7.2.2 Selection of Suitable Industries for the IMT

(1) Analysis of Suitability of Industries

From the candidate industries which were short-listed in the above section, the suitable industries for the IMT are selected. The suitability of different types of industries for locating in the IMT is evaluated by using a two-stage evaluation method.

In the first stage of evaluation, the industries are evaluated by using the "restriction criterion", which restricts certain industries considered unsuitable for the IMT. The following two standards are used in the "restriction criteria".

(a) Coastal and river-side industries : Industries which are dependent on the shipping of large cargo or which require large amounts of cooling water are restricted from locating in the IMT. These types of industries are generally located near the sea coasts or river-side.

(b) Resource-dependent industries : Industries which require large amount of resources such as water, electricity, etc., per industrial unit are restricted from locating in the IMT.

Since the IMT site is located in the hinterland (i.e. away from the sea coast) and a large number of industries are expected to be located in the IMT, the above mentioned two types of industries are considered unsuitable for locating in the IMT.

As a result of the "restriction criteria", 30 industries were restricted from locating in the IMT. These industries are marked with a bold triangle (▲ symbol) in the Table 7.2.3. The remaining industries (total 104 industries) were considered for the second stage of evaluation. These industries are marked with an empty circle (○ symbol) in Table 7.2.3.

In the second stage of evaluation the "promotion criteria" is used for evaluating the suitability of locating the industries in the IMT. The following five standards are used for the "promotion criteria".

(a) Added-value of goods : Added-value of goods achieved by the labor is defined as the ratio of the total amount of added-value to the value of total industrial output. The amount of added-value will be a standard for evaluation.

(b) Land-productivity : The land-productivity is defined as the ratio of the total amount of added-value to the total industrial area. The value of land-productivity will be a standard for evaluation.

(c) Environmental burden : The burden put on the environment by exhaust gases and waste water (calculated by: value of energy used/value of output) will be a standard for evaluation.

(d) Number of industry types : The number of industry types involved in each business will be a standard for evaluation.

(e) Desirability : The desirability of an industry types based on criteria of the Haryana government will be a standard for evaluation.

(2) Analysis of Questionnaire Survey

For the potential type of industries as identified in the previous chapter on Investment Demand Survey, the level of possibility for investment in the IMT was estimated in the secondary evaluation.

(a) The classification of the level of interest to the IMT is based on the information obtained from questionnaire and interview survey of chapter 6 on Investment Demand Survey (refer to Table 6.3.7 of Chapter 6). The classification used in Chapter 6 is by SIC code whereas that of Chapter 7 is by JIS code numbers. The correspondence table of both code numbers is attached in Appendix IV.

(b) The evaluation items have been assigned as "Investment Possibility of firms to the IMT", to be consistent with the evaluation items of (a) as shown below.

From Results of Questionnaire Survey		From Criteria for Secondary Evaluation	
A	Investment Possibility greater than 50%	3 points	Investment Possibility greater than 50%
B	Investment Possibility between 50% and 25%	2 points	Investment Possibility between 50% and 25%
C	Investment Possibility between 25% and 10%	1 points	Investment Possibility between 25% and 10%
D	Investment Possibility below 10%	0 points	Investment Possibility below 10%

(c) The analysis of Chapter 6 is more realistic than that of Chapter 7 which only estimates the possible fields of industry from Analysing information, for Chapter 6 summarises the possibilities obtained directly from the respondents. The information of Chapter 6 is to be ranked higher than the other evaluation items and hence each rank (refer Table 7.2.2) more emphasis is placed on.

(3) Short-Listing of Suitable Industries

In the "promotion criteria", scores are given for each of the above mentioned standards for all the industries. Table 7.2.2 lists the basis for each promotion criteria. The industries achieving high total scores are considered suitable for locating in the IMT.

As a result, 70 industries (64 manufacturing ; 6 non-manufacturing) were considered to be suitable for locating in the IMT. These industries are also shown in Table 7.2.3 and are marked with a bold square (■ symbol).

Promotion points (W*original points) were assigned to each criteria, and industries which ranked above the average for all industries (15 points) were selected as suitable for entrance to IMT. Note that only manufacturing industries were evaluated.

Table 7.2.2 : Evaluation Criteria for Entrance to IMT (secondary evaluation)

Promotion Criteria	Classifications		Basis for Evaluation	W*1	Base points	Weighted points
a. Added Value Productivity	High	Above average value	Added value productivity=added value/value of industrial output ● Japanese factories with over 30 employees ● Average value: 350 thousand yen per one million yen of added value	1	3	3
	Normal	Average value			2	2
	Low	Below average value			1	1
b. Land Productivity	High	Above average productivity	Land productivity = added value / factory surface area ● Japanese factories with over 30 employees ● Average value: 67.3 thousand yen per square meter	1	3	3
	Normal	Average productivity			2	2
	Low	Below average productivity			1	1
c. Environmental Burden	Low	Below average burden	Environmental burden = energy use / added value ● Japanese factories with over 30 employees ● Average value: 23 thousand yen per one million yen of added value	1	3	3
	Normal	Average burden			2	2
	High	Above average burden			1	1
d. Number of Industry Types	Many	3 or more industry types	Number of relevant industry types per business from the 10 types *2 ● Average value: 1.7 industry types per business	1	3	3
	Average	2 industry types			2	2
	Few	1 industry type			1	1
e. Desirability	High	Strongly desired	Response from Survey of the Haryana Government: ● Responses: Strongly desired, desired or not certain.	2	3	6
	Normal	Desired			2	4
	Low	Not certain			1	2
f. Investment Possibility to the IMT	High	Over 50% possibility	Investment Demand Survey (Chapter 6) ● Results of 1st, 2nd questionnaires and oral questioning	3	3	9
	Normal	25% to 50% possibility			2	6
	Low	10% to 25% possibility			1	3

Notes *1 W= weighting factor for evaluation

*2 The 10 group of industries are: 1. Metro-dependent ; 2. High-Tech; 3. Distribution/ processing; 4. Airport-dependent; 5. Technical collaboration; 6. Information-technology; 7. Industrial collaboration; 8. Resource-dependent; 9. Labor intensive; 10. Subsidiary.

Table 7.2.3 : Selection of Suitable Industries for the IMT

Selection Criteria's / Candidate Industries	Restriction Criteria			Promotion-Criteria (P_C)*							
				W=1	W=1	W=1	W=1	W=2	W=3	P_W	
	Coastal & River-Side	Resource-Dependent	Selected (1st Step)	Value-Added	Land-Productiveness	Environmental Impact	Number of Ind. Types	Desired Industries	Disiring Companies	Total-Point	Selected (2nd Step)
Food & Beverage & Feed											
Live-stock products			○	1	1	2	1	2	2	15	■
Seafood processing	▲										
Vegitables canned			○	2	1	2	1	3	3	21	■
Seasonings			○	2	2	2	2	3	2	20	■
Suger processing		▲									
Flour & Grainmill	▲										
Bakery & Confectionary			○	3	3	2	2	2	0	14	
Oil & Fats			○	1	2	1	2	2	2	16	■
Miscel. food			○	2	2	1	1	2	0	10	
Soft drinks			○	2	2	2	1	2	2	17	■
Alcoholic beverage			○	1	2	2	1	1	0	10	
Tea & Coffee			○	1	2	1	1	2	0	9	
Ice			○	2	1	3	1	2	0	11	
Textile & Apparel											
Silk reeling		▲									
Spinning mills			○	1	1	2	1	2	0	9	
Twisting & Balky yarns			○	2	1	2	1	2	0	10	
Woven fabric mills			○	1	1	2	3	2	2	17	■
Knitting mills			○	2	1	3	2	2	2	15	■
Dyed & finished textile		▲									
Outer garment			○	3	2	3	3	3	1	20	■
Whit.shirts & underwear			○	3	2	3	2	3	1	18	■
Fur apparel & acessor.			○	1	2	2	1	1	0	8	
Hats			○	3	3	3	2	1	1	16	■
Lumber & Furniture											
Sawing, planing mills	▲										
Millwork, Plywood			○	1	1	2	1	1	0	7	
Wooden containers			○	2	2	2	1	2	0	11	
Furniture & Fixture			○	2	1	3	2	2	2	18	■
Religious funiture			○	3	2	3	1	2	0	13	
Paper											
Pulp	▲	▲									
Paper		▲									
Coated & glazed paper			○	1	1	1	2	3	3	20	■
Paper products			○	2	2	3	1	3	2	20	■
Paper containers			○	2	1	2	1	3	1	15	■
Miscel. pulp,paper			○	2	2	2	2	2	1	15	■

Selection Criteria's / Candidate Industries	Restriction Criteria			Promotion-Criteria (P_C)*							
				W=1	W=1	W=1	W=1	W=2	W=3	P_W	
	Coastal & River-Side	Resource-Dependent	Selected (1st Step)	Value-Added	Land-Productiveness	Environmental Impact	Number of Ind. Types	Desired Industries	Disiring Companies	Total-Point	Selected (2nd Step)
Publishing & Printing											
Newspaper			○	3	3	3	2	2	0	15	■
Publishing			○	3	3	3	2	3	0	17	■
Printing			○	1	3	3	1	3	0	14	
Plate making			○	3	3	3	1	2	0	14	
Book-binding,Print.mat			○	3	3	3	1	2	0	14	
Chemical											
Chemical fertilizers		▲									
Inorganic chemicals		▲									
Organic chemicals		▲									
Chemical fibres		▲									
Oil & Fat prod., Soaps			○	2	2	2	2	2	2	18	■
Drugs & Medicines			○	3	2	3	3	3	1	20	■
Miscel. chemical			○	3	2	3	2	2	2	20	■
Petroleum & Coal											
Petroleum refining		▲									
Lubricating oils,grease	▲										
Coke		▲									
Briquettes & br.Balls			○	3	1	1	1	3	0	12	
Paving materials			○	3	1	1	2	3	2	19	■
Miscel. petroleum		▲									
Plastic											
Plates,bars,rods,tubes			○	2	1	2	2	3	2	19	■
Films, sheets			○	1	1	2	2	3	1	15	■
Indust. plastic prod.			○	2	2	3	1	3	1	17	■
Foamed & reinforced			○	1	1	1	2	3	2	17	■
Compounding pl. matter			○	1	1	2	1	3	1	14	
Miscel. plast. products			○	1	1	2	1	3	1	14	
Rubber prod.											
Rubber & plast. footwear			○	2	2	2	1	2	3	20	■
Rubber belts & hoses			○	2	2	3	1	2	2	18	■
Miscel. rubber			○	2	1	2	1	3	1	15	■
Leather											
Tanning		▲									
Mechanical leather pr.			○	2	3	2	1	2	0	12	
Boot,Shoe stock,Find.			○	2	2	3	1	2	1	15	■
Footwear			○	2	2	3	1	2	1	15	■
Gloves & Mittens			○	3	3	3	2	3	0	17	■
Luggage			○	2	1	3	1	3	0	13	
Handbags			○	2	2	3	1	3	0	14	
Miscel. leather prod.			○	2	1	1	1	3	1	14	

Selection Criteria's / Candidate Industries	Restriction Criteria			Promotion-Criteria (P_C)*							
				W=1	W=1	W=1	W=1	W=2	W=3	P_W	
	Coastal & River-Side	Resource-Dependent	Selected (1st Step)	Value-Added	Land-Productiveness	Environmental Impact	Number of Ind. Types	Desired Industries	Disiring Companies	Total-Point	Selected (2nd Step)
Celamic, Stone											
Glass			○	3	2	1	3	3	2	21	■
Cement	▲										
Structural clay			○	3	1	1	2	2	1	14	
Pottery			○	3	1	1	3	3	0	14	
Clay refractories	▲										
Carbon & Graphite		▲									
Abrasive			○	3	1	2	1	2	0	11	
Aggregate & Stone			○	3	1	1	3	3	1	17	■
Miscel. ceramic, stone		▲									
Iron, Steel											
With blast furnaces	▲	▲									
Without blast furnaces	▲	▲									
Steel, with rolling f.		▲									
Steel, except smelting		▲									
Coated steel		▲									
Steel forgings,casting			○	2	1	1	2	3	2	18	■
Iron castings			○	2	1	1	2	3	1	15	■
Miscel. iron & steel			○	1	1	2	3	3	1	16	■
Non-ferrous metal											
Primary smelting,ref.	▲	▲									
Secondary smelt.,ref.	▲	▲									
Rolling of nonfer.met.		▲									
Electric wire & cable			○	1	1	3	2	3	1	16	■
Nonferrous foundries			○	2	1	1	2	3	0	12	
Miscel. nonfer. metal			○	1	1	1	3	3	1	15	■
Fabricated-metal											
Tableware, Cutlery			○	2	2	3	1	2	1	15	■
Constructional			○	1	1	2	2	3	1	15	■
Stamped & pressed prod.			○	1	1	2	1	3	1	14	
Powder metallurgy			○	2	2	2	1	3	1	16	■
Fabricated wire			○	2	1	1	1	3	1	14	
Bolts, Nuts, Rivets			○	2	2	2	1	3	1	16	■
Miscel.fab.metal prod.			○	2	2	3	2	3	1	18	■
General machinery											
Boilers, Engines			○	2	2	3	2	3	1	18	■
Agricultural machinery			○	2	1	3	1	2	0	11	
For construction			○	1	1	3	1	2	1	13	
Metal working machin.			○	2	2	3	2	2	2	19	■
Textile machinery			○	2	2	3	1	2	1	15	■
Special ind. machinery			○	2	2	3	1	2	1	15	■

Selection Criteria's / Candidate Industries	Restriction Criteria			Promotion-Criteria (P_C)*							
				W=1	W=1	W=1	W=1	W=2	W=3	P_W	
	Coastal & River-Side	Resource-Dependent	Selected (1st Step)	Value-Added	Land-Productiveness	Environmental Impact	Number of Ind. Types	Desired Industries	Disiring Companies	Total-Point	Selected (2nd Step)
General machinery (cont.)											
General ind. machinery			○	2	2	3	1	2	1	15	■
Office, service ind.			○	1	2	3	1	2	1	14	
Miscel. machinery			○	2	2	3	3	2	1	17	■
Electrical machinery											
Generating,Transmiss.			○	2	2	3	2	2	2	19	■
Household appliances			○	2	3	3	1	0	2	15	■
Communication equip.			○	1	3	3	1	2	1	15	■
Data processing			○	2	3	3	2	3	1	19	■
Electronic equip.			○	1	2	3	3	3	1	18	■
Measuring instr.			○	2	3	3	2	3	1	19	■
Parts for elect.appl.			○	2	2	3	3	3	2	22	■
Miscel.electr.machinery			○	2	2	3	2	2	1	16	■
Transportation eqiupment											
Moter vehicles			○	1	2	3	3	2	2	19	■
Railroad equip.			○	1	1	3	2	2	0	11	
Bicycles & parts			○	2	3	3	1	0	0	9	
Ship building & parts	▲										
Aircraft & parts			○	1	2	3	3	3	0	15	■
Miscel. transport.			○	1	2	3	1	3	0	13	
Precision instruments											
Measuring, analytical			○	2	3	3	1	3	0	15	■
Surveying inst.			○	2	3	3	2	3	2	22	■
Medical inst.			○	2	3	3	2	3	2	22	■
Physical & chemical			○	3	2	3	3	3	0	17	■
Optical inst. & lenses			○	1	2	3	1	3	0	13	
Ophthalmic goods			○	3	2	3	2	3	0	16	■
Watches, clocks			○	1	2	3	1	0	1	10	
Others											
Precious metal prod.			○	1	3	3	1	1	1	13	
Musical instruments			○	2	2	3	1	1	0	8	
Toys & Sporting goods			○	2	2	3	2	1	1	14	
Pens & Stationery			○	2	2	3	2	0	0	9	
Lacquer ware			○	2	1	2	2	0	0	7	
Total			**104**								**64**

Note : * P_C = Number of Industries
W = Weight (Points) given to each Type of Industry
$P_W = P_C \times W$ = Weighted Points for each Type of Industry

7.2.3 Scale of Development

In this section, the total scale of development of the IMT is estimated in order to allocate the selected industries in the IMT. The items to be estimated are the infrastructural requirements such as total area, water supply (fresh water supply), electric power (contracted amount of electricity), inflow and outflow freight volume, number of employees and fuel requirements. These items are necessary to determine the scale of the development of IMT which will be necessary for allocating the selected industries in the IMT. These industries were selected from the candidate industries by the three-stage evaluation method as mentioned in section 7.2.2.

The basic requirements for the above items (such as area, electric power, water supply etc.) per industrial unit (termed here as basic location unit) will depend on various factors such as the characteristics of the IMT site, available and planned infrastructure facilities in and around the IMT and the management strategy of the industries in the IMT.

Since this feasibility study refers to the planning stage of the IMT, the basic location unit was determined by adapting the available data from existing industrial estates as follows.

(1) For large scale and core industries, the internationally used basic location unit is applied for IMT.

(2) For other type of industries, the basic location unit, as used in Japan and South Asian countries is applied.

The Table 7.2.4 shows the infrastructural requirements per industrial unit (i.e. basic location units) for the selected industries. On the basis of these basic location units, the total requirements for the IMT, and thus the scale of the development of the IMT is estimated as shown in Table 7.2.5.

As shown in the Table 7.2.5, the number of industries is 112, the area required is 267 hectares, water supply at 32,870 cubic meter per day, electricity at 77,320 kW, inflow freight volume at about 2.23 million tonnes per year and the outflow freight volume at about 2.24 million tonnes per year, number of employees at 28,890 and the fuel at 516,810 million kcal per year.

In the Master Plan Study, the area for industrial-use was estimated at about 288 hectares, and after including roads, green belt and other public facilities, the total industrial area in the IMT was about 400 hectares.

From the results of the Investment Demand Survey as described in Chapter 6, the total area for industrial-use was estimated to be around 329 hectares. Since this area is greater than 267 hectares as estimated in this study, the area for public facilities will be reduced by 30 to 40 % so that the total industrial area in the IMT can be adjusted to 400 hectares.

Table 7.2.4 : Infrastructural Requirements per Industrial Unit by Type of Industry

Type of Selected Industries	Land Area (ha)	Water Supply (m^3/day)	Electric Power Supply (kw)	Cargo Volume ($10n^3$tons/year) Inflow	Cargo Volume ($10n^3$tons/year) Outflow	Number of Employees (person)	Fuel Consumption (10^6kcal)
Food, Beverage, Feed							
Live-stock	5.0	90	270	1	0.5	120	8,350
Canned fruits	2.0	600	520	1.5	1	200	5,780
Seasonings	3.0	330	920	14	16	220	24,780
Oil & fats	2.0	250	450	6	5	100	25,240
Soft drinks	5.0	2,300	1,270	63	90	150	1,300
Textile, Apparel							
Woven fabrics	2.0	300	1,500	1	1	180	3,280
Knitting mills	2.0	320	540	2	2	260	2,070
Outer garments	4.0	200	1,080	2	2	930	3,370
Underwear	2.0	60	540	3	3	430	370
Hats	1.0	40	270	6	6	160	670
Furniture	4.0	220	700	20	18	260	4,070
Paper							
Coated paper	3.0	1,000	1,000	40	30	150	16,230
Paper products	2.0	80	400	13	12	180	560
Containers	1.0	100	500	25	23	100	2,090
Miscel. paper	1.0	640	200	5	4	90	4,960
Publishing, Printing							
Newspaper	1.0	460	200	52	68	900	220
Publishing	1.0	240	200	34	34	810	4,400
Chemical							
Oil & Fat prod	7.0	770	3,000	84	62	330	43,640
Medicines	3.0	900	1,000	4	3	110	8,660
Miscel.chemic.	3.0	100	1,000	4	4	90	4,190
Paving materials	2.0	130	2,000	68	64	60	11,110
Plastic							
Plastic plates	3.0	1,000	1,600	20	18	110	9,090
Plastic films	5.0	200	700	40	36	60	26,850
Industrial pl.	3.0	1,000	1,700	18	16	90	1,360
Foamed plastic	4.0	400	600	30	28	360	15,480
Rubber							
Footwear	2.0	1,000	2,000	4	3.5	750	5,260
Betls & hoses	2.0	280	600	4	3.5	180	3,550
Miscel. rubber	1.0	200	400	3	2.5	100	3,080
Leather							
Shoe cut stock	1.0	30	150	1	1	200	350
Footwear	0.5	20	100	0.5	0.5	90	140
Gloves	0.5	10	100	0.5	0.5	70	370
Ceramic, Stone, Clay							
Glass	3.0	590	2,700	28	20	150	64,330
Aggregate	2.0	250	1,500	25	21	100	12,760

Type of Selected Industries	Land Area (ha)	Water Supply (m^3/day)	Electric Power Supply (kw)	Cargo Volume ($10n^3$tons/year) Inflow	Cargo Volume ($10n^3$tons/year) Outflow	Number of Employees (person)	Fuel Consumption (10^6kcal)
Iron, Steel							
Forgings	4.0	350	1,000	5	4	150	16,640
Castings	8.0	200	1,900	5	3.5	100	29,150
Miscel. prod.	2.0	100	700	3	2.5	90	2,470
Nonferrous Metals							
Wire & Cable	7.0	1,000	3,000	14	13	600	10,290
Miscel. prod.	2.0	100	500	2	1.5	150	4,000
Fabricated Metal Products							
Tableware	2.0	200	400	9	6	160	1,550
Constructional	7.0	250	1,500	13	12	460	2,070
Powder,Coating	3.0	1,000	2,800	4	3.5	420	7,990
Bolts, nuts	2.0	160	400	9	8	140	2,740
Miscel. prod.	1.0	70	200	4	4	100	840
General machinery							
Boilers,turbin	4.0	360	1,120	3	2	230	1,550
Metal working	5.0	300	2,000	10	9	450	3,900
Textile mach.	3.0	40	840	4	3	200	1,310
Special Ind.	4.0	60	500	3	2	300	1,040
General Ind.	5.0	990	2,000	10	9	610	3,050
Miscel. machin	1.0	60	180	2	2	100	310
Electrical machinery							
Generating	5.0	1,200	1,500	12	10	690	3,050
Household	4.0	1,750	2,500	4	4	780	2,810
Communication	4.0	300	1,200	4	4	1,250	2,550
Data process.	5.0	80	300	2	2	270	3,520
Electronic eq.	4.0	200	1,200	3	3	1,360	1,630
Measuring	4.0	200	1,200	3	3	1,380	2,180
Electro. parts	5.0	3,000	4,600	4	4	2,000	7,770
Miscel. mach.	3.0	570	900	2	2	700	1,110
Transportation equipment							
Moter vihicle	25.0	2,500	4,000	15	14	1,800	58,000
Aircraft	5.0	130	1,400	8	7	1,400	4,070
Precision instruments							
Measuring	4.0	350	1,500	1	1	880	2,180
Surveying	2.0	80	300	1	1	210	1,980
Medical inst.	2.0	90	400	1	1	280	3,740
Physical	2.0	110	300	2	2	220	300
Ophthalmic	3.0	270	750	1	1	280	2,110
Manufacturing Total	**220.0**	**30,180**	**70,800**	**785.5**	**743**	**25,850**	**503,860**

Type of Selected Industries	Land Area (ha)	Water Supply (㎥/day)	Electric Power Supply (kw)	Cargo Volume (10n³tons/year)		Number of Employees (person)	Fuel Consumption (10⁶kcal)
				Inflow	Outflow		
Warehouse estate	25.0	300	1,000	480	500	1,000	4,630
Energy distribut.	10.0	100	2,000	880	900	200	1,850
Creaning factory	2.0	1,400	770	10	12	100	3,700
Mart place	4.0	300	1,000	70	80	1,000	740
Car repair factory	4.0	160	960	3	3	240	740
Soft ware park	2.0	430	790	2	2	500	1,290
Non-Manufacturing Total	**47.0**	**2,690**	**6,520**	**1,445**	**1,497**	**3,040**	**12,950**
Grand-Total	**267.0**	**32,870**	**77,320**	**2,230.5**	**2,240**	**28,890**	**516,810**

Source :

For Land Area, Water Supply and Electric Power Supply

(1) Tables for Basic Industrial Location Units, 1992, Ministry of International Trade and Industry.
(2) Compilation of Basic Industrial Location Units for South-East Asia, Location Technologies Corp, 1994.
(3) Tables for Basic Industrial Location Units for Model Industries, 1982, Japan Industrial Location Center.

For Cargo Volume

(4) Tables for Freight Volume Traffic, 1979, Ministry of International Trade and Industry.

For Fuel Consumption

(5) Statistics on Consumption of Crude Oil, 1992, Ministry of International Trade and Industry.

Table 7.2.5 : Summary of the Total Scale of the IMT

Selected Industries for the IMT	Number of Industries	Total Area (ha)	Water Supply (m³/day)	Electric Power Supply (kw)	Cargo Volume (10^3tons/year) Inflow	Cargo Volume (10^3tons/year) Outflow	Number of Employees (persons)	Fuel Consumption (10^6kcal)
Food, Beverage	5	17	3,570	3,430	85.5	112.5	790	65,450
Textile, Apparel	5	11	920	3,930	14	14	1,960	9,760
Lumber, Furniture	1	4	220	700	20	18	260	4,070
Paper	4	7	1,820	2,100	83	69	520	23,840
Publishing, Print.	2	2	700	400	86	102	1,710	4,660
Chemical	3	13	1,770	5,000	92	69	530	56,490
Petroleum	1	2	130	2,000	68	64	60	11,110
Plastic	4	15	2,600	4,600	108	98	620	52,780
Rubber	3	5	1,480	3,000	11	9.5	1,030	11,890
Leather	3	2	60	350	2	2	360	860
Ceramic	2	5	840	4,200	53	41	250	77,090
Iron, Steel	3	14	650	3,600	13	10	340	48,260
Non-ferrous Metals	2	9	1,100	3,500	16	14.5	750	14,290
Fabricated Metal	5	15	1,680	5,300	39	33.5	1,280	15,190
General machinery	6	22	1,810	6,640	32	27	1,890	11,160
Electrical mach.	8	34	7,300	13,400	34	32	8,430	24,620
Transportation eq.	2	30	2,630	5,400	23	21	3,200	62,070
Precision instrum.	5	13	900	3,250	6	6	1,870	10,310
Manufacturing total	**64**	**220**	**30,180**	**70,800**	**785.5**	**743**	**25,850**	**503,860**
Warehouse estate	10	25	300	1,000	480	500	1,000	4,630
Energy distribut.	2	10	100	2,000	880	900	200	1,850
Cleaning factory	2	2	1,400	770	10	12	100	3,700
Mart place	20	4	300	1,000	70	80	1,000	740
Car repair factory	4	4	160	960	3	3	240	740
Soft ware park	10	2	430	790	2	2	500	1,290
Non-Manufacturing tot.	**48**	**47**	**2,690**	**6,520**	**1,445**	**1,497**	**3,040**	**12,950**
Grand-T o t a l	**112**	**267**	**32,870**	**77,320**	**2,230.5**	**2,240**	**28,890**	**516,810**

7.3 Planning of Housing and Urban Facilities

7.3.1 Type of Housing and Urban Facilities

(1) Housing Facilities

The housing facilities are planned for both the employees of the industries located in the IMT as well as persons engaged in commercial and service activities in the IMT. The housing is divided into 3 types, high density housing, medium density housing and low density housing. These facilities are planned for both the single employees and employees with families. Separate facilities are planned for executives, middle & senior level employees, junior employees and servants.

(a) High Density Housing

In the high density housing area, two type of housing facilities are planned; one for the junior employees and the other for servants. There are two types of housing facilities for the junior employees, housing for single employees and housing for employees with families. Housing for families is planned as per the standards used in the high density areas of the new housing estates being constructed in Gurgaon.

(b) Medium Density Housing

In the medium density housing area, housing facilities are planned for middle & senior-level employees, supervisors and foremen.

(c) Low Density Housing

In the low density housing area, housing facilities (including club and guest houses) are planned for the executives of large and multinational companies having companies/ factories in the IMT. The land required for these facilities will be sold to these companies and the facilities will be constructed by the companies themselves.

Table 7.3.1 : Type of Housing Facilities in the IMT

1. High Density Housing	
Junior Employees	Two types of housing facilities for junior employees - single type / family type
Servants	Housing facilities for servants
2. Medium Density Housing	Housing facilities for middle & senior level employees, supervisors and foremen
3. Low Density Housing	Housing facilities (including club and guest houses) for the executives of large and multinational companies

(2) Urban and Business-Related Facilities

The urban and business-related facilities which are planned in the IMT, can be broadly grouped into three categories; urban facilities for the IMT, business support facilities for the promotion of business and industries, and office facilities for companies as mentioned below.

Urban Facilities

1. Town Center
2. Community Center
3. Health Care Center
4. Shopping Center
5. Restaurant Building
6. Shopping Mall
7. School
8. Police and Fire Station

Business Support Facilities

1. Promotion Center
2. Training Center
3. Seminar House

Office Facilities

1. Office Building

(a) Urban Facilities

(i) Town Center

The Town Center will provide facilities such as post office, bank and public and governmental agencies including the single-window services of Haryana and Central government.

(ii) Community Center

The Community Center will provide several type of facilities for the residents of the IMT such as cultural facilities, facilities of interchange, communication and meeting places, clinic etc.

(iii) Health Care Center

The Health Care Center will provide medical and sports facilities for health care of the residents in the IMT.

(iv) Shopping Center

Shopping Center is planned as the main commercial facility in the IMT. General household items and daily use materials and foods (including imported items for foreign residents) will be sold in this shopping center.

(v) Restaurant Building

This building is planned to contain high class restaurants and bars which will serve both Indian and continental foods.

(vi) Shopping Mall

The Shopping Mall is planned for shops and small stores, fast food restaurants, amusement facilities and others.

(vii) School

This school is provided for the children of the residents in the IMT and will be planned as an international school to attract multinational companies to the IMT.

(viii) Police and Fire Station

A police and fire station are planned in the IMT for the safety and security of the IMT residents and work force.

(b) Business Support Facilities

(i) Promotion Center

The Promotion Center will be the core facility to promote the industrial activity in the IMT. The promotional functions were also mentioned in the Master Plan Study and are as follows.

1. Investment Promotion
2. Management Services
3. Technical Service Assistance
4. Manpower Development
5. Information Services Coordination
6. Civil and Public Coordination Services

Since the Training Center and the Seminar House will have the manpower development function, the Promotion Center has the remaining 5 functions i.e. investment promotion, management services, technical service assistance, information services coordination, civil and public coordination services.

(ii) Training Center

The Training Center will provide high-level manpower required by the industries in the IMT. The industries in the IMT will have the priority to employ the persons who complete the training course of the center.

(iii) Seminar House

The Seminar House is provided for the industries in the IMT to hold meetings, give training to employees and interact with research organizations and other companies.

(c) Office Facilities

The software and electronics industry and the administrative sections of companies that have factories in the IMT will be provided office facilities in the Office Building. The administrative departments of the residential and commercial facilities will also be located in the IMT.

7.3.2 Size of Housing facilities

(1) Expected Number of Employees in the IMT

As discussed in Section 7.2.3, the number of persons employed in the industries located in the IMT is estimated to be around 28,890. A large number of persons are also expected to be engaged in the commercial and service activities in the IMT, estimated as follows.

The share of persons engaged in the commercial and service activities in the total population in Haryana was about 20% for urban areas and 10% for the whole state (in 1991). Since the IMT will also have an influence on the people living in the surrounding villages of the IMT, the total population influenced by the IMT is estimated to be about 100,000 persons. Also because, several shopping centers and commercial facilities are being planned for development in the surroundings area of the IMT site, the percentage of persons engaged in the commercial and service activities in the IMT is assumed to be 10% of population influenced by the IMT.

Thus, an additional 10,000 persons are expected to be engaged in the commercial and service activities in the IMT.

Number of Total Employees in the IMT	
Employed in industries located in the IMT	28,890 persons
Engaged in commercial and service activities	10,000
(Total)	38,890

Since the percentage of middle & senior-level employees in the total employees is expected to be around 15-20%; thus the percentage of junior employees is assumed at 85% in the IMT.

Number of Total Junior Employees

Employed in industries located in the IMT	24,600 persons
Engaged in commercial and service activities	8,500
(Total)	33,100

(2) Housing for Junior Employees (High Density Housing)

(a) Number of Junior Employees (Single) and Resident in the IMT

The number of junior employees (single) employed in industries located in the IMT is assumed at 10,000 and persons engaged in commercial and service activities at 3,000. The number of residents in the housing for singles is assumed 4,000 for those employed in industries and 1,000 for those engaged in commercial and service activities, as described below.

The number of new employees in industries in the IMT is estimated to be around 1,000 persons per year. All of them are assumed to be singles, and their average resident term is about 4 to 5 years; thus the number of residents in the housing for singles in the IMT is estimated to be 4,000.

The number of residents of commercial and service activities in the IMT should be 1,500 according to the percentage of single residents in industries, but the market area of manpower for commercial and service activities is smaller than that of industries; thus the number of residents of commercial and service activities in the IMT is assumed at 1,000.

Number of Junior Employees (Single)

Employed in industries located in the IMT	10,000 persons
Engaged in commercial and service activities	3,000
(Total)	13,000

Number of Junior Employees (Single) and Resident in the IMT

Employed in industries located in the IMT	4,000 persons
Engaged in commercial and service activities	1,000
(Total)	5,000

(b) Number of Junior employees (with families) and Resident in the IMT

The number of junior employees (with families) is assumed to be 14,600 for industries and 5,500 for commercial and service activities in the IMT. Among those employed in industries, about 1/3 (i.e. 5000) are assumed to be residing in the IMT. For the junior employees (with families) and engaged in commercial and service activities, about 1/6 (half the ratio for industries) are assumed to be resident in the IMT. Thus the number of resident junior employees (with families) is 4,900 for industries and 1,000 for commercial and service activities.

Number of Junior employees (with families)

Employed in industries located in the IMT	14,600 persons
Engaged in commercial and service activities	5,500
(Total)	20,100

Number of Junior employees (with families) and Resident in the IMT

Employed in industries located in the IMT	4,900 persons
Engaged in commercial and service activities	1,000
(Total)	5,900

(c) Size of Housing for Junior Employees

Housing for Junior Employees (Singles)

Number of apartment buildings	50 (100 houses per building)
Total floor area	10.0 ha (2,000 m^2 per building)
Total built-up area	3.0 ha (600 m^2 per building)
Total ground area	12.5 ha (2,500 m^2 per building)

Total floor area per building

Residential space	1,000 m^2 (10 m^2 per room, 100 rooms)
Others	1,000 m^2 (shower room, lavatory, laundry, lounge, cafeteria, others)

Housing for Junior Employees (with families)

Number of apartment buildings	60 (10 floors and 100 units per building)
Total floor area	60.0 ha (10,200 m^2 per building)
Total built-up area	6.0 ha (1,000 m^2 per building)
Total ground area	36.0 ha (6,000 m^2 per building)

Total floor area per building

80 m^2 per unit * 120 units * 1.25 = 12,000 m^2

The factor of 1.25 is used to account for the common floor area provided in each building. The floor area of 80 m^2 per housing unit is based on the average floor area in the high density and medium density housing in the developing housing estates in Gurgaon as shown below.

High density	30 - 70 m^2	(average 60 m^2)
Middle density	71 - 150 m^2	(average 100 m^2)
Low density	151 m^2-	(average 180 m^2)

(3) Housing for Servants (High Density Housing)

(a) Number of Servants in the IMT

The share of marginal workers to main workers was 8.2% in Haryana state in the year

1991. The category of "Marginal workers" includes not only servant workers but also part-time workers. Since some of the industries in the IMT will be mechanized and automated, they would require fewer marginal workers than the average in the state. Therefore the ratio of servants to total employees in the IMT is assumed at 5% which is smaller than the average of the State at 8.2%. Thus the number of servants is assumed to be 2,000 which is 5% of the total number of employees in the IMT at 38,890.

(b) Number of Servants Resident in the IMT and their Housing

It might be difficult for the servants and marginal workers to afford housing in the surrounding area of the IMT because of their low income and also to avoid the development of slums in the surrounding area, housing for servants will be provided in the IMT. In case of low-income employees, generally two persons per family work, so the number of housing units provided is 1,000.

Housing for Servants

Number of Apartment buildings	25 (4 floors and 40 units per building)
Total floor area	3.6 ha (1,440 m^2 per building)
Total built-up area	1.0 ha (400 m^2 per building)
Total ground area	4.0 ha (1,600 m^2 per building)

Total floor area of each building

30 m^2/unit * 40 units * 1.2 = 1,440 m^2

The factor of 1.2 is applied to account for the common floor area in each building.

(4) Housing for Middle & Senior Level Employees (Medium Density Housing)

Housing for middle & senior level employees, supervisors and foremen is provided in the medium density housing area. Since the share of middle & senior level employees to total employees is around 15%, the number of such employees are assumed to be 4,290 in industries, 1,500 in commercial and service activities and 5,790 employees in total. It is also assumed that many of them will live in the developing residential estates in Gurgaon, because of their large income, the ratio of residents is assumed to be around a quarter of all middle & senior level employees in the IMT which comes to around 1,500 persons.

Number of middle & senior level employees

Employed in industries located in the IMT	4,290 persons
Engaged in commercial and service activities	1,500
(total)	5,790

Number of middle & senior level employees resident in the IMT

Employed in industries located in the IMT	1,100 persons
Engaged in commercial and service activities	400
(total)	1,500

Housing for middle & senior level employees

Apartment buildings	50	(3 floors and 30 units per building)
Total floor area	18.8 ha	(3,750 m^2 per building)
Total built-up area	6.5 ha	(1,300 m^2 per building)
Total ground area	39.0 ha	(7,800 m^2 per building)

Total floor area of each building

100 m^2/unit * 30 units * 1.25 = 3,750 m^2

The factor of 1.25 is used to account for the common floor area provided in each building. The floor area of 100 m^2 per housing unit is based on the average floor area of such houses in the developing housing estates in Gurgaon.

Medium density housing can be constructed on the upper floors of the shopping mall if the medium density housing as mentioned above is not sufficient. These housing facilities will be high class housing and will be developed by private sectors.

(5) Housing for Executives (Low Density Housing)

The housing facilities (including club and guest houses) for the executives of large and multinational companies having companies/ factories in the IMT, are planned in the low density housing area. The land required for these facilities will be sold to these companies and the facilities will be constructed by the companies themselves. About 20 lots with 10,000 m^2 per lot are being planned in the IMT.

Table 7.3.2 : Number of Housing Units in the IMT by Type of Employees

Type of Housing	Number of housing units	Total floor area (ha)	Total built-up area (ha)	Total ground area (ha)
High Density Housing (Single)	5,000	10.0	3.0	12.5
High Density Housing (Family)	6,000	60.0	6.0	36.0
(Sub-Total)	11,000	70.0	9.0	48.5
Medium Density Housing	1,500	18.8	6.5	39.0
Low Density Housing	-	-	-	20.0
Housing for Servants	1,000	3.6	1.0	4.0
(TOTAL)	**13,500**	**92.4**	**16.5**	**111.5**

Table 7.3.3 : Expected Number of Employees and Residents in the IMT

Type of Employees and Housing			Number of Employees	Number of Residents by Type of Housing			Share of Residents (%)
				High Density	Medium Density	(Total)	
Employed in Industries Located in the IMT	High Density	Single	10,000	4,000	-	4,000	40.0
		Family	14,600	4,900	-	4,900	33.6
		Total	24,600	8,900	-	8,900	36.2
	Medium Density		4,290	-	1,100	1,100	25.6
	Sub-Total		**28,890**	**8,900**	**1,100**	**10,000**	**34.6**
Engaged in Commercial and Economic activities	High Density	Single	3,000	1,000	-	1,000	33.3
		Family	5,500	1,000	-	1,000	18.2
		Total	8,500	2,000	-	2,000	23.5
	Medium Density		1,500	-	400	400	26.7
	Sub-Total		**10,000**	**2,000**	**400**	**2,400**	**24.0**
Total Employees			38,890	10,900	1,500	12,400	31.9
Servants			2,000	2,000	-	2,000	100.0
Grand Total			**40,890**	**12,900**	**1,500**	**14,400**	**35.2**

Table 7.3.4 : Number of Housing Units and Residents

Type of Housing	Number of Housing Units	Resident Population	Total ground area (ha)	Density (persons/ha)
High density Single	5,000	5,000	12.5	400
Family	6,000	24,000	36.0	667
(Sub-Total)	11,000	29,000	48.5	598
Medium density	1,500	6,000	39.0	164
(Sub-Total)	12,500	35,000	84.5	414
Servant Housing	1,000	5,000	4.0	1,250

Note: The average number of persons per household was 5 in urban areas in Haryana state in 1991.
It is assumed that the number of persons per household in the IMT will be less than the average for the State, because of high income and educational level of employees in the IMT. Therefore the number of persons per household is assumed to be 4 in the IMT. But the number of persons per household for servants is assumed to be 5, the same as the average for the State.

7.3.3 Size of Urban Facilities

(1) Urban Facilities

(a) Town Center

The Town Center is planned to provide facilities such as post office, bank and public and governmental agencies including the single-window services of Haryana and Central government. It consists of a single building with the following details.

Number of buildings	1 (4 floors and 1 underground floor)
Total floor area	20,000 m^2
Total built-up area	5,000 m^2
Total ground area	20,000 m^2

Details of the total floor area

Administration center	13,000 m^2 (reception space, information desk, offices, meeting rooms, others)
Bank and post office	2,000 m^2
Entrance, lobby, others	5,000 m^2

(b) Community Center

The Community Center will provide several type of facilities for the residents of the IMT such as cultural facilities, facilities of interchange, communication and meeting places etc. The Community Center consists of a single multi-use facility with the following features.

Number of buildings	1 building
Total floor area	4,400 m^2
Total built-up area	3,000 m^2
Total ground area	30,000 m^2
Details of the total floor area	
Culture	1,400 m^2 (library, AV hall)
Communication	1,800 m^2 (lobby, meeting room, multi use hall)
Others	1,200 m^2 (dining room, lavatory, others)

(c) Health Care Center

The Health Care Center is planned as medical and sports facilities for health care of the residents in the IMT. The facilities include clinic, gymnasium, aerobics studio, running track, golf range, indoor/outdoor swimming pools, indoor/outdoor tennis courts, shower rooms and sauna bath. The land and floor requirements for the Health Care Center is as follows.

Indoor	Total floor area	6,000 m^2
	Total built-up area	5,000 m^2
Outdoor		3,000 m^2
Total ground area		50,000 m^2

(d) Shopping Center

The market sphere of the shopping center is the residents and the workers of the IMT, and the residents and workers in surroundings of the IMT. The number residents in the IMT is 35,000 persons, and the number of non-resident worker is about 26,000. It is assumed that the population of the market sphere, which also includes the population of surrounding villages, is around 100,000 persons. The type of the facilities is GMS (general merchandising store) type in a local city of Japan. The Shopping Center consists of two buildings with the following details.

Number of buildings	2 (2 floors in each building)
Floor area of shops	20,000 m^2 (10,000 m^2 per building)
Total floor area	28,000 m^2 (14,000 m^2 per building)
Total built-up area	14,000 m^2 (7,000 m^2 per building)
Total ground area	50,000 m^2 (25,000 m^2 per building)

(e) Restaurant Building

The Restaurant Building is planned to contain high class restaurants and bars which will serve both Indian and continental foods. There are four restaurant buildings with the following details.

Number of restaurant buildings	4 (2 floors per building)
Floor area of restaurants	4,800 m^2 (1,200 m^2 per building)
Total floor area	7,200 m^2 (1,800 m^2 per building)
Total built-up area	4,000 m^2 (1,000 m^2 per building)
Total ground area	16,000 m^2(4,000 m^2 per building)

(f) Shopping Mall

The Shopping Mall is planned as a multi-use facility containing several shops and stores for daily use, fast food restaurants, amusement facilities and others. It is assumed that the floor area of all commercial facilities in the IMT will be about 0.70 m^2 per person. Since the total population influenced by the IMT is estimated to be 100, 000, the total floor area will be around 70,000 m^2. This total floor area, less the total floor area of the shopping centers and restaurant buildings, leaves about 40,000 m^2; thus the total floor area of the shopping mall is 40,000 m^2.

Floor area of stores	40,000 m^2 (400 stores with 100 m^2 per store)
Total floor area	48,000 m^2
Total built-up area	24,000 m^2
Total ground area	72,000 m^2

(g) School

The number of residents in the IMT is 40,000, and the ratio of school age population is 15% of the residents; therefore the number is about 6,000. Most of them go governmental schools and public school in surroundings of the IMT. The school in the IMT is provided to about 10 to 15% of the school age residents, which comes to about 1000 students. The school is planned as a primary and middle school and will consist of two buildings, one gymnasium, and an outdoor sports facilities.

Students	1,000 persons (4 classes and 100 students per year)
Teachers	40 persons
Total floor area	18,000 m^2 (school buildings 13,000 m^2, gymnasium 5,000 m^2)
Total built-up area	10,000 m^2 (school buildings 5,000 m^2 gymnasium 5,000 m^2)
Total ground area	70,000 m^2

(h) Police Station and Fire Station

In Japan, there is one policeman per 400 residents and one fireman per 800 residents. The same ratio is adopted in the IMT. The IMT will have one police station with 100 policemen and one fire station with 50 firemen. The details of the area required is as follows.

	(Police Station)	(Fire Station)	(Total)
Total floor area	1,000 m^2	500 m^2	1,500 m^2
Total built-up area	500 m^2	250 m^2	750 m^2
Total ground area	3,000 m^2	3,000 m^2	6,000 m^2

(2) Business Support Facilities

(a) Promotion Center

The Promotion Center will provide facilities for the IMTPC (IMT Promotion Center) and other organizations to promote industrial activities (Investment Promotion, Management Services, Technical Service Assistance, Manpower Development, Information Services Coordination, Civil and Public Coordination Services) in the IMT. It consists of offices, teaching room, training room, information center, data-base center, library, laboratory, consulting offices and rooms, presentation rooms, large/small halls, meeting rooms and others.

Promotion Center Building	1(4 floors and 1 underground floor)
Total floor area	20,000 m^2
Total built-up area	5,000 m^2
Total ground area	20,000 m^2

(b) Training Center

The Training Center will provide training facilities to train high level manpower for the industries in the IMT. It will contain teaching rooms, seminar rooms, training rooms, laboratory, computer room, library and others.

The number of factory employees is 28,890 and the ratio of workers is 85% of it; therefore the number of workers is 24,600. The number of new employees of factories in the IMT is about 1,000 persons per a year. The training center provides 10% of new employees of factories, and has a 2 year training course.

Trainees	200 persons
Training Center Building	1 (4 floors)
Total floor area	9,000 m^2
Total built-up area	2,500 m^2
Total ground area	30,000 m^2

(c) Seminar House

The seminar house is a facility for the industries in the IMT to have meetings, train employees, interchange with research organizations and between companies. It will consist of teaching rooms, seminar rooms, meeting rooms, hall, library, dining room, bedrooms and others.

Total floor area	6,000 m^2
Total built-up area	2,000 m^2
Total ground area	20,000 m^2

(3) Office Buildings

Office facilities will be provided for the software and electronics industry, administrative departments of companies that have factories in the IMT and to support the commercial and service functions in the IMT.

Number of office buildings	4 (6 floors and 1 underground floor each)
Total floor area	68,000 m^2 (17,000 m^2 per building)
Total built-up area	12,000 m^2 (3,000 m^2 per building)
Total ground area	48,000 m^2 (12,000 m^2 per building)

(4) Traffic Facilities

(a) Bus Terminal

Bus terminal facilities will be provided in the IMT. Road-side type bus stops are planned on both sides. on the National Highway No.8.

Total ground area	1,000 m^2 (500 m^2 per bus stop)

(b) Heliport

A small heli-stop type heliport is planned in the IMT for emergency cases.

Total ground area	11,200 m^2 (80 m * 140 m)

The area of some other utility facilities is shown in Table 7.3.5. The size of all the IMT facilities is summarised in Table 7.3.6.

The infrastructure requirements for water supply, electric power and other energies is shown in Table 7.3.7.

Table 7.3.5 : Size of Utility Facilities

Type of Public Utility	Area (ha)	Remarks
Water Supply Facilities	3.7	Water storage and distribution facilities (Underground)
Sewage Treatment Facilities	6.0	Stormwater and sewage treatment facilities
Power Station	3.6	Power Generation (one site); Sub-station : 2 Facilities ; one in town center and one in Industrial area
Telecommunication	0.4	Land required for telephone exchange facilities is located within the site of the Town Center
(Total)	**13.3**	

Table 7.3.6 : Sizes of Housing and Urban Facilities (ha)

Type of Housing and Urban Facilities		Total floor area (ha)	Total built-up area (ha)	Total ground area (ha)
Housing High density	Single	10.0	3.0	12.5
	Family	60.0	6.0	36.0
	(Total)	70.0	9.0	48.5
Medium density		18.8	6.5	39.0
Low density		-		20.0
Servants		3.6	1.0	4.0
(Total)		92.4	16.5	111.5
Urban Facilities	1. Town Center	2.0	0.5	2.0
	2. Community Center	0.4	0.3	3.0
	3. Health Care Center	0.6	0.5	5.0
	4. Shopping Center	2.8	1.4	5.0
	5. Restaurant Build.	0.7	0.4	1.6
	6. Shopping Mall	4.8	2.4	7.2
	7. School	1.8	1.0	7.0
	8. Police Stn., Fire Stn.	0.2	0.1	0.6
	(Total)	13.3	6.6	31.4
Business Support Facilities	1. Promotion Center	2.0	0.5	2.0
	2. Training Center	0.9	0.3	3.0
	3. Seminar House	0.6	0.2	2.0
	(Total)	3.5	1.0	7.0
Office Buildings		6.8	1.2	4.8
Traffic	1. Bus Terminal*			(0.1)
	2. Heliport			1.1
	(Total)			1.1
Utility				13.3
(Total)				**169.1**

Note * : Since the Bus Terminal Will be located along the road side, its area is included in the area of the roads.

Table 7.3.7 : Basic Infrastructural Requirements for Housing and Urban Facilities

Item	Facilities	Water Supply (m^3/day)	Power Supply kW	Other Energies 10^3 kcal/day
Housing Facilities	High density Housing	3,300	26,800	54,000
	Medium density Housing	1,000	7,200	14,000
	Low density Housing	100	1,920	2,500
	Servant Housing	500	1,380	9,900
	(Sub Total)	4,900	37,400	80,400
Urban Facilities	1. Town Center	120	2,400	30
	2. Community Center	40	480	10
	3. Health Care Center	210	720	300
	4. Shopping Center	240	3,360	20
	5. Restaurant Build.	60	840	400
	6. Sopping mall	400	5,760	1,000
	7. School	60	2,160	800
	8. Police Stn., Fire Stn.	20	240	120
	(Sub Total)	1,150	15,960	2,680
Business Support Facilities	1. Promotion Center	200	2,400	70
	2. Training Center	60	720	50
	3. Seminar House	90	1,080	50
	(Sub Total)	350	4,200	170
Office Buildings		600	8,160	240
(Grand Total)		**7,000**	**65,720**	**83,490**

Note 1 : The standard units as used in Japan were adjusted to Indian conditions for the estimation of the infrastructural requirements.

Note 2 : The energy requirements for kitchen and hot-water were excluded from Other Energies.

7.4 Development Methodology for the IMT

The successful implementation of the IMT project would require the involvement of different types of implementing agencies and the coordination of these agencies with the funding agencies. In this section, alternative scenarios for the development of the IMT are examined and are discussed as follows.

7.4.1 Characteristics of the IMT Project

The IMT will consist of various kinds of infrastructure and urban facilities, some of which could be expected to be self-sustainable or even profitable. However, in total these infrastructure and urban facilities would require a huge investment. Therefore it is considered necessary to study the existing implementing agencies which are normally responsible for developing infrastructure and urban facilities, and to formulate an efficient development methodology for the IMT. Accordingly, the possibilities available for developing each of the facilities in the IMT are studied from two perspectives, the "Potential Implementing Agencies" and the " Potential Funding Agencies".

(1) IMT facilities

The IMT facilities can be broadly grouped into two types, the infrastructure facilities and the urban facilities (Refer Fig. 7.4.1). Infrastructure facilities consist of roads, water supply, electric supply, etc. and urban facilities consist of housing, shopping center, promotion center etc. Some of the infrastructure facilities are located within the IMT and others outside the IMT because of the necessary connection to the existing infrastructure in the surrounding area. In addition, some infrastructure facilities can be expected to provide a return on their investment through the sale of land or service charges from users. The urban facilities consists of public facilities (with little or no return on investment) such as servant housing, town center, community center, etc., and commercial facilities (with return on investment) such as offices, restaurants, shopping center etc.

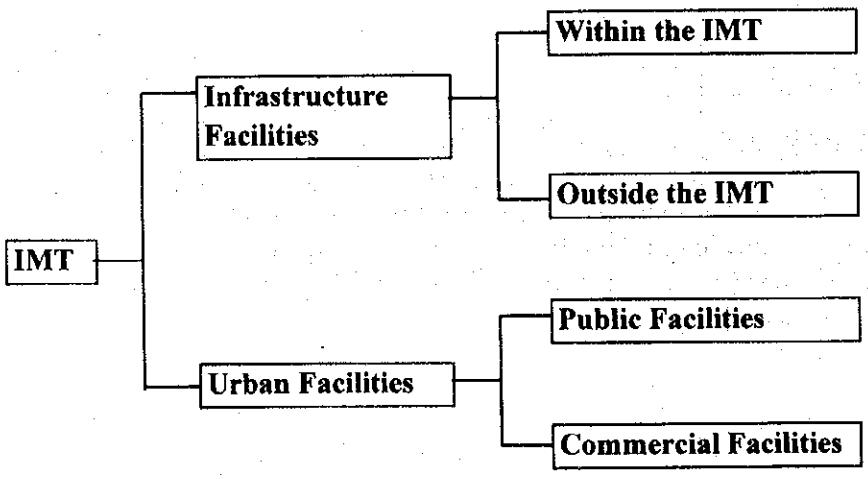

Fig 7.4.1 : Grouping of IMT Facilities

Table 7.4.1 : Facilities in the IMT (Location and Possibility of Return on Investment)

Type of Infrastructure	Type of Facilities	Location of Facilities			Possibility of Return on Investment		
		Within the IMT		Outside the IMT	Possible		Not possible
		Industrial Zone	Urban Zone		Method A*	Method B**	
Roads	Flyover on National Highway No. 8			●			●
	Roads in IMT	●	●		●		
	Local Access to IMT			●			●
Environment	Parks & Green Belt	●	●		●		
Water Supply	Water Treatment and Supply			●		●	
	Pumping and Distribution Facilities	●	●			●	
Drainage	Collection of Storm Water	●	●		●		
	Drainage of Storm Water			●			●
Sewage	Sewage Treatment Facilities	●				●	
	Drainage of Sewage			●			●
Electric Power	Fuel pipeline to IMT			●		●	
	Power Plant/ Distribution	●	●			●	
Telecommunications	Equipment for Telephone Exchange		●			●	
	Telephone Exchange Building		●			●	
	Connection Cables	●	●			●	
Solid Waste	Collection of Solid Waste	●	●			●	
	Solid Waste Disposal			●		●	
Housing	Executive Level		●		●	●	
	Middle & Senior Level		●		●	●	
	Junior Level		●		●	●	
	Servants		●				●
Urban Facilities	Town Center		●				●
	Community Center		●				●
	Shopping Center		●		●	●	

Type of Infrastructure	Type of Facilities	Location of Facilities			Possibility of Return on Investment		
		Within the IMT		Outside the IMT	Possible		Not possible
		Industrial Zone	Urban Zone		Method A*	Method B**	
	Restaurant Building		●		●	●	
	Shopping Mall		●		●	●	
	Health care center		●		●	●	
	Schools		●		●	●	
	Police & Fire Station		●				●
Business Support Facilities	Promotion Center		●		●		
	Training Center		●				●
	Seminar House		●				●
Office Building			●		●	●	

Note : * Method A : Through Sale of Land in the IMT.

** Method B : Through Collection of Service Charge from Users.

(2) Implementing Agencies

The existing implementing agencies responsible for development of industrial estates and also new implementing agencies are possible for the implementation of the IMT.

(a) Existing Implementing Agencies

The existing implementing agencies for the development of the IMT and the related infrastructure are as follows.

(i) Industrial estate

The Haryana State Industrial Development Corporation (HSIDC) is the main implementing agency for the development and operation of industrial estates in Haryana. In addition, the Haryana State Urban Development Agency (HUDA) has also partially undertaken industrial estate development in Haryana.

(ii) Urban development

Infrastructure, housing, urban facilities, business supporting facilities, etc. in the urban areas of Haryana are developed by HUDA. Housing, office buildings, etc. are also developed by private developers.

(iii) Roads

The roads outside the of industrial estate are developed by the following agencies.

- National Highways : Public Works Department (PWD, B & R), Central Government
- State Highways : Public Works Department (PWD, B & R), Haryana State Government
- Major District Roads (MDR) & Village Roads : (PWD, B & R), Haryana State Govt.

From this year, the private sector has also been allowed to develop Highways.

(iv) Water Supply

The water supply facilities outside the industrial estate are developed by the PWD (Public Health and Engineering Dept. -PHED) of the Haryana State Government.

(v) Sewage

Similar to water supply facilities, the PHED of the PWD is in charge of sewage facilities outside the industrial estates.

(vi) Electricity and Energy

Haryana State Electricity Board (HSEB) is in charge of electric supply in Haryana, except for the industrial estates. Private sector has also been allowed to generate and supply electricity.

Gas supply is provided by the Gas Authority of India Ltd.(GAIL), which is a public sector corporation.

(vii) Telecommunications

Telecommunications is in the charge of Department of Telecommunications (DOT) under the Ministry of Communications, Government of India. The private sector has also been allowed to participate in this sector.

(viii) Industrial waste treatment

The industrial waste treatment is carried by each industry under the control of the Haryana State Pollution Control Board (HSPCB).

(b) New Implementing Agencies

In addition to the above, new implementing agencies could also be established for the development and implementation of the IMT:

(i) Private sector

In the case of private companies, the following three cases are possible for the development of the IMT.

1. Private companies in India
2. Private companies in foreign countries
3. Joint cooperation of Indian and foreign private companies

(ii) Third Sector

New implementing agencies (the third sector) can be established by the joint cooperation of the above stated private companies with the existing public corporations for the IMT development.

(3) Funding Agencies

Funding agencies will be required for the funding of the IMT, however its arrangement will be different from that of implementing agencies. It is possible to make financial arrangements using funding from i) India, ii) foreign countries and iii) joint India and foreign cooperation.

(a) India

(i) Haryana State Government

Allocation of financial resources can be made from the public budget of Haryana State Government. This could also include a subsidy from the Central Government.

(ii) Private companies

Financial arrangements can be made by Indian private companies or their consortium. This could also include borrowings from financial institutions in India.

(iii) Joint State Government and Indian private companies (Third Sector)

Financial arrangement can be made jointly by the Haryana State Government and Indian private companies.

(b) Foreign

(i) Public Organization

Borrowing can be made from international organizations or foreign public organizations.

(ii) Private companies

Financial arrangement can be made by foreign private companies. This could also include borrowings from foreign commercial banks.

(iii) Joint Public and Private companies

Financial arrangement can be made from multi-consortium bodies consisting of foreign public organizations and private companies.

(c) Joint cooperation of India and foreign funding sources

The following cases are possible for cooperation between Indian and foreign funding sources.

Indian	**Foreign**		
	Public Organizations	Private Companies	Joint Cooperation of Public and Private Companies
Haryana State Government	❶	❷	❸
Indian Private Companies		❹	❺
Joint Cooperation of Haryana State Government and Indian Private Companies		❻	❼

❶ Joint cooperation of Haryana State Government and foreign public organizations
❷ Joint cooperation of Haryana State government and foreign private companies

❹ Joint cooperation of Haryana State Government, foreign public organizations and foreign private companies
❺ Joint cooperation of India and foreign private companies
❻ Joint cooperation of India private companies, foreign public organizations and foreign private companies
❼ Joint cooperation of Haryana State Government, India private companies and foreign private companies
❽ Joint cooperation of Haryana State Government, India private companies, foreign public organizations and foreign private companies

(4) Evaluation Method

Various factors such as type and nature of the IMT facilities, prospects of return on investment, the existing implementing agencies and possibility of establishing new implementing agencies, availability of financial resources etc. need to be taken into consideration for formulating an appropriate development methodology for the IMT. Based on the above mentioned factors, several alternative scenarios were formulated for the development of the IMT. A three-step evaluation method is used for formulating and evaluating the alternative scenarios for the development of the IMT.

(a) Primary evaluation : Formulation of alternative scenarios

In the primary evaluation, each IMT facility (both, infrastructure and urban facilities) is evaluated using two criteria; the prospect for return on investment and possible implementing agencies. Based on the results of the primary evaluation, alternative scenarios for development of the IMT are formulated.

(b) Secondary evaluation : Evaluation of alternative scenarios

In the secondary evaluation, the alternative scenarios which were formulated in the primary evaluation are further examined for their advantages and disadvantages. The availability of financial resources is also considered in the examination of the alternative scenarios.

(c) Tertiary Evaluation : Evaluation from the demand side

The subject of the primary and secondary evaluation is studying the development methodology from the view point of implementing agency of each facillty of IMT. However, in the tertiary evaluation, implementing agency is studied from the view point of demand from foreign investors. The evaluation method discussed above is illustrated on Fig. 7.4.2.

7.4.2 Primary Evaluation : Formulation of alternative scenarios

Three development methods were considered for developing each of the facilities in the IMT, namely, development by public sector, by private sector and by third sector. The most practical development method was selected for the development of each of the facilities.

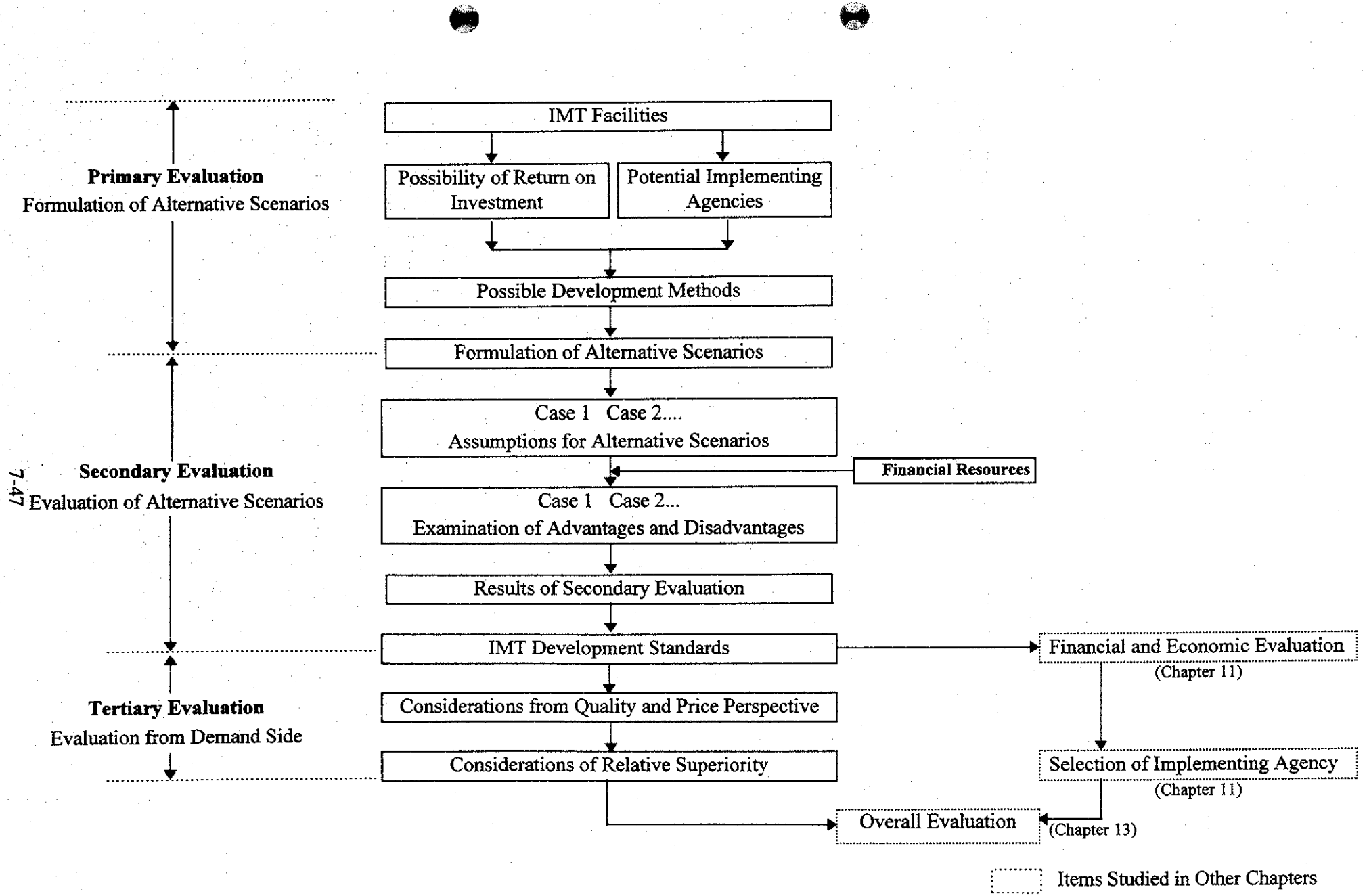

Fig 7.4.2 : Evaluation Method for Formulation and Evaluation of Alternative Scenarios

(1) Profitability of IMT facilities

The IMT facilities were evaluated by the possibility and scale of return on investment as follows.

(a) Profitable facilities

Those IMT facilities which can be developed and operated on a commercial basis.

(b) Non-profitable Facilities

Those IMT facilities which cannot be developed and operated on a commercial basis because either it is difficult to collect charge from the users or they are deemed public service facilities.

(c) Facilities having low profitability

Those facilities which are not attractive to develop and operate on a commercial basis because of low profit considering the scale of investment. Therefore, such facilities can be developed and operated by the joint cooperation of public and private sectors.

(2) Potential Implementing Agencies

The IMT facilities are classified according to the possible implementing agencies based on practical considerations. The results are shown in Table 7.4.2.

(3) Possible Development methods for the IMT Facilities

The possible options for developing the IMT Facilities are as follows.

(a) Profitable facilities : Development by private sector
(b) Non-profitable Facilities : Development by public sector
(c) Facilities having low profit: Development by third sector

However, most facilities could be developed by any of the development methods stated above. Therefore, many cases were considered in formulating the different alternative scenarios. From a practical view point, typical development scenarios will be selected and the selected scenarios will be further studied in the secondary evaluation.

For the secondary evaluation, each infrastructure and urban facility has been classified as Group "A", "B" or "C" for convenience.

- Group "A" -- Development by public sector
- Group "B" -- Development by public, private or third sector
- Group "C" -- Development by private sector

The evaluation results are shown in Table 7.4.2.

Table 7.4.2 : Results of the Primary Evaluation

P : Profitable
LP : Low Profitability
NP : Not Profitable
GN : Government Agencies (Central and State)
PR : Private Agencies
IN : Indian Companies
FR : Foreign Companies
JV : Joint Venture of Government and Private Agencies
TS : Third Sector
PS :Private Sector
GS : Government or Public Sector

Group A : Development by Public Sector
Group B : Development by Public, Private or Third Sector
Group C : Development by Private Sector

Type of Infrastructure	Type of Facilities	Profitability			Potential Implementing Agencies						Development Method			Group
		P	LP	NP	Existing		New Agencies				PS	GS	TS	
					GN	PR	Private			TS				
							IN	FR	JV					
Roads	Flyover on National Highway No. 8			●	●							●		A
	Roads in IMT	●			●		●		●	●	●	●	●	B
Environment	Parks & Green Belt	●			●		●		●	●	●	●	●	B
Water Supply	Water Treatment and Supply	●			●							●		A
	Pumping and Distribution Facilities	●			●		●		●	●	●	●	●	B
Drainage	Collection of Storm Water	●			●		●		●	●	●	●	●	B
	Discharge channel for Storm Water			●	●							●		A
Sewage	Sewage Treatment Facilities	●			●		●		●	●	●	●	●	B
	Discharge of Sewage			●	●							●		A
Electric Power	Fuel pipeline to IMT	●			●							●		A
	Power Plant/ Distribution	●			●	●	●		●	●	●	●	●	B
Telecommunications	Equipment for Telephone Exchange	●			●							●		A
	Telephone Exchange Building	●			●		●		●	●	●	●	●	B
	Connection Cables	●			●							●		A

Type of Infrastructure	Type of Facilities	Profitability			Potential Implementing Agencies						Development Method			Group
		P	LP	NP	Existing		New Agencies				PS	GS	TS	
					GN	PR	Private			TS				
							IN	FR	JV					
Solid Waste	Collection of Solid Waste	●			●		●			●	●	●	●	B
	Solid Waste Disposal		●		●							●		A
Housing	Executive Level	●			●	●	●				●	●	●	B
	Middle & Senior Level	●			●	●	●				●	●	●	B
	Junior Level	●			●	●	●				●	●	●	B
	Servants		●		●							●		A
Urban Facilities	Town Center		●		●							●		A
	Community Center		●		●							●		A
	Shopping Center	●				●	●				●			C
	Restaurant Building	●				●	●				●			C
	Shopping Mall	●				●	●				●			C
	Health care center	●				●	●				●			C
	Schools			●	●						●	●	●	A
	Police & Fire Station			●	●							●		A
Business Support Facilities	Promotion Center	●			●		●			●	●	●	●	B
	Training Center		●		●							●		A
	Seminar House		●		●							●		A
Office Building		●			●	●	●				●			C

(3) Formulation of Alternative Scenarios

The various facilities are classified into three groups according to the primary evaluation.

(a) Group "A" -- (Development by public sector)

Infrastructure Facilities
- Flyover on NH No. 8
- Water Treatment and Supply to IMT
- Discharge of Storm Water and Sewage
- Fuel Pipeline to IMT
- Telecommunication Facilities
- Solid Waste Disposal

Housing and Urban Facilities
- Servant Housing
- Town Center
- Community Center
- Police and Fire Station
- Primary & Middle Schools
- Training Center
- Seminar House

(b) Group "B" -- (Development by public, private or third sector)

Infrastructure Facilities
- Roads in IMT
- Parks and Green Belt
- Water Pumping & Distribution Facilities
- Collection of Storm Water
- Sewage Treatment Facilities
- Power Generation/Distribution
- Solid Waste Collection and Treatment

Housing and Urban Facilities
- Executive Level Housing
- Middle & Senior Level Housing
- Junior Level Housing
- Promotion Center

(c) Group "C" -- (Development by private sector)

Infrastructure Facilities

Housing and Urban Facilities
- Shopping Center
- Restaurant Building
- Shopping Mall
- Health Care Center
- Office Building

As per the above grouping, the characteristic of Group A is that the infrastructure facilities are outside the IMT and the urban facilities are mainly public facilities with no possibility of return on the investment. Urban facilities of Group C are expected to make profit and private sector can positively develop these facilities. However, the facilities of Group B could be developed by any development method. Therefore by adding and combining typical development methods of Group B facilities with Group A and Group C facilities, a range of alternative development scenarios can be formulated. As a result, six typical cases for development are formulated.

For Case 1 to Case 3, development of site preparation and infrastructure will be mainly done by the public sector whereas for Case 4 to case 6, this development will be mainly done by the private sector.

Land acquisition should be carried out by the state government so it is added to Group A. The Groups and Cases are summarised in the following Table.

<table>
<tr><th colspan="2" rowspan="2">IMT Facilities</th><th colspan="6">Development Scenario</th></tr>
<tr><th>Case 1</th><th>Case 2</th><th>Case 3</th><th>Case 4</th><th>Case 5</th><th>Case 6</th></tr>
<tr><td rowspan="2">Group A</td><td>Land Acquisition</td><td colspan="6">Haryana State</td></tr>
<tr><td>Infrastructure Facilities outside the IMT (1)

Part (2) of Urban & Housing Facilities</td><td colspan="6">Haryana State</td></tr>
<tr><td rowspan="3">Group B</td><td>Site preparation and other Infrastructure (3)

Promotion Center

Solid Waste Collection</td><td>Haryana State</td><td colspan="2">Third Sector</td><td colspan="3">Private Sector</td></tr>
<tr><td>Power Plant</td><td colspan="2">Haryana State</td><td>Third Sector</td><td>Haryana State</td><td>Third Sector</td><td>Private Sector</td></tr>
<tr><td>Housing</td><td colspan="3">Haryana State</td><td colspan="3">Private Sector</td></tr>
<tr><td>Group C</td><td>Shopping Center and others (4)</td><td colspan="6">Private Sector</td></tr>
</table>

Note

(1) Flyover on NH No. 8, Water Treatment and Supply to IMT, Discharge of Storm Water and Sewage, Fuel Pipeline to IMT, Telecommunication Facilities, Solid Waste Disposal

(2) Servant Housing, Town Center, Community Center, Schools, Police and Fire Station, Training Center, Seminar House

(3) Roads in IMT, Parks and Green Belt, Water Pumping & Distribution Facilities, Collection of Storm Water, Sewage Treatment Facilities, Solid Waste Collection

(4) Shopping Center, Restaurant Building, Shopping Mall, Health Care Center, Office Building

7.4.3 Secondary Evaluation : Evaluation of alternative scenarios

(1) Methodology for Secondary Evaluation

The six alternative scenarios (Cases 1 to 6) which were formulated in the primary evaluation, are further examined for their advantages and disadvantages as follows.

Establishment of the IMT would require "land acquisition", followed by "Establishment of an implementing agency", "Construction" and "Operation". However, the implementation must be supported by firm financial resources. Furthermore, good borrowing conditions will be favorable for implementation of the IMT. Therefore, the secondary evaluation is studied from viewpoint of impact on business activity and investment cost subject to borrowing conditions. Evaluation items for each of the six Cases are set as follows.

Impact on business activity

a) Would it be possible for each development scenario to establish the required implementing agency(s) in accordance with the development schedule? --. preparation of establishment
b) Would the development scenario affect the options available for financing (funding) the IMT? -- financial considerations
c) How would each development scenario be likely to affect the ability to successfully promote the IMT and attract companies to invest? -- business activities
d) What effect would the development scenario have on the ability to achieve a uniform and international level of development within the IMT? Development of all components of the IMT should be to uniform high standards in terms of architecture, materials, etc. -- harmonization/uniformity.

Impact on investment cost

e) Are any of the six development scenarios likely to provide access to more favourable borrowing conditions? -- borrowing conditions
f) Does the type of business entity (public or private) provide any opportunity or possibility of reducing the investment cost? -- characteristics of business entity
g) Do any of the six scenarios provide the opportunity or possibility of an earlier recovery of investment cost? -- cost recovery

(2) Case-1

This case is based on the most common method of development of industrial estates in Haryana state because development is by existing implementing agencies of the Government except for the shopping center, restaurant, etc. which are to be developed by the private sector (Refer to Fig. 7.4.3).

(a) Road

(i) National Highway No.8 (Outside IMT)
- Flyover and intersections are expected to be constructed on National Highway No.8 at the IMT candidate site.
- National Highway No.8 should be improved by the Ministry of Public Works, Government of India, which is the implementing agency, through discussion with the Haryana State Government in compliance with the IMT development schedule.
- This development will be made by the public sector in the usual manner because of the public nature and non-profitability of the facility.
- Financial resources will be sought from foreign public financial institutions.

(ii) Site preparation and Roads in IMT (inside IMT)
- Road construction inside IMT is a part of site preparation of the industrial estate.
- Development cost can be recovered through sale of land using HSIDC, the existing implementing agency.
- Financial resources will be sought from foreign public financial institutions.

(b) Environmental Facilities (Parks & Green belt inside the IMT)

- Parks and green belt are common facilities in the IMT similar to roads.
- Development cost can be recovered through the sale of land.
- Development method and financial resources are similar to that of roads in the IMT.

(c) Water Supply

(i) Water treatment and water supply to IMT (Outside IMT)
- Water treatment plant and water supply pipe to the IMT are developed by the existing implementing agency.
- Investment cost is recovered through water charge to users.
- Financial resources will be sought from foreign public financial institutions similar to the site preparation.

(ii) Pumping station/piping (Inside IMT)
- Water supply works inside the IMT will developed by HSIDC in a similar manner to the site preparation.
- Development cost is recovered by means of water charge to the users.
- Financial resources will be sought as above.

(d) Drainage

(i) Collection of storm water (Inside IMT)
- Storm water drainage works will be developed as a part of site preparation.
- Development cost will be recovered through the sale of land.
- Financial resources will be sought from foreign public financial institutions.

(ii) Drainage of storm water (Outside IMT)
- Drainage works is required from the water treatment plant to the existing drainage.
- Development cost is not recovered.
- Financial resources will be sought as above.

(e) Sewage

(i) Sewage treatment facilities and sewage collection (Inside IMT)
- Similar to the water supply, HSIDC will be the implementing agency as same as site clearing.
- Development cost will be recovered by means of service charges.
- Financial resources will be sought from foreign public institutions.

(ii) Drain (Outside IMT)
- This is drainage works from sewerage treatment plant to the existing drain.
- Development cost is not recovered.
- This drain is commonly used for sewerage and storm water, therefore the existing implementing agency will develop.
- Financial resources will be sought as above.

(f) Electric supply

(i) Fuel pipeline (Outside IMT)
- Fuel pipeline of about 40 km length, will be installed for the supply of fuel to the power plant.
- Development cost will be recovered by electric charge.
- The implementing agency is the GAIL.
- Financial resources will be sought from foreign public institutions, as for other infrastructure.

(ii) Power plant, distribution (Inside IMT)
- HSIDC is the implementing agency, as for site clearing.
- Development cost will be recovered by means of electricity charges.
- Financial resources will be sought as above.

(g) Telecommunications

(i) Equipment for telephone exchange (Inside IMT)
- DOT, the existing implementing agency, will install the telephone exchange.
- Development cost will be recovered by means of service charges.

- Financial resources will be sought from foreign and public institutions, as for other infrastructure.

(ii) Telephone exchange building (Inside IMT)
- HSIDC will also develop facility for telephone exchange equipment as same as site preparation.
- Development cost will be recovered by means of service charges.
- Financial resources will be sought as above.

(iii) Connection cable (Outside IMT)
- Connecting cable is from telephone exchange in the IMT to the existing PBX at Gurgaon.
- Development method is similar to that for telephone exchange equipment.
- Financial resources will be sought as above.

(h) Industrial solid Waste

(i) Collection of solid waste (Inside IMT)
- HSIDC as management body of the IMT will be in charge.
- Investment cost will be recovered by service charge.
- Financial resources will be sought as same as other infrastructure.

(ii) Disposal site (Outside IMT)
- Site development will be under the state government.
- Disposal cost will be recovered by means of service charges.
- Financial resources will be sought as above.

(I) Housing (except Servant Housing)
- HUDA as the existing implementing agency, will develop these facilities.
- Development cost is recovered by means of sales price or leased price. It is difficult to recover investment cost of housing for servants.
- Financial resources will be sought from foreign public institutions, as for other infrastructure.

(j) Servant Housing, Town Center, Community Center, School, Police & Fire Station, Training Center, Seminar House
- HUDA as the existing implementing agency, will develop these facilities.
- For Servant Housing, Training Center and Seminar House, the development cost can be recovered through service charges to the users.
- For other facilities, it is not possible to recover the development cost by service charge to the users.
- Financial resources will be sought as above.

(k) Shopping Center, Restaurant, Shopping Mall, Health Care Center, Office Building
- Private developers can develop these facilities on a commercial basis.
- Financial resources will be sought from private companies and banks.

(l) Promotion Center

- HSIDC will develop this facility as part of the business support facilities.
- Recovery of the cost through the sale of land is expected, however, it might not be possible to recover the full investment cost.
- Financial resources will be sought from foreign public institutions, as for other infrastructure.

Advantages and disadvantages of this development method are shown on Table 7.4.3 as follows.

Table : 7.4.3 : Examination of Advantages and Disadvantages (Case 1)

Items of Evaluation	Advantages	Disadvantages
Business Activities		
a) Preparation of establishment	Legislation for establishment of new entity is not required because of the existing organizations are the executing organizations. Project implementation schedule is not affected by this preparatory works.	
b) Financial considerations	Large portion of investment cost would be sourced from foreign public financial institutions because the State Government is the executing organization.	It could be difficult to borrow low-interest funds from foreign private companies.
c) Business activities	Past experience of HSIDC, HUDA, etc. can be applied for this project.	Introduction activity of companies is deemed less than if the private sector was involved.
d) Harmonization/ Uniformity	Development uniformity will be formulated based on past experience.	Infrastructure with international level is difficult to develop because of lack of experience at international level.
Investment cost		
e) borrowing conditions		Since funds borrowed from foreign public institutions will be channeled via the central government at an higher rate of interest, the development cost will be increased.
f) Characteristics of business entity	Profit is not expected from sale price or service charge, therefore development cost can be actual investment cost base.	
g) Cost recovery		Cost recovery would be delayed due to a lack of positive promotion and introduction of companies.

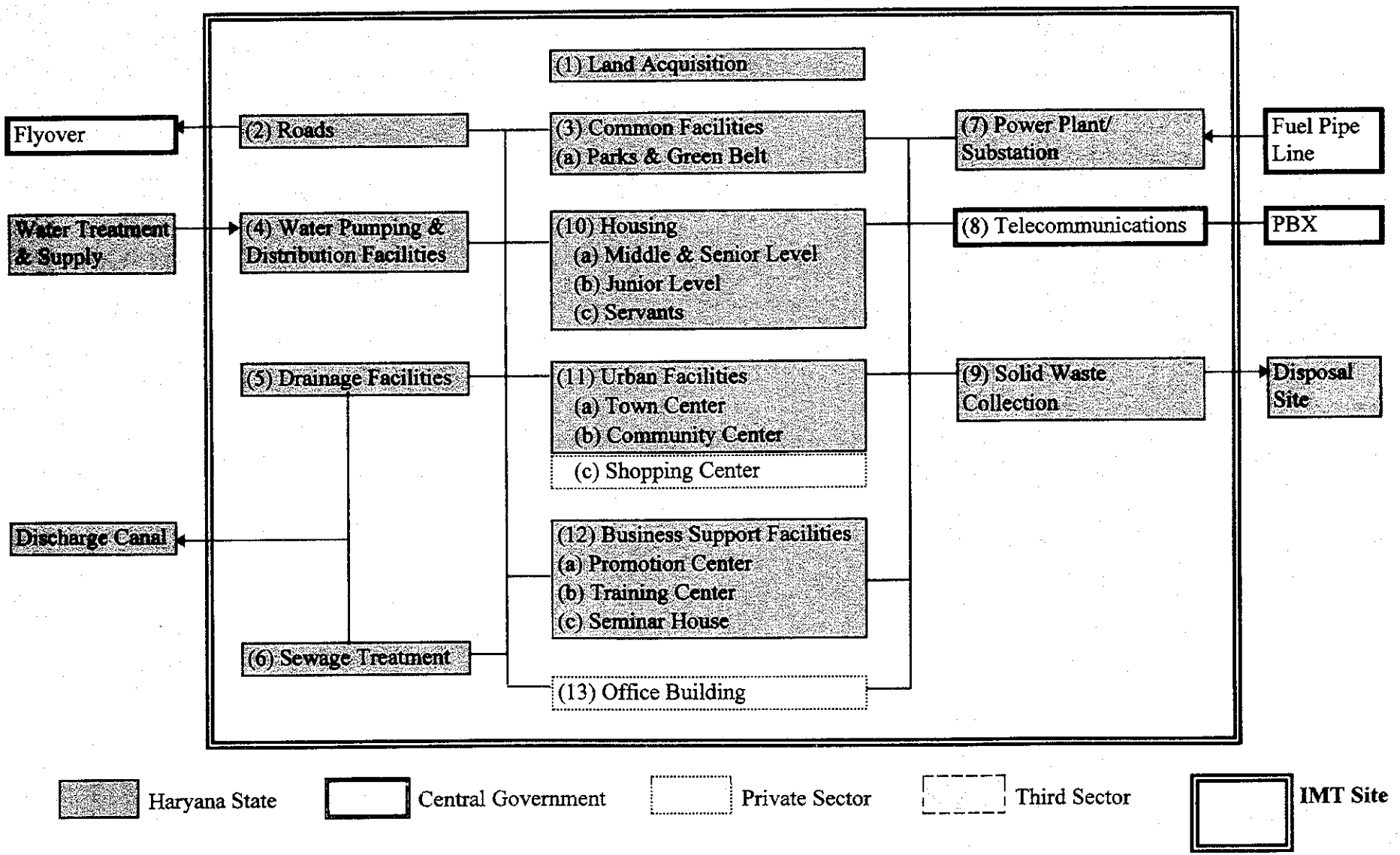

Fig 7.4.3 : Development Scenario for IMT (Case 1)

(3) Case 2

In this development method, the industrial estate will be mostly developed by the third sector, while power supply and residential areas will be developed by the State Government (Refer to Fig. 7.4.4).

- Infrastructure outside the IMT (National highway No.8, water supply to IMT, Storm water drainage, connecting cable of telecommunications and disposal site) will be developed by the existing government organizations, as for as Case-1.
- Infrastructure inside the IMT will be developed by the third sector instead of HSIDC.
- Power supply is developed by the State Government.
- Other facilities inside the IMT will be developed by the State government and the private sector.

Advantages and disadvantages of this case can be summarised as follows.

Table : 7.4.4 : Examination of Advantages and Disadvantages (Case 2)

Items of Evaluation	Advantages	Disadvantages
Business Activities		
a) Preparation of establishment		Preparatory works for establishment of third sector is required so it takes time.
b) Financial considerations	It is possible to borrow from foreign public financial institutions. If foreign private companies participate, then low-interest funds of these companies can also be used.	
c) Business activities	If foreign company will participate, their promotional experience, i.e. ability to introduce companies, etc. can be utilized.	New third sector entity must negotiate internally to clarify rights, responsibilities, etc., of public and private sector.
d) Harmonization/ Uniformity	Development uniformity can be expected because State government also participates in new organization.	Scope of works of each sector must be clarified and development guidelines established.
Investment cost		
e) borrowing conditions	It is expected that the development cost can be reduced by using the low-interest borrowings of foreign private companies.	
f) Characteristics of business entity	Development cost will be lower if private sector participates compared to the case in which development is done solely by the state government.	
g) Cost recovery	Quick cost recovery will be made by positive introduction activities of companies.	

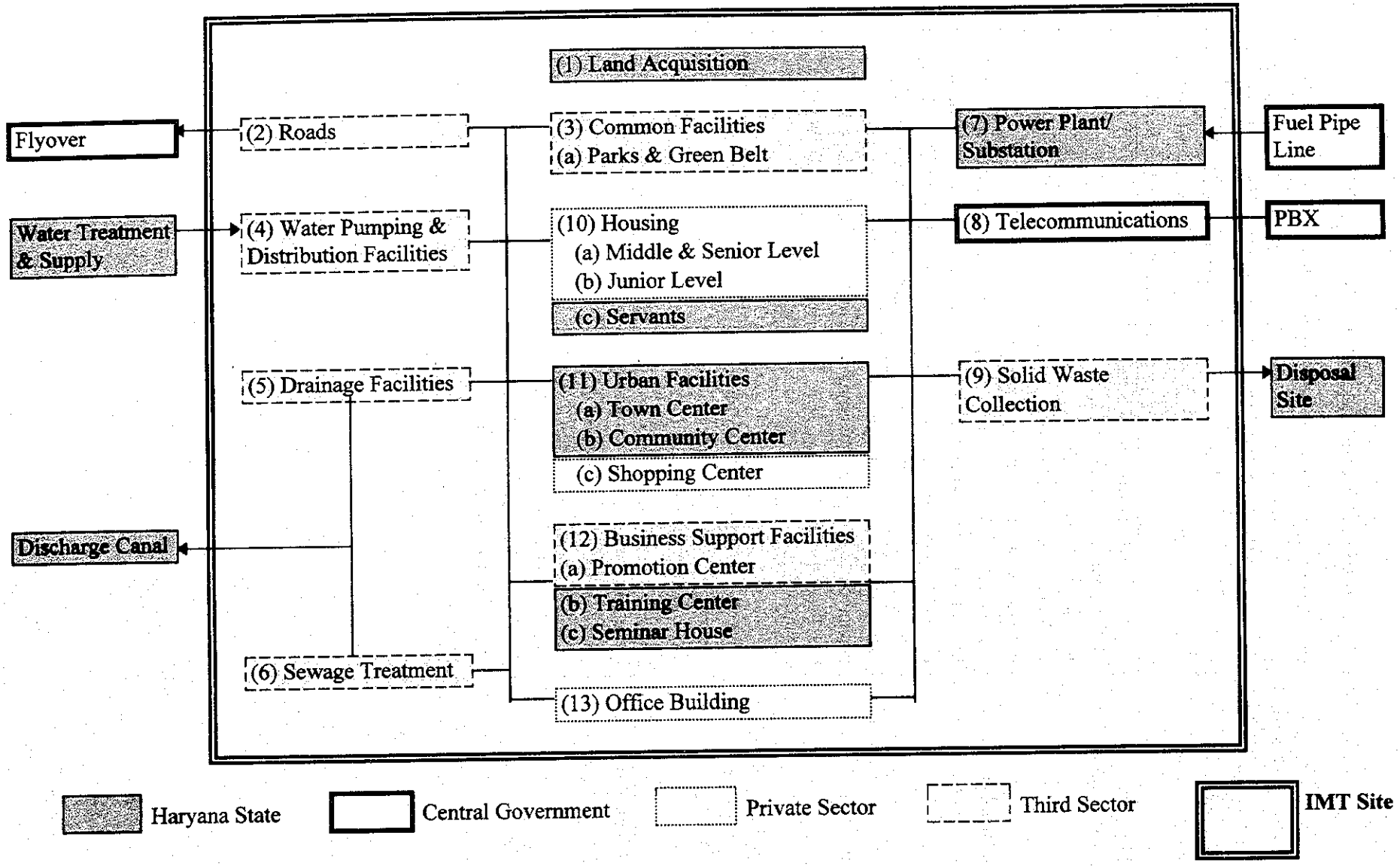

Fig 7.4.4 : Development Scenario for IMT (Case 2)

(4) Case 3

In this development method, the industrial estate will be mostly developed by the third sector including power supply facilities, while residential areas will be developed by the State Government and the private sector (Refer to Fig. 7.4.5).

- Infrastructure outside the IMT will be developed by the existing organizations, as for Case 1.
- Infrastructure inside the IMT will be developed by the Third sector.
- Power supply will be undertaken by the Third sector.
- Other facilities inside the IMT will be developed by the State Government and the private sector similar to Case 1.

Advantages and disadvantages of this case are summarised on the following table.

Table : 7.4.5 : Examination of Advantages and Disadvantages (Case 3)

Items of Evaluation	Advantages	Disadvantages
Business Activities		
a) Preparation of establishment		Establishment of new entity as Third sector will be required for preparatory works.
b) Financial considerations	It is possible to borrow from foreign public financial institutions. If foreign private companies participate, then low-interest funds of these companies can also be used.	
c) Business activities	If foreign private companies will participate, their promotional experience and their ability to introduce companies can be utilized.	New third sector entity must negotiate internally to clarify rights, responsibilities, etc., of public and private sector.
d) Harmonization/ Uniformity	Development uniformity can be expected because State Government also participates in new organisation.	Scope of works of each sector must be clarified and development guidelines established.
Investment cost		
e) borrowing conditions	It is expected that the development cost can be reduced by using the low-interest borrowings of the foreign private companies.	
f) Characteristics of business entity		
g) Cost recovery	Quick cost recovery will be made because of positive introduction activity of company.	

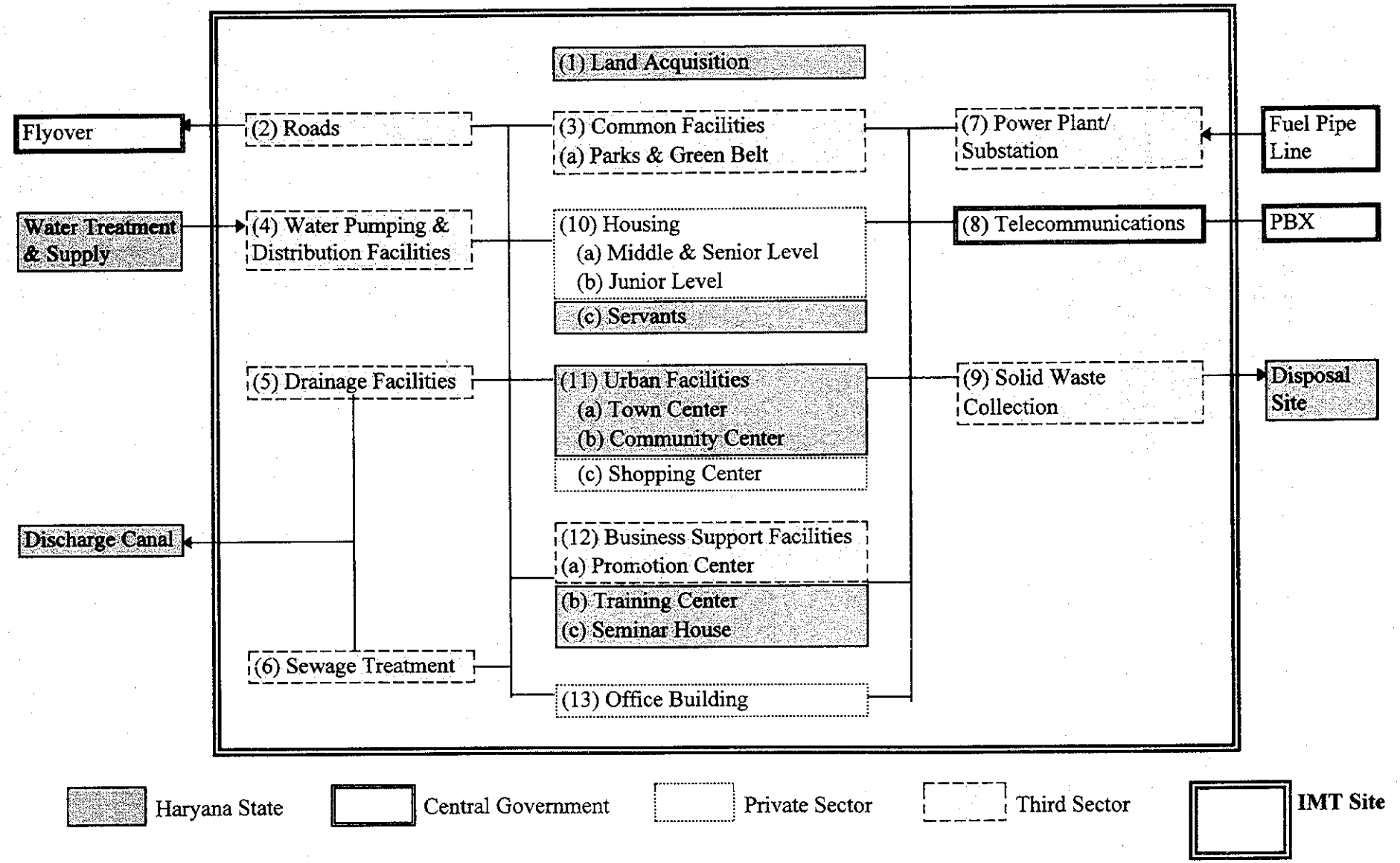

Fig 7.4.5 : Development Scenario for IMT (Case 3)

(5) Case 4

In this development method, the industrial estate will be mostly developed by the private sector except for power plant and supply facilities. (Refer to Fig. 7.4.6).

- Infrastructure outside the IMT will be developed by the existing implementing agencies.
- Infrastructure inside the IMT will be mainly developed by the private sector.
- Power plant and supply facilities will be developed by the Haryana State Government.
- The rest of the facilities inside the IMT will be developed by the Private sector.

Advantages and disadvantages of this case are discussed as follows.

Table : 7.4.6 : Examination of Advantages and Disadvantages (Case 4)

Items of Evaluation	Advantages	Disadvantages
Business Activities		
a) Preparation of establishment		Some companies are required to make consortium due to scale of development, and time will be required for discussions with consortium members and State Government. Legislation for development permission will be formulated for private sector participation.
b) Financial considerations	Financial resources will be expanded by increasing private sector participation.	Realization will be mostly depend on foreign company participation. If foreign company will not participate, development cost will be increased because of domestic borrowings at high interest rate.
c) Business activities	In case of foreign company participation, their experience in promotional and introduction activities of companies can be utilized.	In case of no participation of foreign company, realization of this development case is doubtful.
d) Harmonization/ Uniformity		State government is required to supervise the IMT development.
Investment cost		
e) borrowing conditions	It is expected that the development cost can be reduced by using the low-interest borrowings of foreign private companies.	
f) Characteristics of business entity	Power supply will be made by State government while other facilities will be developed by private sector. However, low interest loan can be applied if foreign companies can participate.	If foreign companies do not participate, it is difficult to obtain low interest loan.
g) Cost recovery	Quick cost recovery is anticipated because of positive introduction activities of companies.	

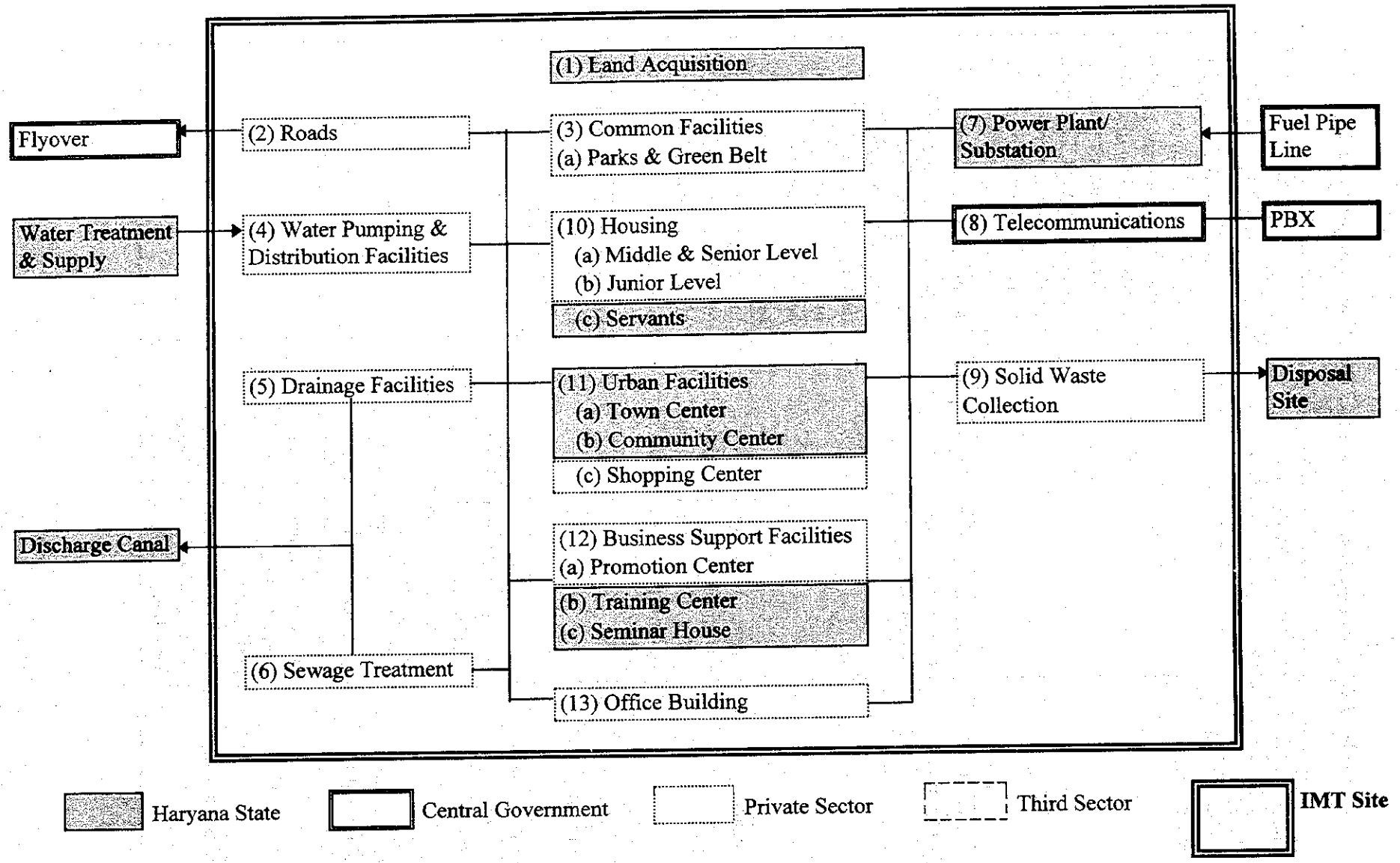

Fig 7.4.6 : Development Scenario for IMT (Case 4)

(6) Case-5

In this development method, the industrial estate will be mostly developed by the private sector except for power plant and supply facilities. (Refer to Fig. 7.4.7).

- Infrastructure outside the IMT will be developed by the existing implementing agencies.
- Infrastructure, Housing, Shopping Center etc., inside the IMT will be mainly developed by the private sector.
- Power plant and supply facilities will be developed by the Third Sector.
- The rest of the facilities inside the IMT will be developed by the Haryana State Government.

Advantages and disadvantages of this case are discussed as follows.

Table : 7.4.7 : Examination of Advantages and Disadvantages (Case 5)

Items of Evaluation	Advantages	Disadvantages
Business Activities		
a) Preparation of establishment		Some companies are required to make consortium due to scale of development, and time will be required for discussions with consortium members and State Government. Legislation for development permission will be formulated for private sector participation.
b) Financial considerations	Financial resources will be expanded by increasing private sector participation.	Realization will be mostly depend on foreign company participation. If foreign company will not participate, development cost will be increased because of domestic borrowings at high interest rate.
c) Business activities	In case of foreign company participation, private sector's experience of introduction activities of company can be utilized.	In case of no participation of foreign company, realization of this development case is doubtful.
d) Harmonization/ Uniformity		State government is required to supervise the IMT development.
Investment cost		
e) borrowing conditions	It is expected that the development cost can be reduced by using the low-interest borrowings of foreign private companies.	
f) Characteristics of business entity	Power supply will be developed by Third Sector while other facilities will be developed by private sector. However, low interest loan can be applied if foreign companies can participate.	If foreign companies do not participate, it is difficult to obtain low interest loan.
g) Cost recovery	Quick cost recovery is anticipated because of positive introduction activities of companies.	

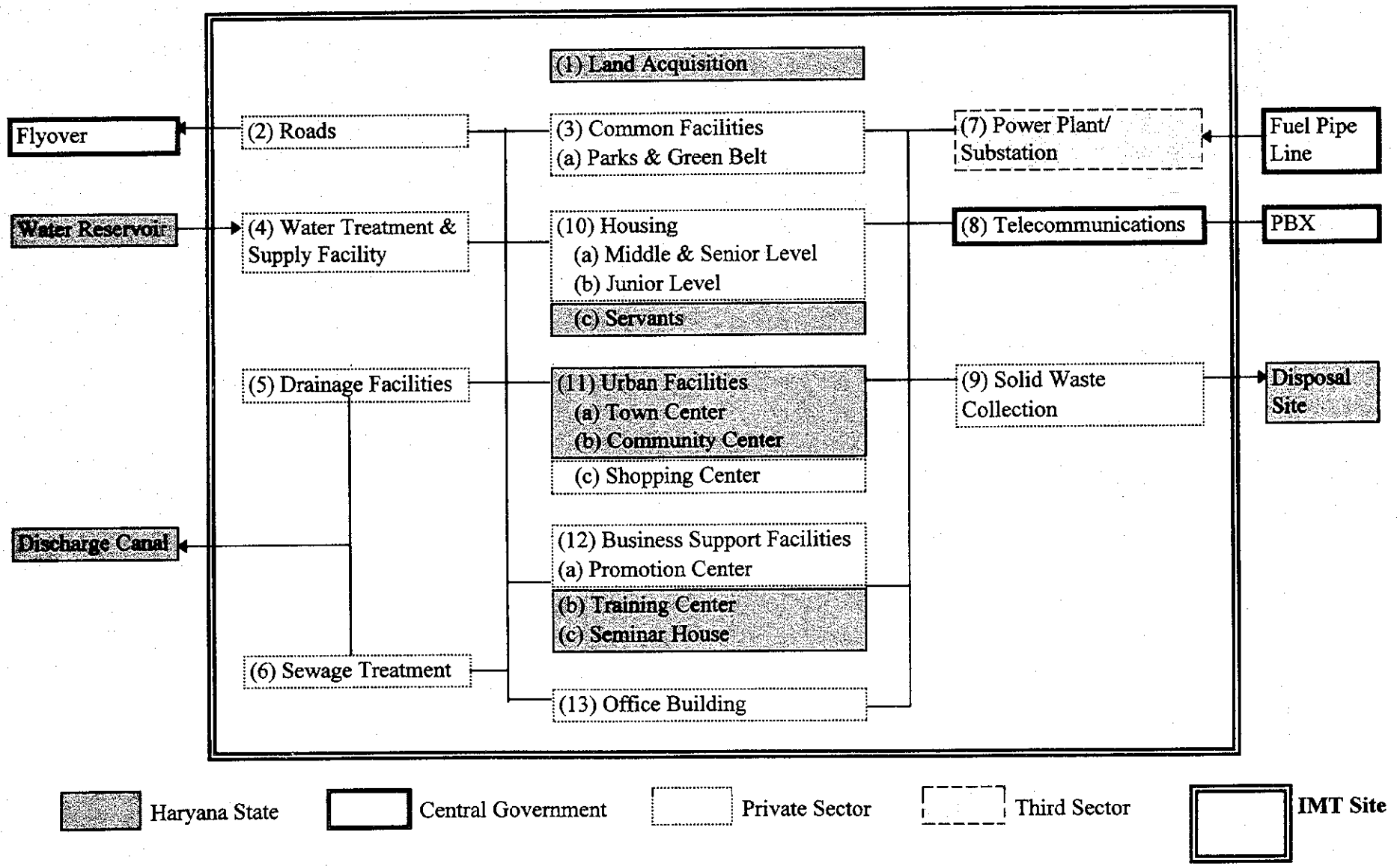

Fig 7.4.7 : Development Scenario for IMT (Case 5)

(7) Case 6

In this development method, the industrial estate will be mostly developed by the private sector except for public facilities such as Town Center, Community Center etc. (Refer to Fig. 7.4.8).

- Infrastructure outside the IMT will be developed by the existing implementing agencies.
- Infrastructure and urban facilities inside the IMT, except for facilities such as Town Center, Community Center etc, will be mainly developed by the private sector.

Advantages and disadvantages of this case are discussed as follows.

Table : 7.4.8 : Examination of Advantages and Disadvantages (Case 6)

Items of Evaluation	Advantages	Disadvantages
Business Activities		
a) Preparation of establishment		Some companies are required to make consortium due to scale of development, and time will be required for discussions with consortium members and State Government. Legislation for development permission will be formulated for private sector participation.
b) Financial considerations	Financial resources will be expanded by increasing private sector participation.	Realization will be mostly depend on foreign company participation. If foreign company will not participate, development cost will be increased because of domestic borrowings at high interest rate.
c) Business activities	In case of foreign company participation, private sector's experience of introduction activities of company can be utilized.	In case of no participation of foreign company, realization of this development case is doubtful.
d) Harmonization/ Uniformity		State government is required to supervise the IMT development.
Investment cost		
e) borrowing conditions	It is expected that the development cost can be reduced by using the low-interest borrowings of foreign private companies.	
f) Characteristics of business entity	Low interest loan can be applied if foreign companies can participate.	If foreign companies will not participate, it is difficult to obtain low interest loan.
g) Cost recovery	Quick cost recovery is anticipated because of positive introduction activities of companies.	

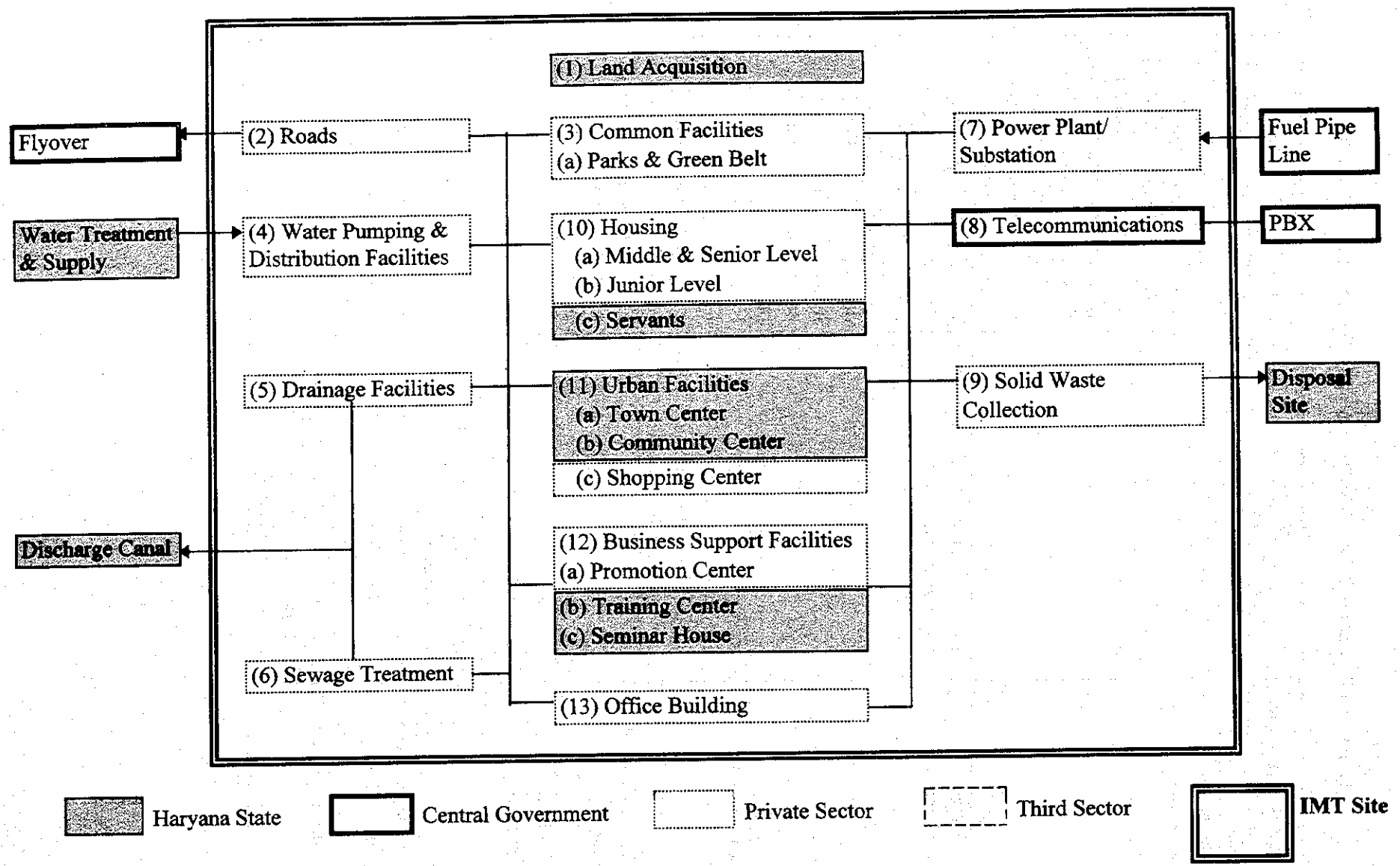

Fig 7.4.8 : Development Scenario for IMT (Case 6)

(8) Results of Secondary Evaluation

The secondary evaluation has examined the relative advantages using Case 1 as the base case. However, because this project comprises a variety of aspects, it is difficult to draw conclusions regarding the superiority or inferiority of one case relative to others. Notwithstanding such difficulties, the conclusions of the comparative evaluation of the different cases are expressed in general terms below.

Case 1 contemplates the state government itself using public funds borrowed from foreign sources to develop the project in the same manner it has heretofore carried out such projects. However, interest on the borrowed funds may result in relatively expensive development costs. Nonetheless, the state government acting as developer would enable public facilities to be developed together with the industrial park.

In Cases 2 and 3 most development would be carried out by the third sector which would also include private foreign companies. Because this approach would allow the utilization of low-cost private funds from foreign sources, it has advantages with respect to development costs.

In Cases 4 through 6 most development would be carried out by private developers. Whereas this approach would result in advantageous development costs due to the low-interest private financing that could be obtained from abroad, it raises questions regarding integrated development due to its inability to provide for public facilities and infrastructure outside of IMT.

With respect to the implementing agency for this project : (1) It is desirable for the state government to be the main implementing agency in order to ensure that development is integrated with the public facilities in Group A. (2) Due to favorable borrowing conditions, development by private companies from abroad is assumed to be the most advantageous approach in terms of development costs. Development-cost savings can also be anticipated from the efficient execution of the project, including such aspects as the activities to attract foreign companies to locate in the IMT.

The inability to identify the most appropriate development method from the results of the secondary evaluation, is due to the project's nature as a mixture of commercial and public facilities and also arises from the intention to develop both types of facilities simultaneously. In particular, the facilities that constitute Group B can be developed through any of the three approaches. Secondly, a distinctive characteristic of the project (IMT as a whole) is that the constituent facilities of Group B, namely (1) site preparation and infrastructure development, (2) electric power, and (3) housing, each stand on their own as independent projects. Thirdly, the above-mentioned three types of infrastructure comprised by Group B differ from one another in terms of their nature as projects:

- The value created by the site preparation and infrastructure development will in turn be sold after development to companies that occupy the IMT.
- Electric power will be sold to users (occupant companies) and the electric utility will aim to run its operations with revenues from electricity charges.

- Although the revenue stream generated by the housing development will differ depending on whether rental housing or housing for sale are developed, in the case of rental housing, the developer will intend to conduct its operations using the revenues derived from occupancy of the housing units. (It is desirable for the decision of whether to develop rental housing or housing for sale, to be based on the results of financial analysis).

The point of the foregoing discussion is that whereas the developer will seek to recover its investment in site preparation and infrastructure development swiftly, it will recover its investment in electric power facilities and housing as a stream of monthly payments for the use of those facilities. Hence, the profitability of these facilities should be estimated by projecting returns over a long term. In addition, one of the points that has attracted the most interest from investors is the acquisition prices of sites, which constitute bases of production. Accordingly, the configuration of the implementing agency for the housing and electric power facilities will be selected after taking into account the results of Chapter 11's financial and economic analysis; and here we will address the issue of which of the developer configurations discussed above is most desirable for execution of the site preparation and infrastructure development. Selecting the configuration of the implementing agency that will carry out site preparation and infrastructure development based only on the profitability of the project would result in failing to take the tendencies of the demand side into consideration. The point being that the fundamental posture of prospective land purchasers (i.e. companies wishing to locate within the industrial park) is to attempt to acquire a site inexpensively, conditioned upon the prior completion of the requisite infrastructure; whereas the concept by which the developer operates is pursuit of maximum profit and minimization of costs. It is necessary to consider the question of which of the developer configurations best satisfies these two inverse conditions.

Note: Due to the state of affairs within India, interest rates arranged with official aid agencies from abroad do not apply. In consequence, the interest rates on loans from foreign private financial institutions are lower than those from the official agencies.

7.4.4 Tertiary Evaluation : Evaluation from the Demand Side

Because the nature of the project is such that it is affected to a great extent by factors on the demand side, we will conduct from the perspective of product quality and price an evaluation that considers investment-related aspects, particularly the conditions for seeking foreign investment.

(1) IMT's Development Standards

IMT's role and development standards were confirmed by the Master Plan Study.

(a) Background of the IMT Project

At the 18th joint meeting of the Japan India Research Committee, held in India in March 1989, the establishment of industrial parks with infrastructure that meets international standards was proposed by the Japanese delegation as a strategy to stimulate foreign investment.

(b) IMT's Objectives

Pursuant to the findings of the Master Plan Study, the objectives of IMT were formulated as (1) promoting the expansion of domestic industry (i.e. strengthening and fostering industries to respond to domestic demand) as a measure to invigorate the Indian economy; and (2) promoting the development of local industries to provide an impetus for foreign investment and technology transfer.

(c) Standards for the Development of Infrastructure

Because a country's infrastructure standards (which ensure quality) are a major factor for investors considering investing in a country, it was decided to develop IMT's infrastructure in conformance with international standards as an enticement for both foreign and domestic firms to locate within IMT. Consequently, the question of whether a high-quality industrial park with infrastructure that conforms to international standards can be offered at a price that can compete with the industrial parks in the environs of Delhi and in other Asian countries becomes a major issue. Expressed differently, it is a question of whether it is possible to create an industrial park that can secure a relative advantage in terms of both quality and price.

(2) Considering Matters From the Perspective of Quality and Price

We will examine from the perspective of foreign investors IMT's relative advantage in terms of the quality and price that IMT is seeking to realize. In addition to a stable supply of power, water and other utilities and services to the companies located within IMT, the product quality (the standards by which infrastructure and services are established) that will be demanded of IMT by companies also includes (1) development integrated with public facilities and infrastructure outside of IMT, (2) provision of various business support services to the occupant companies, and (3) cost performance deriving from operating efficiency.

With respect to price, sales prices will be inexpensive by virtue of the advantageous combination of the characteristics of the configuration of the implementing agency that develops the project and financing conditions.

Table 7.4.9 shows the various combinations of implementing agency and financing sources. However, due to the state government's policy of aiming to bring this project to fruition through the utilization of as much capital from abroad as possible, we will limit this comparison to scenarios in which the financing is obtained from abroad. We will also take into consideration the fact that due to circumstances in India, interest rates on public funds borrowed from abroad through India's central government are higher than those on funds borrowed from private foreign financial institutions. As shown in Table 7.4.9, pairing the different variables results in six scenarios, which are numbered one through six.

Table 7.4.9 : Combinations of Implementing Agencies and Sources of Funds

Source of funds	Implementing Agency		
	State Government	Third Sector	Private Sector
Public funds from abroad	①	②	③
Private funds from abroad	④	⑤	⑥

Of these scenarios, the ones whose financing conditions give rise to an advantage in terms of pricing are the ones in the bottom row, which are premised upon the borrowing of private funds from abroad. Hence, we will hereupon comparatively examine scenarios ④, ⑤, and ⑥ with respect to product quality.

Scenario ④, in which the state government is paired as the developer with private funds from abroad, has advantages that derive from the state government being the implementing agency : development that is integrated with both infrastructure outside of IMT and public facilities will be able to be realized; and a variety of business support services will be able to be provided to the occupant companies. However, this scenario has drawbacks in terms of cost performance related to operating efficiency.

Scenario ⑥, in which a private-sector developer is paired with private funds from abroad, has advantages in terms of cost performance deriving from the operating efficiency that would result the developer being a private implementing agency. However, this scenario has drawbacks in terms of its ability both to integrate development with infrastructure outside of IMT and public facilities, and to provide various business support services to occupant companies.

Due to the fact that the developer in scenario ⑤, a pairing of a public/private joint venture as developer with private funds from abroad, is a joint venture between the state government and private companies from abroad, we can say that this approach is able to capitalize upon the advantages of scenarios ④ and ⑥ while compensating for their drawbacks. The results of the above evaluation are organized in the table below.

Table 7.4.10 : Results of the Evaluation Conducted from the Perspective of Product Quality

Product-quality evaluation criteria	State Government	Third Sector	Private Sector
Development integrated with infrastructure outside of IMT and public facilities	○	○	□
Provision of various business support services to occupant companies	○	○	□
Cost performance deriving from operating efficiency	□	○	○

Note : ○: Can be expected; □: Difficult to realize/cannot be expected

(3) Consideration of Relative Superiority

Based on the results of the secondary evaluation, development by a private-sector developer tended to be rated as superior to the other alternatives due to cost considerations deriving from the potential to obtain low-interest financing and efficiency considerations related to such aspects of the project as activities to attract companies to locate in the industrial park. However, the results of the tertiary evaluation indicate that from the perspective of product quality, participation by the state government is desirable. We will now examine the relative advantages of scenario ⑤, in which a public/private joint venture would develop the project using private financing obtained from abroad.

By adopting the approach of developing the project through a public/private joint venture, it is possible to maintain the following relative advantages:

- If HSIDC participates, it will be easy to ensure unity of the project, because the state government would develop the related Group-A infrastructure outside of IMT and a portion of the urban facilities.
- Because HSIDC can acquire land at below-market prices, it will also be possible to keep subdivision prices low.
- Private companies from abroad participating in the joint venture will contribute their know-how to the project, thus enabling the pursuit of project efficiency.
- Due to the experience and capabilities of the private companies from abroad participating in the project, both the establishment of infrastructure conforming to international standards and the vigorous progress of activities to attract companies to locate in IMT can be anticipated.
- HSIDC's previous development experience can also be fully utilized in this project.

That is to say, with respect to Group-B's site preparation and infrastructure development, the option-formation development scenario of either Case 2 or 3 would be adopted. By so doing, it will be possible for the state government to utilize the financial and technological capabilities of private companies from abroad to the maximum extent possible.

Chapter 8

Conceptual Design of the IMT

Chapter 8 Conceptual Design of the IMT

8.1 Land Use and Site Preparation Planning

8.1.1 Zoning Concept

- The IMT is made up of an industrial zone and urban zone. The total area is 600 ha, of which 400 ha is used for the industrial zone and 200 ha for the urban zone. National Highway 8 (NH-8) will run through the IMT, with 100 ha of the IMT on the east side and 500 ha on the west side of NH-8.
- Based on the above, the zoning of the IMT will be as follows for the reasons given below: 400 ha in the western side will be secured as the industrial zone, and 100 ha to the west of NH-8 and 100 ha to the east of NH-8 will be used as the urban zone.

  1 The industrial zone and urban zone will be clearly divided.
  2 The industrial zone will be a continuous zone.
  3 Considerations will be made so that the industrial zone can be expanded in the future.

8.1.2 Basic Idea for Land Use Planning by Zone

(1) Philosophy of Land Use Planning for Industrial Zone

Land use planning for the IMT should be drafted from the following study results taking into consideration the present conditions of regional development, socio-economic conditions in the surrounding area and geophysical condition of the candidate site.

1 Movement patterns of cargo and people
2 Standard land plots
3 Structure of green areas
4 Reserved land by land utilization
5 Establishment of major utilities
6 Effective industrial allotment

(a) Movement pattern of cargo goods and people

- For an effective and safe transportation system, the movement pattern of cargo goods and people should be separated as much as possible.
- Cargo movement patterns should be considered linked with the wide traffic pattern.
- People movement patterns should be considered linked with new housing allotment and surrounding towns and villages.
- Roads in industrial estate are classified into four types as follows.
  1 Primary trunk road
  2 Secondary trunk road
  3 Trunk road
  4 Other roads

(b) Standard land plot

- Standard land plots for different type and scale of industries must be designed.
- Minimum unit of standard lot is one hectare.
- Standard grid of four hectares consists of four standard lots.
- Vertical or horizontal division should split the standard lot into equal portions.
- Standard lots for factory size are as follows.

Factory Size	Size	S.S	S	M	L	L.L
	Area (ha)	1	2	4~6	10~12	24

(c) Green structure

- In order to improve the variety and attractiveness of the industrial zone and to create a good environment, the following green zones will be created for harmonization with the surrounding area.
  1 Green belt for separation from surrounding area.
  2 Large scale green zone separating the industrial estate from other land uses.
  3 Green belt for traffic safety and future expansion of roads.

(d) Land use

- Industrial zone is divided into manufacturing and non-manufacturing areas.
- Both areas are separated by trunk roads.

(e) Establishment of major utilities

- Major utilities are established based on the following ideas.
  1 Main utility lines will be installed in common utility ducts along major trunk roads.
  2 Water supply facility will be located near the point of entry of the water supply line.
  3 Sewage treatment facility will be located at the lowest corner of the site to make most effective use of gravity flow.

(f) Effective industrial allotment

- The following idea is employed for effective industrial allotment.

1 Relationship between necessary land scale of enterprise and standard lot and grid.
2 Characteristics of production pattern by type of industry; similar type of industries should be located together.
3 Smooth flow of traffic.
4 Convenience for residents, workers, pedestrians, etc.

(2) Basic Philosophy for Land Use Planning in the Urban Zone

- The urban zone will be roughly divided into a residential area and an urban facilities area. These areas will be laid out according to the following concepts.

(a) Layout of Residential Facilities

- In considering the living environment, the residential area will be located as far as possible from the industrial zone. A significant portion of the residential area will be located on the eastern side of NH-8 (100 ha) so as to form a continuous and independent area.
- The residential facilities which cannot be located in the 100 ha above will be located on the western side of NH-8 (100 ha), but they will be located on the fringes in order to avoid locating them in the center of the urban zone.
- In regard to the area on the western side of NH-8, where residential facilities are adjacent to the trunk road which connects the industrial zone with NH-8, a green belt (15 m width), which will also be used for rain water drainage, will be located between the road and residential area, so that a good living environment is maintained.

(b) Layout of Urban Facilities

- Among the urban facilities, the promotion center, town center, office buildings and commercial facilities will be placed in a continuous zone in order to form the urban area of the IMT.

- The urban area will be created in the center of the IMT site. In order to make the urban area accessible from the industrial zone without having to go through the residential area, the urban area will be located next to the industrial zone.

- Business support facilities will be located on the periphery of the urban area.

- Of the urban facilities, those which are mainly for residents, such as the community center, health care center, and elementary school, will be located near the residential area to make them more convenient for residents.

(c) Roads

- Because the urban zone will be divided into two parts by NH-8, a trunk road connecting the two areas will be constructed, so that the residential and urban facilities will be a continuous urban zone. The boulevard will be constructed as the main street of the city, but it will not intersect with the road (industrial road) which will connect the industrial zone with NH-8.

- In regard to the industrial road which passes through the urban zone, green belts (15 m width), which will also act as rain water drainage, will be located on both sides of the road, so that the urban environment is not disturbed.

- In regard to the IMT boulevard and roads other than the industrial road, the traffic density will be considered from the layout of the various facilities, and the width of the roads will be determined accordingly.