-resolution imagery of Najaf could not be procured as no available satellite images were available in the image archive of QuickBird at the beginning of this study.

i) QuickBird High-Resolution Satellite Imagery

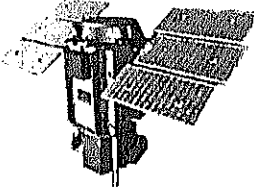
QuickBird was launched in October, 2001 and has been operated and maintained by DigitalGlobe® located in the United States. Its resolution of panchromatic imagery is between 0.61 m and 0.72 m, while the resolution of multi-spectral imagery is between 2.44 m and 2.88 m.

In this study, 3-band natural color images were generated by "pansharpening" both panchromatic images and multi-spectral images. "Pansharpened" 3-band natural color images have almost the same resolution as the original panchromatic images. Those images can actually provide users with more detailed land

information and “visibility” than from panchromatic images. They are also useful in preparing GIS maps and are suitable to improve the accuracy of the digitizing undertaken by operators.

Table 8.1.3 shows an overview of QuickBird and its imagery.

**Table 8.1.3 Overview of QuickBird**

 <b>QuickBird</b>	Launch Date	October 18, 2001	
	Orbit Altitude, Inclination	450 km, 97.2 degree, sun-synchronous	
	Speed	7.1 km/second	
	Equator Crossing Time	10:30 a.m. (descending node)	
	Orbit Time	93.5 minutes	
	Revisit Time	1-3.5 days depending on latitude (30° off-nadir)	
	Swath Width	16.5 km x 16.5 km at nadir	
	Metric Accuracy	23-meter horizontal (CE90%)	
	Digitization	11 bits	
	Resolution	Pan: 61 cm (nadir) to 72 cm (25° off-nadir) Multispectral: 2.44 m (nadir) to 2.88 m (25° off-nadir)	
	Image Bands	Pan	: 450 – 900 nm
		Blue	: 450 – 520 nm
	Green	: 520 – 600 nm	
	Red	: 630 – 690 nm	
	Near IR	: 760 – 900 nm	

“IKONOS”, operated and maintained by “Space Imaging®”, is one of QuickBird’s competitors in terms of its high-resolution capability. However, the team decided to procure QuickBird images after considering the following criteria:

- (i) Availability of existing imagery of the eight cities at the beginning of this study (shown in Table 8.1.4)
- (ii) Availability of images acquired after the declaration of the end of the 2003 Iraq War
- (iii) Resolution of usable images to identify each house/building at a scale of 1:5,000 (it was considered this specified resolution should be at least one meter in natural color).

Table 8.1.4 also presents the results of a comparison of the imagery and availability of both satellites.

**Table 8.1.4 Availability of Images Taken after the 2003 Iraq War  
(As of December, 2003)**

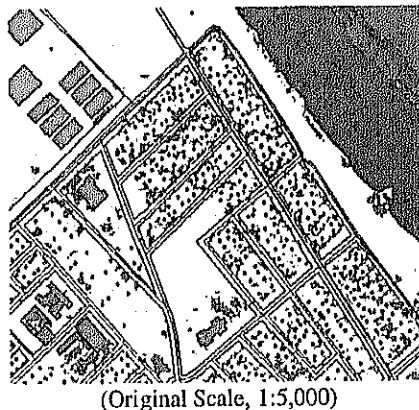
Satellite	QuickBird		IKONOS
Owner's Country	U.S.A.		U.S.A.
Resolution	Multispectral (Color): 2.44~2.88m Panchromatic (Monochrome): 0.61~0.72m		Multispectral (Color): 3.3~4.2m Panchromatic (Monochrome): 0.82~1.0m
Revisit Time	Average 5 days		Average 11 days
Existence of Images of Area of Interest	City	Availability	Availability
	Baghdad	A	NA
A: Available NA: Not Available	Karbala	A	A
	Najaf	NA	NA
	Kut	A	NA
	Basra	A	A
	Samawah	A	A
	Umm Qasr	A	A
	Nasiriyah	A	A

The area of the seven cities covered by QuickBird images is shown in Figure 8.1.1.

ii) GIS Mapping Using Satellite Imagery

The total area to be mapped was 900 square kilometers. Mapping was done using rectified and pansharpened QuickBird images as the base maps. All vector data (points, lines and polygons) directly overlaid the base map images. The satellite images were scaled at about 1:750 to identify individual objects on the ground during digitization.

The following GIS data layers and attributes were prepared for each city (Table 8.1.5). Figure 8.1.2 shows part of the GIS map of Kut as a sample.



**Figure 8.1.2 Sample GIS Map (Kut)**



**Table 8.1.5 Prepared GIS Data Layers**

Vector Type	Feature Types	Definition
Line	Main Road Structures	Highways and main roads that are used for inter-community transportation
	Local Road Structures	Other formed (properly constructed) roads that are used for regular intra-community transportation
	Road Structure Features	These include tunnels, road dividers and other linear features
	Bridge Features	Bridges 2.5 m wide or wider (if width < 2.5 m, do not digitize)
	Railway Features	Railways
	Water Features	Rivers 15 m wide or wider (if width < 15 m, do not digitize); Canals 10 m wide or wider (if width < 10 m, do not digitize)
	Airfield Features	Airfields with runways shorter than 1,000 m in length
	Port Facility Features	Port facilities having a linear appearance (e.g. tracks used by traveling cranes) and pipelines (oil and gas)
	Transport Terminal Features	Transport terminal facilities having a linear appearance
	Unidentified Line Features	Unidentified line features
	Reconnaissance Data	Line features which were collected by local consultant in the study
Polygon	Road Features	(a) Road Polygons, defined by the outer sides of the main road
	Road Structure Features	(b) Road Structure Polygon
	Bridge Features	Bridges 5 m wide or wider (the same as defined for lines)
	Water Features	(Rivers, canals, lakes and ponds) 20m wide or wider
	Building Features	Buildings having any side 30m long or longer
	Airfield Features	Airfields with runways 1,000m long or longer
	Port Facility Features	Port facilities having any side 20 m long or longer
	Transport Terminal Features	Transport terminal facilities having any side 20 m long or longer
	Residential and City Blocks	Residential and city blocks within built-up areas
	Unidentified Polygon Features	Unidentified polygon features
	Vegetation Areas	Vegetation areas abstracted from false color imagery
	Reconnaissance Data	Polygon features which were collected by local consultant in the study
	Point	Building Features
Water Features		Water features (lakes and ponds) between 5 and 20 m wide at the widest point (if width < 5 m, do not digitize)
Airfield Features		Airfield facilities (helicopter landing areas, fuel storage tanks, etc.)
Port Facility Features		Port facilities having all sides shorter than 20 m in length
Transport Terminal Features		Transport terminal facilities having all sides shorter than 20 m in length
Damaged Places		Damaged places by deciphering satellite imagery
Unidentified Point Features		Unidentified point features, the location where damaged areas are observed, and the location of flyovers or tunnels
Locality		Locality name read from existing analogue maps
Reconnaissance Data	Point features which were collected by local consultant in the study	

Vegetation areas were vectorized using approximately 2.4-m resolution false-color images. Figure 8.1.3 shows a false-color image of Kut. Vectorized vegetation areas were incorporated into the GIS data sets as polygon data.



Vegetation is displayed in red (Kut)

**Figure 8.1.3 Sample of False Color Image**

iii) **Damage Assessment Using QuickBird Imagery**

Damaged buildings/facilities were identified by deciphering the pansharpned images. The images were scaled to 1:5,000 and used by Japanese engineers. Reconnaissance in Iraq was not performed by Japanese team members as they were not permitted to enter the country during this study.

Damaged places in seven cities were digitized as point data and incorporated into GIS data sets. The tentative classifications that were used for the damage assessment in the study are listed in Table 8.1.6 and Table 8.1.7.

**Table 8.1.6 Damaged Objects**

No.	Class
1	Building
2	Road
3	Bridge
4	Port
5	Air Field
6	Military
7	Ship
0	Unknown

**Table 8.1.7 Reasons for Damage**

No.	Category
1	Ruined, Superannuated, Overage
2	Bombed or Damaged by Air Strikes in past wars
3	Fire, Conflagration
0	Unknown

Table 8.1.8 shows the results of the damage assessment for the seven cities.

**Table 8.1.8 Number of Damaged Places in Each Area/City**

Area/City	Total Number of Damaged Places (Conjecture)	Object Type*	Cause Type**	Number of Damaged Places
Baghdad	427	1	1	108
			2	115
			3	2
			0	180
		2	0	1
		8	0	1
		0	0	20
Basra	128	1	1	49
			2	8
			3	1
			0	64
		3	0	1
		7	0	4
		0	0	1
Karbala	0	-	-	-
Kut	12	1	1	5
			0	7
Nasiriyah	18	1	1	2
			0	16
Samawah	25	1	1	8
			0	17
Umm Qasr	9	1	1	9

Note: Results include conjecture; \* See Table 8.1.8; \*\* See Table 8.1.9

Figure 8.1.4 shows sample satellite images of typical damaged places in Baghdad.



(Presidential palace?)



(Military Administrator Office?)

**Figure 8.1.4 Buildings in Baghdad Damaged by Air Strikes**

(b) LANDSAT TM (Thematic Mapper) Imagery and Outputs

i) LANDSAT Imagery

The improved version of LANDSAT-5 with high-resolution TM radiometer is now being operated. LANDSAT travels along a sun-synchronous orbit over the North and South poles, at roughly right angles to the equator and an altitude of about 700 km. The satellites circle the earth 15 times a day, and return to their starting point every 16 days. Observed data are provided in 185 km x 170 km scenes. LANDSAT observes this scene about every 24 seconds.

TM is an advanced version of observation equipment, and observes the Earth's surface in 7 bands ranging from visible to thermal near-infrared regions. The ground resolutions are 120 m in the thermal near-infrared bands and 30 m in other bands.

ii) Preliminary Imagery-based Analysis on Mesopotamian Marshlands

LANDSAT-5 TM images, observed in 1986 and 2000, were procured by the study team primarily to assess the decrease in the Mesopotamian marshlands. Table 8.1.9 outlines the list of procured LANDSAT TM images obtained for the study. For each year, the team generated a landcover map and a landuse map from the procured TM imagery data. These covered the marshlands and adjacent areas.

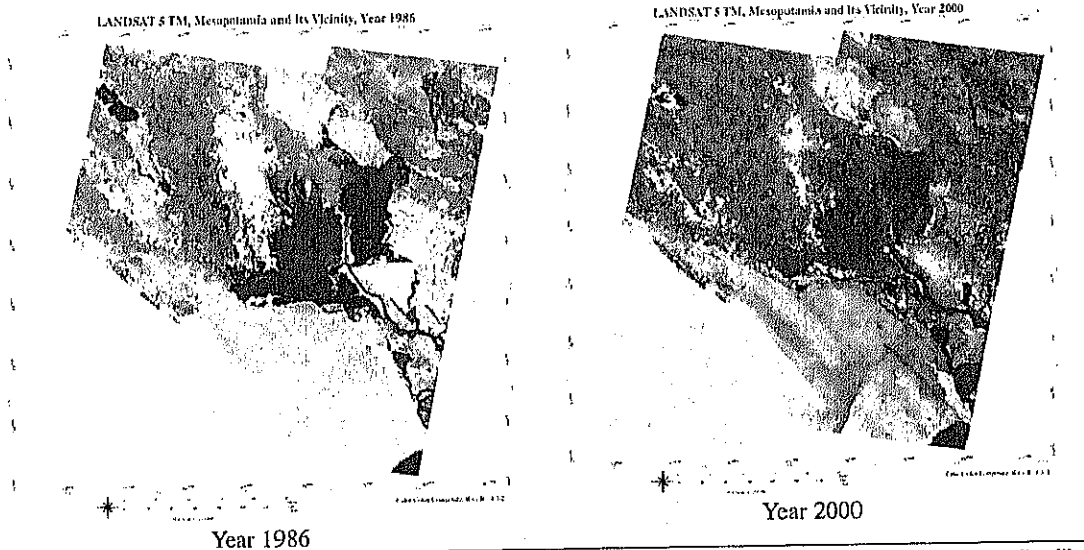
It was therefore possible to compare changes or transitions of landuse/landcover of the marshlands and adjacent lands using the maps for each year.

**Table 8.1.9 List of Procured LANDSAT-5 TM Image Data**

Station	Sensor	Acquisition Date	Satellite	Path	Row	Cloud Cover (%)
U.S.	TM	2000/06/06	5	166	38	0
U.S.	TM	2000/06/06	5	166	39	0
U.S.	TM	2000/06/13	5	167	38	0
U.S.	TM	2000/06/13	5	167	39	0
U.S.	TM	1986/06/16	5	166	38	0
U.S.	TM	1986/06/16	5	166	39	0
U.S.	TM	1986/06/07	5	167	38	0
U.S.	TM	1986/06/07	5	167	39	0

<Remarks> U.S.: United States; TM: Thematic Mapper

Figure 8.1.5 shows mosaiced images for Year 1986 and Year 2000.



The Mesopotamian marshlands are shown in the center of each satellite image. Vegetation is shown as "red" in each image. One (mosaic) image consists of four single-scenes in each year.

**Figure 8.1.5 LANDSAT 5 TM, Mosaic Imagery for Year 1986 and Year 2000**

**Table 8.1.10(1) Landcover Classes for Mesopotamian Marshlands**

ID	Landcover Class	Definition
11	Water: Clear	Clear water
12	Water: Turbid	Turbid water mixes with deposited soil (mud along river)
21	Vegetation: Dense/Wet/Marsh	Growth stage and dense vegetation mix with wet vegetation and marsh Since the image data in 2000 shows rather high confusion of reflectance value among vegetation, marsh area cannot be classed from wet vegetation
22	Vegetation: Medium	Vegetation medium density
23	Vegetation: Sparse	Vegetation sparse density mixes with harvested cultivation area
24	Vegetation: Harvested/Dry	Dry vegetation mixes with harvested cultivation area
31	Soil: Wet1	Soil in wet condition covers range of NDVI values between -0.02 to -0.07 in 1986 and -0.01 to -0.035 in 2000. The ranges of NDVI values of Soil Wet1 and Soil Wet2 overlapped and showed some confusion of wet condition (difficult to say which is wetter but can see the difference in tone/soil color). In Soil Wet1, upper area has lower wet condition than Soil Wet1 around the previous marshland.
32	Soil: Wet2	Soil in wet condition covers range of NDVI values between -0.065 to -0.095 in 1986 and -0.02 to -0.05 in 2000.
33	Soil: Dry	Dry soil or major area of barren land
34	Soil: Salty	Salty soil mixes with bare land

**Table 8.1.10(2) Landuse Classes for Mesopotamian Marshlands**

ID	Landuse Class/Definition
1	Water body (W)
11	Main river (Wm)
12	Reservoir (Wr)
2	Agriculture (A)
21	Large-scale irrigated (developed or systematic irrigation pattern – large scale and well organized in patch shape) (Al)
22	Small-scale irrigated (conventional pattern – small-scale irrigation and various sizes and shapes of path) (As)
3	Urban (U)
32	City (Uc)
33	Airport (Ua)
4	Rural (RU)
41	Others (RUo)
42	Small wetlands (RUs)
5	Barren (B)
50	Others (Bo)
51	Salty soil (Bs)
6	Marshland (M)
61	Natural (Mn)
62	Under drainage work (Mu)
7	Reclaimed land (RE)

## 8.2 Use of Geographic Information and GIS in Future Supporting Program

As mentioned above, some organizations including UN offices, have prepared geographic information or paper maps at regional or nationwide scales. However, more precise maps of the major cities in Iraq, which are necessary for future planning, are limited.

Moreover, the country appears to be seriously short in human resources and hardware/software related to geographic matters and topographic survey.

The “Baghdad Mayoralty” had hoped to introduce GIS into its office for future transportation planning. It may also be necessary to provide GIS and data not only for Baghdad but also for other cities or districts as required.

Analogue (paper) maps were not acquired in this study, although it is possible they may at present be maintained or managed by Iraqi authorities.

GIS data for the seven cities were prepared by deciphering the high-resolution satellite imagery during the study. However, individual objects on the ground have yet to be verified through field reconnaissance. Also, GIS maps prepared during the study lack appropriate GCP data, which should be supplied from field surveys.

It will be necessary to carry out topographic/geographic surveys through organizations such as local Iraqi consultants in order to collect:

- (i) additional data related to ground-objects and
- (ii) GCP data to rectify the GIS maps in the future.

### (1) Practical Use of GIS Data

Suggestions on practical use of the GIS data prepared in the study are presented below.

#### (a) High-Resolution Satellite Imagery

Pansharpened (QuickBird) natural color imagery has almost the same resolution as panchromatic imagery. Also, near-infrared band data are useful to identify vegetation.

Using pansharpened imagery, it is possible to identify comparatively small objects on the ground, as shown in Table 8.2.1. It is also useful in obtaining ground

information for each city without actually entering Iraq.

**Table 8.2.1 Visible Small Ground Objects Using QuickBird Imagery**

Sector	Geographic Object	Remarks
Transportation	Difference of paved or unpaved road	Digitized
	Rutted road	Digitized
	Number of road lanes	Digitized
	Small bridges	Digitized
	Ships	
	Cars	
Urban, Education, Medical	Individual houses	Digitized
	Number of cars in car parks	
	Collapsed houses	
	Broken roofs of buildings	
	Vacant land	
	Parks, ground	
Rivers	Bars in rivers, aquatic plant areas	Digitized

(b) GIS Data of Each City

The GIS data prepared in the study lack field reconnaissance to identify individual objects on the ground. Therefore, details of public facilities or buildings have not been verified.

For practical use of the basic GIS data sets, it will be indispensable for the appropriate allocation of GIS and its purpose on individual projects, to digitize additional features on the ground, to verify ground features through field reconnaissance, and to revise and update attribute data based on actual conditions.

Table 8.2.2 outlines ideas on practical use of GIS data in future projects.



**Table 8.2.2 Practical Use of GIS Data**

Sectors	Utilization	Useful GIS Data Layer
Urban, Water Supply	Water demand analysis	Building features, residential city blocks
Urban, Water Supply	Pipeline route selection	Building features, residential city blocks
Urban, Water Supply	Watering block planning	Building features, residential city blocks
Urban	Moving	Building features, residential city blocks
Urban	Removal of destroyed/broken houses	Building features, damage assessment results
Urban	Spatial planning Town planning	Necessary layers
Urban, Environment	Facility restoration	Building features, damage assessment results
Port	Calculation of abandoned ships to be removed	Damage assessment results, high-resolution satellite imagery
Port	Dredging	Water features, vegetation features, port facility features, building features, road features, and residential and city blocks
Port	Port	Water features, vegetation features, port facility features, building features, road features, and residential and city blocks.
Port	Port restoration	Airfield features, road features, building features, and damage assessment results
Road, Railway	Facility restoration	Road features, railway features, and damage assessment features
Road	Transportation planning	Road features, building features, and residential and city blocks.
Water Resources, Irrigation	Agricultural planning	Road features, vegetation features, and residential city blocks
Water Resources, Irrigation	Irrigation route selection	Water features, building features
Health, Medical	Medical care facility allocation	Building features, residential and city blocks, road features, and damage assessment result.
Education	Educational facility allocation	Building features, residential and city blocks, road features, and damage assessment result.
Industry	Facility allocation	Building features, residential and city blocks, road features, and damage assessment result.
Communication, Broadcasting	Info-communication facility allocation	Building features, residential and city blocks, road features, road structure features, and bridge features

(c) LAND 55 SAT-5 TM Imagery

LANDSAT-5 TM imagery acquired in 1986 and 2000 is useful to assess changes in landuse/landcover of the Mesopotamian marshlands and adjacent areas in future supporting projects.

(d) Landcover/Landuse Maps of Mesopotamian Marshlands

Landcover maps and landuse maps for Year 1986 and Year 2000 were digitized or vectorized as GIS data based on remote-sensing technology. These data are usable to assess various issues e.g. major reasons for the decrease in marshlands, environmental changes, area to be recovered, and also for master planning of various related projects in the future.

However, ground-truth work (field verification work) for the area has not been performed in this study.

Therefore, it may be necessary to improve the accuracy of the maps through additional work should the need arise or in accordance with specific purposes.

(2) Other Necessary Geographic Information/GIS Data in Future

Basic GIS “vector” data were prepared for seven cities by deciphering the high-resolution satellite images. However, due to the limited amount of existing geographic information, the number of attributes that could be linked to each vector object was limited. In future, it will be necessary to collect additional appropriate attribute data with which to update the GIS databases in accordance with the objectives and contents of the projects for each sector. These data may at present be retained by various Iraqi authorities.

Table 8.2.3 shows necessary geographic information or GIS data that should be updated in future.

GIS data for cities other than the seven mentioned above would be prepared on a project-specific case as the need arises.

**Table 8.2.3 Necessary GIS Data and Geographic Information in Future**

Geographic Information and GIS data	Necessary or Useful Data or Contents
Administrative Boundary	Vector Data: boundary line, attributes, name of administration
Road Features	Attributes: type, purpose of use, route name, speed limit, traffic/junction rules
Bridge Features	Attributes: type, purpose of use, bridge name
Building Features	Attributes: type, purpose of use, name
Water Features	Attributes: type, purpose of use, name
Port Facility Features	Attributes: type, purpose of use, name
Airfield Facility Features	Attributes: type, purpose of use, name
Transport Terminal Facility Features	Attributes: type, purpose of use, name
Residential and City Blocks	Attributes: type, purpose of use, name
Ground Control Point	“GCP” data that will be obtained from field survey
Statistical Data	Various statistical data
Planning Maps (Drawings)	Various planning maps

(3) Necessity for Support on Geographic Matters

GIS is considered to be one of the latest technologies that could be applied beneficially in Iraq. At present, the number of Iraqi experts in geographic fields such as GIS and related hardware/software is considered to be insufficient.

Recently, UN offices and HIC have begun to provide GIS training and related instruments and materials to Iraqi organizations. However, there are limitations in the qualities and quantities of training and supplies provided.

(a) Capacity Building and Technology Transfer

It may be necessary for Iraqi authorities to be given basic GIS training by local consultants from neighboring countries (e.g. Egypt, Jordan or Syria) in the future.

In terms of the training projects, it is necessary to confirm the following aspects:

- (i) Number of trainees
- (ii) Contents and levels of training
- (iii) Persons to be invited

Moreover, it will be necessary to discuss the operation of ongoing similar projects by various organizations (e.g. UN, HIC) with the leaders of those training projects.

To be effective, it is also considered that more advanced and practical skills in GIS, which are useful in actual projects, should be transferred to Iraqi authorities through on-the-job training. This would be in accordance with objectives and contents of each project.

(b) Provision of GIS-related Hardware/Software

It is considered necessary to provide GIS-related hardware/software to the authorities. However, there are some issues to be clarified in each supporting project as outlined below:

- (i) Target authorities
- (ii) Specifications of hardware and software
- (iii) Quantity of hardware and software

(c) Other Issues and Recommendations

More accurate and detailed geographic information based on field surveys may be required at advanced stages of future projects. Authorities in Baghdad have lacked usable survey instruments; most of those currently available are too old to use and have been out of order in recent decades.

In addition, the available human resources and expertise relating to topographic survey are limited. This situation appears to be the case not only in Baghdad but also in other major cities in Iraq.

Therefore, a new project may be required with the following objectives:

- (i) Capacity building concerning survey work
- (ii) Provision of new survey instruments (hardware/software)
- (iii) Formulation of survey-related laws

However, as a result of the recent military situation, some nations in the Middle East have banned the publication of:

- (i) detailed topographical maps
- (ii) survey data
- (iii) formulas for map projection, and
- (iv) parameters to be used in the formulas.

It is thought that Iraq has been one of these countries.

In Iraq it is also not known whether such data or maps have been lost. This is a possibility although it is also possible the US Army or CPA have obtained and kept the data.

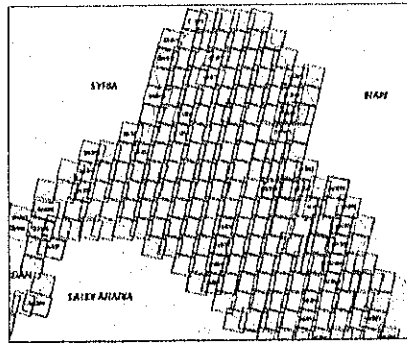
If required, and as mentioned above, a comprehensive nation-wide project may be required. This would consist of capacity building, provision of instruments and formulation of related laws, and so on.

However, the necessary level of support regarding geographic matters has not yet been confirmed in the study. Therefore, it is necessary to continue the collection of information and to carry out investigations concerning such matters in Iraq.

#### (d) Other Reference Information

High-resolution satellite imagery will be useful to form a "practical" geographic base. Such imagery is supplied by satellites such as IKONOS, QuickBird and SPOT-5. Images of the entire area of Iraq have already been acquired by SPOT-5. The imagery of SPOT-5 has a 2.5-m resolution and is considered to be suitable for base maps at scales between 1:25,000 and 1:200,000. Figure 8.2.1 shows a coverage map of 2.5-m resolution images that were taken by SPOT-5 after July,

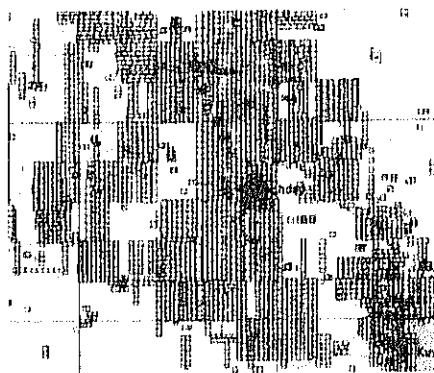
2002.



Cloud Cover < 10% (By NTT DATA CORPORATION)

**Figure 8.2.1 Coverage Map of Existing 2.5-m resolution Satellite Images by SPOT 5**

Both IKONOS and QuickBird have also acquired land images of Iraq, although these have been limited to the major cities. The resolution of these two satellites is higher than that of SPOT-5 and is more suitable for use in detailed city planning. Figure 8.2.2 also shows coverage maps of the satellite images of Iraq acquired by IKONOS and QuickBird.



Existing Images by IKONOS  
Cloud Cover < 20%  
(By Japan Space Imaging)



Existing Images by QuickBird  
Cloud Cover < 20%  
(By DigitalGlobe®)

**Figure 8.2.2 Coverage Maps of Existing Satellite Images by IKONOS and QuickBird**

## **CHAPTER 9 SUPPORT PROGRAM FOR URGENT RECONSTRUCTION**

The support program for urgent reconstruction of Iraq comprises the five sub-programs outlined below:

- i) Urgent sub-program bringing immediate effect
- ii) Industrial and agricultural reconstruction sub-program aimed at employment creation
- iii) Human resource development sub-program
- iv) Complex sub-program for southern region
- v) Sub-program for formulating mid- and long-term master plans

In formulating the support program, the policies and needs for each sector described in Chapters 4 and 5 were taken into consideration.

### **9.1 Program Development Bringing Immediate Effects**

#### **- Proposal for urgent grant aid projects -**

Needless to say, urgent action is required for the reconstruction support program. Most government officers met during this survey requested urgent rehabilitation of existing facilities. The study team also concluded that early implementation of urgent infrastructure rehabilitation projects was important given these would directly contribute to an improvement in the lives of Iraqi people.

Urgent infrastructure rehabilitation projects are not only proposed for infrastructure destroyed due to the war but also for poorly managed infrastructure. The latter have resulted due to a lack of spare parts, limited foreign currency and imbalances in domestic budgetary allocation following the imposition of economic sanctions from 1990.

Among potential infrastructure rehabilitation support programs, fifteen were selected as being urgent and having immediate impacts on people's lives. Total project cost is estimated to be around US\$50.5 million. An outline of these projects is presented below.

**Table 9.1.1 Outline of Fifteen Selected Urgent Projects**

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
1	Port	Supply office equipment, furniture, spare parts for working boats, communication equipment for port management	Supply office equipment, furniture, spare parts for working boats and communication equipment to the Um Qasr and Knor Al Zubair ports. management offices.	500
2	Port	Urgent Access Channel Restoration Project for Khor Al Zubair port (Phase 1)	Dredging the access channel from Um Qasr to Khor Al Zubair, channel length 15 km, width 200m, depth 8m, volume $3.5 \times 10^6$ m <sup>3</sup> and installation of buoys along the channel.	2,500
3	Road and Bridge	Al Samawa Bridge Construction	New bridge construction crossing Euphrates river. This new bridge will help Samawa people by improving the accessibility in Samawa city. The planned bridge is 300 m long and 12 m wide with 2 lanes.	900
4	Railway	Pre-stressed concrete sleeper factory reconstruction project	IRR can commence with the replacement of deteriorated sleepers and reconstruction of the railway network once stable production of pre-stressed concrete sleepers is reinstated.	1,100
5	Urban Transportation	Improvement of bus capacity in Baghdad	Public transportation is barely functioning in Baghdad. This project aims at restoring the public transportation system by providing buses and spare parts for repair.	6,000
6	Irrigation	Provision of horizontal pumps for main irrigation and drainage canals	Providing fixed type horizontal pumps to restore functions of main irrigation and drainage canals in the southern region.	2,000
7	Irrigation	Provision of construction machinery for maintenance of irrigation canals	Providing (i) small dredging boats, (ii) long boom excavators, (iii) land excavators, (iv) dump trucks, (v) equipment for removing water grass. Aimed at irrigation and drainage canals and environmental improvement.	2,000
8	Communication	Nationwide digital microwave backbone network construction project	To establish digital microwave backbone transmission link by installing necessary equipment to existing buildings between Baghdad and Basrah.	3,000
9	Communication	"Standard A" earth station and international switching system reconstruction project	Install two new "Standard A" earth stations and related new international telephone switching system in Baghdad.	3,000
10	Health/Medical Treatment	Basrah nursing college construction plan (new establishment)	Construction of nursing junior colleges to serve as centers of the nursing system. Such construction would also meet the needs suggested by international institutions. New construction of junior nursing colleges in Basrah and a second located in Baghdad are planned by WHO and the Iraqi government.	2,500
11	Education	Expansion and development of Baghdad University	Highest priority is given to reconstruction of facilities and provision of machinery to the school of engineering.	7,000

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
12	Education	Technical institute reconstruction plan	Prompt construction of campus buildings and supply of educational equipment, which has been damaged by the war.	8,000
13	Industrial Reconstruction	Rehabilitation of South LPG Plant in north Rumaila oil field	The plant treats associated gas and collects LPG. The gas produced by the plant is used for fuel for power plant and also used as material for nitrogen fertilizer products produced in Basrah. The project includes rehabilitation of facilities and provision of equipments.	3,000
14	Industrial Reconstruction	Rehabilitation of Basrah fertilizer factory	Constructed by a Japanese company, Basrah fertilizer factory ceased operating due to a lack of spare parts, electricity, raw materials and obsolete equipment. Through reconstruction of the factory and provision of equipment, the project would support creation of employment and reactivate agriculture.	3,000
15	Industrial Reconstruction	Rehabilitation of Muthanna cement factory	This factory was constructed with German assistance in 1981. Current rate of operation ranges from around 0% to 30% due to shortage of electricity and spare parts. By rehabilitating the facility and providing equipment, the project would support creation of employment and reactivate the housing industry.	6,000
Total project cost for urgent projects				50,500

## 9.2 Program Formulated Considering Employment Creation

### - Reconstruction of industrial and agricultural bases -

Employment creation is an essential activity to stabilize the lives of Iraqi people. Although reconstruction of those items essential for people's lives, such as electricity and water, are urgent, the study team also formulated support programs focusing on employment creation.

Considering that prior to the war about 70% of Iraqi people were urban residents, construction of 1.4 million residences is required to accommodate international and domestic refugees, and the oil-related industry contributed about 40% to the country's GNP, future reconstruction of the housing industry (and its base industry of cement manufacturing) would be effective in creating employment, as would the oil-related industry itself. This would be the case particularly for people in urban areas.

Taking into account the serious decline in food self-sufficiency and the negative



impacts on rural society resulting from the war, it is also proposed that the promotion of agriculture and irrigation projects be given high priority. The aim would be to increase food production. In addition, the agricultural sector is also expected to have a positive impact on employment in rural areas while reconstruction of existing farmland and irrigation facilities would expand cultivated areas. Creation of new employment is also expected for 'value adding' activities associated with agriculture products, such as agricultural processing.

As described below, nine projects in industrial reconstruction and three projects in the agricultural and rural development sector are proposed, all having a considerable and positive impact on employment creation.

**Table 9.2.1 Twelve Proposed Projects Considering Employment Creation**

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
1	Industrial Reconstruction	Rehabilitation of north oil factory and Salah Ad Din oil refinery plant	This was originally constructed by a Japanese company in 1983. Together with Salah Ad Din oil plant, capacity is 300,000 barrel/day, but present rate of operation is lower than 20% of this. Rehabilitation of facilities and provision of equipment are included in the project.	3,000
2	Industrial Reconstruction	Rehabilitation of Kirkuk LPG Plant	Originally constructed by a Japanese company in 1983. The treated natural gas from the plant is supplied to a chemical fertilizer plant in Baiji, which was also constructed by a Japanese company in 1985. As current rate of operation is at 16% of capacity, rehabilitation of facilities and provision of equipment are required.	3,000
3	Industrial Reconstruction	Rehabilitation of South LPG Plant	Same as the description in Table 9.1.1	3,000
4	Industrial Reconstruction	Construction of new Central oil factory	Iraq government and Japanese companies have signed a construction contract. However, the contract has not been fulfilled due to the Gulf War and UN sanctions.	40,000
5	Industrial Reconstruction	Rehabilitation of Basrah fertilizer factory	Same as the description in Table 9.1.1	3,000
6	Industrial Reconstruction	Rehabilitation of Baiji fertilizer factory	A plant adjacent to the above factory. Originally constructed by a Japanese company in 1975. Current production is zero. As fuel supply is required from an oil factory, rehabilitation of oil factory should proceed earlier.	17,000

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
7	Industrial Reconstruction	Rehabilitation of Muthanna cement factory	Same as the description in Table 9.1.1	6,000
8	Industrial Reconstruction	Rehabilitation of Kubaisa cement factory	Originally constructed by a Japanese company in 1980. Previously it was a main supplier to the Baghdad area, but present rate of operation is 20% of capacity. The project would provide in-house generator (20 MW), spare parts and equipment to collect fine particles of cement.	8,000
9	Industrial Reconstruction	Rehabilitation of Kirkuk cement factory	Originally constructed by a Japanese company in 1980. Present rate of operation is 25% of capacity. The project would provide in-house generator (25 MW), spare parts and equipment to collect fine particles of cement.	8,000
10	Agriculture / Irrigation	Pilot project on improvement of irrigation systems in Tigris and Euphrates river middle basins	Implementation of rural development pilot project in priority areas (about five areas), including improvement of water management, cropping pattern, agricultural product processing)	5,000
11	Wetland Conservation / Rural Development	Model rural development project in Mesopotamian Marshland	Small-scale model rural development project aimed at balancing rural development and environmental conservation including inner basin fishery and so on.	1,000
12	Regional Development	Samawa regional development project	Including establishment of vegetable and fruit cultivation and agricultural extension center as part of regional development.	1,000

### 9.3 Program Development Attaching Importance to Human Resource Development - Formulation of integrated program, project implementation with training -

Although administrative capabilities in Iraq are relatively high, public agencies have not had access to knowledge or experience in advanced technologies over the last 20 years, particularly since the Iran-Iraq war and imposition of economic sanctions since 1990. As engineers in Iraqi governmental agencies lack advanced knowledge on such technologies, human resource development is therefore an urgent task.

The Iraqi government also does not have up to date experience on contract systems and cooperative project implementation at the international level due to the dictatorship under which it existed. Capacity building is therefore necessary for the successful implementation of reconstruction projects based on international cooperation. However, most of the proposed reconstruction support projects are required urgently and cannot wait for the implementation of the organizational,

institutional, and human resource development plans that are necessary.

Therefore, the study team formulated an integrated program in which the implementation of reconstruction projects was combined with organizational and human resource capacity building. This also recognizes that human resource development is the first priority task. Among the proposed projects, 22 contain counterpart training as one of the project components.

Although projects having an immediate impact are proposed, such as rehabilitation of existing facilities and provision of equipment, almost all provide an opportunity for technical transfer through the installation of equipment, technical guidance on operation and management, and so on. In addition, an ODA seminar for Iraqi government officers is proposed to be held prior to the full-scale implementation of reconstruction projects in order to facilitate their understanding of the Japanese ODA system and its procedures.

Moreover, in those sectors with which Iraqi engineers are unfamiliar, technical training in Japan and/or neighboring countries will be important to facilitate a mutual understanding between Iraq and Japan and to construct a cooperative structure for full-scale implementation of reconstruction support projects. The training will include water management systems based on the most advanced communication technologies, information management, and mapping techniques using GIS technology. These types of technical training methods are proposed for the airport and port, water resources and irrigation, water supply, sewerage and solid waste, urban planning, communication, and health and medical treatment sectors. Those projects placing high priority on human resource development are listed below.

**Table 9.3.1 Proposed Projects Placing High Priority on Human Resource Development**

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
1	Port	Training for port operation along with container terminal development in Um Qasr Port	Provide two year training programs to the port staff along with container terminal development.	500
2	Transport (Meteorological)	Study to formulate national seismic assessment program	Program development of seismic assessment and forecasting in Iraq, together with one year technology transfer.	500
3	Water Resources	Training in water management techniques in Jordan and Japan	Water management techniques in irrigation and integrated dam management approaches (about six months).	300

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
4	Irrigation	Training on water saving techniques in Jordan	Training on water saving irrigation techniques for efficient water management and reducing salinity damage of agricultural land (about three months).	100
5	Water Supply, Irrigation and Solid Waste Management	Training for management, planning, design, operation and management	Provide training and overseas study tour on facility management for Iraqi engineers with sufficient capabilities but who have not had exposure to advanced technologies (about three months).	300
6	Urban Planning	Capacity building on national urban planning	Provide training in Jordan and Japan for urban planners and related personnel from 14 cities in Iraq in relation to urban planning, design, institutions and development, as well as site visits to residential development areas (about 1.5 months).	600

#### 9.4 Infrastructure Development in Southern Region

##### - Realizing multiple effects from each project -

The effectiveness of reconstruction support programs can be increased by concentrating the implementation of projects from different sectors in those areas where major reconstruction is required. Through this approach projects created will have a multiplying effect on each other.

From this viewpoint, the study team proposes that emphasis be given to infrastructure development projects around Um Qasr port, the country's only seaport, Khor Al Zubair port, a port upstream of Um Qasr, and its' adjoining city of Basrah, the second largest city of Iraq. Through this approach, re-establishment of Iraq's economy and improvement in standard of living could be facilitated within a limited budget based on employment creation. In total, 19 projects are proposed in and around Basrah city as outlined below.

**Table 9.4.1 Proposed Projects in Basrah City and Surrounding Port Areas**

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
1	Port	Um Qasr and Knor Al Zubair Ports development-related project	Consists of eight projects including development of navigation, port-related facilities, container terminal, etc.	68,000
2	Airport	Supply and installation of airport navigation aids and landing guide instrumentation at Basrah Airport	Providing equipment for up-grading Basrah International Airport.	4,000

No.	Sector	Project Name	Project Outline	Estimated Cost (JPY million)
3	Road	Rehabilitation of three bridges in Basrah City	Rehabilitation of three bridges in and around of Basrah city destroyed during the war.	2,700
4	Road / Drainage	City road and drainage improvement project in Basrah city	Project aims at concurrently improving roads and drainage system in Basrah city.	10,000
5	Communication	Construction of optical fiber network system in Basrah city	Based on the result of master plan study proposed separately, reconstruction of optical fiber network system and supply of exchange equipment will be carried out in Basrah city.	5,000
6	Health / Medical Treatment	Basrah nursing college construction project	Project aims to eliminate shortage of nurses and re-establish nursing system by constructing new nursing college.	2,500
7	Education	Basrah Technical Institute reconstruction project	Basrah Technical Institute (established in 1973) would be a center for technology development in the southern region. Urgent rehabilitation is needed since it was seriously damaged during the war.	8,000
8	Industrial Reconstruction	Rehabilitation of South LPG Plant	Rehabilitation of LPG plant in North Rumaila located west of Basrah. The gas produced by the plant is used as fuel for power plant and also as material for nitrogen fertilizer.	3,000
9	Industrial Reconstruction	Rehabilitation of Basrah fertilizer factory	The project contributes to creation of employment and activation of agriculture.	3,000
10	Urban Planning	Study on urban planning for Basrah city	Following plans for Basrah city are formulated by the study, i) socio-economic frame, ii) strengthening of administrative organizations, iii) land use plan, iv) transportation plan, v) water supply, sewerage, solid waste management plan, vi) industrial development from mid- and long-term viewpoints.	500
			Total	106,700

## 9.5 Appropriate Infrastructure Development Based on Mid- to Long-term Viewpoints

### - Formulation of master plans -

In recent years in Iraq, basic plans for projects have not been developed from the long-term viewpoint. Therefore, formulation of master plans for multiple sector development or integrated regional development is necessary. Notwithstanding, rehabilitation projects should be commenced before master plans are formulated due to the urgent need for reconstruction to commence.

Sector master plans as well as integrated regional development plans are required to

be formulated along with implementation of urgent rehabilitation and equipment supply projects as described in Chapter 9.1. Proposed large-scale infrastructure development projects should be reviewed on a needs and scale basis in master plan studies. They should also only be considered for implementation if they fit with the appropriate infrastructure development and long-term vision. The study team proposes the following master plan studies.

**Table 9.5.1 Proposed Studies on Sector Master Plans and Integrated Regional Development Plans**

No.	Sector	Project Name	Project Outline
1	Port	Study on nation-wide ports development plan	Formulating master plan based on current situation of port facilities, demand projection taking economic reconstruction into account, and future functions of each port in Iraq.
2	Transportation	Study on national transportation master plan	Integrated transportation master plan study on roads, rail, ports and airports. Early implementation is required for formulating mid- and long-term transportation development projects in Iraq.
3	Urban Transportation	Integrated urban transportation master plan study in Baghdad	Integrated transportation master plan study including F/S for proposed large-scale projects including ring road, ring railway and subway.
4	Water Resources	Master plan study on water management system for Tigris and Euphrates river basins	Projections on the national water demand, water resource development plans, and operation plan on existing facilities are included in the study. Master plan study and water management projects are implemented at the same time. Feasibility study for new water resource development project is carried out separately if necessary.
5	Irrigation	Master plan study on rehabilitation of irrigation system in Euphrates river middle basin	The study covers total irrigation area of 400,000 ha and 14 projects. System improvement plan will be proposed based on the present condition. Implementation plan is prepared with rehabilitation priority and implementation period.
6	Southern Wetland	Base study on natural environment and land use in Mesopotamian Marshland	This study is a preparatory work for master plan study for whole area of Mesopotamian Marshland.
7	Urban Environment	Master plan study on water supply, sewerage and solid waste management in Baghdad	Necessity and scale of the Rasafa water treatment plant are evaluated in the study. The study formulates sewerage and solid waste management plan in which presently no sufficient long-term plan exists.
8	Urban Planning	Master plan study on urban planning of Baghdad city	Targeting years 2010, 2015 and 2020, reviewing urban development plan of Baghdad city area, including population, land use, industry location, water supply, sewerage, urban transportation, solid waste and other environmental facilities.

No.	Sector	Project Name	Project Outline
9	Communication	Master plan study on establishment of national communication and broadcasting network system	Formulating master plan to establish national communication and broadcasting network system promptly and effectively.
10	Communication	Master plan study on Information Communication Technology (ICT)	Master plan study for introducing electrified national administrative system such as e-government system.
11	Urban Planning	Integrated regional development master plan study for five major cities	Formulating integrated regional development master plan for five cities of Kerbala, Najaf, Mosul, Basrah, and Kirkuk from mid- and long-term viewpoints.
12	Regional Planning	Samawa integrated regional development plan	Formulating mid- and long-term development plan along with implementation of multiple sector model projects.

## 9.6 Project List and Priority on Implementation

Based on the urgent infrastructure reconstruction plan discussed in Chapter 5, proposed projects to support urgent reconstruction in Iraq are summarized and listed below.

The following table shows the target sector and number of projects in each.

**Table 9.6.1 Summary of Proposed Project Lists by Sector**

No.	Sector	Number of projects	Total project scale/cost (JPY million)	Remarks
1	Port and airport	22	331,300	Including large scale projects such as regional airports
2	Road, railway, urban transportation	23	1,160,300	Including large scale projects such as subways and highways
3	Water resources, irrigation and southern wetland	11	23,700	Excluding new construction of dams and rehabilitation
4	Water supply, sewerage and solid waste management	8	89,800	Excluding Rasafa water treatment plant and Baghdad sewerage system
5	Residential and urban planning	7	48,500	
6	Communication	14	67,100	Only accounted for 9 projects from total of 14
7	Health and medical treatment	5	-	
8	Education	4	20,500	
9	Industrial reconstruction	9	91,000	
10	Regional development	3	2,200	Only model projects and studies
	Total	106	1,834,400	

Priority on implementation is classified based on five criteria: i) urgency, ii) necessity,

iii) impact on employment creation, iv) possibility on implementation, and v) sustainability of the project as follows:

- (1) “Urgent”: required to be implemented in 2004
- (2) “Short-term”: required to be commenced from 2004 to 2005
- (3) “Mid-term”: required to be commenced from 2006 to 2007
- (4) “Long-term”: can be commenced after 2008



**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Project (Airport and Port)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Transport (Port)	Supply office equipment, furniture, and spare parts to working boats, communication equipment	Basra Pro. Um Qasr Khor Al Zubair	GCPI	Supply office equipment, furniture, spare parts of working boats and communication equipment to the UmQasr and Knor Al Zubair port management offices	Urgent
2	Transport (Port)	Urgent Access Channel Restoration Project to Khor Al Zubair port ( Phase 1)	Basra Pro. Um Qasr Khor Al Zubair	GCPI	Dredging the access channel from Um Qasr to Khor Al Zubair, channel length 15 km, width of 200m, depth 8m volume 3.5 mil cum and installation of 10 units of bouys along the channel	Urgent
3	Transport (Port)	Urgent Access Channel Restoration Project to Khor Al Zubair port ( Phase 2)	Basra Pro. Um Qasr Khor Al Zubair	GCPI	Dredging the access channel from Um Qasr to Khor Al Zubair, channel length 18 km, width of 300m, depth 12.5m volume 6.5 mil cum and, removal of 4 sunk ships and installation of 10 units of bouys along the channel	Short Term
4	Transport (Port)	The Study of Nationwide Development of Ports	Basra Province	GCPI	The Study of master plan of each port and select short term projects and conduct feasibility study	Urgent
5	Transport (Port)	Container Terminal Development and expansion of port facilities Project in Um Qasr Port	Basra Um Qasr port its hinterland	GCPI	Rehabilitation of general cargo handling equipment, container cranes, supply spare parts to grain unloader, development of container terminal by renovation of bulk terminal with removal of belt conveyer	Middle Term
6	Transport (Port)	Procurement of service ships for port management in Iraq and container cranes for terminals development (Phase 1)	Basra Pro.	GCPI	Procurement of working ships, and boats; 6 tug boats, 2 hopper suction dredgers, 3 cutter suction dredgers with spareparts, 5 units of container cranes, and communication equipment for all ports in Iraq	Middle Term
7	Transport (Port)	Procurement of services ships for port management in Iraq and container cranes for terminals development (Phase 2)	Basra Pro.	GCPI	Procurement of working ships, and boats; 12 tug boats, 9 pilot boats, 1 oil supply barge, 6 hopper suction dredgers, 4 floating cranes, 18 working boats for berthing, 4 passenger ships, 4 fire fighting boats, 2 coast guard ships for the use by all ports in Iraq	Long Term
8	Transport (Port)	Khor Al Zubair Port Urgent Rehabilitation Project	Basra Pro. Khor Al Zubair	GCPI	Rehabilitation of port facilities, port inside road, port management office, yard pavement, worn out cargo handling facilities at Khor Al Zubair port	Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Project (Airport and Port)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
9	Transport (Port)	Restoration /Rehabilitation projects of Maqal port, Abu Flus Port	Basra Pro. Shatt Al Arab River	GCPI	Rehabilitation of existing wooden jetty, port inside road, storage warehouses, utility supply facilities at Maqal port and Abu Flus port	Middle Term
10	Transport (Port)	The Access Channel development Project from Um Qasr to the Arab Gulf	Basra Pro. From Um Qasr to Arab Gulf Channel	GCPI	Channel dredging of access channel from Arab Gulf to Um Qasr port to the depth of -13.5m, rehabilitation of navigation aids, removal of 12 sunk ships from the channel in coordination with UNDP	Long Term
11	Transport (Port)	Urgent Restoration of Access Channel to Maqal and Abu Flus ports along Shatt Al Arab River	Basra Pro. Shatt Al Arab River	GCPI	Channel dredging, removal of sunk ships, installation of navigation aids in the Shatt Al Arab river from Al Fao port to the Maqal port	Middle Term
12	Transport (Port)	Restoration/Rehabilitaion of Navigation Aids Facilities in all access channels	Basra Pro.	GCPI	Rehabilitation and reinforcement of existing navigation aids and installation of new equipments in the channel from Arab Gulf to Um Qasr, Khor Al Zubair, from Al Fao to Maqal port	Middle Term
13	Transport (Port)	Expansion and development of Khor Al Zubair Port	Basra Pro. Khor Al Zubair	GCPI	Development of 600m long berth for dredgers fleets base with supply facilities, and and working boats, expansion of LPG terminal, and on land facilities of Khor Al Zubair port	Long Term
14	Transport (Port)	Redevelopment of Maqal Port	Basra Port and City	GCPI	Redevelopment of existing wooden jetty of Maqal port for Basra city water front port facilities	Long Term
15	Transport (AirPort)	Supply and Installation of Airport Navigation aids and landing guide instruments	Basra, Mosul	MOT/ICAA	Supply and install the air traffic control radar, instrument of landing system, air flight lamps along the runway and communication instrument with pilots in the airplain and controll tower at Basra and Mosul airports for aircrafts of commercial purpose only. Training of air traffic control technique, maintenance and operation of newly introduced instruments to air port employees	Short Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Project (Airport and Port)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
16	Transport (AirPort)	Development of International Airport at Najaf	Basra Province	MOT/ICAA	Development of international air port at Najaf with passenger terminal accommodating 2 mil passenges	Short Term
17	Transport (AirPort)	Development of International Airport at Arbi	North of Iraq	MOT/ICAA	Development of international air port at Arbi with passenger terminal accommodating 2 mil passenges	Short Term
18	Transport (AirPort)	Development of International Airport at Mosul	North of Iraq	MOT/ICAA	Development of international air port at Mosul with passenger terminal accommodating 2 mil passenges	Short Term
19	Transport (AirPort)	Development of National Airport at Sumaire	North of Iraq	MOT/ICAA	Development of national air port at Sumaire	Short Term
20	Transport (AirPort)	Development of National Airport at Maisan	Southeast of Iraq	MOT/ICAA	Development of national air port at Maisan	Short Term
21	Transport (AirPort)	Development of National Airport at Kiru Ku-Ku	North of Iraq	MOT/ICAA	Development of national air port at Kiru Ku-Ku	Short Term
22	Transport (Meteorological)	Study of formulate the Nationa Seismic Detective Program	Nation wide	MOT, Planning Dept	Development of program of seismic detection and forecasting of Iraq based on the Japanese technology. Training Iraq engineers on aspects of seismic engineering.	Short Term

Note GCPI: General Company of Ports of Iraq

ICAA: Iraq Civil Aviation Authority

GOL: Government of Iraq,

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Road and Bridge)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Bridge	Al Samawa Bridge Construction	Samawa	Ministry of Housing and Construction	New bridge construction crossing Euphrates river. This new bridge will help Samawa people in improving the accessibility in Samawa city. The planned bridge is 300 m long and 12 m wide with 2 lanes.	Urgent
2	Bridge	Al Shindbad Bridge Rehabilitation	Basra	Ministry of Housing and Construction	Rehabilitation of the only bridge crossing Shatt Al Arab in Basra. The first three headwaters span were completely destroyed in the First Gulf War, 1991. There is a temporary floating bridge with pontoons beside the main bridge. But, for some hours in each day, this floating bridge is closed because of the tide movements. Early rehabilitation of the main bridge is eagerly requested by citizen in Samawa.	Short Term
3	Bridge	Rehabilitation of Bridge over Shatt Al-Basra on Expressway No.1	Basra	Ministry of Housing and Construction	The central swing span to make room for ship passage is damaged. There is no problem in other spans.	Short Term
4	Bridge	Al Mussayib Bridge Construction	Baghdad	Ministry of Housing and Construction	New bridge construction crossing the Euphrates river on the trunk road between Baghdad, Kurbala and Najaf. Though there is a 2-lane bridge near the site, there is traffic congestion because both oKurbala and Najaf are the holy place for Shi'ah. 350m long and 12m wide concrete bridge.	Middle Term
5	Bridge	Dair Bridge Construction	Near Basra	Ministry of Housing and Construction	New bridge construction connecting huge oil field north of Basra with port city in south. This bridge is indispensable for Iraqi recovery. The temporary floating bridge there which has load limitation is closed twice a day because of tide level. Main bridge is planned as 468m long, 15m wide concrete bridge with 2.5km x 2 connecting road.	Middle Term
6	Bridge	2nd Kut Bridge Construction	Kut	Ministry of Housing and Construction	Bypass construction of Kut. Tigris river bridge is planned 800m long and 33.5m wide. Gharaf river bridge is planned 160m long and 27m wide. Road section is 18km long with 3 interchanges and 3 overpasses.	Middle Term
7	Road	Expressway No.2 Construction	Northern Iraq	Ministry of Housing and Construction	Construction of expressway between Baghdad and Turkish border. Totally 518km long with many bridges, interchanges and tunnels.	Middle-Long Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Road and Bridge)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
8	Road	Construction of Construction Machine Center	Baghdad	Ministry of Housing and Construction	This project is to construct the maintenance center of construction machine of Ministry of Housing and Construction including the supply of equipment and spare parts.	Short Term
9	Integrated Transport	Integrated Transport M/P	Nationwide	Ministry of Planning	Integrated transport study for roads, railways, ports and airport sector. Road sector plans for national road network.	Urgent

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Railway)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Railway	Pre-stressed concrete sleeper factory reconstruction project	Baghdad	MOTC/IRR	Reconstruction of the pre-stressed concrete sleeper factory of IRR, which was destroyed during the post-war confusion in 2003 IRR can commence with the replacement of the deteriorated sleepers and reconstruction of the railway network once the stable production of pre-stressed concrete sleepers is reinstated. Therefore this project is considered to have a significant return on investment.	Urgent
2	Railway	New line construction for Baghdad - Kirkuk - Mosul	Northeastern area of Iraq	MOTC/IRR	New railway line construction project for Baghdad - Kirkuk - Mosul (Total length 915 km)	Long Term
3	Railway	New line construction for Baghdad - Kut - Basrah, etc.	Southeastern area of Iraq	MOTC/IRR	New railway line construction project for Baghdad - Kut - Nasiriyah and Kut - Amarah - Basrah (Total length 620 km)	Long Term
4	Railway	New line construction for Mosul - Zako	Northern area of Iraq	MOTC/IRR	New railway line construction project for Mosul - Turkish Border, Zako (Total length 150 km)	Long Term
5	Integrated transportation	Master plan study on nationwide integrated transportation (Development study)	Nationwide	MOP	Nationwide integrated transportation master plan study comprehending road, railway, port and airport As for railways, nationwide railway network reinforcement/improvement (New line construction, double-tracking, electrification, signaling/telecommunication system improvement) planning is to be worked out.	Urgent

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Urban Transportation)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	City Road	City Road and Drainage improvement projects in Major cities in Iraqi Southern Region	Baghdad, Basra and Samawa	Governorate MOHC	It is a common problem in urban area in Iraqi that city roads and drainage system are in extremely poor condition in high populated areas and hinder the daily life of the people. The project aims to improve these city roads and drainage system in selected highly populated areas in Baghdad, Samawa and Basrah cities.	Urgent
2	Urban Transport	Construction of Viaduct Bridge crossing Army Canal in Baghdad	Baghdad	Ministry of Public Works	Construction of Viaduct Bridge crossing Army Canal in East Baghdad and connecting to Ring Road No.3.	Short Term
3	Urban Transport	Construction of Viaduct Bridge crossing Railway in Baghdad	Baghdad	Ministry of Public Works	Construction of viaduct bridge crossing railway and connecting to Ring Road No.1	Short Term
4	Urban Transport	Construction of Viaduct Bridge of Ring Road No.1 in Baghdad	Baghdad	Ministry of Public Works	Construction of viaduct bridge of Ring Road No.1 connecting to the existing viaduct bridge.	Short Term
5	Urban Transport	Supply of Urban Road Maintenance Machine in Baghdad	Baghdad	Baghdad Municipality	Supply of rehabilitation machines for urban road managed by Baghdad municipality.	Short Term
6	Urban Transport	Improvement of Bus Capacity in Baghdad	Baghdad	Ministry of Transport and Communication BPTCS	Supply of buses and maintenance equipment to Baghdad Passenger Transport and Cargos St under the Ministry of Transport and Communication	Urgent
7	Urban Transport	Construction of Baghdad Metro	Baghdad	Ministry of Transport and Communication	Construction of Baghdad Metro	Middle-Long Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Urban Transportation)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
8	Urban Transport	Construction of Ring Road in Baghdad	Baghdad	Ministry of Housing and Construction	Construction of Ring Road in Baghdad. 4 ring road are planned while a part of Ring Road No.2 has been completed.	Middle-Long Term
9	Urban Transport	Construction of Ring Railway in Baghdad	Baghdad	Ministry of Transport and Communication	Construction of Ring Railway in Baghdad including transfer of depot to the suburbs.	Middle-Long Term
10	Integrated Urban Transport	Integrated Urban Transport Masterplan Study in Baghdad	Nationwide	Ministry of Planning Baghdad Municipality	Integrated transport study for road, railway, port and airport sectors including F/S of big projects.	Urgent



**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Water Resources and Irrigation)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Water Resources	Water Management System for Tigris and Euphrates River Basins - Phase 1 "Training for Water Management System in Jordan and Japan"	Nationwide	Ministry of Water Resources/Department of Hydrological Monitoring, Department of Dam and Reservoir Management	Trainings for water management system and water resources management skills to engineers of departments of hydrological monitoring and dam and reservoir management are to be conducted in the collaboration with Jordan Valley Authority, Jordan; Tonegawa Int	Urgent
2	Water Resources	Water Management System for Tigris and Euphrates River Basins - Phase 2 "Installation of dam and weir operation monitoring system"	Mosul Dam, Haditha Dam, Sammara Barrage, Ramadi Barrage, Tharthar Lake, Dokan Dam	Ministry of Water Resources/Department of Hydrological Monitoring, Department of Dam and Reservoir Management	As the first step, a system in which inflow, storage, water level, outflow, etc. at the main dams and barrages in the Tigris and Euphrates river basins are monitored in real time and the data transmitted to hydrological monitoring center in Bagdad with a telemeter, is to be introduced. This system would make it possible to monitor the status of water distribution at main water resources monitoring points.	Urgent Short Term
3	Water Resources	Water Management System for Tigris and Euphrates River Basins - Phase 3 "Basinwide water management system"	Main water resources and intake points nationwide	Ministry of Water Resources/Department of Hydrological Monitoring, Department of Dam and Reservoir Management	Basin wide water management system would be introduced. By establishing operation rules for main dams and barrages, the efficiency of water use is improved.	Medium-Long Term
4	Water Resources	Major Dams Rehabilitation Project	Nationwide	Ministry of Water Resources/Department of Dam and Reservoir Management	The survey for identifying the current conditions of existing dams and reservoirs would be conducted and rehabilitation works to improve the safety and operation efficiency would be implemented. The project sites cover 6 dams of 37.5 billion m <sup>3</sup> total storage capacity in the Tigris river basin.	Urgent
5	Irrigation	Provision of fixed type horizontal pumps to urgently rehabilitate the pumps for main irrigation and drainage channels	Southern Area (Downstream stretch of the Tigris and Euphrates rivers)	Ministry of Water Resources / Department of Operation and Maintenance of Irrigation Facilities	Irrigation area in Iraq is 3.5 million ha. It is reported that only about half of the irrigation area is irrigated in reality. It is because the function of pumps connecting main irrigation and drainage channels have deteriorated and parts of the irrigation area are inundated. To urgently solve the problem, the provision of fixed type horizontal pumps of 1 m <sup>3</sup> /s capacity is necessary. The provision of the pumps is the most prioritized assistance request in Ministry of Water Resources	Urgent

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Water Resources and Irrigation)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
6	Irrigation	Provision of Equipment for Dredging of Existing Irrigation Canal and Improvement of the Environment	Southern Area (Downstream stretch of the Tigris and Euphrates rivers)	Ministry of Water Resources / State commissions for operation of the Tigris and Euphrates projects or State commission for reclamation and irrigation	Efficiency of using irrigation and drainage facilities and agricultural production is to be enhanced by providing equipment necessary for dredging irrigation and drainage canal and improving the environment. The equipment, 1) small dredges, 2) barges and long boom excavators, 3) land excavators, 4) dump trucks, and 5) wheel loaders, to be provided.	Urgent
7	Irrigation	Training on Water Saving Technologies in Jordan	Nationwide	Ministry of Water Resources / Ministry of Agriculture	To effectively use limited water resources, efficient water use such as drip irrigation, sprinkler irrigation, vinyl houses, prevention sheet for evapotranspiration from agricultural land, diversion system between treated water and river water, etc. would be executed in Jordan Valley, Jordan. The training in Jordan is practical for engineers and extension workers in the Ministry of Water Resources and the Ministry of Agriculture to transfer technologies and knowhow for water saving.	Urgent Short Term
8	Irrigation	Master Plan for Rehabilitation of Irrigation System at the middle reach of the Euphrates river	Southern part (middle reach of the Euphrates river)	Ministry of Water Resources	The project area suffers from serious water shortage. Master plan for the project area covers the improvement of water use efficiency by reconsidering the improvement of existing irrigation system, the diversification of planting plan and processing of agricultural product, the establishment of water charge for irrigation to promote water saving, the strengthening of agricultural cooperative, and the establishment of collection and distribution.	Short-Middle Term
9	Irrigation	Pilot Project for Improvement of Irrigation System in the middle reach of the Euphrates river	Southern part (middle reach of the Euphrates river)	Ministry of Water Resources	After prioritized sites are selected in the master plan formulated in item 2-3, the pilot project at the project site would be implemented.	Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Water Resources and Irrigation)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
10	Environment	Basic Study on Natural Environment and Land Use in Mesopotamian Marshland	Southern part	Ministry of Water Resources	To grasp the current conditions of marshland, the basic study covers 1) social survey for residents' lives, 2) land use survey, 3) survey for water quality, soil, agriculture, 4) natural and social survey in existing marsh land, 5) formulation of protection measures for Hawizeh Marsh, 6) topographic survey at the surrounding area of Euphrates Dike, 7) formulation of small scale model rural project plan for rural development and environmental protection. Workshops in which persons related to the project gather are periodically held in Jordan.	Short-Middle Term
11	Environment	Dispatchment of Experts and Provision of Monitoring Equipment to CRIM in Ministry of Water Resources	Southern part	Ministry of Water Resources	The project contains the dispatchment of Japanese experts to the Center for Restoration of Iraq Marshland to be established this March, and provision of monitoring equipment. Participating in the activities of CRIM enables it to implement the project for	Short-Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Water Supply, Sewerage, and Waste Disposal)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Water supply/sewerage system/waste management	Extension of Kerth WWTP	Baghdad city	Baghdad Sewerage Authority	Wastewater generation from the east side of the Tigris River (Kerth area with estimated population of 2.7 million) is estimated at 600,000 m <sup>3</sup> /day. Approximately 400,000 m <sup>3</sup> /day of wastewater is estimated to flow to the Kerth WWTP (capacity of 205,000 m <sup>3</sup> /day) via the existing Doura pumping station. The inflow wastewater into the WWTP is discharged directly into the Tigris River without any treatment because of improper operation due to lack of maintenance, lack of funds and loss of equipment during the war. Untreated wastewater discharge pollutes the river, which causes health and environmental problem not only in Baghdad City but also in the downstream reaches of the River. The project consists of rehabilitation of existing facilities, expansion of the WWTP capacity by 205,000 m <sup>3</sup> /day, new construction of sewer main and Doura pumping station (P.S) No.2.	Urgent
2	Water supply/sewerage system/waste management	Extension of Saba Nissan WTP and construction of water quality laboratory	Baghdad city	Baghdad Water Authority	Saba Nissan WTP is located on the east side of the Tigris River (Rasafa side) in Baghdad City. It is the biggest WTP in Baghdad city at present with the capacity of 450,000 m <sup>3</sup> /day. The actual condition is that 300,000-400,000 m <sup>3</sup> /day of water is temporally supplied to the Saba Nissan network system across the Tigris river from Kerth WTP, which is located on the west side of the river. This project consists of rehabilitation of the existing WTP, expansion of existing WTP Phase 1 and 2 with the capacity of 225,000 m <sup>3</sup> /day each and rehabilitation of water intake facility in order to ease water shortage in Rasafa area.	Urgent
3	Water supply/sewerage system/waste management	Comprehensive M/P and F/S of water supply. Sewerage system and waste management in Baghdad City	Baghdad city	Mayorality of Baghdad	The objective of M/P and/or F/S is to evaluate the necessity and scale of the Rasafa WTP that was proposed more than 20 years ago by an English consultant and planned and designed by French Degremont in 1994. Along with it, comprehensive M/P including sewerage system that is still shortage at present and solid waste management including medical and industrial waste will be formulated. During the course of the study, urgent pilot project will be proposed and execute,	Urgent Short-term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Water Supply, Sewerage, and Waste Disposal)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
4	Water supply/sewerage system/waste management	M/P and F/S of water supply, sewerage and waste management for local municipalities	Najaf, Karbala, Samawah and Nasiriyah	Each municipality	Although concrete information was very limited and concrete projects were not formulated, needs for water and sanitation are potentially in the south area. Comprehensive M/P and F/S of water and sanitation will be conducted to pick up priority project and possibility of the implementation. In case the project is suitable enough to implement immediately, it should be in practice immediately. As for waste management, even a small sized sanitary landfill as one of the pilot projects is found, it will be started immediately for gradual waste management and continuous capacity building and capability improvement.	Short-Middle Term
5	Water supply/sewerage system/waste management	Capability improvement and capacity building of staff	Baghdad city	Water and sanitary related organization in Baghdad Mayoralty	Considering that Iraq has been a closed country for more than 20 years, reconstructing institutions and improving staff capacity and capabilities are absolutely necessary. To improve the situation, continuous training for managerial persons, planning and design technicians, O/M technicians and workers of the related agencies and organizations in Baghdad Mayoralty as the first target in the third countries or in Japan will be considered. And dispatching specialist from Japan will also be considered when peace and security is improved.	Urgent Short-Middle-Long Term
6	Water supply/sewerage system/waste management	Rehabilitation or new construction of large diameter concrete pipe for sewerage network	Baghdad city	Ministry of construction	One Japanese construction company constructed one third of sewerage/drainage network in Baghdad City in early 1980s. It constructed a concrete pipe factory for the construction. The factory was donated to the Ministry of Construction; however, it is operated at only 10% of full capacity due to lack of money and maintenance. This projects will contribute to the improvement of sewerage systems in Iraq.	Short-Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Water Supply, Sewerage, and Waste Disposal)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
7	Water supply/sewerage system/waste management	Construction of waste landfill	Not decided	Not decided	There exists no comprehensive waste landfill in Iraq. The construction of small scale sanitary landfill for mixed, control and stable wastes should be planned and constructed in order to help Iraqi people to gradually improve their ability to manage landfills. The total capacity of the three landfills will be 1 million m <sup>3</sup> . Landfill and environmental monitoring equipment will also be provided for capability improvement and capacity building. Asphalt will be used for landfill shield material. At the beginning, simple leachate treatment facility will be installed to demonstrate to the managerial and technical people what kind of landfill facility is necessary and how to manage and cope with the leachate problem, including hazardous substances, though appropriate laws. Target area will be the place where groundwater level is below 1.5 m and population is at around 200,000.	Urgent Short Term
8	Water supply/sewerage system/waste management	Water supply/sewerage system improvement in Samawah	Samawah	Not decided	Although a compact water treatment unit will be provided as a Japanese grant aid to Samawah City, where the Japanese Self Defense Force is operating for reconstruction assistance, there will still be water shortage there. In addition, there is no sewerage system there at present, so the need for water supply and sewerage system improvement will be big. This project will meet the need. The biggest concern will be the scale of the project.	Short-Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Residence and Urban Development)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	City Planning	Capacity Building in National City Planning and Housing Construction	Grant Aids	the whole Country	Having been economically stagnant because of the three wars over 20 years and following economic sanctions, Iraqi personnel in charge of city planning and housing are outdated from world common knowledge and technology. This training project aims for their capacity building in these fields and will be conducted in the way that the trainee will be invited in a third country, Jordan, first and will take the relevant lectures. And at the final stage, they will have a study trip to Japan to have field survey.	Urgent
2	City Planning	Masterplan Up-date survey in Baghdad city (including feasibility survey on city infrastructure with JBIC Yen loan)	Grant Aids	Baghdad and Suburbs	The development projects in the capital city and suburbs have been delayed since 1980's, while population has been increased by 3.5% per year. Taking this situation into account, it is urgently required to review the master planning of Baghdad city and its environs. The master plan and comprehensive project survey and proposal for infrastructure building, namely industrial estate location, land use, water and sewerage, municipal traffic, waste treatment and environmental facilities will be reviewed each time in 2010, 2015 and 2020. This project is deemed to be undertaken with Iraqi experts in a cooperative manner.	Urgent
3	Housing	Housing Provision for Refugee and Internally Displaced People (IDP)	UNDP Fund	the whole Country	There are 500 thousand refugees in Iraq mainly consisted of Kurds and Iran-origin internally displaced people. UN organisations and CPU are undertaking the return plan for them and there is a project to make 100 thousand dwelling units for refugees and it will be implemented during 2004 to 2007. This project should be treated in cooperation with UN organisations already involved in this issue, namely UN-HABITA and IMO.	Urgent
4	Housing	Housing Project for Low-Income People	JBIC Yen Loan	Ministry of Housing	Given the condition of the significant shortage of dwelling, 1.4 million units shortage, and high unemployment rate 65-70%, it is strongly recognised that the support for low income people (including the unemployed) is urgently required and, accordingly, the Ministry of Housing announced the middle term plan 2004-2007 for housing construction of 20 thousand units (for 100 thousand people). This project is deemed to supplement the middle term plan with JBIC Yen loan.	Urgent

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Residence and Urban Development)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
5	Housing	Housing Construction for Low Income People in Samawa	Grant Aids	Samawa City	The Ministry of Housing determined to undertake the housing construction plan to provide 100 thousand dwelling units for low income people in 40 sites in Iraq, and the units to be provided in Samawa city, where Japanese Self-Defence Force is stationed, accounts for 500 units of the total. As a solution to the shortage of dwelling there, Musantara District and Samawa city request Japan to implement housing project with grant aids in the short term.	Middle Term
6	Housing	Rehabilitation of Slum Area and Poor Dwelling Infrastructure	JBIC Yen Loan	the whole Country	Given the example of Saddle city in Baghdad region, 30% of slums and the condition of housing infrastructure is far below the international standard. Rehabilitation of the municipal functions and improvement of living conditions there is urgently required. Accordingly, the Ministry of Housing has started the project to make the slum area good condition to live in 10 years. This project will support the part of the ongoing project with JBIC Yen loan.	Urgent
7	Housing Finance	Housing Loan Expansion Project for "Two step loan"	JBIC Yen Loan	the whole Country	Given the condition of the significant shortage of dwelling, 1.4 million units shortage, and high unemployment rate, 65-70%, it is strongly recognised that the support for low income people (including the unemployed) is urgently required and, accordingly, the Ministry of Housing announced the middle term plan 2004-2014 to expand the housing loan system for the middle class people. This project will support the part of the plan with JBIC Yen loan.	Urgent



**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Communication)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Comm	Nationwide Digital Microwave Backbone Network Construction Project	Major Cities	MOC, ITPC	To establish Digital Microwave Backbone Transmission Link covers the most populated areas in the country. It consists of two grids of Southern Backbone (Baghdad- Hilla- Najaf- Samawa- Nashirya- Basra: 22 Hops) and Northern Backbone (Baghdad- Samara- Tikrit- Mosul: 13 Hops). Existing Building to be rehabilitated as necessary and install equipment	Urgent
2	Comm	Standard A Earth Station and International Switching System reconstruction Project	Baghdad	MOC, ITPC	Install Two new Standard A Earth Stations (for Indian Ocean Region and Atlantic Ocean Region) and related new International Telephone Switching System in Baghdad. It includes minor civil work	Urgent
3	Comm	Rehabilitation and reconstruction for Transmission and Exchange system in Major Cities	Major Cities	MOC, ITPC	To supply and install equipment for rehabilitation and reconstruction of major cities to connect above mentioned backbone network for the improvement of telecommunication condition.	Urgent Short-Middle Term
4	Comm	Master Plan Study for Establishment of National Communication and Broadcasting Network System	Nationwide	MOC, ITPC	To establish comprehensive master plan from middle- and long-term point of view as national master plan	Short Term
5	Comm	Master Plan Study for Communication System Development for Regional Cities and Remote Areas	Regional Cities Remote Areas	MOC, ITPC	To establish master plan and feasibility study to implement communication network in regional cities and remote areas	Middle Term
6	Comm	Master Plan Study for Nationwide Postal Service Modernization Project	Nationwide	MOC, ITPC	Master plan and Feasibility Study for the followings - Rehabilitation and reconstruction of post offices, - Installation of sorter machines to major post offices, - Computerization of savings department, and - Introduction of delivery vehicles and bikes	Middle Term
7	Comm	The Study for Establishment of National ICT Master Plan	Nationwide	MOC, ITPC	Master plan study for introduction of E-Government system to Iraqi Administration	Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Communication)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
8	Comm	Nationwide Postal Service Rehabilitation and Reconstruction Project	Nationwide	ITPC	Based on the result of master plan study, the following project will be done Rehabilitation and reconstruction of post offices Install sorter machine to major post offices Computerization of savings department Introduction of delivery Vehicle and bike	Middle Term
9	Comm	Construction of Optical Fiber Network System in Baghdad City	Baghdad	ITPC	Reconstruction of optical fibre network system and supply exchange equipment in Baghdad	Short-Middle Term
10	Comm	Construction of Optical Fiber Network System in Mosul and Basra City	Mosul Basra	ITPC	Reconstruction of optical fibre network system and supply exchange equipment in Basra and Mosul	Short-Middle Term
11	Comm	Construction of Communication Systems for Regional Cities and Remote Areas	Regional Cities Remote Areas	ITPC	Based on the result of master plan study, to recover and improve communication network in regional cities and remote areas	Middle-Long Term
12	Comm	Outside Plant Maintenance Center Construction Project	Major Cities	ITPC	To establish facilities for operation, maintenance and training centre for ITPC personnels. Centers will be constructed in Mosul, Baghdad and Basra as Centre in Phase 1 and about 20 sub centres will be construct as phase 2	Middle-Long Term
13	Comm	International Underwater Cable Construction Project	-	ITPC	To construct under seawater cable to meet for future demand of international communications. Cable will be installed from Basra to UAE and connect international cable networks such as FLAG, SEA-WE-MEA.	Long Term
14	Comm	Regional Area Landline Telephone System (PHS System) Development Project	Regional Cities Remote Areas	ITPC	To establish land line telecommunication system with PHS system in small town (for exsample less than 200 thousand) and villages	Middle-Long Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Health Medicare)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Health	Regional Hospital Rehabilitation plan	Nationwide: (18 governorates)	Ministry of Health, regional ministries of health	This proposal calls for preparation of at least one secondary core hospital in each governorate. In addition to rehabilitation of the thirteen hospitals famous for their support under Japan's 1980s aid program, reconstruction will proceed strategically at five hospitals in Basrah, Sulaymaniyah, Diyala, Babil, and Karbala. Aid from Japan is also planned for these subject hospitals. However, since such aid is intended for emergency restoration of functions, it is necessary to implement a survey of regional core hospital development plans and to confirm healthcare needs, and then to determine the required hospital scale for regional core hospitals and the minimal repairs required, among other matters. In line with the results of this survey, it will be necessary to consider shifting some examination and treatment functions to newly constructed hospitals.	Short-Term
2	Health	Baghdad Teaching Hospital Rehabilitation Plan	Baghdad	Ministry of Health	In Iraq, with its population of more than 20 million, a vital topic of importance is construction of teaching hospitals with sufficient medical facilities, in order to nurture appropriately trained doctors, nurses, and medical technicians. In order to develop the abilities of doctors, nurses, and medical technicians in an efficient manner, a coordinated system within the medical complex has been proposed, with training hospitals at its core. This proposal covers the facilities, equipment, and other matters necessary for constructing a unified medical training system.	Short-Term
3	Health	Basrah Nursing College Construction Plan (New establishment)	Basrah	Ministry of Health, Ministry of Higher Education	Preparation of nursing junior colleges is essential to the restructuring of Iraq's nursing system. Construction of nursing junior colleges to serve as centers of the nursing system in Baghdad, Sulaymaniyah, Kirkuk, Mosul, Arbil, Basrah, and a second location in Baghdad are vital projects for the purpose of achieving the future goal of a coordinated regional healthcare system. Such construction would also meet the needs indicated by international institutions. The nursing junior colleges in Basrah and the second location in Baghdad are new institutions planned by the WHO and the Iraqi government.	Urgent

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Health Medicare)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
4	Health	Master Plan Study of Regional medical system (Development Study)	Nationwide	Ministry of Health	A total of nine sites for construction of new hospitals has been indicated in the requests from Iraq's Ministry of Health. Formulating strategic regional medical system reconstruction plans backed up by medical needs is required in advance of constructing new hospitals. Major details of surveys: medical needs survey, referral system, survey of medical-related human-resources development needs, defining gaps in demand and supply, reviewing examination and treatment structures, regional medical systems	Short Term
5	Health	Master Plan Study of PHC medical system (Development Study)	Nationwide	Ministry of Health	As in other countries receiving aid, needs are high for construction of primary medical facilities that form the foundation of the referral system. UNICEF, the WHO, and NGOs have begun PHC aid as emergency reconstruction support efforts. It is necessary to use the lead time until application of yen loans to survey actual circumstances of PHCs and to ascertain medical needs.	Medium-Long Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Education)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Education	Expansion and Development of Engineering at Baghdad University	Baghdad	Ministry of Higher Education	This plan covers reconstruction for a symbol of Iraqi education: Baghdad University. Buildings and educational facilities at this university have deteriorated severely after being left unmaintained. As such, swift implementation of this project is desirable. The Ministry of Higher Education has requested that the highest priority be given to expanding the buildings of the school of engineering.	Urgent
2	Education	Technical Institute Reconstruction Plan	Basrah / Baghdad	Ministry of Higher Education	The Basrah Technical Institute (established in 1973) is located in Basra, which is Iraq's second-largest city and the central city of the southern region. Since this university was the site of exchanges of fire during the war, many of its buildings have been destroyed. Prompt construction on campus buildings and supply of educational equipment are anticipated. In addition, a request concerning this project was submitted to the government of Japan in 2003. The Basrah Technical Institute has approximately 10,000 students, 131 instructors, and 726 staff members.	Urgent
3	Education	Master Plan Study of Primary and Secondary School	Nationwide	Ministry of Health	Throughout Iraq, several thousand schools are said to require rebuilding and rehabilitation of their school buildings. Beginning with UNICEF, international institutions and aid groups have already begun such activities. Since it is anticipated that aid through the yen loans project will not begin until 2006 or later due to restrictions of the scheme, and in order to prevent duplication of projects, it is anticipated that projects will be implemented in selected regions after implementation of the Iraq elementary and middle school redevelopment plan. With regard to project scale, proposals call for implementation in units of 100 schools.	Short Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Education)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
4	Education	Vocational School renovation plan (Implementation of Development Study)	Nationwide	Ministry of Education	Results of hearings have confirmed the high level of necessity for Vocational schools throughout Iraq. However, the content of curricula must be changed to fit the human-resources supply/demand relationship. First of all, it is necessary to determine the gaps between human-resources supply and demand in the labor market and to reformulate educational plans accordingly. Since existing information is affected by many biases, at present it is difficult to ascertain the changes in Iraq's industrial structure. For this reason, it is necessary first to conduct a development survey to ascertain gaps between supply and demand, and then to formulate a project for the vocational schools.	Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Industrial Infrastructure)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Industry Infrastructure (oil plant)	(1) Rehabilitation of North Oil Factory and Salah Ad Din Oil Refinery Plant North	Baiji (200km NNE from Baghdad)	Ministry of Oil, North Oil Co.	North oil plant (Baiji) was constructed by Chiyoda Corporation in 1983 and is a large and modern refinery with a capacity of 150,000 barrels/day. Together with Salah Ad Din oil plant, capacity is 300,000 barrel/day which accounts for 43% of total oil refinery capacity. The rate of operation is below 20% due to old equipment and shortage of electricity. The project would rehabilitate the plant. The project covers hydrogen dissolution equipment, continuous contact dissolution equipment, hydrogen plant, low pressure distillation plant, sulfur collection equipment, control bulb and boiler.	Short Term
2	Industry Infrastructure (gas)	(2) Rehabilitation of Kirkuk LPG Plant	Kirkuk (north of Baghdad)	Ministry of Oil, North Gas Co.	North Gas Plant is an associated gas treatment plant constructed in Kirkuk in 1983 by Mitsubishi Heavy Industry. The plant collects LPG and natural gasoline produced by associated gas process, and a large amount of processed gas is used for power generation and chemical fertilizer production. The treated natural gas a produced by the plant is supplied to chemical fertilizer plant in Baiji constructed by Hitachi Zosen/Nissho Iwai in 1985. Due to old equipment and power shortages, the rate of operation is 16%. The project is rehabilitation of the plant. The project covers thermal turbine, compressor, pump, electric meter equipment.	Short Term
3	Industry Infrastructure (gas)	(3) Rehabilitation of South LPG Plant	North Rumaila (West of Basrah)	Ministry of Oil, South Gas Co.	South LPG Plant was constructed in North Rumaila oil field in Southern Iraq by Chiyoda Corporation in 1983. The plant treats associated gas and collects LPG. The gas produced by the plant is used for fuel for power generation and also used as raw material for nitrogen fertilizer products produced in a chemical fertilizer plant in Basrah. Due to old equipment and power shortage, the rate of operation is 19%. The project is rehabilitation of the plant. The project covers thermal turbine, compressor, pump, electric meter equipment.	Urgent
4	Industry Infrastructure (oil plant)	(4) Construction of new Central Oil Factory	50km SW of Baghdad	Ministry of Oil, National Oil Project Co.	Iraq government and Chiyoda Chemical/Mitsubishi Corporation enforced a construction contract for the Central oil plant located in the suburb of Baghdad in 1990; however, the contract has not been fulfilled due to the Gulf War and UN sanctions.	Middle Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Industrial Infrastructure)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
5	Industry Infrastructure (Fertilizer Factory)	(1) Rehabilitation of Basrah Chemical Fertilizer Factory	Basrah	Ministry of Industry, South Fertilizer State Co.	Basrah No.3 fertilizer factory was constructed in 1975 by Mitsubishi Heavy Industry to produce fertilizer for agriculture (ammonia, urea fertilizer). Due to old equipment, shortage of parts, suspension of supply of electricity and gas, production is estimated to be zero. This project aims to conduct rehabilitation of equipment, conduct maintenance, and provide spare parts. The project covers revolving equipment such as turbine and pump, stillness and catalyst equipment, pipe for corrosion, boiler and other parts, heat retention material, and meter and control system	Urgent
6	Industry Infrastructure (Fertilizer Factory)	(2) Rehabilitation of Baiji Fertilizer Factory	Baiji (200km NNW from Baghdad)	Ministry of Industry, North Fertilizer State Co.	Baiji fertilizer factory was constructed in 1990 by Hitachi Zosen/M.W.Kellogg (now KBR)/Nissho Iwai and produces fertilizer for agriculture (ammonia, urea fertilizer). Due to old equipment, shortage of spare parts and suspension of electricity and gas, production is estimated to be zero. The project conducts rehabilitation of a variety of equipment, supply of spare parts targeting mid-term. The project covers revolving equipment such as construction of gas turbine generator, heat exhaustion boiler and peripherals, gas compressor, turbine and pumps.	Middle Term
7	Industry Infrastructure (Cement Factory)	(1) Rehabilitation of Muthanna Cement Factory	Muthanna (45km W from Samawa: limestone can be mined)	Ministry of Industry, South Cement State Co.	Constructed in 1981 by KHD (Germany) in 45km west of Samawa. Production capacity is 2.3million ton. Due to power shortage and parts shortage, rate of operation is 0-30%. The project aims to provide generator (60MW) and a variety of equipment and materials.	Urgent
8	Industry Infrastructure (Cement Factory)	(2) Rehabilitation of Kubaisa Cement Factory	Kubaisa (West of Baghdad)	Ministry of Industry, Central Cement State Co.	In 1980, Kawasaki Heavy Industry constructed two lines with capacity of 1 million ton each. Production capacity is 2 million ton/year and used to supply 50% of cement consumed in Baghdad, but due to shortage of electricity, problem of O&M, and shortage of spare parts, the present rate of operation is 20%. This project supplies generator (25MW), spare parts and equipment for collection of cement particles.	Short Term



**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Industrial Infrastructure)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
9	Industry Infrastructure (Cement Factory)	(3)Rehabilitation of Kirkuk Cement Factory	Kirkuk	Ministry of Industry, Central Cement State Co.	In 1980, Kawasaki Heavy Industry constructed two lines with capacity of 1 million ton each. Production capacity is 2 million ton/year, but due to shortage of electricity, problem of O&M, and shortage of spare parts, the present rate of operation is 20%. This project supplies generator (25MW), spare parts and equipment for collection of cement particles.	Short Term

**Basic Study on the Program Formulation For Reconstruction and Rehabilitation of Infrastructure in IRAQ  
List of Proposed Projects (Urban Plan and Regional Development in Major Cities)**

No.	Sector	Project Name	Project Area	Implementation Agency in Iraq	Project Outline	Priority on Implementation
1	Urban • Regional Development	Baghdad Urban Master Plan	Baghdad	Ministry of Public Works, Baghdad City Government	Formulation of new "Baghdad Urban Master Plan" for following sectors, (a) Urban (Socio-economic frame, urban function/land use plan, capacity building of administration) (b) Housing (c) Transportation (d) Water supply/sewerage, drainage, solid waste management	Urgent
2	Urban • Regional Development	Regional Development M/P for five major cities	Kerbala, Najaf, Mosul, Basrah, Kirkuk	Ministries of Public Works and 5 regional governments	Formulation of new "Regional Development M/P" for following sectors, (a) Investigation of regional development policy, strategy, and scenario (b) Socio-economic framework (c) Capacity development of administration and implementation agency (d) Land use plan (e) Transportation	Urgent
3	Urban • Regional Development	Samawa Regional Development Master Plan	Samawa	Ministry of Public Works, Muthanna province, Samawa city government	Formulation of "Samawa Regional Development M/P" and implementation of model projects in the following sectors. (a) Integrated infrastructure plan (road, drainage, power generation facility, telecommunication facility) (b) Agriculture development plan and model projects (vegetables and fruits such as tomato, spinach, melon, watermelon, construction of agriculture extension center) (c) Small and medium scale industry promotion plan and model projects (construction of workshop for cement and workshop) (d) Housing plan and housing construction model projects (500 units) (e) Solar panel project for Bedouin (100 households) (f) Capacity development for regional government and related implanting agencies	Urgent

## CHAPTER 10 CONCLUSIONS AND RECOMMENDATIONS

### 10.1 Conclusions

The study was implemented under difficult conditions. The study team members could not enter Iraq for field investigation in the course of the study due to the unstable security situation in Iraq. Consequently, local consultants in Iraq were hired and the investigations and discussions with the government were conducted through them.

Using the methods described above, candidate projects for Japanese assistance for urgent reconstruction and rehabilitation in Iraq were identified. The target year for commencement of the implementation is set before the year 2007 for almost all components of the support program, which is to be met by the Japanese Grant Aid Program in 2004 of 15 billion dollars and Yen Credit Loan Program for 2005-2007 of 35 billion dollars.

The entire program of urgent reconstruction and rehabilitation of infrastructure was proposed based on the following framework:

- (1) Aiming at "Improvement and Stability of Living condition" of Iraqi people.
- (2) Focusing on rehabilitation of infrastructure and industry to create employment opportunities. Among the infrastructures for rehabilitation, sea ports and oil refineries would be the key targets to rebuild economic activity in Iraq.
- (3) Focusing the agriculture sector on increasing food production for the improvement of food security in Iraq.
- (4) Electricity is essential for reconstruction and rehabilitation activities. Many sectors are highly dependent on the rehabilitation of the electricity sector.
- (5) Synergetic effects among the sectors are expected through an integrated regional development approach, particularly for Baghdad and the major cities in southern Iraq.
- (6) The Japanese characteristics of the program are to be emphasized by placing priorities on rehabilitation of Japanese assisted projects and by applying technologies in which Japan has advantages compared to the other countries, and so on.
- (7) Putting priority on the Samawah area, which is where the Japanese Self-Defence-Force is currently undertaking reconstruction activities.
- (8) Aiming at effective coordination between Japanese grant aid program and Japanese Yen Credit loan program.

- (9) Taking into account cooperation with international and other bi-lateral donors.

Urgent actions are required for effective reconstruction and rehabilitation assistance under the above basic concepts.

## **10.2 Recommendations**

The following items are recommended for further action.

Although various types of Japanese assistance have already commenced, such as SDF activities and equipment and material supply, other assistance activities, particularly reconstruction and rehabilitation of infrastructure and industrial support facilities, should be commenced urgently.

- (1) As the study team had limited opportunities for direct communication with the Iraqi government staff, the information collected regarding the project formulation cannot be regarded as complete.
- (2) Additional studies and investigations should be conducted, particularly for the selected candidate projects. At that time, the study team will require more opportunities to communicate directly with the Iraqi government.
- (3) The project list prepared in the study should be shown to and discussed with the Iraqi government to finalize the composition of the support program.
- (4) A project management consultant team should be formed for the further conduct of project formulation and implementation. This team should be separate from the project implementation teams. Integration of information is essential for the entire Japanese activities for urgent reconstruction and rehabilitation activities in Iraq to be effective.
- (5) Capacity building is essential and a top priority issue in all sectors. Training and capacity building programs are therefore to be commenced as soon as possible by means of existing training schemes of JICA. Particularly, there is a certain gap in technology development in Iraq over the past 10–20 years on which the training program should be focused.
- (6) Japanese technology, products, and services should form the major sources for the program components, by which partnership between Japan and Iraq can be further developed.
- (7) Program formulation for Northern Iraq should also be carried out. However, in the course of the study, the highest needs for reconstruction and rehabilitation of infrastructures were identified in southern Iraq.
- (8) There is a strong relationship between urgent reconstruction/rehabilitation activities and security/peace-keeping issues. Although the security is an important issue for implementing urgent reconstruction/rehabilitation activities, it should take into account the matter of human security in Iraq, for which urgent assistance is required.

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