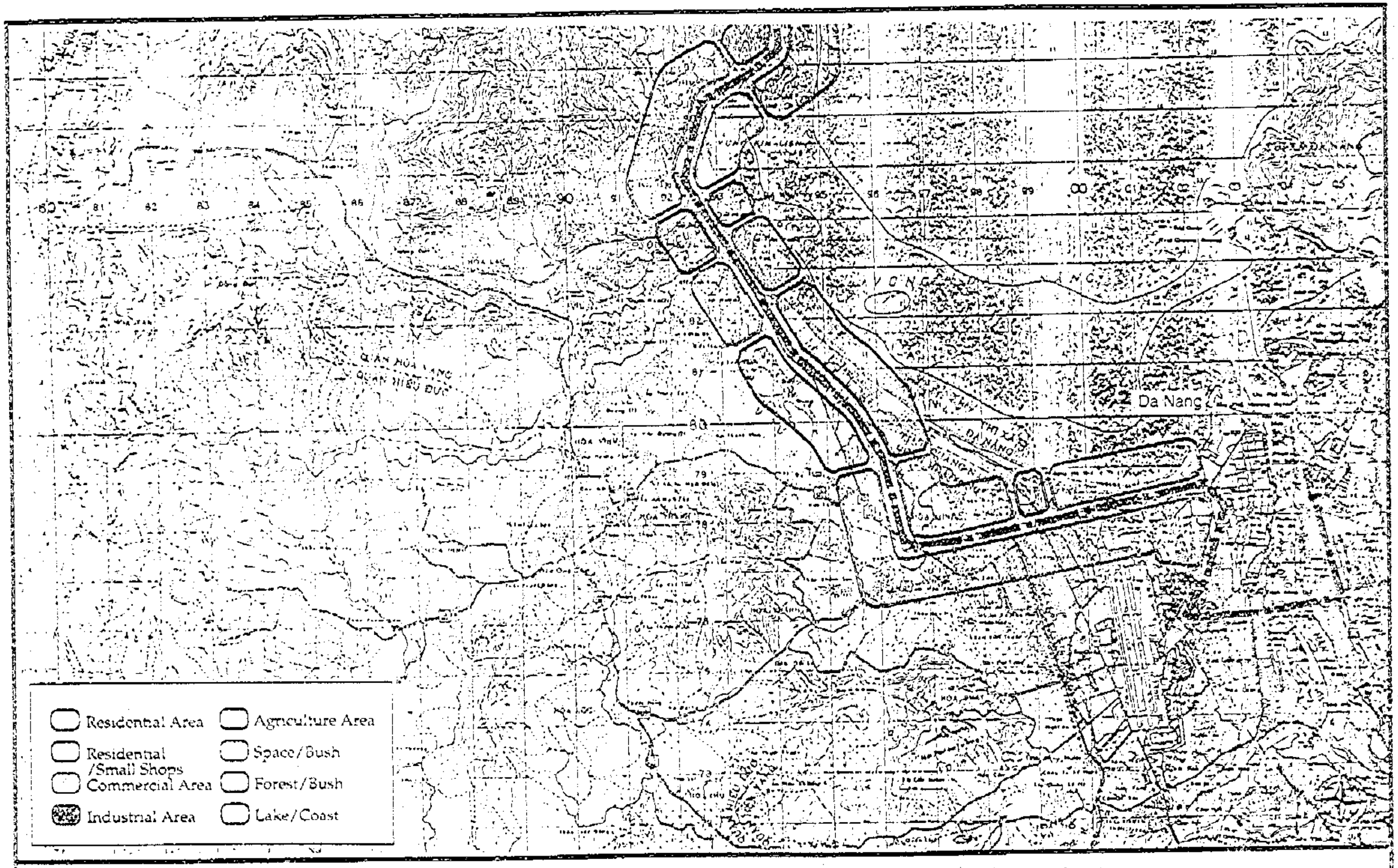


Fig. 8.16.6 (11) Land Use along Railway on Hanoi - Ho Chi Minh Line (Hue - Da Nang)

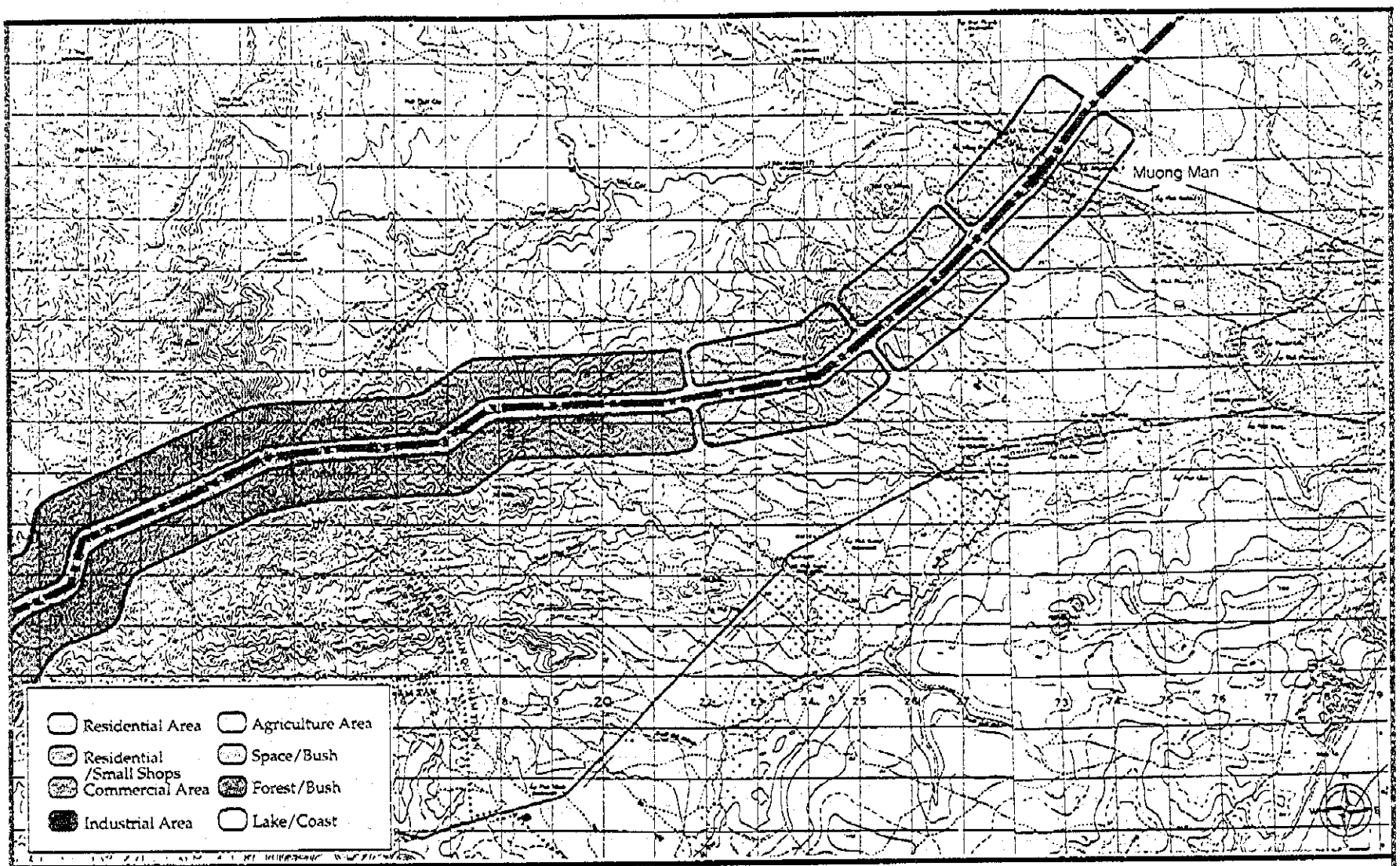


Fig. 8.16.6 (12) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

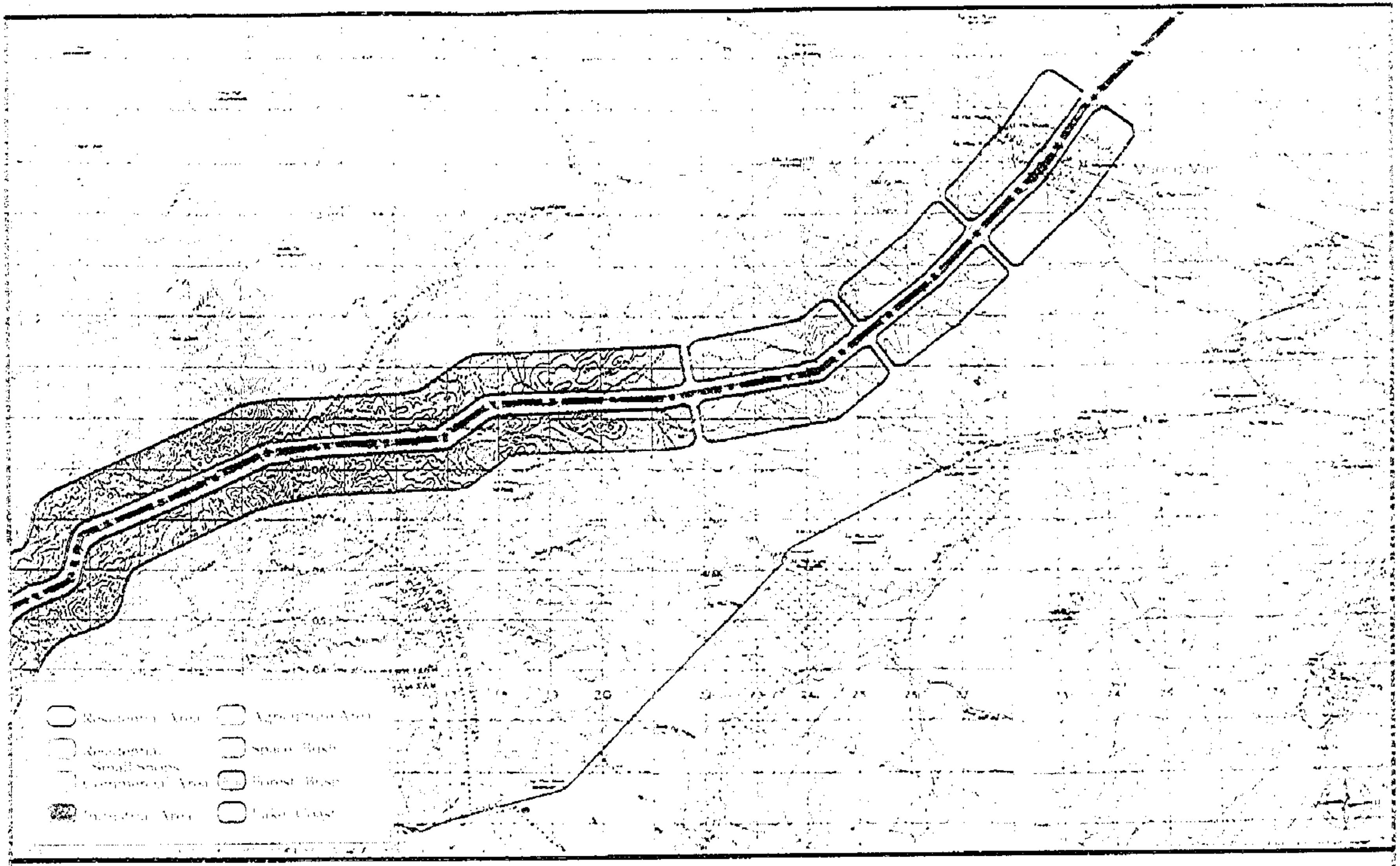


Fig. 8.1.6.6-(2) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

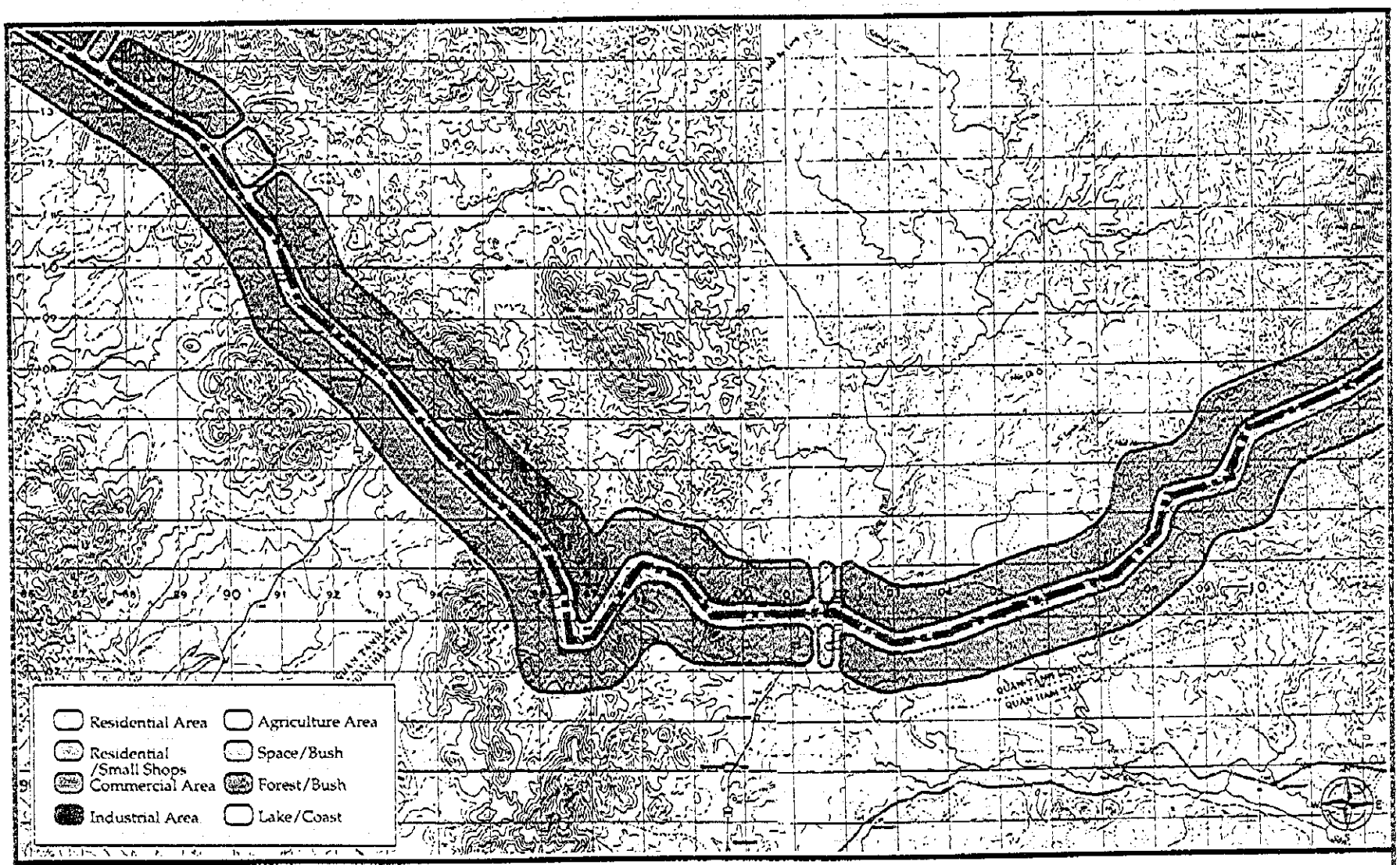


Fig. 8.16.6 (13) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

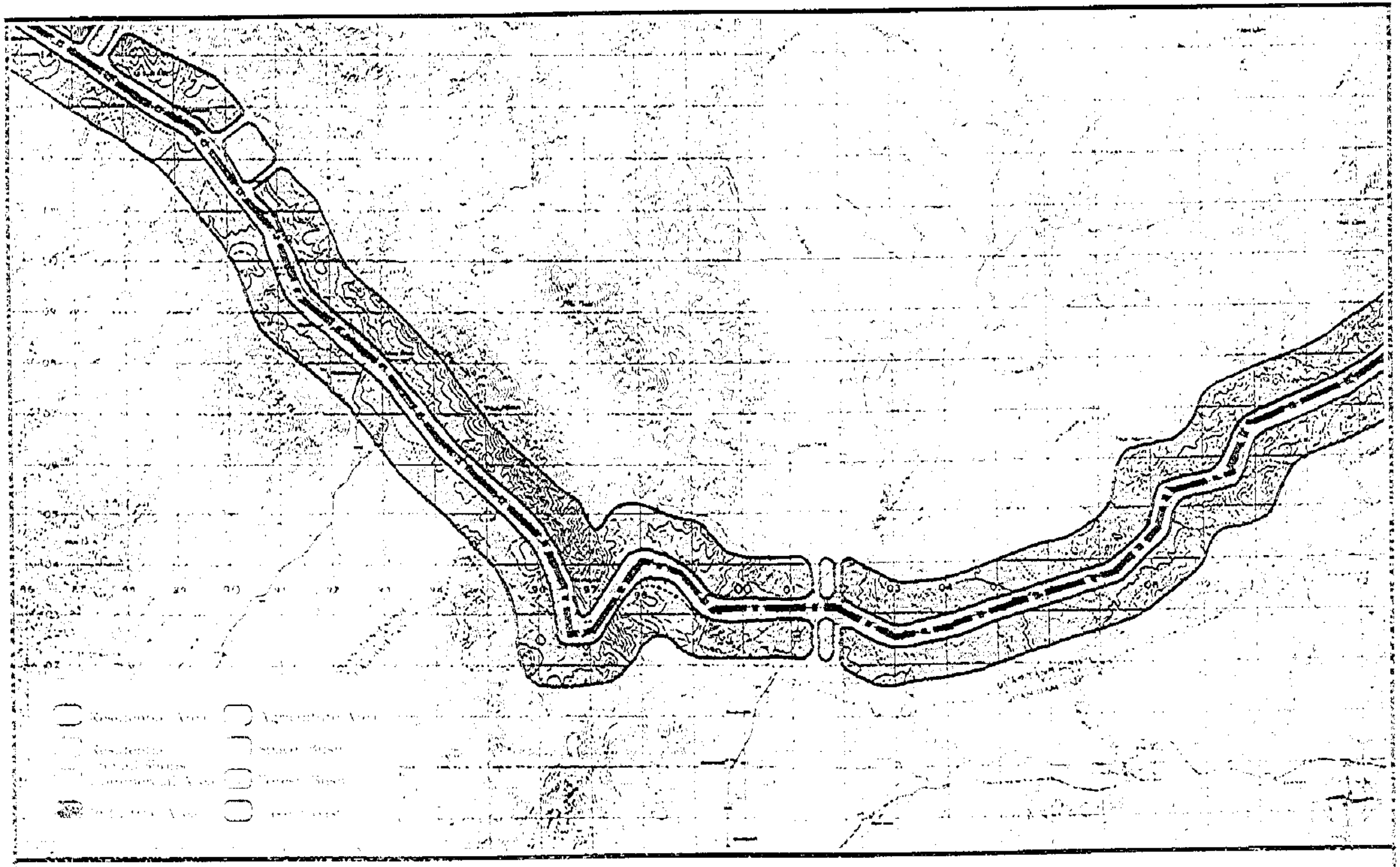


Fig. 8.7.6.6-3 Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

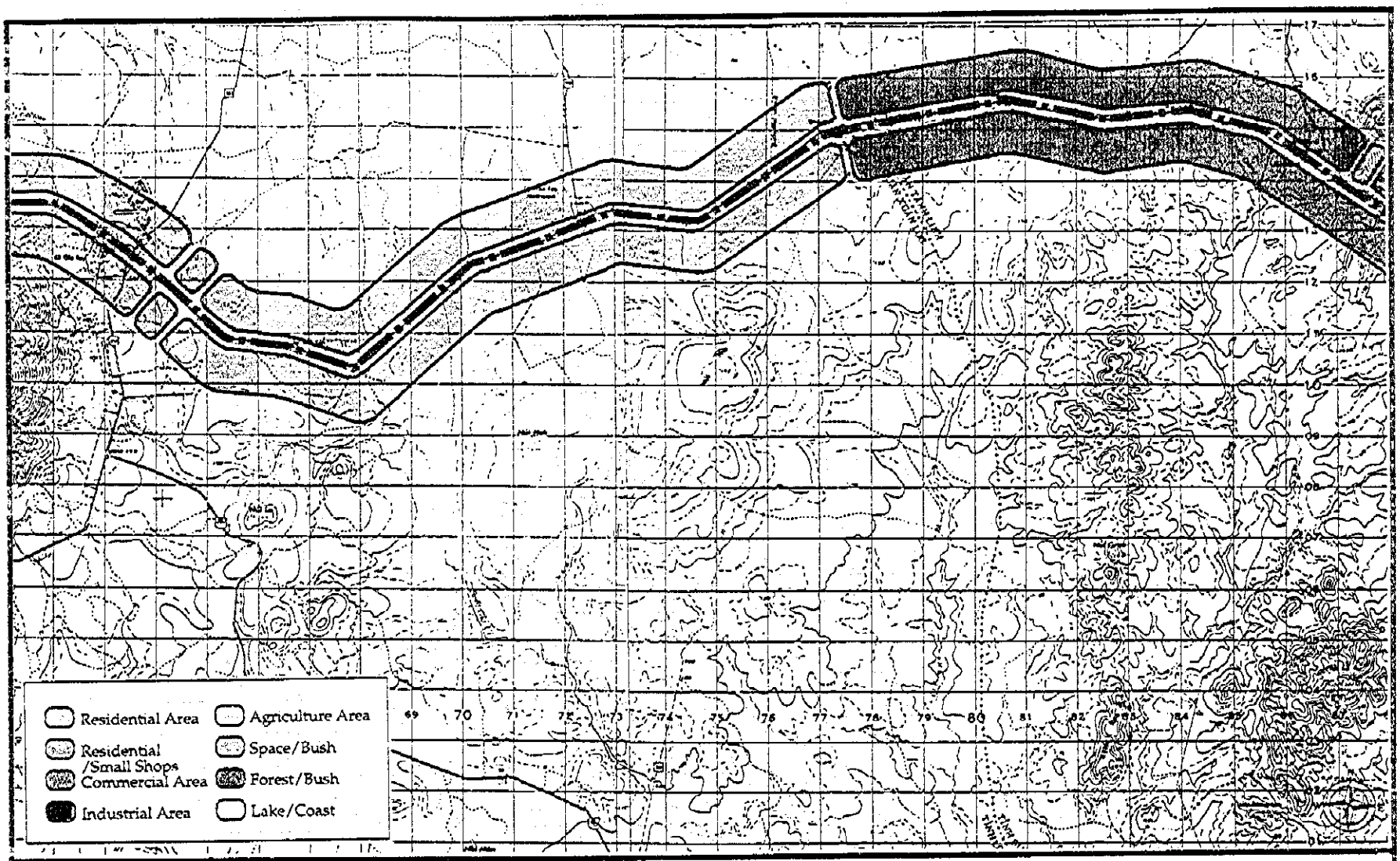


Fig. 8.16.6 (14) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

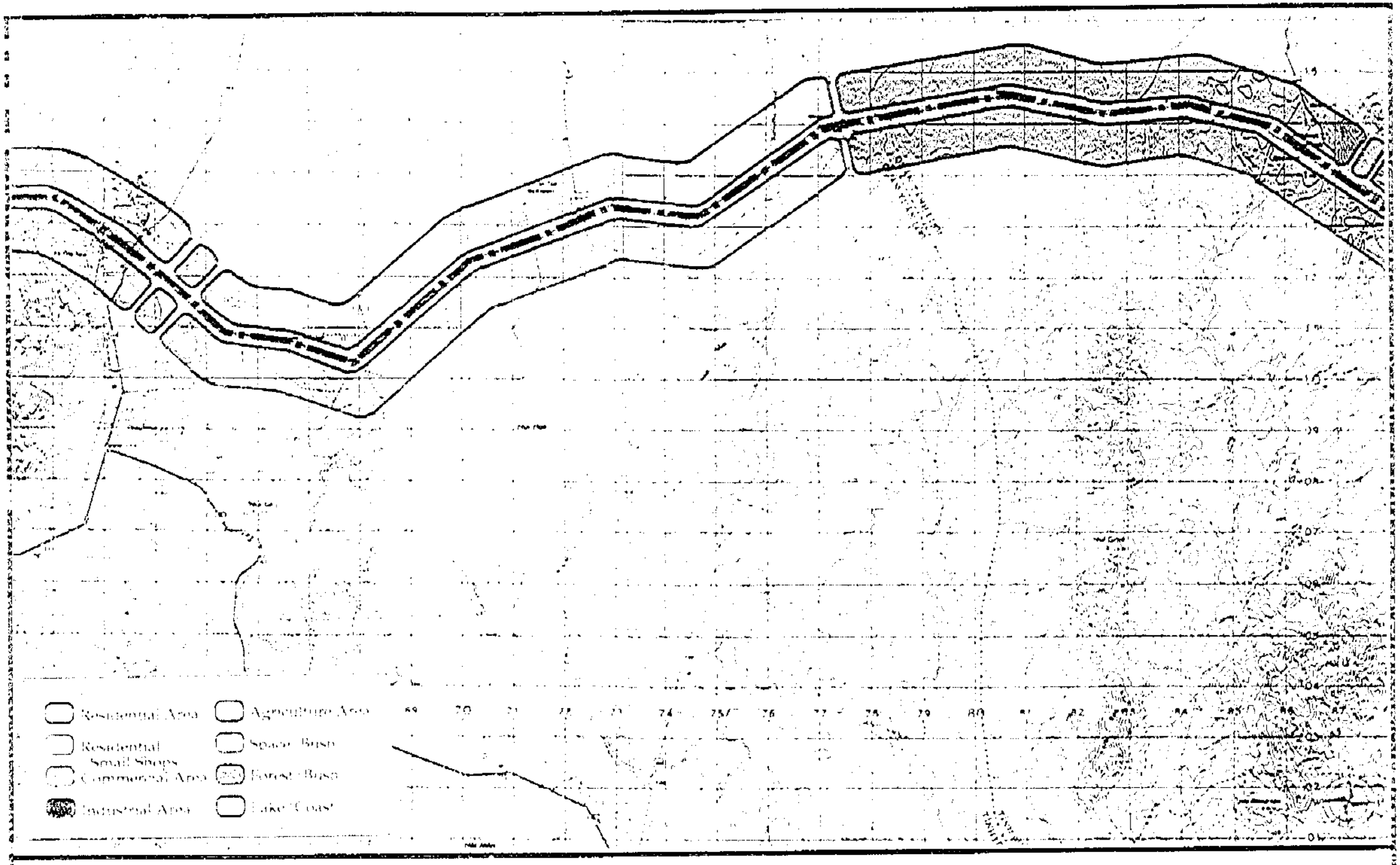


Fig. 8.16.6 (34) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

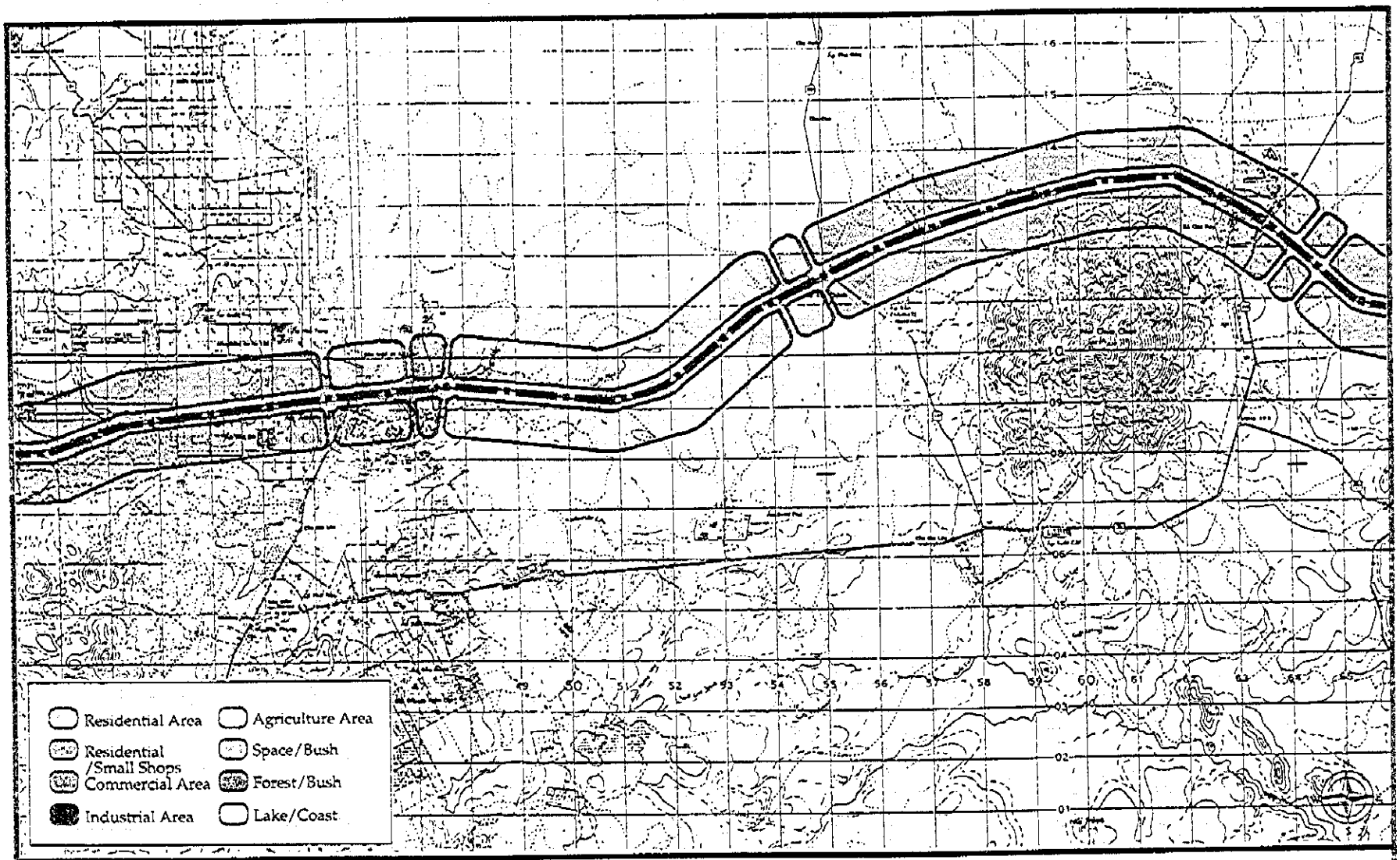


Fig. 8.16.6 (15) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

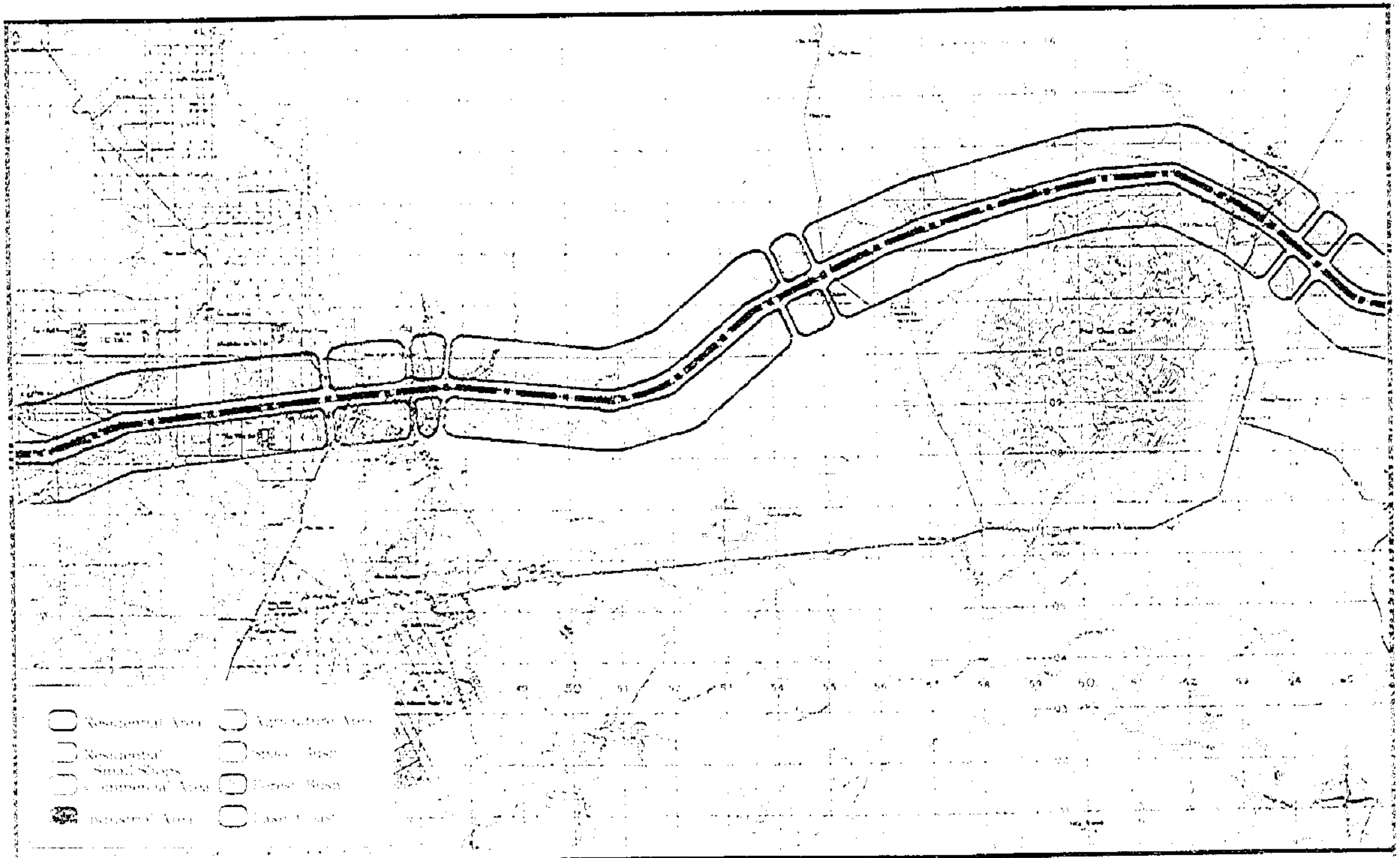


Fig. 8.3.6-18 Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

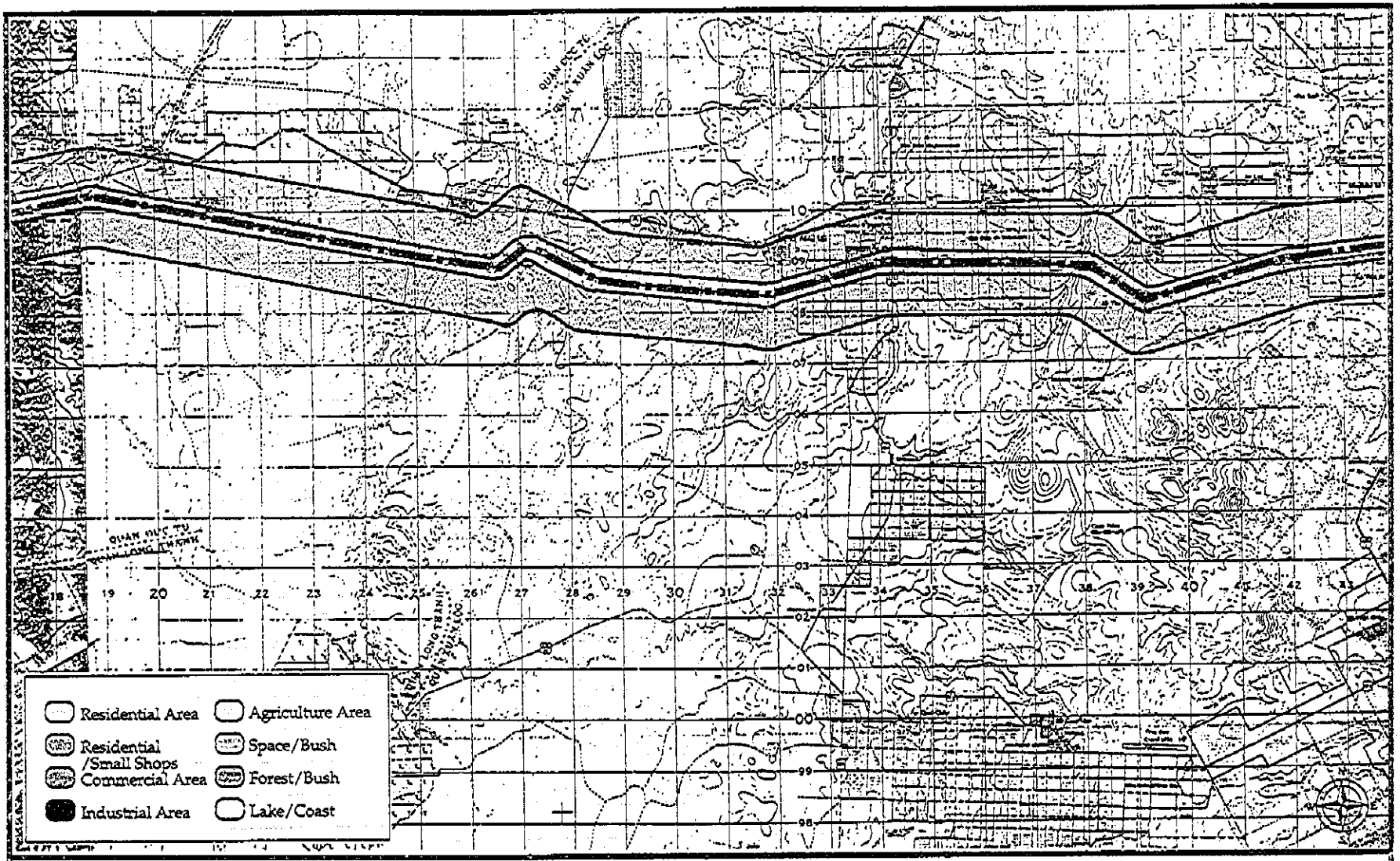


Fig. 8.16.6 (16) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

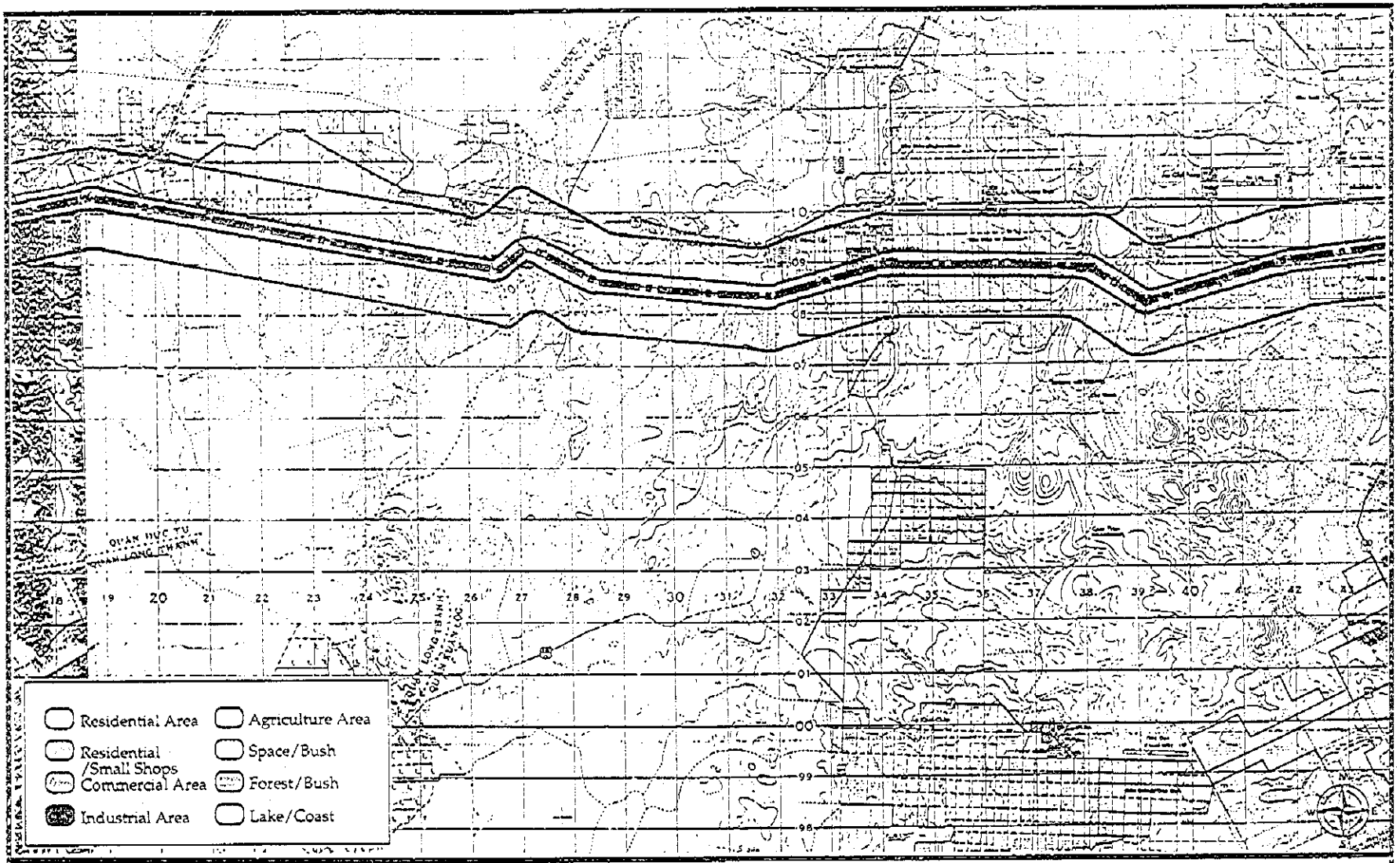


Fig. 8.16.6 (16) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

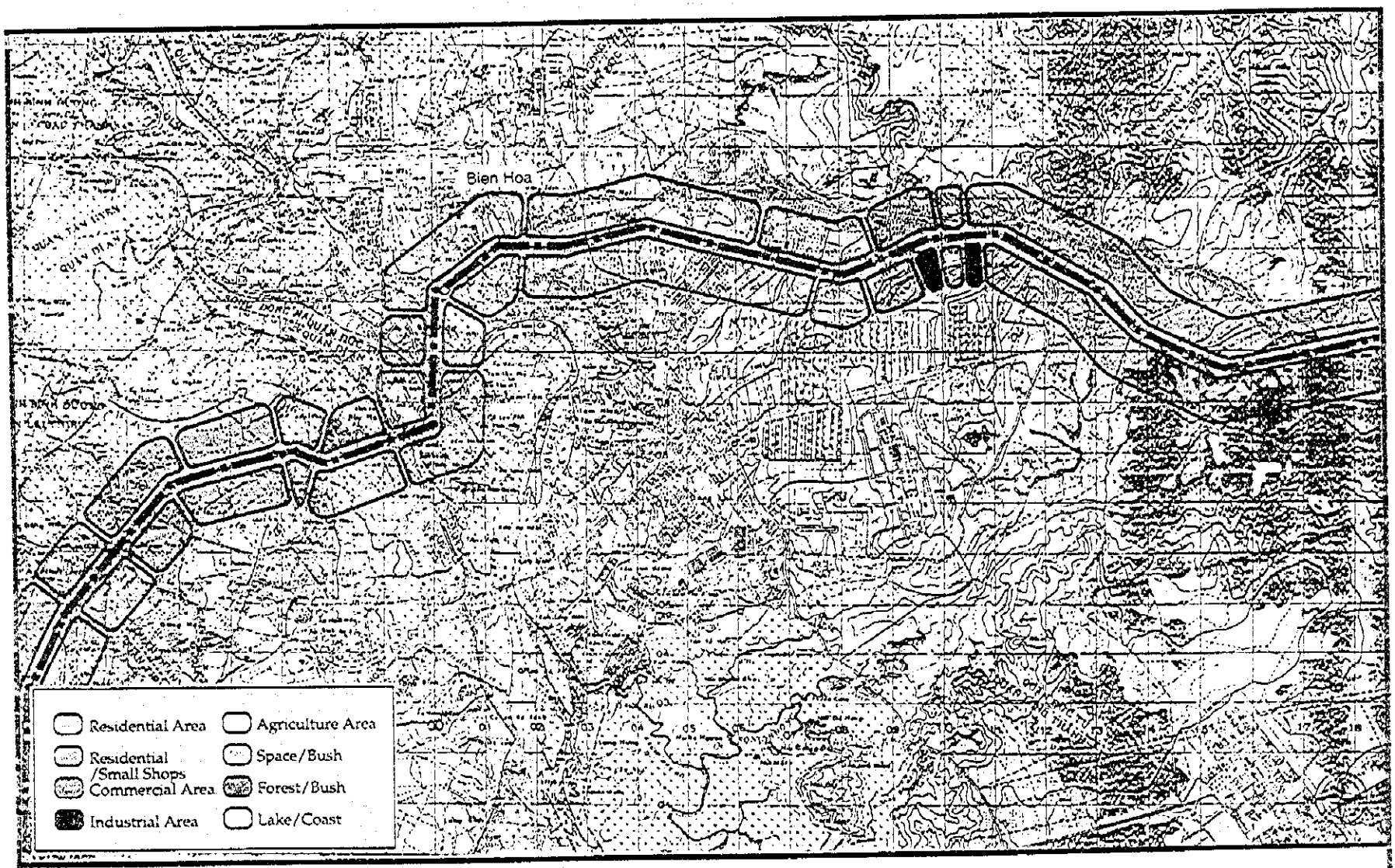


Fig. 8.16.6 (17) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

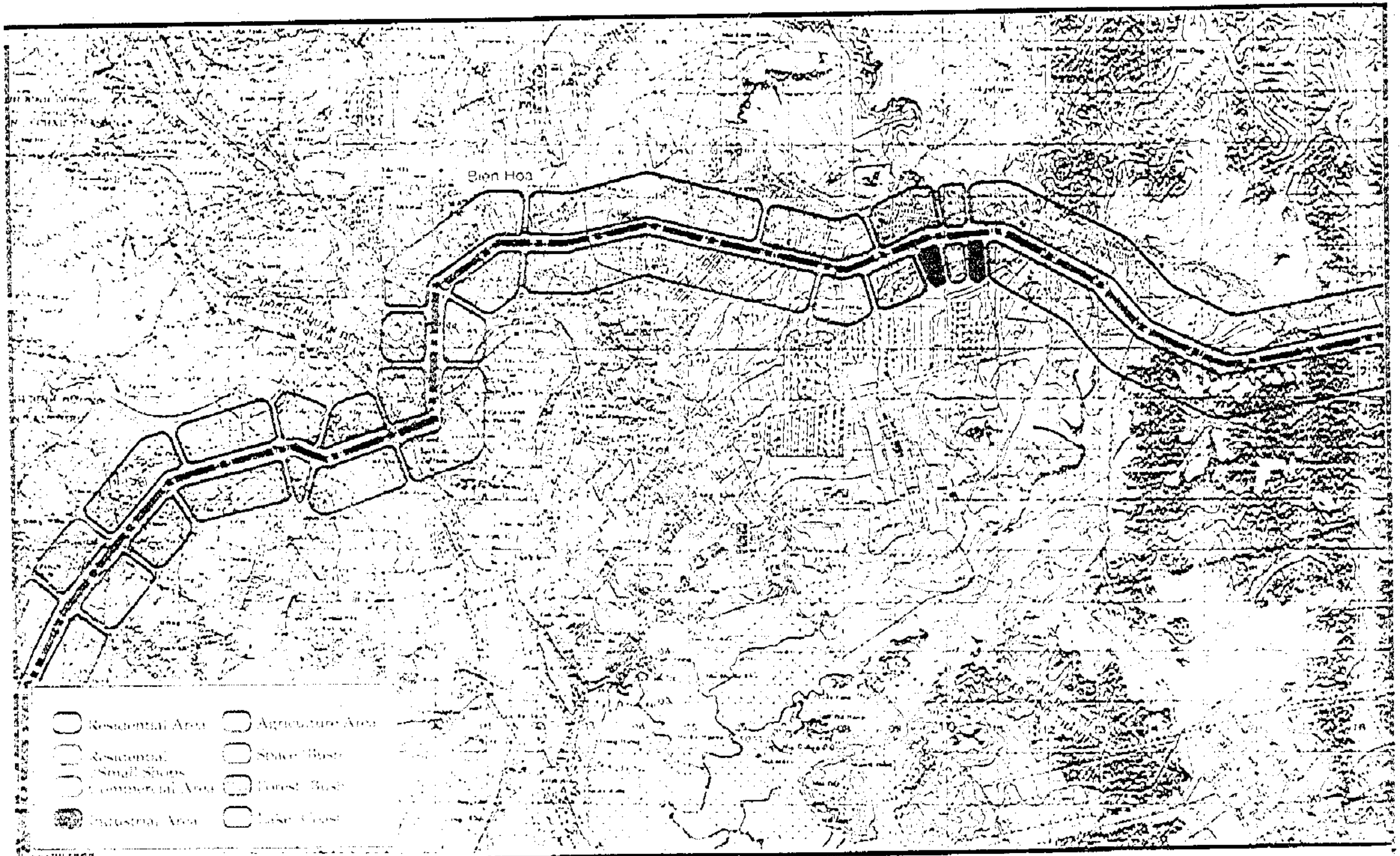


Fig. 8.7.6.6(17) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

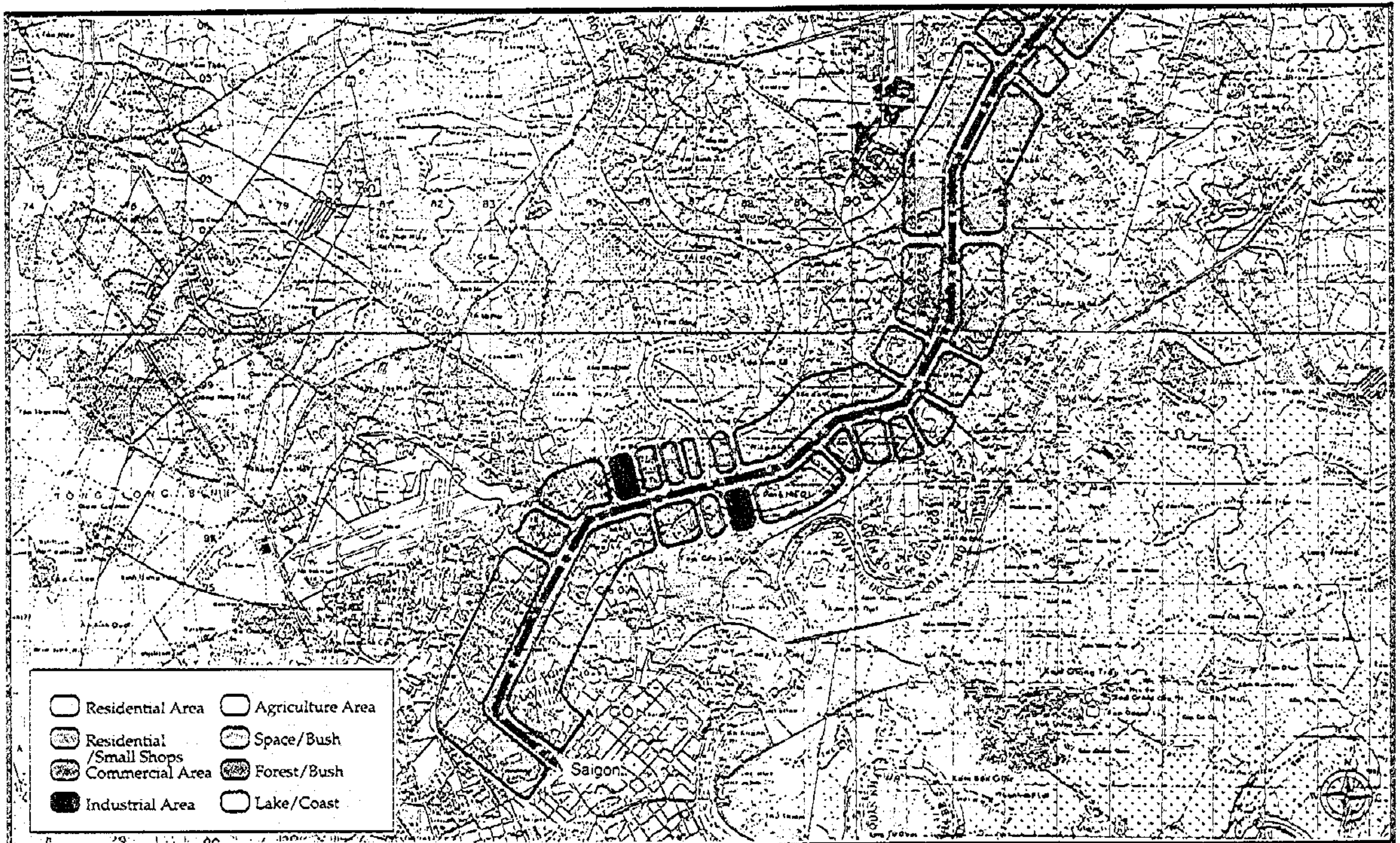


Fig. 8.16.6 (18) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

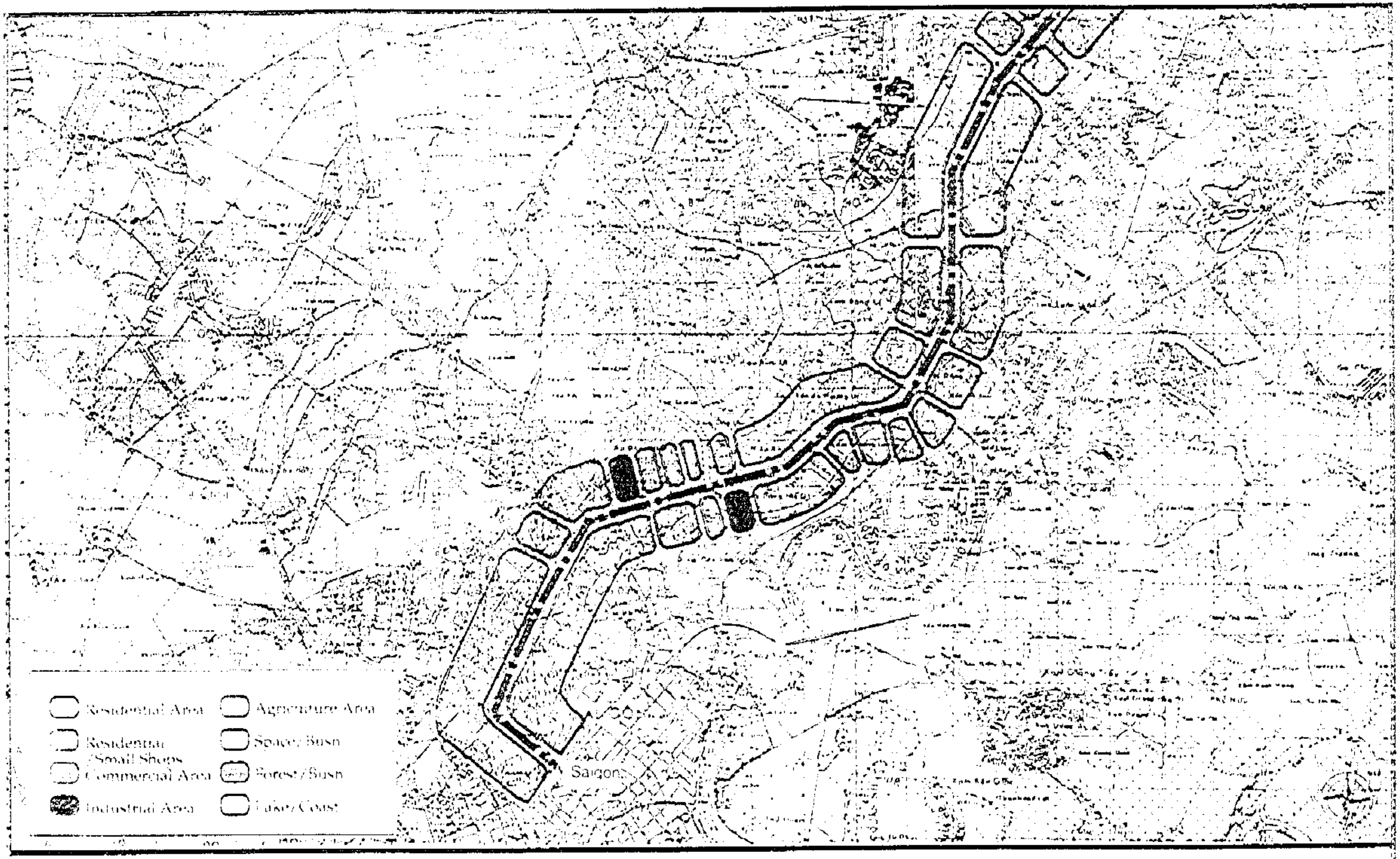


Fig. 8.16.6 (18) Land Use along Railway on Hanoi - Ho Chi Minh Line (Muong Man - Saigon)

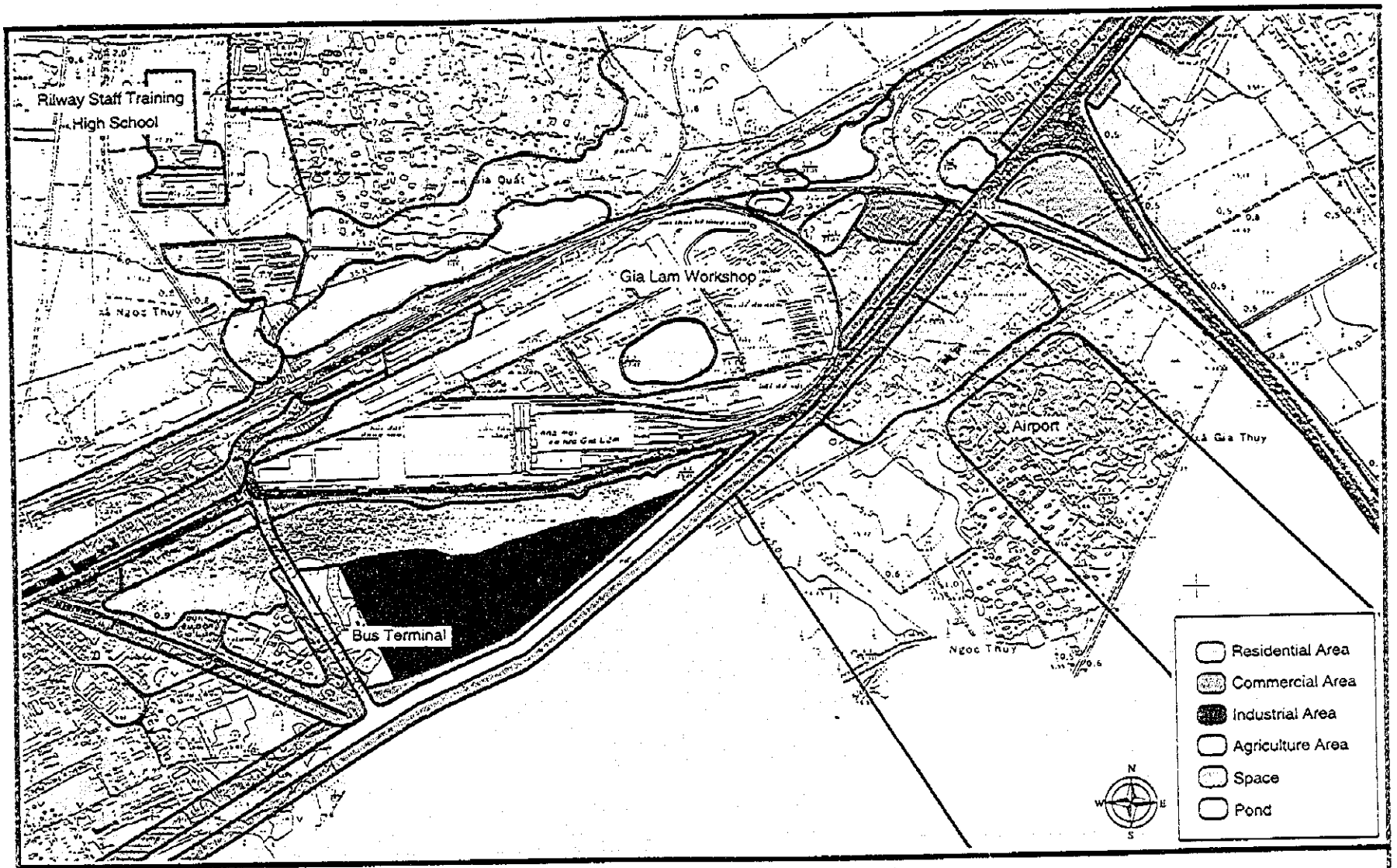


Fig. 8.16.7 Land Use around Gia Lam Workshop

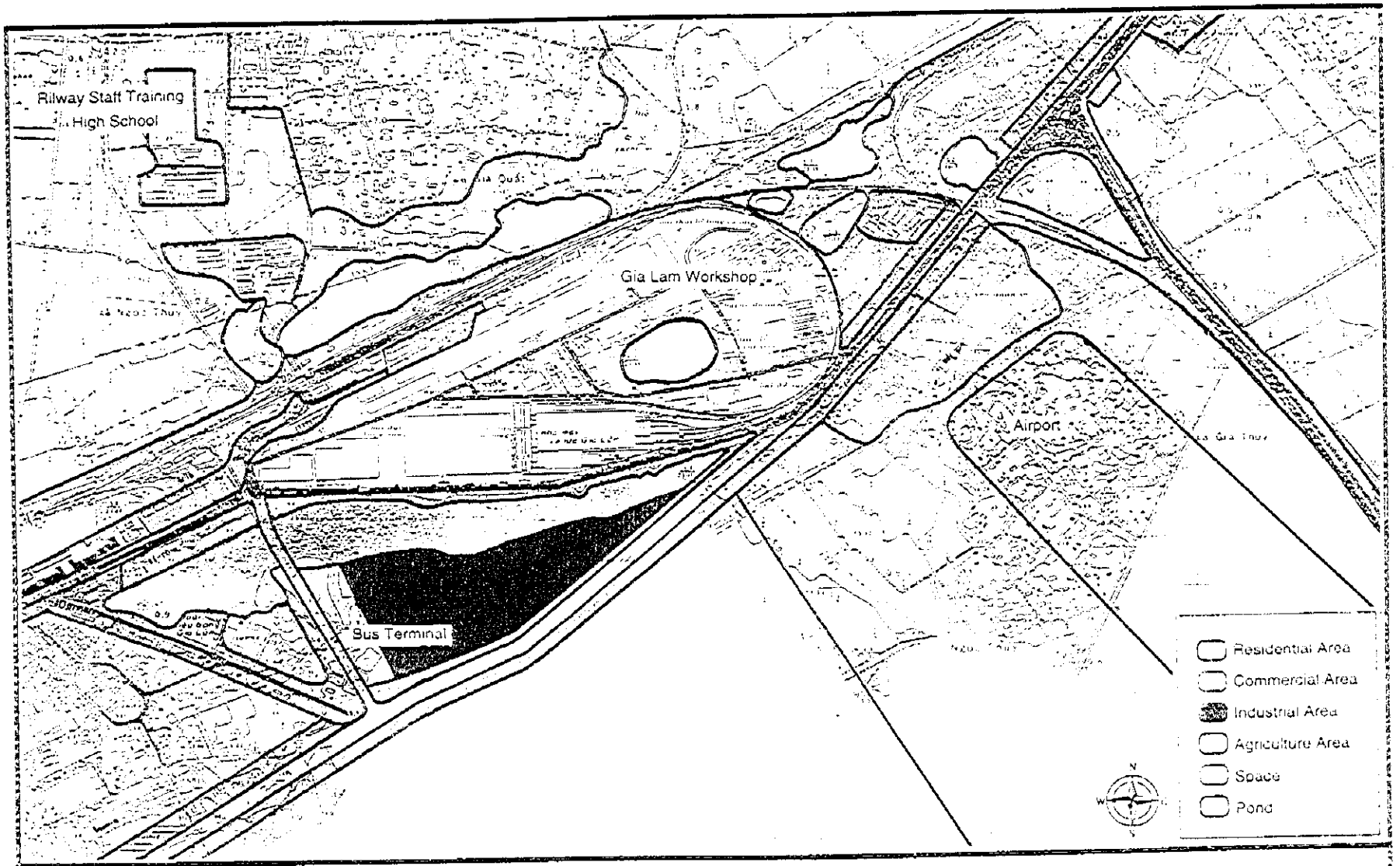


Fig. 8.16.7 Land Use around Gia Lam Workshop

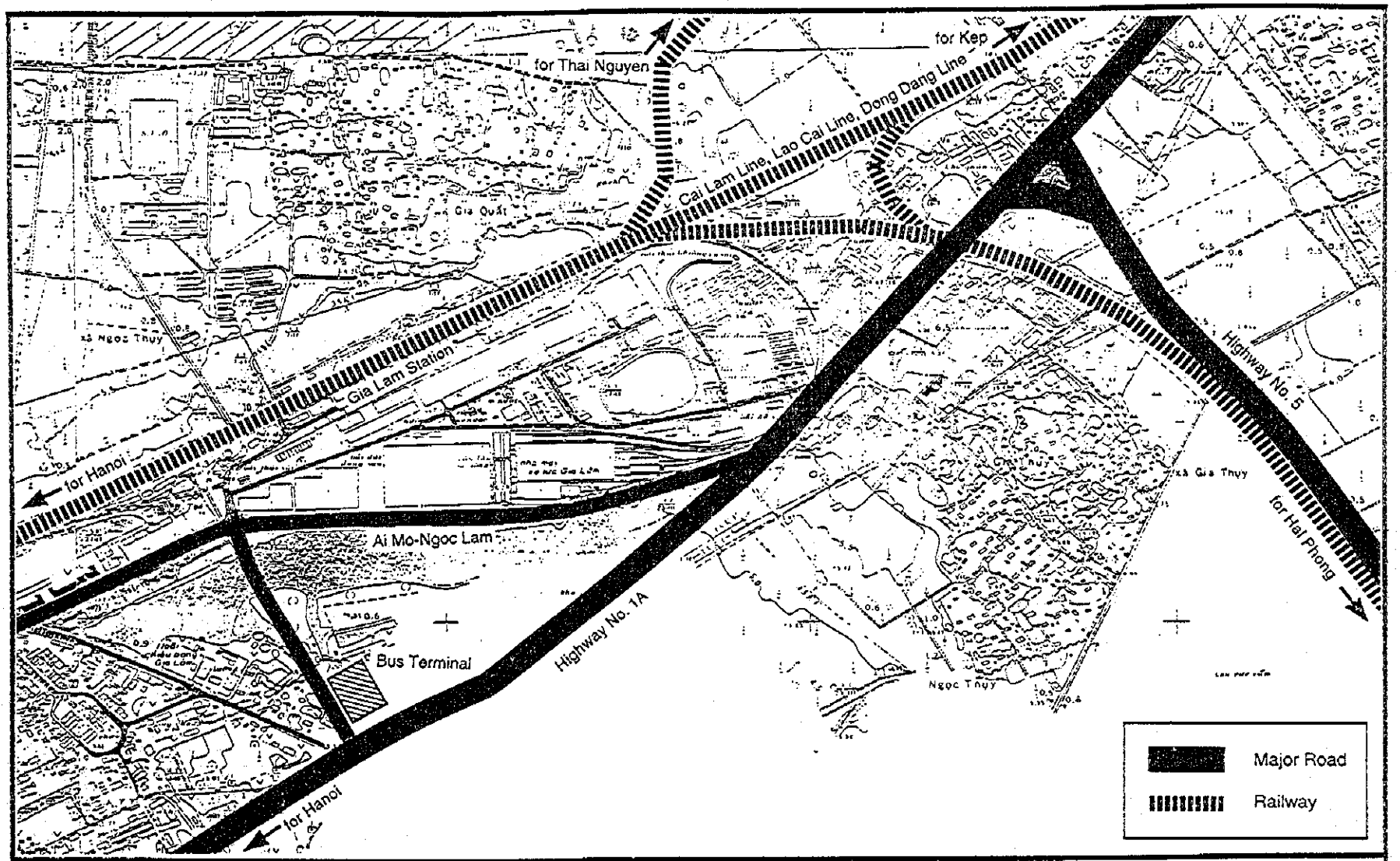


Fig. 8.16.8 Transportation Network around Gia Lam Workshop

8. 17 Level Crossing issues in Hanoi and Hochi Minh Cities

(1) Current Conditions

The main means of urban transport in Hanoi and Hochi Minh City today are bicycles and motorbikes. In particular, the number of motorbikes has been rapidly increasing in recent years. In contrast, public transport, including buses and the railway, plays only a minor role. The transport infrastructure in Hanoi with a population of approximately 3.15 million is far from satisfactory.

Ho Chi Minh City has a population of approximately 4 million and the transport demand of local residents and tourists has been rapidly increasing. Like Hanoi, motorbikes and bicycles are the main means of urban transport, accounting for 95-97% of the transportation volume and leaving public transport a share of 3-5%.

In both cities, railway level crossing are presenting serious problems to urban transport, and the authority concerned has recently announced to prohibit its train operation daytime (6:00 AM to 6:30 PM) from January 1996 within its cities(excluding Hanoi-Saigon through express train).

The transport demand in both cities is expected to grow in the future following the economic growth of Viet Nam and there is increasing concern in regard to (1) Chronic congestion during the morning and evening rush hours, (2) Increase of the number of traffic accidents, (3) Environmental problems, such as traffic noise and air pollution and (4) Inefficient socioeconomic activities resulting from the above problems and adverse impacts on civic life.

(2) Issues at Railway Level Crossing

The level crossing has following issues and they should be solved in the development program of respective cities.

- The closing of a level crossing disturbs the traffic flow of the road. Accordingly, the function of city will become inefficient. The road traffic flow has been increasing in both cities.
- Traffic accidents have occurred at level crossing, they disturb stability of train operation and give damage to people.
- The railway track on the ground divides the area of the city and disturbs a sound development of towns.

(3) Solution to the Problems

In order to solve railway level crossings issues mentioned above, there would be conceived two

major solutions, namely grade separation between railway and road, and to remove railway to the outside of the center of the city.

However if the railway is removed to the outside of the center of the city, another rail based or guided mass rapid transit (MRT) systems must be constructed in the near future to connect the center of the city and the terminal of the railway located outside of the city center.

Such MRT construction would require a huge amount of expenditure because it must be constructed through the already developed area of the city and acquisition of right-of-way would be expensive and difficult.
Accordingly, removing the railway to the outside of the city must be examined very carefully from various points of view.

On the other hand, grade separation of the existing railway system would be easier because it can make effective use of existing facilities and equipment.
Here in this section, the solution by grade separation would be discussed as given below.

(4) Solution by grade separation

A grade separation in a large city needs to be formulated in the frame work of overall city planning including road network planning, land use planning and the demand of traffic flow.
By grade separations, railway level crossing issues mentioned in(2) above will be solved completely or sufficiently.

There are several types of grade separation as follows:

1) Railway viaduct structure type
   1-1 continuous type
   1-2 discrete type
2) Railway underground (subway) type
3) Road flyover type

The realization of a grade separation is not an easy work because it needs a considerable amount of expenditure. It should be noted that by grade separation, the benefit is mainly shared by road transport. In Japan it is estimated that share of benefit by railway is about 5～10%. Accordingly the railway authority bears only 5～15% of grade separation cost and the rest is borne by road administrator in Japan.

(5) Advantages and disadvantages of each type of grade separation

As mentioned in (4) above there may be conceived 4 alternatives for the structures of the grade separation in Ha Noi and Ho Chi Minh cities;

- Viaduct(continuous bridge) structure type
- Viaduct (discrete) structure type
- Under ground (subway) structure type
- Road flyover construction

Advantages and disadvantages of each type are given as follows:

1) Under ground (subway) structure type

This type has the following disadvantages for construction and maintenance :

- Construction cost is 2-7 fold of the viaduct type. Especially an underground station needs much cost.
- Operation cost for drainage, air ventilation and lighting is expensive. They share a half of the whole energy consumption for operation
- Anti fire and evacuation facilities and system are necessary. The electric train operation is favorable for the under ground track. Rolling stock needs countermeasures for fire, therefore, the cost for them is higher than usual car.
- Construction works disturb road traffic to some extent when construction is executed by open cut method.

Merits of this type are as follows;

- Most of under ground railways are constructed under roads, therefore, acquisition of land is not necessary.
- No obstacles to urban development.
- No obstacles to urban landscape.
- Less environmental problems (no noise, no hindrance to radio wave, no sun shade)

2) Grade separation by viaduct (continuous)

Demerits of this type are as follows;

- Land acquisition is necessary
- Landscape is necessary to be taken into consideration.
- Noise, sunshade, hindrance to radio wave.

This type has the following merits comparing with under ground type or other types.

- Cost is moderate
- Maintenance is easy

- There is no worry for air ventilation ,drainage, lighting and fire, but a passenger evacuation system needs to be considered in case of train accidents.
- Space under viaduct can be utilized for parking space or shops or offices.
- No obstacle to urban development

3) Grade separation by viaduct (discrete type)

Compared with continuous type, cost is cheeper, landscape issue will be less, however it will present an obstacle to city development because except discrete grade separation point, the railway divides the city into two parts.

4) Road flyover

Disadvantage of this type : interference to city development because railway and road slope divides the city into two or four portions.

Merits : Generally cost is cheapest among the 4 types

(6) Grade Separation Alternatives for Hanoi and Hochi Minh Railway Level Crossing Problems

1) Hanoi City

There may be 3 alternative solutions for Hanoi City. In considering 3 alternatives, the following preconditions has been considered.

(a) Between Long Bien Bridge and Hanoi Station, continuous viaduct solution will be considered, because railway track near the Long Bien Bridge is already elevated and many large roads are crossing rail roads close to each other. Continuous viaduct will be the only solution.

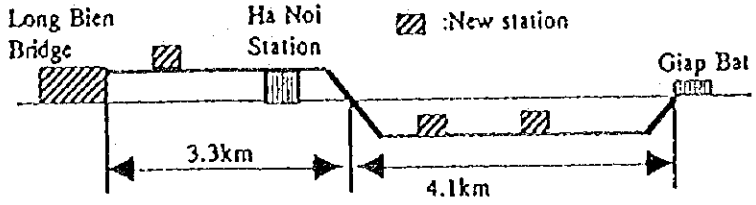
(b) In this discussion, railway main tracks at Station will be assumed also to be elevated. However, elevation of sidings at station yard will not be considered. Such elevation must be carefully studied and possibility of relocation of passenger coach yard must be also studied. Outline of each alternative and estimation of rough cost for each alternative are given as follows:

Grade Separation in Hanoi (Unit: US$ million)

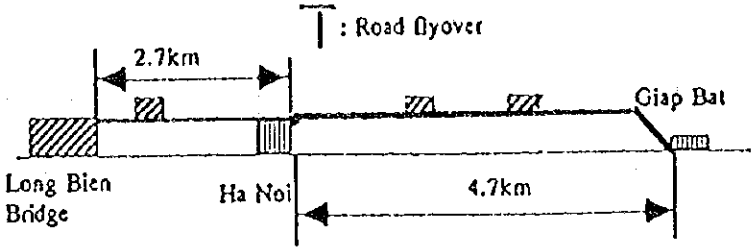
		Unit	Unit cost	Alternative 1 Underground		Alternative 2 Viaduct		Alternative 3 Road flyover	
				Qty	Cost	Qty	Cost	Qty	Cost
Underground		km	40	4.1	164.0				
Viaduct	6m height	km	22	3.3	72.6	7.4	162.8	3.3	72.6
Station Viaduct	6m height	station	5	1	5.0	3	15	1	5
	Underground	station	21	2	42				
	Hanoi	station	37	1	37	1	37	1	37
Additional cost		flyover	4					2	8
Total Cost					320.6		214.8		122.6

* Line is assumed as double track. Hanoi station has 6 tracks and 4 platforms.

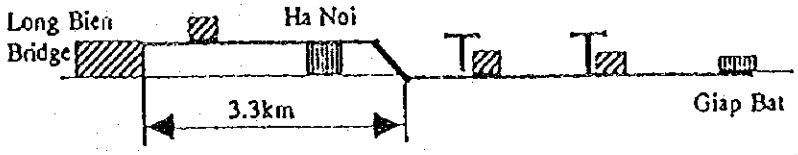
Alternative 1: Undergroud Structure



Alternative 2: Viaduct Structure



Alternative 3: Road Flyover



(*) For the alternative 2, with respect to the large roads between Hanoi and GiapBat crossing the Hanoi - Hochi Minh Railway and Road No.1, there may be considered various solutions for grade separation with Road No. 1, such as (a) crossing roads flying over road No. 1, and the railway viaduct runs further over these flyovers, (b) Road No. 1 flyovers the crossing roads, (c) roads flyover the viaduct of railways etc. However, here we assumed the railway viaduct as the height of 6 m.

2) Hochi Minh City

For Hochi Minh City we assumed only two alternatives, namely

Alternative 1 : Underground for the whole section. Saigon Station was assumed at grade.

Alternative 2 : Viaduct for the whole section. Saigon Station also elevated.

The rough cost estimate for each alternative is given below:

Grade Separation in Hochi Minh City (Unit : million US$)

	Unit	Unit cost	Alternative 1 Underground		Alternative 2 Viaduct	
			Qty	Cost	Qty	Cost
Underground	km	40	7.2	288.0		
Viaduct 6m height	km	22			7.2	158.4
Station Viaduct (6m height)	station	5			3	15.0
Underground		21	3	63		
Saigon Station		37				37
Total				351.0		210.4

*The track is assumed as double track.

(7) Construction Period.

Rough construction period required for grade separation work for Hanoi and Hochi Minh City are given below.

(a) Hanoi City

(i) Alternative 1

	1st Year	2ndYear	3rd Year	4th Year	5th year	6th year
Design	---------	---				
LandAcquisition	---------	---------	---			
Temporaly work		---------	---------	-----	--------	--
Excavate/Burry		-----	---------	---------	------	--
Structure work			---------	---------	-----	
Track work					---------	
Removal of track	------					-----

(ii) Alternative 2 &3

	1st Year	2ndYear	3rd Year	4th Year
Design	----------	----		
Land Acquisition	----------	----------		
Viaduct work		----------	----------	
Track work			------	------
Removal of track	------			------

(b) Hochi Minh City

(i) Alternative 1

	1st Year	2ndYear	3rd Year	4th Year	5th year	6th year
Design	---------	---				
LandAcquisition	---------	---------	---			
Temporaly work		---------	---------	-----	--------	--
Excavate/Burry		-----	---------	---------	------	--
Structure work			---------	---------	-----	
Track work					---------	
Removal of track						-----

(ii) Alternative 2

	1st Year	2ndYear	3rd Year	4th Year	5th Year
Design	----------	---			
Land Acquisition	----------	----------	----------		
Viaduct work		--------	----------	----------	
Track work				-------	----
Removal of track	------				------

In estimating the construction periods above, we assumed subway construction method as open cut with cover.

(8) Procedure for realization of grade separation

The final solution for railway level crossings will be the grade separation of railway track and crossing roads. However it must be planned based on the overall city planning and will require the large amount of investment. Accordingly it can be considered as a long term plan.

Firstly the city planning including land use and road network planning must be established. Based on this established city planning, feasibility studies for railway-road grade separation issues in Hanoi and Hochi Minh Cities must be carried out. Feasibility studies will provide optimal types of grade separation, estimation of cost, construction period, optimal timing of construction and economical and financial analysis of the project.

(9) Urgent Countermeasures for Disturbance of Level Crossings

As it will be a long way to implement the grade separation project, an urgent countermeasures to reduce the disturbance of level crossing is recommended as a short-term plan. Urgent measures are presented below.

There are many level crossings in Tokyo, Osaka and other cities and commuter trains run every 2 or 3 minutes in Japan. People is irritated but accepts such situation as a public tolerance * because the running priority is given to railways and railways play an important role in the transport network in Japan. It is recommended to apply such standards to Viet Nam.

* public tolerance: People who lives in modernized and mechanized society needs to tolerate some environmental problems (noise from car and train, disturbance at level crossing) in order to keep the modernized society system.

The interval of red signal at a road level crossing with main traffic road is usually 45-90 seconds in Japan and Europe. Since disturbance by red signal of a railway level crossing is about 40 seconds, it is no longer than disturbance of road traffic at modernized level crossings.

It is recommended that VNR modernize level crossings in Ha Noi and Ho Chi Minh cities.

1) Alarming time

According to the declaration of Japanese Ministry of Transport, following criteria is ruled in Japan:

- (Motion time of gate barriers) Time from the beginning of alarm up to the closing of the gate is over 10 seconds and 15 seconds is the standard.
- (Time from closing the gate until a train coming) Time from the closing of the gate up to the arriving of a train at the level crossing is over 15 seconds and 20 second is the standard. (Total closing time of the gate is about 40 seconds)

- The motion of the gate to open should be commenced after the train passing.
- Time of the beginning of alarming at the level crossing signal (with no gate nor barrier) up to the arriving of a train is over 20 seconds.

2) Objectives of crossing guarded

There are 25 level crossings registered between Long Bien Bridge and Giap Bat and 12 between Bien Trieu and Saigon.

The interval of crossing that are equipped with alarming devices needs to be over 300m because of technical reasons. The most reliable alarm system uses the track circuit and the minimum length of track circuit is about 300m.

The number of planned crossing guarded with gate is 19 in Hanoi and 10 in Hochi Minh cities. Other level crossings and un-registered ones should be closed.

3) System of alarming facilities

Bell and flasher signals, automatic gates and signal posts to show closing of the gate for train drivers are a set of a level crossing signal system. Signals are controlled with a track circuit that is the most reliable signalling system. Ballast of track is cleaned in order to keep an electrical insulation for a track circuit.

Gate keepers arrange the flow of traffic during crossing barriers descent automatically.
When a track circuit detects train approaching and sends signal to the crossing, bells and flasher lamps start to decent and signal post shows for train drivers that bells are ringing and the flasher lamps are flashing.

4) Rearrangement of crossing

It is not reasonable to invest alarm equipment for all crossings at present, therefore, it is necessary to reduce the number of crossings used. Reasonable interval of crossings is 300-500m, so that crossings to be guarded will be selected according to the current traffic situation and future road network planning respectively.

Small traffic path should be closed. Sub-roads will be constructed in return for closing crossings in order to detour to another safety crossing.

The rigid fence will be constructed in order to prohibit disorderly crossing the railway track and to guard the safety of high speed train operation.

5) Acquisition and compensation of land and house

It is better to secure the width of double track in this project because land acquisition will become difficult year by year.

Acquisition and compensation will be implemented in advance the commencement of the construction. The width of double track is approximately 10m and a width of side road from a deleted level crossing will be negotiated with the city authority.

In order to recover order for the right of way and secure train running safety, the rigid fence is constructed along the track.

Chapter 9 Project Profiles for Cost-Benefit Analysis in the Feasibility Studies

9.1 General

(1) Investment cost

List and cost of projects described in this chapter are as follows:

(Unit: million US$)

Project	Total Cost	Local Currency	Foreign Currency
Modernization and Efficiency of VNR Management	7.12	0.18	6.94
Overall Rehabilitation at Hanoi-Thanh Hoa Section	45.83	14.64	31.19
Overall Rehabilitation at Hue Da Nang Section	41.52	12.10	29.42
Overall Rehabilitation at Muong Man-Saigon Section	59.01	18.67	40.34
Bridge Replacement and Rehabilitation	82.37	12.80	69.57
Tunnel Rehabilitation	7.26	1.27	5.99
Track-crossing Drain and Side Drain Widening and Construction	1.36	1.19	0.17
Track and Other Structure Rehabilitation and Improvement	42.59	10.82	31.77
Station Improvement	0.84	0.77	0.07
Signal Rehabilitation and Improvement	13.06	2.20	10.86
Telecommunication Rehabilitation and Improvement	4.48	0.76	3.72
Rolling Stock Plan	107.80	29.00	78.80
Gia Lam Rolling Stock Workshop Improvement	30.04	6.46	23.58
High Speed Train for Hanoi-Saigon Section	28.00	6.50	21.50
Hai Van Pass Transport Capacity Improvement	9.62	8.33	1.29
	480.9	125.69	355.21

(2) Sequence of implementation

The following matters should be taken into consideration for the implementation and procurement, when a sequence of projects is arranged:

(a) Basic function improvement items

Basic function improvement items, such as **"9.2 Improvement of Management"**, **"10.1 Railway School"** and **"10.2 Bridge Technology Center"** projects will take a long time to realize its effect in the management of VNR. Therefore, these basic function improvement projects should be started as fast as possible. Costs of these effective improvement are not expensive and some part of them is possible to commence by the budget of VNR.

(b) Basic technical functions for implementation

Basic technical functions, such as technology and machines/equipment/tools, for bridge and track maintenance/rehabilitation should be installed prior to the implementation work.

(c) Inspection and studies

Inspection and survey for bridges, tunnels and submerged sections should be executed in advance of repair works of them in order to formulate suitable repair plans and to use budget efficiently. These projects include technology transfer of advanced technology.

Studies for several projects implemented in the near future, such as "**Freight Transport Study**" and "**Hai Van Pass New Tunnel Survey**" are better to be completed as fast as possible.

(d) Domestic production capacity

Materials and products made in Viet Nam should be used as much as possible. The domestic production will contribute in reducing project costs, create jobs and raising the technology and capacity of Viet Nam. It will eliminate time consuming import procedures and then shorten procurement time. Therefore, an installation or improvement of production machines and technology, such as for domestic production of rolling stock, turnouts, crushed stone, pre-stressed concrete sleepers and motor cars and track machines/equipment, should be arranged at first.

(e) Rolling stock

The new rolling stock being necessary for the projects should be manufactured in Viet Nam. "**The Gia Lam workshop improvement**" should be implemented as fast as possible. This project will raise design capacity and level of rolling stock quality.

(f) Sequence of implementation work

As a result, there are sequence of execution shown in Fig 9.1.1 Sequence of Project Implementation.

(g) Priority section projects

"**The priority section projects**" will includes many fields of improvements such as:

- Management and marketing reformation in passenger and freight transport
- Upgrading of passenger and freight transportation services in order to increase customers and income

- Upgrading and modernization of track maintenance capacity
- Rehabilitation and replacement of track, bridges, signaling, telecommunications and rolling stock
- Countermeasures for safety and stable train operation

Therefore, priority should be given for the **"priority section projects"**.

(h) Equalizing of work

There are a lot of woks to be implemented by 2010. These works should be executed equally every year in order to use Vietnamese capacity and facilities efficiently. Capacity, manpower, technicians, skilled workers, technology, machines and equipment in Viet Nam should be utilized in an average.

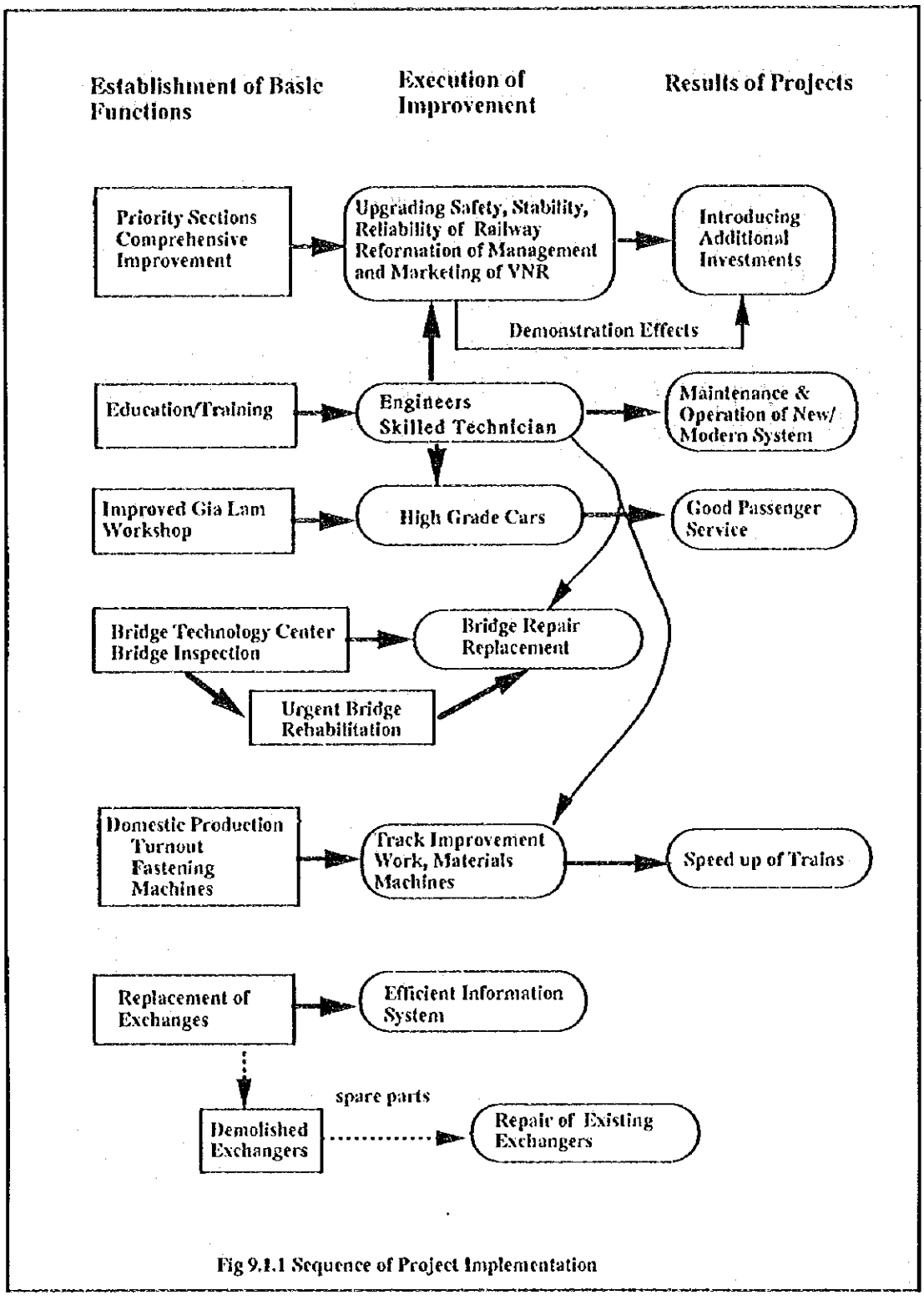


Fig 9.1.1 Sequence of Project Implementation

9.2 Modernization and Efficiency Improvement of VNR Management(MIS)

(1) Name of Project: Modernization and Efficiency Improvement of VNR Management(Management Information System, MIS)

(2) Priority: A

(3) Location: Hanoi and whole VNR

(4) Cost:

Cost is shown as follows:

Phase 1 System Design Investment Costs (Unit: million US$)

Investment Items	Foreign Currency	Local Currency	Total
Expatriate expert fee	3.034		3.034
Office supporting cost	0.128	0.025	0.153
Documents & reports cost		0.060	0.060
Overseas training	0.594		0.594
Office computer fee	0.080		0.080
Total	3.836	0.085	3.921

Phase 2 Equipment Investment Costs (Unit: million US$)

Investment Items	Foreign Currency	Local Currency	Total
Computer system construction	1.410	0.052	1.462
Programming of software	1.200		1.200
Consulting engineering	0.270		0.270
Total	2.880	0.052	2.932

Total Investment Costs (Unit: million US$)

Investment Items	Foreign Currency	Local Currency	Total
Phase 1 System design	3.836	0.085	3.921
Phase 2 Equipment	2.880	0.052	2.932
Contingency	0.224	0.043	0.267
Total	6.940	0.180	7.120

(5) Objectives:

There are many obstacles to be tackled to modernize VNR. There should be visions and direction of VNR for the purpose of strengthening of managerial and financial structure for grasping accurately user's needs, taking into account of dual aspects of railway as publicity and business and recognizing the role and function of railway in transport system. The following is the major managerial problems to be resolved:

- Restructuring of management form
- Improvement of productivity and rationalization
- Modernization of financial and accounting system
- Strategic fare policy
- Policy for increasing revenue
- Policy for reduction of expenditures
- Management diversification

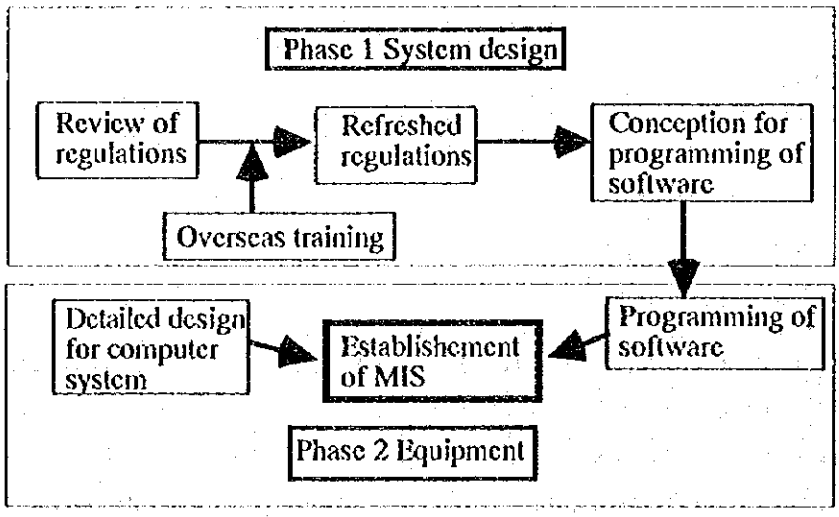
Above mentioned policies will be formulated and implemented based on the appropriate hot management information. Therefore, this project will present up-to-date management information for managers of VNR and detect real daily management condition by the results of this project.

(6) Implementation Schedule:

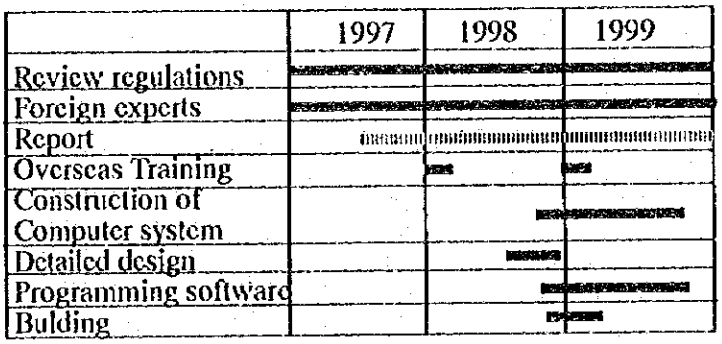
This project will be divided into 2 Phases:
Phase 1: System Design
Restructuring of management organization, system and institute, review of rule and standards will be executed in Phase 1.

Phase 2: Equipment
Hard and software of management information system will be constructed in Phase 2. Programs for computer software are composed after conception and condition for programming are decided in Phase 1.

Sequence of each component is shown as follows:



Implementation schedule is as follows:



(7) Components:

a. Restructuring of management organization, institute and regulation

Toward structure of strategic management information system, the following systems and regulations (standards) of VNR are needed to be studied and restructured.

(a) Financial and accounting system and regulations(standards)
(b) Fare system and regulations(standards)
(c) Personnel administration system and regulations(standards)
(d) Salary system and regulations(standards)
(e) Management system and regulations(standards)

b. Establishment of management information system

For the purpose of computer processing of management information, the new working manuals are prepared for accounting works, salary calculation, materials management, repair management, consignors ledger, seat reservation and so on.

The basic facilities for information strategic management will be carried out by the following tactics:

(a) Overall office automation by rationalization of manual works in the middle stage

(b) Establishment of sales strategy by preparing system to cope with diversification of sales network

(c) Establishment of system to support managerial strategies stetting up data base, making information for control on staffs, materials, repair and so on and for supporting them.

The components of the project are as follows:

	Unit	Quantity
Expatriate expert(3 experts)	Man-Month	108
Typist and clerk	Man-Month	72
Interpreter	Man-Month	54
Office equipment	Lump sum	1
Document and report	set	6
Overseas training(1 month)	person	18
Office computer	set	10
Construction of computer system	Lump sum	1
Soft ware program	set	20
Consulting for the system	Lump sum	1

(8) Relations with other projects

This project is closely related to telecommunication projects, Especially, the seat reservation system in Program 2000 is indispensable for strategic management information system. Then it must be careful to estimate construction cost refraining from wasting money, and implementation schedule of both projects must be carefully coordinated.

(9) Others

There is no particular problems.

9.3 Overall Rehabilitation at Hanoi-Thanh Hoa (175km)

(1) Name of Project: Overall Rehabilitation between Hanoi-Thanh Hoa

(2) Priority: A

(3) Location: Hanoi-Thanh Hoa

(4) Cost:

Investment Components (Unit: million US$)

	Foreign Currency	Local Currency	Total
Rail Welding	0.55	1.27	1.82
Turnout Replacement	1.99	1.39	3.38
Track Improvement	11.20	5.94	17.14
Track Ballast Adding		1.12	1.12
Crossing Pavement Improvement		0.16	0.16
Track Maintenance Machines	2.24	0.53	2.77
Bridge Reahbiliotation	4.60	1.58	6.44
Rainfall Gauges	0.05		0.05
Station Building Improvement	0.37	0.46	0.83
Station Track improvement	0.17	0.51	0.68
Loading Machines	0.88	0.09	0.97
Signal Improvement	2.40	0.44	2.84
Telephone Exchange	0.95	0.23	1.18
Underground Cable Laying	5.53	0.92	6.45
Total	31.19	14.64	45.83

Rolling stock cost of 20.70 US$ million for the project is excuded and it is included in "9.13 Rolling Stock Plan".

(5) Objectives:

A priority section between Hanoi and Thanh Hoa Line is selected for an intensive investment, improvement and rehabilitation. Within this section, almost all the rehabilitation and improvement work are all subjects, and are designed to generate a definite results up to the year 2000. This section can be a model section for other remaining sections. Priority sections aim at attracting loan provision from the domestic and international financial organizations.

The comprehensive improvement plan is designed to make VNR more attractive and effective to increase the passenger and cargo volume, aiming at the same time, improving the management and financial status of the VNR.

The following comprehensive investments will be executed for the improvement, modernization and rationalization:

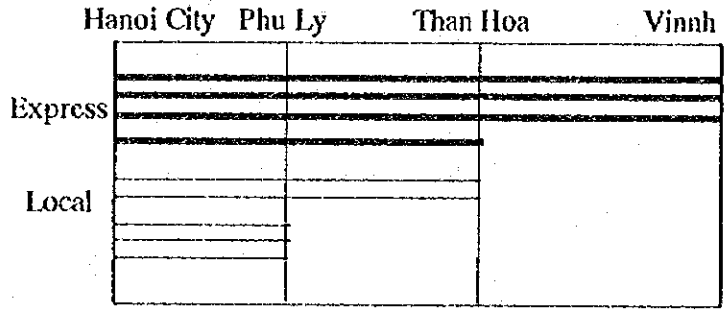
(a) Upgrading of passenger services

Shortening of travel time(speed and waiting time), frequent train operation service, comfortable accommodation of passenger cars and feeder service are essential services for passenger marketing.

- Passenger service facilities such as ticket sales counters, waiting rooms, toilet, shopping and restaurant, parking spaces for bicycle and motor-bikes and station front plazas at Hanoi, Phu Ly, Nam Dinh and Thanh Hoa stations will be installed and improved.
- Seat Reservation system will be installed at Hanoi, Nam Dinh and Thanh Hoa stations.
- Required number of passenger cars will be innovated for comfortable cars.
- Parking spaces will be provided for the passenger access and egress to and from stations.

(b) Frequent service of inter-city and local trains

The following inter-city express and local/commuter trains will be provided.



*Excluding limited express trains operated between Hanoi-Saigon

(c) Freight loading machines

Cargo loading machines are installed for major cargo handling stations and other stations will stop the handling of cargo. A set of folk lift and other machines are installed for a station.

Major stations are as follows:

Giap Bat, Van Dien, Ninh Binh, Cau Yen, Dong Giao, Bim Son, Thanh Hoa and Yen Thai (8 stations).

(d) Railway structure improvement

The following improvements will be implemented in order to speed-up, improve work efficiency and grade up technology;

- Rail welding from 12.5m rails to 25m rails
- Replacement of superannuated turnouts with heavier rails.
- Upgrading of track structure at high speed operation. Installation of pre-stressed concrete sleeper production machines
- Adding of track ballast and innovation of a crushed stone factory and providing hopper wagons for delivering ballast.
- Pavements at level crossings will be improved for smooth passing of cars

(e) Modernization and rationalization of track maintenance work

The following improvements will be implemented in order to speed-up, improve work efficiency and grade up technology;

- Installation of track maintenance machines, equipment and tools for 7 track maintenance depots.
- A multiple tie-tamper will be purchased.
- Improvement of Dong Anh workshop: Dong Anh workshop(near Hanoi) will be improved for domestic production of turnouts, elastic fastenings and track maintenance equipment.

After finishing of these investment, maximum speed of trains will be raised from current 60km/h to 80km/h.

(f) Bridge rehabilitation

Bridges that have the speed restriction of 30km/h and less will be rehabilitated. The following bridges will be rehabilitated:

No.	Name	Location	Length	Speed
7	Ong Tao	103.5km	30	30 km/h
8	Ninh Binh	113.5km	224	30 km/h
9	Cau Yen	119.5km	42	30 km/h
12	Tnog Giang	144.3km	38	30 km/h
13	Cu	145.5km	36	30 km/h
Total			370m	

(g) Installation of modern signaling systems

VNR are implementing the replacement of signaling systems from a token to a tokenless block systems and from a semaphore to color light signals. However,

there are some remained stations not to be improved by 2000, so they will be implemented with this project.
Electric power sources will be installed for stations that have no electricity.

Level crossing alarm systems will be installed for national roads. Manned level crossings of 15 will be installed with train approaching alarm systems and gates.

(h) Installation of modern telecommunication systems
Telecommunication systems of this section are superannuated, accordingly, VNR lacks spare parts for maintenance.
A optical fiber cable will be laid from Hanoi to Thanh Hoa. A cable laying between Thanh Hoa and Vinh will be implemented with a telecommunication improvement project.
Exchanges will be installed at Phu Ly, Namh Dinh, Cau Yen and Thanh Hoa. The parts of demolished exchanges will be re-used for the repair of current exchanges.

(i) Unmanned stations
Employees at stations that have small amount of passengers will be eliminated in order to improve efficiency of man-power. Employees excluding dispatchers at stations that have small amount of passenger of below 100 per day should be eliminated.
Conductors on a train will treat ticket sales and checking.

(j) Disaster prevention
Rainfall gauges and wind velocity gauges will be installed at Hanoi, Ninh Binh and Thanh Hoa in order to manage train operations in heavy rains and storms

(6) Implementation Schedule:

Implemet Year	1996	1997	1998	1999	2000
Approval of Project					
Detailed Design					
Contract Negotiation					
Manufacturing Equipment					
Construction					
Unmanned Station					
Rail Welding					

(7) Components:

	Unit	Quantity
Rail Welding	spot	23,000
Turnout Replacement	set	97
Track Improvement	km	149
Track Ballast Adding	km	120
Crossing Pavement Improvement	place	102
Track Maintenance Machines	set	7
D. Anh Workshop improvement	Lp	1
Bridge rehabilitation	m	370
Rainfall Gauges	set	3
Station Building Improvement	station	4
Seat Reservation System	set	3
Station Track improvement	LS	1
Loading Machines	station	8
Color Light Signals	station	13
Level Crossing Alarm System	place	15
Telephone Exchange	set	4
Underground Cable Laying	km	175

(8) Investment Effects:

This comprehensive improvement project will make VNR more attractive and effective to increase the passenger and cargo volume. Improvement of the management and financial status of the VNR will be achieved with this project.

(9) Relation with Other Projects:

-Train operation plan of limited express trains between Hanoi-Saigon will be implemented with 9.15 High Speed Train for Hanoi-Saigon Section.

-Emergent Solution to Level crossing Issues in Hanoi City.

(10) Others:

9.4 Overall Rehabilitation at Hue-Da Nang (103km)

(1) Name of Project: Overall Rehabilitation between Hue-Da Nang

(2) Priority: B

(3) Location: Hue-Da Nang (103km)

(4) Cost:

Investment Components (Unit: million US$)

	Foreign Currency	Local Currency	Total
Rail Welding	0.22	0.69	0.91
Turnout Replacement	0.86	0.58	1.44
Track Improvement	5.61	3.10	8.71
Track Ballast Adding		0.94	0.94
Crossing Pavement Improvement		0.08	0.08
Rearrangement of Curves		0.23	0.23
Track Maintenance Machines	1.20	0.22	1.42
Rainfall Gauges	0.05		0.05
Station Building Improvement	0.16	0.19	0.35
Construction of Signal Sation	0.15	0.64	0.79
Station Track improvement		0.03	0.03
Loading Machines	0.22	0.02	0.24
Bridge Rehabilitation	11.91	3.77	15.68
Tunnel Rehabilitation	6.09	1.05	7.14
Signal Improvement	1.32	0.23	1.55
Telephone Exchange	1.60	0.33	1.93
Seat Reservation System	0.03		0.03
Total	29.42	12.10	41.52

Rolling stock cost of 10.30 US$ million for the project is excuded and it is included in "9.13 Rolling Stock Plan".

(5) Objectives:

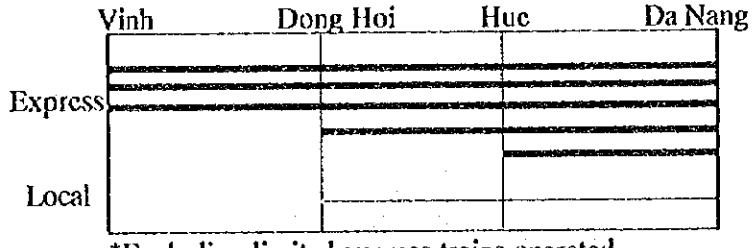
A priority section between Hue and Da Nang Line is selected for an intensive investment, improvement and rehabilitation. Within this section, almost all the rehabilitation and improvement work are all subjects, and are designed to generate a definite results up to the year 2000. This section can be a model section for other remaining sections. Priority sections aim at attracting loan provision from the domestic and international financial organizations.

The comprehensive improvement plan is designed to make VNR more attractive and effective to increase the passenger and cargo volume, aiming at the same time, improving the management and financial status of the VNR.
The following comprehensive investments will be executed for the improvement, modernization and rationalization:

(a) Upgrading of passenger services
Shortening of travel time(increasing speed and reducing waiting time), frequent train operation service, comfortable accommodation of passenger cars and feeder service are essential services for passenger marketing.

- Passenger service facilities such as ticket sales counters, waiting rooms, toilet, shopping and restaurant, parking spaces for bicycle and motor-bikes and station front plazas at Hue and Da Nang stations will be installed or improved.
- Seat Reservation systems will be installed at Hue, Lang Co and Da Nang stations.
- Required number of passenger cars will be innovated into comfortable cars.
- Parking spaces will be provided for the passenger access and egress to and from stations.

(b) Frequent service of inter-city and local trains
The following inter-city express and local/commuter trains will be provided.



*Excluding limited express trains operated between Hanoi-Saigon

(c) Freight loading machines
Cargo loading machines are installed for Hue and Da Nang stations, and other stations will stop the handling of cargo. A set of folk lift and other machines are installed for Hue and Da Nang stations.

(d) Railway structure improvement
The following improvements will be implemented in order to speed-up, improve work efficiency and grade up technology;

- Rail welding from 12.5m rails in length to 25m rails
- Replacement of superannuated turnouts with heavier rails.

- Upgrading of track structure at high speed operation. Installation of pre-stressed concrete sleeper production machines.
- Adding of track ballast and innovation of a crushed stone factory and providing hopper wagons for delivering ballast.
- Pavements at level crossings will be improved for smooth passing of cars

(e) Modernization and rationalization of track maintenance work

The following improvements will be implemented in order to speed-up, improve work efficiency and grade up technology:

- Installation of track maintenance machines, equipment and tools for 3 track maintenance depots.

After finishing of these investment, maximum speed of trains will be raised from current 60km/h to 80km/h.

(f) Bridge rehabilitation

Bridges that have the speed restriction of 30km/h and less will be rehabilitated. The following bridges will be rehabilitated:

No.	Name	Location	Length	Speed
97	Huong Thuy	697.3km	42m	30 km/h
98	Phu Bai	706.8km	52m	30
99	Nong	708.7km	100m	30
100	La Son	710.7km	22m	30
101	Cho Hom	713.2km	42m	30
102	Truoi	715.0km	120m	30
103	Chia	716.6km	22m	40
105	Ong Loai	719.8km	21m	30
106	Hai	728.9km	21m	30
108	Nuoc Ngot	736.4km	42m	30
109	Thua Luu	740.9km	82m	30
126	Nam O	778.1km	276m	15
Total			842m	

(g) The following 2 tunnel has a speed restriction of 15km/h due to deterioration and reduced clearance by temporary supports. They will be repaired.

No	Name	Location	Length
7	Cau Hai	732km816m	358m
8	Phu Gia	745km690m	445m

(h) Installation of modern signaling systems

VNR are implementing the replacement of signaling systems from a token to a tokenless blocking systems and from a semaphore to color light signals. However,

there are some remained stations not to be improved by 2000, so they will be implemented in this project. Electric power sources will be installed for stations that have no electricity.

Level crossing alarm systems will be installed for national roads. Manned level crossings of 4 will be installed with train approaching alarm systems and gates.

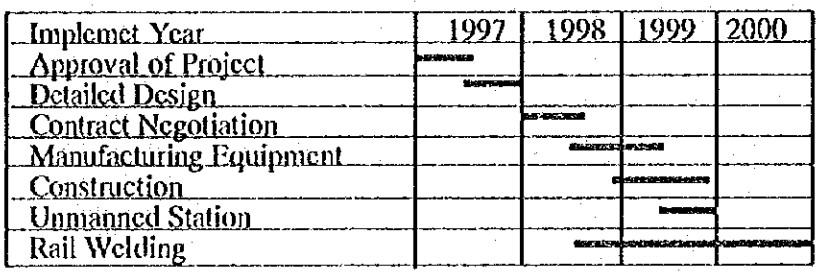
(i) Installation of modern telecommunication systems
Telecommunication systems of this section are superannuated and VNR lacks spare parts for maintenance.
Exchanges will be installed at Hue and Cau Hai. The parts of demolished exchanges will be re-used for the repair of current exchanges.

(j) Unmanned stations
Employees at stations that have small amount of passengers will be eliminated in order to improve efficiency of man-power.
Employees excluding dispatchers at stations that have small amount of passenger of below 100 per day should be eliminated. Conductors on a train will treat ticket sales and checking.
Stations except Hue, Lang Co and Da Nang will be unmanned stations.

(k) Disaster prevention
Rainfall gauges and wind velocity gauges will be installed at Hue and Da Nang in order to manage train operations in heavy rains and storms

(l) Construction of a signal station
The traffic capacity between Hue-Lang Co-Kim Lien is lowest on the Hanoi-Saigon due to the severe geographical features at Hai Van Path. Adding two signal stations is necessary by 2000 according to the train operation program.
A signal station will be constructed at the location of 748km between Thua Luu-Lang Co stations and another is at 768km between Dinh Deo-Ha Van Nam stations. The former signal station cost is included in this project, however, another signal station at 768km is formulated as 9.16 Hai Van Pass Transport Capacity Improvement Project.

(6) Implementation Schedule:



(7) Components:

	Unit	Quantity
Rail Welding	spot	12,600
Turnout Replacement	set	41
Track Improvement	km	75
Track Ballast Adding	km	100
Crossing Pavement Improvement	place	53
Track Maintenance Machines	set	5
Bridge rehabilitation	m	842
Rainfall Gauges	set	3
Station Building Improvement	station	2
Seat Reservation System	set	3
Station Track Improvement	LS	Da Nang
Signal station at 748km	station	1
Loading Machines	station	2
Color Light Signals	station	5
Construction of Signal Station	station	1
Level Crossing Alarm system	place	4
Telephone Exchange	set	2

(8) Investment Effects:

This comprehensive improvement project will make VNR more attractive and effective to increase the passenger and cargo volume. Improvement of the management and financial status of the VNR will be achieved with this project.

(9) Relation with Other Projects:

The following project and study are related for the improvement of this section:

-9.16 Hai Van Pass Transport Capacity Improvement

-10.7 Route Selection of New Ha Van Tunnel

-Train operation plan of limited express trains between Hanoi-Saigon will be implemented with 9.15 High Speed Train for Hanoi-Saigon Section.

(10) Others:

9.5 Overall Rehabilitation at Muong Man-Saigon (175km)

(1) Name of Project: Overall Rehabilitation between Muong Man-Saigon

(2) Priority: A

(3) Location: Muong Man-Saigon(175km)

(4) Cost:

Investment Cost (Unit: million US$)

	Foreign Currency	Local Currency	Total
Rail Welding	0.55	0.96	1.51
Turnout Replacement	1.29	0.91	2.20
Track Improvement	19.79	6.14	25.93
Track Ballast Adding		1.22	1.22
Crossing Pavement Improvement		0.11	0.11
Track Maintenance Machines	2.18	0.31	2.49
Rainfall Gauges	0.03		0.03
Road Bed Improvement	0.39		0.39
Station Building Improvement	0.31	0.37	0.68
Station Track improvement	4.29		4.29
Bridge Rehabilitation	7.56	2.47	10.03
Loading Machines	0.11	0.01	0.12
Signal Improvement	1.84	0.32	2.16
Telephone Exchange	0.87	0.21	1.08
Underground Cable Laying	5.81	0.96	6.77
Total	40.34	18.67	59.01

Rolling stock cost of 9.40 US$ million for the project is excuded and it is included in "9.13 Rolling Stock Plan".

(5) Objectives:

A priority section between Muong Man and Saigon Line is selected for an intensive investment, improvement and rehabilitation. Within this section, almost all the rehabilitation and improvement work are all subjects, and are designed to generate a definite results up to the year 2000. This section can be a model section for other remaining sections. Priority sections aim at attracting loan provision from the domestic and international financial organizations.

The comprehensive improvement plan is designed to make VNR more attractive and effective to increase the passenger and cargo volume, aiming at the same time, improving the management and financial status of the VNR.

The following comprehensive investments will be executed for the improvement, modernization and rationalization:

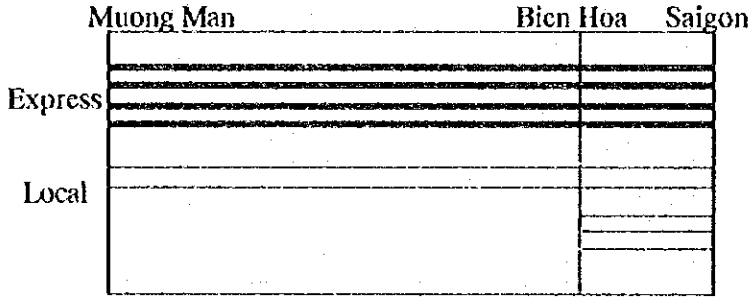
(a) Upgrading of passenger services

Shortening of travel time(speed and waiting time), frequent train operation service, comfortable accommodation of passenger cars and feeder service are essential services for passenger marketing.

- Passenger service facilities such as ticket sales counters, waiting rooms, toilet, shopping and restaurant, parking spaces for bicycle and motor-bikes and station front plazas at Muong Man and Saigon stations will be improved.
- Seat Reservation systems will be installed at Muong Man, Bien Hoa, Binh Trieu and Saigon stations.
- Required number of passenger cars will be innovated for comfortable cars.
- Parking spaces will be provided for the passenger access and egress to and from stations.

(b) Frequent service with inter-city and local trains

The following inter-city express and local/commuter trains will be provided.



*Excluding limited express trains operated between Hanoi-Saigon

(c) Freight loading machines

Cargo loading machines are installed for a major cargo handling station such as Song Than, and other stations will stop the handling of cargo.

A set of folk lift and other machines are installed for Song Than Station.

(d) Railway structure improvement

The following improvements will be implemented in order to speed-up, improve work efficiency and grade up technology;

- Rail welding from 12.5m rails in length to 25m rails
- Replacement of 30kg/m rails and superannuated turnouts with heavier rails.

- Upgrading of track structure at high speed operation. Installation of pre-stressed concrete sleeper production machines
- Adding of track ballast and innovation of a crushed stone factory and providing hopper wagons for delivering ballast.
- Pavements at level crossings will be improved for smooth passing of cars

(e) Modernization and rationalization of track maintenance work

The following improvements will be implemented in order to speed-up, improve work efficiency and grade up technology;

- Installation of track maintenance machines, equipment and tools for 7 track maintenance depots.
- A multiple tie-tamper will be purchased.

After finishing of these investment, maximum speed of trains will be raised from current 60km/h to 80km/h.

(f) Bridge rehabilitation

Bridges that have the speed restriction of 30km/h and less will be rehabilitated. The following bridges will be rehabilitated:

No.	Name	Location	Length	Speed
300	Dong Nai Nho	1,699.2km	124m	30km/h
301	Dong Nai Lon	1,699.9km	200m	15km/h
Total			324m	

(g) Installation of modern signaling systems

VNR are implementing the replacement of signaling systems from a token to a tokenless blocking systems and from a semaphore to color light signals. However, there are some remained stations not to be improved by 2000, so they will be implemented with this project.

Electric power sources will be installed for stations that have no electricity.

Level crossing alarm systems will be installed for national roads. Manned level crossings of 9 will be installed with train approaching alarm systems and gates.

(h) Installation of modern telecommunication systems

Telecommunication systems of this section are superannuated, accordingly, VNR lacks spare parts for maintenance.

A optical fiber cable will be laid from Saigon to Muong Man.

Exchanges will be installed at Muong Man, Trang Tao, Xuan Loc and Song Than. The parts of demolished exchanges will be re-used for the repair of current exchanges.

(i) Unmanned stations

Employees at stations that have small amount of passengers will be eliminated in order to improve efficiency of man-power.

Employees excluding dispatchers at stations that have small amount of passenger of below 100 per day should be eliminated. Conductors on a train will treat ticket sales and checking.

Stations except Muong Man, Saigon and several stations in the Saigon urban area will be unmanned stations.

(j) Disaster prevention

Rainfall gauges and wind velocity gauges will be installed at Muong Man and Saigon in order to manage train operations in heavy rains and storms

(6) Components:

	Unit	Quantity
Rail Welding	spot	17,000
Turnout Replacement	set	64
Track Improvement	km	145
Track Ballast Adding	km	130
Crossing Pavement Improvement	place	72
Track Maintenance Machines	set	7
Bridge rehabilitation	m	324
Rainfall Gauges	set	2
Seat Reservation System	set	4
Station Building Improvement	station	3
Station Track improvement	LS	S. Than
Loading Machines	station	S.Than
Signal Improvement	station	7
Level Crossing Alarm stsem	Place	9
Telephone Exchange	set	4
Underground Cable Laying	km	175

(7) Implementation Schedule:

Implemet Year	1996	1997	1998	1999	2000
Approval of Project					
Detailed Design					
Contract Negotiation					
Manufacturing Equipment					
Construction					
Unmanned Station					
Rail Welding					

(8) Investment Effects:

This comprehensive improvement project will make VNR more attractive and effective to increase the passenger and cargo volume. Improvement of the management and financial status of the VNR will be achieved with this project.

(9) Relation with Other Projects:

-Train operation plan of limited express trains between Hanoi-Saigon will be implemented with 9.15 High Speed Train for Hanoi-Saigon Section.

-Emergent Solution to Level crossing Issues in Ho Chi Minh City.

(10) Others:

9.6 Bridge Replacement and Rehabilitation

(1) Project Title : Bridge replacement and Rehabilitation (for other sections)
(Bridge rehabilitation for priority sections is included in Clauses 9.3, 9.4, 9.5)

(2) Priority : A

(3) Location : Hanoi - Ho Chi Minh line (except priority section)

(4) Cost : Foreign currency $ 69.57 mil., local currency $ 12.80 mil.
Total US $ 82.37 mil.

(5) Objectives : There are many bridges which are damaged by war and lack of maintenance.
To keep the safe railway transport by improving dangerous bridges

(6) Implementation schedule : 1996 - 2000

Item	1996	1997	1998	1999	2000
Inspection	-------	-------	-------		
Design	---	-------	-------	---	
Work		-------	-------	-------	-------

(7)Components

: Improve 16 bridges

(a) Construct new bridge 8 bridges(No.80,83,128,135,138,147,285,286)

(b) Replace the beam 7 bridges(No.21,87,143,196,228,234,236)

(c) Repair existing beam 2 bridges (duplicate 1- (b) type)(No.143,216)

(d) Reinforce the foundation 7 bridges(No.21,143,196,216,228,234,236)

(Refer :Table 8.5.2)

(8) Investment Efficiency

: To be able to keep safety, stable transport and to decrease the maintenance cost

: Speed up trains by removing speed restriction

(9) Relation with Other Project : Bridge Inspection

: SAPROF Project of bridge rehabilitation

(10) Others : Establish beam manufacturing factory

: Introduce technique of building up beams

9.7 Tunnel Rehabilitation

(1) Project Title : Tunnel Rehabilitation

(2) Priority : B

(3) Location : Four (4) tunnels, i.e. Nos. 1, 4, 16, 17 in which the train speed is restricted at 15 km/h will be repaired.

(4) Cost : US$ 7.26 Million

(Unit: US mil$)

Investment Item	Foreign Currency	Local Currency	Total
Rehabilitation	5.15	1.27	6.42
Engineering	0.84	0.00	0.84
Total	5.99	1.27	7.26

(5) Objectives :

1) Tunnels between Hanoi and Ho Chi Minh City were constructed in 1925 - 1936. Being 60 - 70 years old, deterioration is conspicuous of concrete for lining. Part of those tunnels have an evidence of collapse, part of the tunnels have been temporary supported by rails, there are some tunnels in which the construction gauge has been impeded. In some tunnels, train speed has been restricted at 15 km/h.

2) Tunnels in which train speed has been restricted at 15 km/h for reasons being that the lining suffers a considerable deterioration, cracks occur at many locations, and temporary support exists, etc. will have to be repaired or strengthened by the year 2000, and safety on train operation has to be secured eliminating the speed restriction.

(6) Implementation Schedule:

Item	1996	1997	1998	1999	2000
Inspection	----------				
Design	-----	----------			
Work		----------	----------	----------	----------

(7) Components

No.	Name	Kilometerage	Length (m)	Type of Repairs/Length				
				A-1	A-2	A-3	A-4	B
1	Minh Cam So 1	455+417	64			19	45	
4	Le Son So 1	466+091	96			15	36	45
16	Phu Cu	1026+749	171		171			
17	Chi Thanh	1168+537	336		336			
	Total		667	0	507	34	81	45

(8) Investment Efficiency: Safety train operation

Raising train speeds

(9) Relation with Other Projects:

In implementing the repair work, type of repairs and length can be modified based on the Tunnel Structure Inspection.

(10) Others:

1) Live line work: Basically a repair-strengthening work for lining will be carried out without suspending train operation. Work will be done making the most of a longer period of time between trains at night: Workers have to evacuate when train passes. Accordingly, mobility is required for the repair machines.
Four (4) hours or longer period of time between trains have to be secured for the maintenance.

2) Mechanized work: An efficient mechanized implementation is inevitable since the work has to be done in a limited period of time. Various kind of machines such as a concrete scraping machine, concrete sprayer, rock-bolt hammer and mortar-filling machine, etc. are to be loaded on a flat wagon on side track which is constructed near the entrance of tunnel. Right after the last train passed, those machines have to be brought into the tunnel to start the repair work and vice versa before the first train passes.

9.8 Track-crossing Drain and Side Drain Widening and Construction

(1) Project title : Track-crossing Drain and Side Drain Widening and Construction

(2) Priority : B

(3) Location

1) Yen Xuan — Minh Le (330.0 km - 481.8 km, Extension 51.8 km)
2) Vinh Hoa — Muong Man (1,453.7 km - 1551.2 km, Extension 97.5 km)
3) Song Than — Binh Trieu (1710.6km - 1718.3 km, Extension 7.7 km)

(4) Cost

Table 9.8.1 Improvement Cost

(Unit: Million US$)

Item	Foreign Currency	Local Currency	Total	Remarks
Track-crossign Drain	0.17	0.69	0.86	
Side Drain		0.50	0.50	
Total	0.17	1.19	1.36	

(5) Objectives

Countermeasure for safe and stable train operation of on time operation daily

(6) Impremention Schedule

by 2000

(7) Components

The railway will be selected appropriate spots, be designed additional track-crossing waterway and side drain construction if necessary, and be constructed.

(8) Investment efficiency

Sbmerged sections will be decreased and train operations will be partly stabie.

(9) Relations with other projects

This project relate with Bridge Replacement and Rehabilitation.

9.9 Track and Other Structure Rehabilitation and Improvement

(1) Project title

Track and Other Structure Rehabilitation and Improvement

(2) Priority

A

(3) Location

Hanoi - Saigon excluding Hanoi - Thanh Hoa, Hue - Da Nang and Muong Man - Saigon.

(4) Cost

Table 9.9.1 Improvement Cost

(Unit: Million US$)

Item	Foreign Currency	Local Currency	Total	Remarks
Track	31.62	8.46	40.08	
Other Structure	0.15	2.36	2.51	
Total	31.77	10.82	42.59	

(5) Objectives

Each of the following items shall be implemented in order to achieve stability of train operation and safety.

1) Light rails, which have become worn and degraded over time, and turnouts, where trains have to operate at slow speeds, shall be renewed.

2) A minimum ballast thickness of 25 cm shall be secured.

3) PC sleepers shall be introduced to track circuit sections in tion car shall be introduced in order to measure dynamic track irregularity under the same conditions as when a train passes and to aid more suitable maintenance work.

5) Train operation regulations shall be introduced and the necessary rain-gauges and wind velocity gauges shall be installed, in order to prevent disaster-caused train accidents from occurring.

6) A falling rock detection system shall be introduced in order to prevent train accidents due to falling rocks from occurring.

7) Protection works shall be carried out on slope faces, etc., where receive disaster damage every year.

8) Machinery and tools required for providing training and education on the new machinery and tools to be introduced shall be provided to the training centers.

(6) Implementation Schedule

Table 9.9.2 Implementation Schedule

Item	1996	1997	1998	1999	2000
(Track)					
Rails 50 kg/m rails					
Turnuts					
Ballast					
Sleepers					
Track inspection car					
Training Facilities					
(Oter Structure)					
Rain-gauge and Wind velocity gauge					
Falling rock protection system					
Slope improvement					

(7) Components

Talbe 9.9.3 Implement Plan

Item	Unit	Number	Remarks
(Track)			
Rails 50 kg/m rails installation	km	207.8	1096.0 - 1170.6, 1186.0 - 1207.6 1233.5 - 1304.0, 1306.0 - 1318.0 1522.0 - 1551.2
Turnuts Replacement	Stations	8	Phuoc Lanh, La Hai, Tuy Hoa, Dong Tac, Hoa Huynh, Nha Trang, Chau Hanh, Song Luy
Ballast adding	km	570.0	
Sleepers replacement	km	45.0	Train Approach Warning System for Level Crossings.
Track inspection car	Set	1	
Training facilities	Set	1	
(Other Structure)			
Rain-gauge and Wind velocity gauge	Set	9	Vinh, Tan Ap, Dong Hoi, Quang Tac, Nha Trang, Ka Rom Song Mao
Falling rock detection system	Set	1	Phu Hiep - Hoa Son
Slope improvement	km	12.0	811.0 - 821.0, 848.0 - 849.0, 1046.0 - 1047.0

(8) Investment efficiency

(9) Relations with other projects

Introduction of the track inspection car, and training facilities can be carried out together with the project described in 9.3 - 9.5 (Overall Rehabilitation Between Hanoi - Thanh Hoa and Hue - Da Nang and Muong Man - Saigon).

(10) Others

9.10 Station Improvement

(1) Project title

Stations Improvement

(2) Priority

A

(3) Location

Vinh, Dong Hoi, Dieu Tri and a signal station at 415 km.

(4) Cost

Table 9.10.1 Improvement Cost

(Unit: Million US$)

Item	Foreign Currency	Local Currency	Total	Remarks
Track, etc.	0.01	0.62	0.63	
Signaling, etc.	0.06	0.15	0.21	
Total	0.07	0.77	0.84	

Note: Track, etc. includes roadbed and buildings.
Signaling, etc. includes telecommunications and power.

(5) Objectives

In line with the Train Operation Plan designed to increase transportation capacity, a new interchange station to allow trains to pass each other and storage tracks shall be constructed.

(6) Implementation schedule

Table 9.10.2 Implementation Schedule

Item	1996	1997	1998	1999	2000
(New Interchange Station)					
Track etc.					
Signaling etc.					
(Storage Track)					
Track					

(7) Components

Table 9.10.3 Implement Plan

Item	Unit	Number	Remarks
New Interlocking Station	Stations	1	414km676m - 415km225m
Storage Track	Stations	3	Vinh, Dong Hoi, Dieu Tri

(8) Investment efficiency

(9) Relations with oterh projects

(10) Others

9.11 Signaling Rehabilitation and Improvement

(1) Project Title: Signaling Rehabilitation and Improvement

(2) Priority: A

(3) Location: Hanoi-Saigon section excluding Hanoi-Thanh Hoa, Hue Da Nang and Muong Man-Saigon

(4) Cost:

Unit: million US$

Improvement Item	Local Currency	Foreign Currency	Total
Color light signals	0.75	7.39	8.14
Power source	1.20	1.32	2.52
Engine Generator	0.05	0.25	0.30
Manned Crossing	0.20	1.90	2.10
Total	2,20	10.86	13.06

(5) Objectives:

Signaling facilities are important to upgrade train operation. VNR has been progressing modernization of signaling system such as tokenless blocking system, color light signals and installation electric power. Replacement of the tokenless block system will be completed with VNR by 2000.
Since, other improvement has no schedule to complete by 2000, JICA team formulates improvement programs to complete modernization of signaling system up to 2000.

(1) Replacement of semaphore signals with color light signal.
Installation of color light signals for 65 stations will be implemented.

(2) Installation of approaching signals
Approaching signals are newly installed at all stations.

(3) Replacement of relay interlocking device
Mechanical interlocking devices are replaced with electric relay interlocking devices, when signals are electrified.

(4) Renewal of power source and measures for power cut

Renewals of electric power and increase its capacity at 63 stations will be carried out at the time of electrification of signals or replacement of block systems.

(5) Level crossing signal systems will be newly installed at main level crossings in urban areas and national roads that have heavy traffic. Objectives are 7 manned and unmanned crossings.

(7) Components:

Improvement Item	Unit	Number
Color light signals	Station	65
Power source	Station	63
Engine Generator	Station	4
Manned Crossing	Spot	32

(9) Relations with Other Projects

The following projects include improvement of signaling systems:

-Overall rehabilitation at Hanoi-Than Hoa section

-Overall rehabilitation at Hue-Da Nang section

-Overall rehabilitation at Muong Man-Saigon section

-Station improvement

-Hai Van Pass transport capacity improvement

(10) Others:

9.12 Telecommunication Rehabilitation and Improvement

(1) Project title, telecommunication rehabilitation and improvement

(2) Priority A

(3) Location

Communication line: Tan Hoa - Vinh 144 km

Transmission facilities: Tan Hoa - Vinh

(4) Cost

	Foreign currency	Local currency	Total
Communication line	2.08	0.54	2.64
Transmission facilities	0.93	0.22	1.15
Consultant fees	0.71	0	0.71
Total	3.72	0.76	4.48

(5) Objectives

The large part of the telecommunication facilities will need to be renewed by 2010. The target for investment into equipment and facilities for up to 2000 was planned according to the following principles.

Firstly, equipment investment that satisfies the demand for telecommunications in terms of both quality and quantity shall be carried out.

Secondly, the equipment investment shall match with the objectives of securing greater safety, greater income and improved service by 2000.

Thirdly, consideration shall be given to 2010 by investing in equipment that does not eventually prove to be wasteful or surplus to requirements by that time.

Examination was made of the facilities in accordance with these principles, however, the most important and urgent issue to be faced is the replacement of transmission facilities. If investment in this area is not carried out in time, it will become extremely difficult to secure

dispatcher telephones, which are the minimum required means of communication, and it will become impossible to achieve the most basic aim of the telecommunication network. In consideration of these points, improvements to telecommunications shall be carried out in the manner described in the following sections.

(6) Implementation schedule

	1995	1996	1997	1998	1999	2000
Communication line					———	
Transmission Facilities					———	

(7) Components

Because the telecommunication facilities to be introduced will all be new, the works cost shall include the expenses involved in preparing Vietnamese user manuals and carrying out training in equipment use.

1) Communication line

Compound communication cable (8 optical fibers, 30 pairs of metal conductors)

Terminal boxes shall be installed at 1 km intervals.

2) Transmission facilities

Optical fiber equipment	34 (Mbit/sec), Cross Connect, D/I, MUX
Terminal office	Than Hoa, Cau Giat, Vinh
UHF small radio system	Than Hoa - Thi Long
Instrument room	Thi Long, Cau Giat, Vinh
Air conditioning system	Cau Giat, Vinh

(8) Relations with other projects

This plan shall involve a system that integrates with the optical fiber system described in Section 9.3 (Overall Rehabilitation at Hanoi - Thanh Hoa Section). It is, therefore, necessary to execute the work in continuation to that described in 9.3.

9.13 Rolling Stock Plan

9.13.1 General

Following the necessary number of rolling stock calculated by JICA Transportation Planning Team based on the demand forecast, the rolling stock plan upto 2000 is made.

9.13.2 Preconditions

(1) Existing SLs are condemned before 2000

(2) New locomotives will be D12E and D18E types in view of locomotive standardization. As for standard locomotive of 1500CV class, DEL for new high speed train with output of 1450CV is recommended as mentioned later.

(3) Existing D11H (10 locomotives), D12E (40 locomotives), D13E (14 locomotives) and D18E (16 locomotives) will be rehabilitated when their age reaches 15 to 20 years old. Namely, D11H should be rehabilitated before 2000.

(4) 28 D9Es will be used for local passenger trains substituting for D12Es.

(5) D11H and D13E will be utilized as equivalent to D12E class.

(6) D4H will be used for light weight local passenger trains substituting for D12Es.

(7) PCs for Hanoi - Ho Chi Minh Line and Hanoi - Lao Cai Line are together examined. As for short PCs, first class and second class sleeping cars with air-conditioner for Hanoi - Ho Chi Minh Line take priority of new manufacturing.

(8) Dining car (HC), baggage car (HL) and post car (BV) are treated as service car (S), and one service car is connected to each train.

(9) Passenger train configuration is assumed as follows.

Limited Express
(New high speed train): $DEL+2\times A_N+3\times B_N+2\times A+2\times B+1\times S+DEL$

Limited Express: $DL+1\times A_N+3\times B_N+2\times A+2\times B+1\times S$

Express (Middle distance): $DL+1\times A_N+3\times B_N+1\times A+3\times B+1\times S$

Express (Short distance): DL+1×A+4×B+1×S
Local: DL+(2 to 4)×(B and/or C)+1×S

(10) Rescue car

It is said that VNR has to purchase as soon as possible 2 or 3 rescue cars. However, it is clarified that the price of rescue car hauled by locomotive, with capacity of 100 to 120 tons, is too high (may be, more than US$8×10^6 per car). Therefore, the investment cost of rescue car is not included in the Draft Final Report. Only the above comment is stated as reference.

9.13.3 Rolling Stock Plan up to 2000

(1) Summarization of existing number of rolling stock in 2000 for Hanoi - Ho Chi Minh Line

Existing number of rolling stock in 2000 is described in detail in the Clause 8.12.5 of this Volume.

1) Locomotive

D4H	D9E	D11H	D12E	D13E	D12E class subtotal	D18E
150	28	10	40	19	69	16

2) PC

A_N	B_N	A	B	C	S				Total
					HC	HL	BV	Subtotal	
33	62	79	160	57	26	18	18	62	453

3) FC

G	H	V	M	MVT	P	XT	Total
926	668	0	68	0	19	58	1,739

(2) Required number of rolling stock in 2000 for Hanoi - Ho Chi Minh Line

Required number of rolling stock upto 2000 given by JICA Transportation Planning Team is shown in Table 9.13.1.

(3) Necessary number of rolling stock

1) Introduction of new high speed train

5 new high speed trains of push-pull type will be introduced to serve as limited express passenger train connecting Hanoi with Ho Chi Minh City and as inter-regional express passenger train. The

detail of the new high speed train is described in the Clause 9.15 of this Volume.

2) Necessary number of DL and FC

Table 9.13.2 is explanatory table on calculation of necessary number of DL and FC.

3) Necessary number of PC

Table 9.13.3 is explanatory table on calculation of necessary number of PCs for Hanoi - Ho Chi Minh Line and Hanoi - Lao Cai Line.

(4) Rolling stock plan upto 2000

Based on Table 9.13.1, Table 9.13.2, Table 9.13.3 and the rehabilitation of locomotive as mentioned in the Clause 9.13.2 Preconditions, number of newly manufactured and rehabilitated rolling stock upto 2000 along with the investment cost is shown in the following table.

(Million US$)

		Unit Price		Number	Price		Total
		F	D		F	D	
New high speed train (5 trains)	DEL	1.5		10	15		15.0
	PC	0.08	0.12	50	4.0	6.0	10.0
D18E (New)		1.5		33	49.5		49.5
D12E (New)		0.98		16	15.7		15.7
PC (New) (Air-conditioned)		0.08	0.12	32	2.6	3.8	6.4
FC (New)			0.032	661		21.2	21.2
D11H (Rehabilitation)		0.44	0.24	10	4.4	2.4	6.8
PC (Remodelling)		0.33	0.08	20	6.6	1.6	8.2
Total					97.8	35.0	132.8

1) New manufacturing PCs

As for short PCs, first class and second class sleeping cars with air-conditioner for limited express train other than the new high speed train are newly manufactured in the order of priority.

2) Remodelled PC

20 power source and dining cars for limited express train with air-conditioned sleeping cars are planned to be remodelled from the surplus cars.

9.13.4 Domestic Production of PC and FC

(1) Table 8.12.11 of this Volume shows number of new production capability of PC and FC with and without executions of regular overhaul in workshops.

(2) Number of PCs to be newly manufactured and remodelled upto 2000 for Hanoi - Ho Chi Minh Line, Hanoi - Lao Cai Line and Hanoi - Cai Lan Line (1000mm) is totally 157 (40 per year during 4 years), including PCs of new high speed train. According to the same Table 8.12.11, the domestic manufacturing work of these PCs is very easy.

(3) Number of FCs to be newly manufactured upto 2000 for the same lines is totally 661 (165 per year during 4 years). According to the same Table 8.12.11, the domestic manufacturing work of these FCs is also very easy, when number of overhaul of PCs and FCs in Dian Workshop is decreased.

9.13.5 Implement Schedule upto 2000

	Number	1996	1997	1998	1999	2000
D18E	33					
D12E	16					
PC	32					
FC	661					
D11H (RHB)	10					
PC (Remodeling)	20					

(1) New high speed train is described in the Clause 9.15.

(2) Locomotive should be ordered collectively.

(3) New manufacturing and remodelling of PC and FC should be carried out evenly.

(4) Rehabilitation of D11H should be carried out evenly.

Table 9.13.3 Explanatory Table on Calculation of Necessary PCs for Hanoi - Ho Chi Minh Line and Hanoi-Lao Cai Line

Item	Line		AN	BN	A	B	C	S	Total
Necessary number	HN-HCMC	LE	20	60	40	40	-	20	180
		Others	10	28	29	108	70	49	294
	HN-LC		4	8	10	18	36	14	90
	Total		34	96	79	166	106	83	564
Existing number	HN-HCMC		33	62	79	160	57	62	453
	HN-LC		5	9	8	35	22	0	79
	Total		38	71	87	195	79	62	532
Surplus or Shortage	HN-HCMC		3	△26	10	12	△13	△7	△21
	HN-LC		1	1	△2	17	△14	△14	△11
New manufacture	HN-HCMC		20(AC*)	12(AC*)					32
	HN-LC								0
Surplus or shortage	HN-HCMC		23	△14	10	12	△13	△7	11
	HN-LC		1	1	△2	17	△14	△14	△11
Transfer	HN-HCMC		△13	14	△2	3		△13	△11
	HN-LC		13	△14	2	△3		13	11
Surplus or shortage	HN-HCMC		10	0	8	15	△13	△20	0
	HN-LC		14	△13	0	14	△14	△1	0
Remodelling	HN-HCMC		10 to S		8 to S	2 to S			20
	HN-LC		13 toBN 1 to S						14
Surplus or shortage	HN-HCMC		0	0	0	13	△13	0	0
	HN-LC		0	0	0	14	△14	0	0

Final Number of PCs

			AN	BN	A	B	C	S	Total
HN-HCMC	LE	AC*	20	12					32
			0	48	40	40		20	148
	Others		10	28	29	121	57	49	294
HN-LC			4	8	10	32	22	14	90
Total			34	96	79	193	79	83	564

Remarks (1) AC* : Air-conditioned PCs
(2) LE : Limited Express
(3) Other than the above table, 50 air-conditioned PCs for new high speed train are newly manufactured.

Table 9.13.1 Required Number of Rolling Stock in 2000 for Hanoi-Ho Chi Minh Line

		No. of trains	DL					PC						FC			Remarks
			New	D9E	D12E	D9E	D4H	AN	BN	A	B	C	S	G	H	Others	
PT	New high speed train	5	10	—	—	—	—	10	15	10	10	—	5				Including one reserved train
	Limited express	20						20	60	40	40	—	20				Including 4 reserved trains
	Express (Middle distance)	8						8	24	8	24	—	8				
	Express (Short distance)	17						—	—	17	68	—	17				
	Reserved cars for Express	—		14 3*	33 6*	23 5*	6 2*	2	4	4	16	—	4				
	Local	20						—	—			70	20				-Including 4 reserved trains -Various train configurations
	Subtotal (Excluding new high speed train)		—	17	39	28	8	30	88	69	148	70	69				
FT	Coal train			27	38										65		
	Cement train													98			
	Others			5*	8*											227	
	Subtotal			32	46									98	65	227	
Total of DLs			10	49	85	28	8										

Remarks PT : Passenger train
FT : Freight train
* : Reserved locomotives

Table 9.13.2 Explanatory Table on Calculation of Necessary Number of DL and FC for Hanoi- Ho Chi Minh Line

	DL			FC			Remarks
	D18E	D12E	D9E	G	H	Others	
Necessary number	49	85	28	98	65	2237	Table 8.12.18
Existing number	16	69	28	926	668	145	Clause 8.12.6-(2)-1)
Surplus or shortage (△)	△ 33	△ 16	0	828	603	△2092	
Substitute				All to Others	All to Others		
New Manufacturing	33	16	0	0	0	661	

Remarks : Other than the above Table, 10 new DELs for new high speed train are newly manufactured.

9.14 Gia Lam Rolling Stock Workshop Improvement

(1) Project Title : Gia Lam Rolling Stock Workshop Improvement

(2) Priority : A

(3) Location : Gia Lam (Ha Noi)

(4) Cost : Total Cost ; 30.04 million US Dollar

Item	Foreign Currency	Local Currency	Total
Machine Equipment	19.73	0.36	20.09
Car Spar Parts cost	1.00		1.00
Drainage and Waste Disposal Treatment	0.76	0.06	0.82
Repair of Buildings		6.04	6.04
Engineering Fee	2.09		2.09
Total	23.58	6.46	30.04

(5) Objectives

The establishment of a perfect overhaul system is important for safety, as the train speed is now low (less than 50 km/h) but will raise to more than 80 km/h in near future. However, as VNR has no facilities to overhaul DL, it is necessary to upgrade and strengthen the facilities and capacity of the workshop.

The comprehensive objective of this project are to improve the operation of rolling stock through the modernization of existing workshops and effective material and parts handling.

Therefore, this project aims at making the Gia Lam Workshop function properly as a completely integrated workshop for maintenance of DL belonging to UNION 1, with a adequate number of installed machines and equipment.

And this workshop will overhaul the engines that are entrusted from other depots of the other UNION, too.

This plan is also designed to install more equipment for the overhaul and manufacture of PC and FC, and to contribute to quality assurance of maintenance works for rolling stock and to reduce the total cost of the rolling stock.

The number of rolling stock and equipment stayed at the same time under overhaul at this workshop is as follows;

Type of Rolling Stock	Number of Rolling Stocks and EquipmenMt under Overhaul
DL	8
PC	17
FC	24
Engine and others	12

As all buildings of the workshop are in a deteriorated condition, they should be repaired.

(6) Implementation Schedule

Item	1996	1997	1998	1999	2000
Installation of Equipment					
Car Spare Parts					
Drainage and Waste Disposal					
Treatment					
Repair of Buildings					
Engineering Service					

(7) Components (Refer to Appendix 9.14)

1) Installation of equipment for the inspection and repair works at Building 3B.

The VNR will dismantle the rolling stock, inspect and repair each part, and rebuild all the parts again into as new condition. This rolling stock is finally adjusted at the performance testing room of Building 44B, which is rearranged for this purpose.

2) The rolling stock air conditioning will be inspected and repaired equipment at Building 5B, which is the present inspection and repair workshop for passenger cars and freight cars.

The equipment to manufacture the new parts for high-grade rolling stock will be installed.

The necessary equipment eliminating manual labor will be installed at the couplers repair shop. Spray-style washing equipment will be installed at the bogie inspection shop in order to improve the precision of the inspection.

3) Following work areas installed the necessary machines and equipment are arranged;

(a) Building 3B ..... Car-body lifting, lowering, washing area. Bogie-frame repair area. Roller bearing repair area. Auxiliary rotating machine repair area. Traction motor etc. repair area. Electric parts, battery repair area. Air-brake parts area. Radiator etc. repair area. Engine etc. repair area. Engine performance test room.

(b) Building 5B ..... Coupler repair area. Wheel set repair area Air conditioning repair area. Manufacturing area for carriage and wagon components.

(c) Building 44B ..... Final adjustment building.

(d) Others ..... Car-body painting building.

(8) Investment Efficiency

This is a major contribution to;

* save cost, repair and maintenance work cost of the rolling stock.

* guarantee the quality of repair and maintenance work.

* raise train speed to more than 80 km/h in safety.

9.15 High Speed Train for Hanoi-Ho Chi Minh Section

9.15.1 General

The new high speed train of push-pull type is planned to connect Hanoi with Ho Chi Minh City within 24 hours in 2010, and also to use as inter regional express train. Intermediate passenger coaches are newly manufactured with air-conditioner and accommodations to offer comfortable service for passengers.

9.15.2 Selection of Train System

Push-pull train and autorail to select the most suitable system are compared as follows.

(1) Train configuration

1) Push-pull train (PP)

DEL	B	B	B_N	B_N	B_N	B.D	A_N	A_N	A	A	DEL

2) Autorail (DC)

C	B_c	B	B_N	B_N	B_N	A_N	A_N	A	A	B.D	C

DEL : Diesel Electric Locomotive
B : Hard Seating
B_C : Hard Seating
B_N : Hard Sleeper
B.D : Baggage and Dining (In case of autorail, trailer car with generator for cooking)
A_N : Soft Sleeper
A : Soft Seating
C : Driver's Cab

(2) Particulars

	PP	DC	REMARKS
Seating Capacity	446	434	A (64), A_N (24), B (72), B_N (42), B_C (60)
Weight (t)	482	450	DEL (66), PPPC (35), DC (45)
Max axle weight (t)	11	11.25	Axle arrangement of DEL of PP: B-2-B
Driving System	Electric	Hydraulic	
Out put power (HP)	1450×2	330×9	
Train length (m)	228	200	DEL (14m×2) PC, DC (20m)
Max speed (km/h)	120	120	
Air conditioning	Electrical	Mechanical	PP: Power source installed on DEL DC: Mechanical power source directly connected with engine

(3) Comparison on both systems

	PP	DC	REMARKS
1. Manufacturing cost	◎	×	1)
2. Maintainability	◎	×	2)
3. Flexibility of train configuration	×	○	
4. Acceleration performance	×	○	
5. Room noise and vibration	◎	×	3)

1) Train cost

PP: $2\times150\times10^6$ (*1) $+10\times20\times10^6$ (*2)=¥500×10^6

DC: $10\times105\times10^6$ (*1) = ¥1050×10^6

(*1): Import

(*2): Domestic Production

2) Maintainability

DC: — Maintenance for engine and torque converter is complicated and number of them is very large in case of autorail.

— Equipment installed under floor are covered by dust and it may cause overheat of engine.

3) Room noise and vibration

These are fatal defect for sleeping car.

(4) Recommendation

24-hours high speed train between Hanoi and Ho Chi Minh City is to be push-pull train from view points of manufacturing cost, maintainability, and passenger room's noise and vibration.

9.15.2 New High Speed Train

(1) The principal particulars of new high speed train is as shown in the Clause 9.15.1 - (2).

(2) Performance curve (Tractive effort - Speed Curve) is shown in Figure 9.15.1.

(3) Implement schedule

1) Necessary number of new high speed train calculated by JICA Transportation Planning Team based on the demand forecast is 5 in 2000, 27 in 2005 and 44 in 2010. The object of this Feasibility Study is the rolling stock plan upto 2000.

2) Implement schedule upto 2000

	Number	1996	1997	1998	1999	2000
DEL	10					
PC	50					

(a) It is desirable that new high speed train could be introduced as early as possible.

(b) Locomotive

10 Locomotives are procured by the international competitive bidding.

(c) Passenger coach

50 passenger coaches are domestically manufactured in Gia Lam, Haiphon and Dian Workshops. However, a part of necessary equipment such as air conditioning equipment will be imported.

(4) Investment cost

(Million US $)

		Unit Price		No.	Price		Total
		For.	Local		For.	Local	
New high speed train	DEL	1.5		10	15.0		15.0
	PC	0.08	0.12	50	4.0	6.0	10.0
Sewage treatment facilities		0.5	0.1	5	2.5	0.5	3.0
						Total	(28.0) 3.0

1) Sewage treatment facilities are needed for the treatment of sewage from toilet of new high speed train.(see Clause 8.13.3-(13)-1)
Therefore, the investment cost of sewage treatment facilities is included in this project profile.

2) Investment cost of new high speed train is included in the Clause 9.13 Rolling Stock Plan.
Therefore, the total cost (28.0) of above Table is to be read as additional 3.0 million US $.

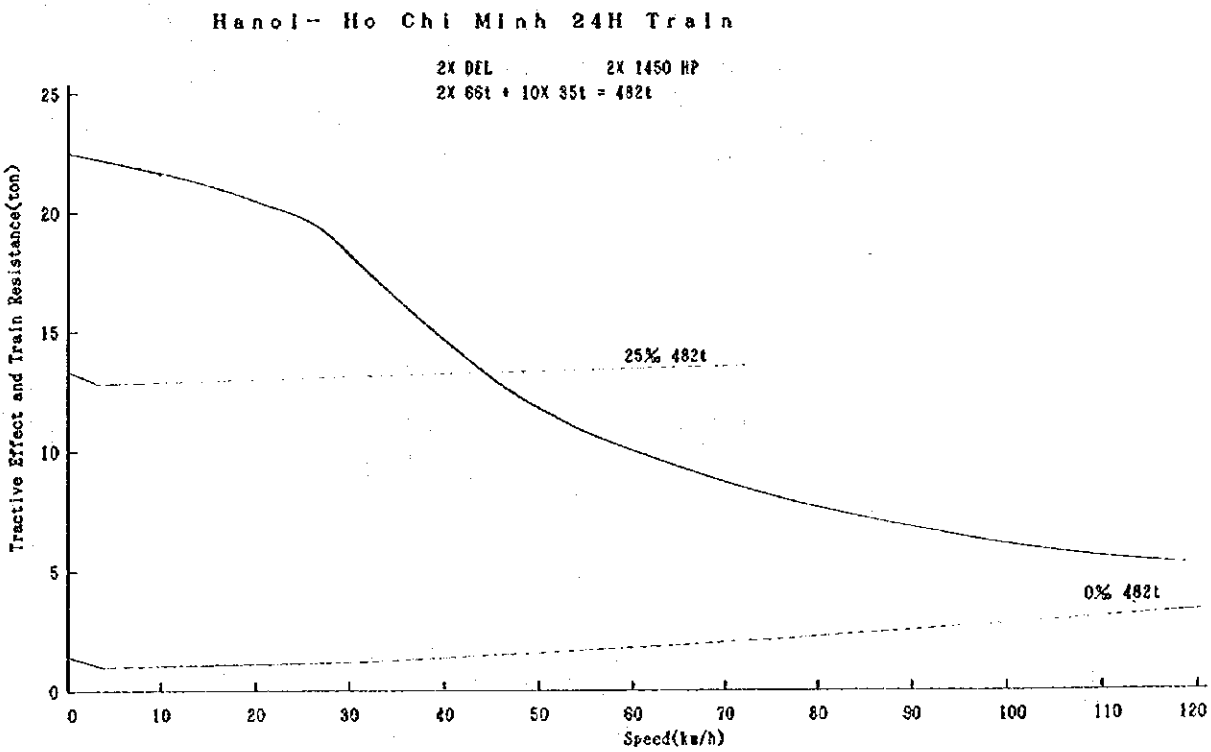


Fig.9.15.1 Performance Curve of New High Speed Train

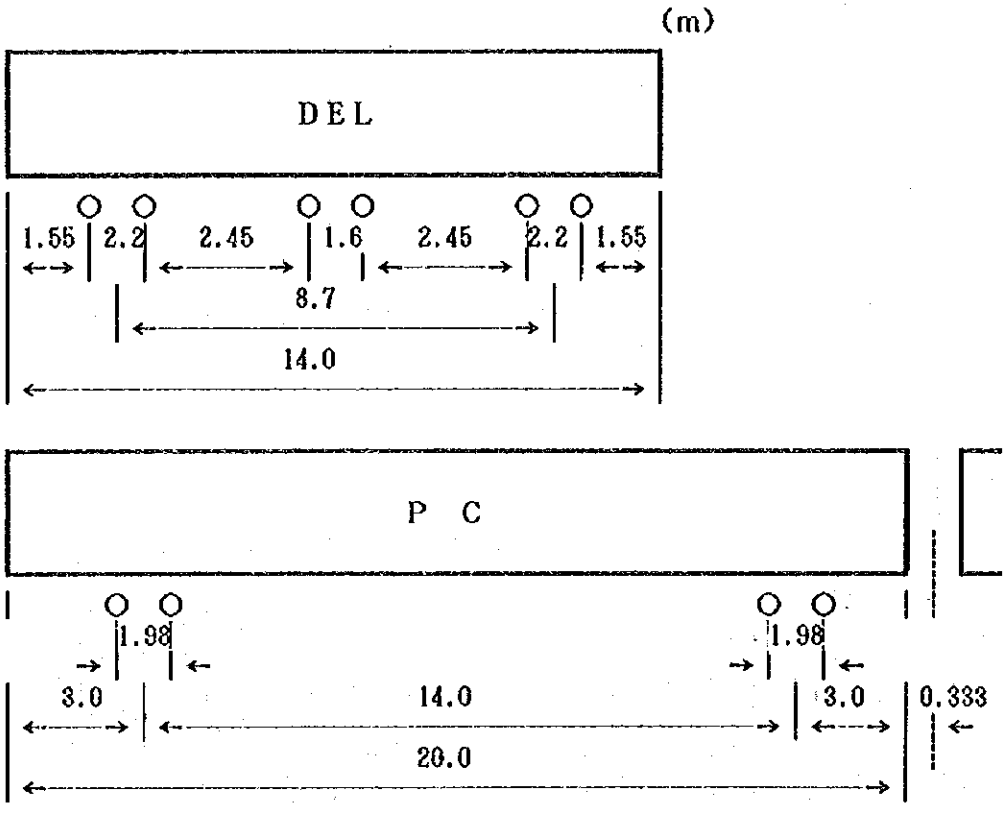


Fig. 9.15.2 Profile of Push-Pull Train

9.16 Hai Van Pass Transport Capacity Improvement

(1) Project title: Hai Van Pass Transport Capacity Improvement

(2) Priority : A

(3) Location : (Hue) Lang Co - Kim Lien (Da Nang)

(4) Cost

Table 9.16.1 Improvement Cost

(Unit: Million US$)

Item	Foreign Currency	Local Currency	Total	Remarks
Civil Structures	0.81	6.62	7.43	
Track	0.42	0.92	1.34	
Buildings		0.02	0.02	
Signaling, etc.	0.03	0.08	0.11	
Consultant		0.70	0.70	
Total	1.26	8.34	9.60	

(5) Objectives : To increase traffic capacity between Ga Hai Van Bac and Ga Hai Van Nam.

(6) Implementation schedule : 2 years.

(7) Components

A new station will be constructed to increase the traffic capacity between Ga Hai Van Bac and Ga Hai Van Nam, and the new temporary station will be a switchback station with passing siding.

(8) Investment efficiency

Traffic capacity will be 32 trains both directions per day in place of the present 22 trains.

(9) Relations with other projects

Feasibility Study of the New Hai Van Tunnel

(10) Others

If a new short cut line will be constructed, the investment in this temporary plan will be short term. This station should be constructed as cheaply as possible.

Chapter 10 Profiles for Other Recommendation Projects

10.1 General

JICA team strongly recommend to implement projects in this chapter; such as training and education, bridge technology center, freight transport study, inspection on bridge, tunnel and submerged sections. They are basic functions the railways must to have, out of economical evaluations and costs of them is cheap, therefore, they are not included in the feasibility evaluation.

It was found that a project for the improvement of freight transport needs to be studied on whole VNR and a new Hai Van tunnel project will need approximately 10 years from a study until the inauguration. Therefore, they are recommended to start studies as fast as possible.

Countermeasures for level crossings in Hanoi and Ho Chi Minh cities is a suggestion for Viet Nam side on a solution of current issues.

List and costs for projects in this chapter are as follows:

(Unit: million US$)

Project	Total Cost	Local Currency	Foreign Currency
Expansion and Improvement of Railway School	11.30	1.30	10.00
Establishment of Bridge Technology Center	2.50	0.30	2.20
Improvement of Freight Transport Capacity Study	1.50	0.20	1.30
Bridge Structure Inspection	4.80	0.40	4.40
Tunnel Structure Inspection	1.20	0.24	0.96
Anti-submerged Measure Study	1.21	0.19	1.02
Route Selection of the New Hai Van tunnel	2.31	0.64	1.67
Emergency Solution to Level Crossing Issues In Hanoi City	9.41	7.33	2.08
Emergency Solution to Level Crossing Issues in Ho Chi Minh City	17.37	16.23	1.14
	51.60	26.83	24.77