PRELIMINARY DESIGN

CHAPTER 4 CITY BUS

4-1 BUS ROUTES

Design of Bus Routes

The purpose of design of bus routes is to improve the convenience of users and to improve profitability through consolidation of bus routes in the Kathmandu urban area. Nineteen routes including the routes for operation of mini buses were proposed from Nepal side as the routes to be operated by NTC with introduction of new buses. These nineteen routes are classified, adjusted and evaluated, and the routes of the bus services to be operated by NTC are proposed in this chapter. (Refer Table 4-1 & Fig. 4-1)

Table 4-1 Proposed routes by NTC

System		Terminal		Route	Running Distance (km)
A	JORPATI	RATNA PARK	1	JORPATI	9
			2	GAUSALA	5
			3	SANKHU	19
			4	SUNDARIJAL	15
B	LAGANKHEL	RATNA PARK	5	PATANDHOKA	5
		(LAGANKHEL)	6	LAGANKHEL -	7.5
			7	- GODAVARI	18
			8	- CHAPAGAON	18
C	KIRTIPUR	RATNA PARK	9	KIRTIPUR	8
			10	THANKOT	10
			11	KIMDOL (SWAYAMBU)	6
D	AIR PORT	SHAHID GATE	12	AIR PORT	8
			13	BHADGAOU (BHAKTAPUR)	14
			14	DHULINKHEL	30
E	BALAJU	JAMAL	15	BALAJU	5
			16	NARAYANSTHAN	10.5
F	TANGAL	RATNA PARK	17	BISHALUGAR	5
G	DAKSHINKALI	SHAHID GATE	18	DAKSHINKALI	22
H	RING ROAD		19	RING ROAD	-

Contents of evaluation items (Refer Table 4-2)

- Operating distance — Routes than cannot accomodate urban bus services are excluded. 15Km route is the limit.

Table 4-2 EVALUATION FOR THE PROPOSED ROUTES AND DESIGNED ROUTES

EVALUATION TABLE

	路線 PROPOSED ROUTE	RUNNING DISTANCE	WIDTH OF ROAD	DEMAND	ELEVATION	RUNNING STATE	
						MINI BUS	CITY BUS
A	1. JORPATI	+	+	+	GOOD	ON	ON
	2. GAUSALA	+	+	+	GOOD	ON	ON
	3. SANKHU	−	+	−		ON	ON
	4. SUNDARIJAL	−	−	−		ON	OFF
B	5. PATANDHOKA	+	+	+	GOOD	ON	ON
	6. LAGANKHEL	+	+	+	GOOD	OFF	ON
	7. GODAVARI	−	−	−		ON	OFF
	8. CHAPAGAON	−	−	−		ON	OFF
C	9. KIRTIPUR	+	+	+	GOOD	ON	ON
	10. THANKOT	+	+	+	GOOD	OFF	ON
	11. KIMDOL (SWAYAMBU)	+	+	−		OFF	OFF
D	12. AIR PORT	+	+	−		ON	OFF
	13. BHADGAOU (BHAKTAPUR)	−	−	+		ON	ON
	14. DHULINKHEL	−	+	+		ON	ON
E	15. BALAJU	+	−	+		ON	OFF
	16. NARAYANSTHAN	+	+	+	GOOD	ON	ON
F	17. BISHALUGAR	+	−	+		ON	OFF
G	18. DAKSHINKALI	−	+	−		OFF	ON
H	19. RING ROAD	−	+	−		OFF	OFF

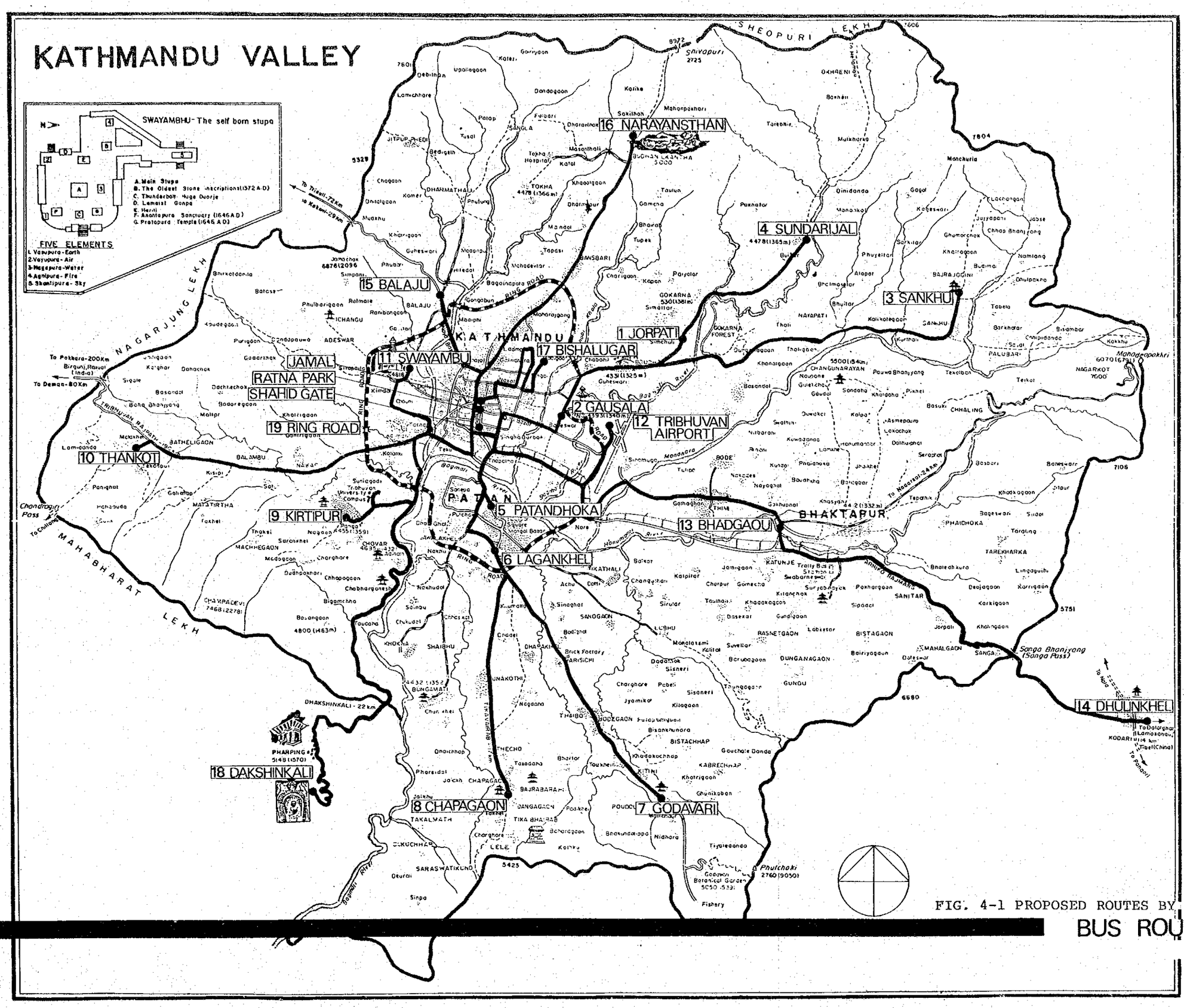


FIG. 4-1 PROPOSED ROUTES BY NTC

BUS ROUTE

Table 4-3 MANAGEMENT INDEXES & NUMBER OF SUPPLIED BUSES

ITEM \ SYSTEM / ROUTES			A.JORPATI		B.LAGANKHEL		C.KIRTIPUR		E.BALAJU	TOTAL
			1.JORPATI	2.GAUSALA	5.PATANDHOKA	6.LAGANKHEL	9.KIRTIPUR	10.THANKOT	16.NARAYANSTHAN	
Operating distance (km)			9	5	5	7.5	7	10	10.5	
Length of turnaround time required (minute)			75	50	50	60	60	90	90	
Number of passengers at peak hour (passenger)	Turnaround terminal (the heart of the city or the surburb)		2,624	4,672	9,180	7,680	6,134	4,271	2,698	
	One-way	Congestion directions ....①	1,790	2,350	5,035	4,474	3,234	2,382	1,496	
		Do.at peak hour .②	262	229	940	526	627	494	265	
		Do.at off-peak hour ····①-②x 2	1,266	1,892	3,155	3,422	1,989	1,394	966	
Number of operations (bus)	One-way	At peak hour	3.7	3.3	13.4	7.5	9.0	7.1	3.8	
		At off-peak hour	28	42	70	76	45	31	22	
Input per hour (bus)	At peak hour		4	4	12	8	9	7	4	
	At off-peak hour		3.5	4.0	5.8	7.6	4.5	4.7	3.3	
System of input (at peak hour + at off-peak hour) (bus)			4	4	6 + 6	8	5 + 4	5 + 2	4	
Number of operations per a day-turnaround			36	50	97	91	63	45	30	
Transportation Kilometer (km)			21,456	22,885	45,540	52,329	41,244	37,800	25,379	
Total travelling distance (km)			648	500	970	1,365	882	900	1,630	
Travelling distance per bus (km)			162	125	81	170	98	129	158	
Mean passenger density (Passengers/Bus)			33.11	45.77	46.95	38.34	46.76	42.00	40.28	
Income per kilometer (Rs/km)			2.65	3.66	3.76	3.07	3.74	3.36	3.22	
Number of inputted buses (bus)	Presend condition		S. 2	0	P. 7	S. 6	N. 4	P. 5	P. 3	27
	Shortage		2	4	5	2	5	2	1	21

- Length of time required
  : 15km/h at average with loss time of about 5min. in view.
- Number of operations
  : Service leveles are 70 passengers/bus around 125% during peak hour and 45 passengers/bus around 85% during off-peak hour.
- Input per hour
  : Number of operations per hour/number of trips per hour
- Total travelling distance : Operating distance x number of operating per day
- Travelling distance per day: Total travelling distance x number of inputted buses
- Mean passenger density : Transportation passenger kilometer/total travelling distance
- Income per kilometer : Mean passenger density/fare rate (0.08 Rs/km)
- Number of inputted buses : Symbol N... NTC
  S... SAJHA
  P... PRIVATE

(Those routes are A-3 SANKHU, A-4 SUNDARIJAL, B-7 GODAVARI, B-8 CHAPAGAON, D-14 DHULINKHEL and G-18 DAKSHINKALI)

- Road width: The routes considered to be unsuitable for operation of buses of medium size or larger are excluded
  (Those routes are A-4 SUNDARIJAL, B-7 GODAVRI, B-8 CHAPAGAON, D-13 BHADGAOU, E-15 BALAJU and F-17 BISHALUGAR)
- Demand for route buses: The routes with little demand and considered to be hardly payable are excluded.
  (Those routes are A-3 SANKHU, A-4 SUNDARIJAL, B-7 GODAVARI, B-8 CHAPAGAON, C-11 KIMDOL, D-12 AIR PORT G-18 DAKSHINKARI and H-19 RING ROAD)

Based on the study on the following seven routes of four systems have been selected to commence bus services under this project.

A. JORPATI	1. JORPATI
	2. GAUSALA
B. LAGANKHEL	5. PATANDHOKA
	6. LAGANKHEL
C. KIRTIPUR	9. KIRTIPUR
	10. THANKOT
E. BALAJU	16. NARAYANSTHAN

4-2 NUMBER OF BUSES

4-2-1 Calculations for Buses Required

To operate Bus Routes in the previous article, bus requirements are estimated from the following conditions.

(1) Passenger utilisation rate will be 125% at peak hour and 85% at off-peak hour at the busiest places and the service level will be raised.

(2) Number of passengers will be to passengers at peak hour and 45 passengers at off-peak hour (30 passengers in seats + 25 passengers on hand-straps = 55 passengers in total).

(3) The mostly busiest places are the terminals (the heart of the city or the suburbs), and the result of this survey of on/off passenger

are used.

(4) The demands of the busy directions (outward or inward to the city) will be satisfied.

Under above conditions, 21 new buses capable of effectively operating are required to 27 current buses. With number of bus operations is set and the required time taken into account. In case new buses are supplied, management indices for bus routes are high except for two route of JORPATI, LAGANKHEL (refer Table 4-3). Depreciation and the expense of parts and tyres can be neglected because new buses are objects of assistance. Operation will be possible by the expenses of 2.2 Rs/km to the total travelling distance of 150 km/day. The travelling distances per bus decreases in some routes and therefore, personal expenses rises because the newly supplied buses must satisfy the demand at peak hour. This is 0.81 Rs/km, 37% of all cost| 2.2 Rs/km. If all cost inclease up to 50%, each routes are able to be operated by all cost of about 2.6 Rs/km.

4-2-2 Number of supplied buses

Number of supplied buses are designed on basis of 21 buses effectively operating which retain the payability and the service level sufficient. On the assumption that the effective operating rate is 90%, number of supplied buses are 24. For supplement, 20% of 27 current buses will require 6 buses on the basis of above number.

As a result 30 new buses are estimated.

4-3 SPECIFICATION FOR BUSES

4-3-1 Basic Policies

Buses will be used in Kathmandu area, and following items shall be considered for the specification for buses.

(1) The current maintenance and service system for vehicles considered, the vehicles have the structure with few occurence of troubles and are capable of easily reparing by low cost without requiring high maintenance technology.

(2) Buses are operated with full passengers in many cases except for a few routes and road conditions are poor. In addition, rough driving is often observed.

Therefore, judged from the current circumstance of maintenance and service described earlier, the entire chassis including axle system, suspension system, and power train system should be durable and strong.

(3) Under meteorological conditions of Kathmandu the starting system and prime mover cooling system shall be protected against water (surface treatment, protection of electrical system, etc.) and shall not be influenced by low atmospheric pressure (prime mover output).

(4) Fuel and lubricants mostly used are made in India. Fuel system and lubrication system should provide excellent durability against their low quality.

4-3-2 Specification for Buses

The followings are the specification for buses.

Item	SPECIFICATION
Overall length	It is not suitable from the standpoints of maintenance and operation that buses of multiple types and different size are introduced, and the buses should be of single type having overall length of about 9.5 m maximum.
Overall width	The overall width shall be 2.5 m maximum from the standpoint of road conditions.
Overall height	The overall height shall be based on the Japanese safety standard (3.2 m maximum)
Wheelbase	The wheelbase shall be 5.2 m maximum.
Rear overhang	Two thirds at maximum of the wheelbase.
Ground clearance of body rear end	The ground clearances is not as required as for vehicle driving on mountains. It should be higher (departure angle should be made larger) than the highest ground clearance of the buses in Japan.
Ground clearance of axles	The ground clearance required is not as much as for the buses driving on mountains.
Gross vehicle weight	There is no problem with normal vehicle weight.
Prime mover	1. Diesel engine is suitable for fuel. 2. Front engine system shall be adopted. 3. Power output shall be required sufficient because of the aititude of Kathmandu, the fact of buses running with full of passengers, and reduction of power output in the process of use.Power output is desired to satisfy the following conditions after compensated by the number of passengers and the altitude of Kathmandu. $PS \geq \frac{1}{100}$ (GVW + 1,500) GVW : Kg 4. The injection pump shall be in-line type (Bosch type)

Item	SPECIFICATION
	suitable for servicing capacity. 5. The filter for fuel and lubricating oil, shall be given sufficient capacity. 6. Starting shall be facilitated during cold season and overheating shall be prevented during hot season.
Fuel tank	The fuel tank capacity shall be about 130-200 ℓ minimum for running distance in a day.
Clutch	Ordinary clutch shall be satisfactory.
Transmission	The transmission shall be five forward speeds, and the third gear, fourth gear and fifth gear at least hsall be synchromesh.
Steering	1. The steering shall be right-hand drive system because of vehicle running on the left of road in Nepal. 2. Power steering is not necessarily suitable for easy maintenance and servicing. However, power steering shall be adopted, if the front axle load is large according as regulations in Japan. 3. The minimum turning radius shall be as small as possible, and about 10 m maximum.
Brake system	1. Air brakes or hydraulic brakes with power servo are suitable. The brake lines shall be dual system against trouble. 2. Exhaust retarder shall be provided for reducing wear of brake shoes.
Tyres	Because buses will be operated in the state of being filled up to full capacity, the tyre size is used 9.00 - 20.
Suspension	The suspension for large loads shall be used because buses will be operated with full passenger.
Electrical system	The electrical system shall be 24V, and cold weather in Nepal shall be considered.
Vehicle body	1. Monocoque type is not suitable for body to be easily repaired. 2. The body shall be full resistant against corrosion. (as well as other parts). 3. Two entrances/exits for passengers shall be provided on the left-hand side of the body, one entrance/exit for the driver shall be provided on the right-hand side of the body, and one emergency door shall be

Item	SPECIFICATION
	provided on the right-hand side or rear side of the body. 4. The effective width of entrances/exits for passengers, is not excessively broad because of acceptance of fare, and it is sufficient to be accorded of such an extent to the Japanese safety standard (60 cm minimum). 5. For operation of the doors for passengers, power type is not suitable from point view of easy maintenance and servicing, and they shall be manual type because conductors will stand at both front and rear doors. 6. For the doors for passengers, external opening type is not suitable from the standpoint of prevention of injury to the passengers outside, and the height, steps, etc. shall conform to the Japanese safety standard. 7. The front windshield glasses shall be laminated sheet glasses split at the center for easy replacement and short procuring period on breakage. 8. The windows shall be of openable type with the climate taken into account, and safety glasses shall be used. 9. Ventilation ports for both of fine and rain weather shall be provided on the roof, front side, etc. with the climate (especially in rainy season) taken into account. 10. Destination indicators (with lighting fixture) of manual winding type shall be provided at both front and rear sides for future expansion of the service network. 11. Roof carriers are not necessary because the buses will be used in the town only.
Interior	1. Passengers' seats shall be three-way seats (long seats) from the current situation of passenger density. 2. The seat size shall conform to the Japanese safety standard. 3. The seat cushions and seat backs shall be made of the materials to be hardly broken and to be easily and partially repaired by low expence. 4. Two or three handrails (with or without hand straps) shall be provided on the ceiling for standing passengers. The effective height for standing passengers shall

Item	SPECIFICATION
	conform to the Japanese safety standard (180 cm minimum). 5. The driver's seat shall be adjustable and protective bars and other protective means shall be provided to prevent hindrance to driving by passengers. 6. Standing spaces of conductors shall be near both front and rear passenger entrances/exits with pipes or other suitable means as partition and shall be equipped with buzzers for communication with the driver's seat. (It will be more suitable if these buzzers can also be operated from outside of the body near the passenger entrances/exits.) 7. The passenger entrances/exits shall be provided with grip bars for safety of up and down. 8. Interior heating is not required by maintenance and servicing, operation error and atmospheric temperature.
Lights	1. Fluorescent lamps are suitable for lighting the interior for the purpose of power consumption and luminous intensity. The brightness shall conform to the Japanese safety standard (fluorescent lamp: 2 W/m^2), and it is suitable to adopt dual system for lighting. 2. Fog lamps shall be provided because fog tends to be generated in the morning.
Other device (including items described earlier)	1. Head lamps, side marker lamps, tail lamps, brake lamps, license plate lamp, rear reflectors, turn signals, back-up lamps, side lamps or side reflectors, horn, rear view mirros, under mirror, interior rear view mirror, windshield wiper, windshield washer, defroster and indication of driving devices shall be provided in conformity to the Japanese safety standard and other regulations. 2. The instruments and alarms around the driver's seat (speedometer (km system), odometer, brake alarm, etc.), sun visors, step lamps, traction hooks at both front and rear, etc. shall correspond to the specifications for city buses used in Japan. 3. The spare tyre with wheel, white/red flash lamp, fire extinguisher, jack, tool set, etc. shall be provided in correspondence to the city buses used in Japan.

4-4 SPECIFICATION FOR BUS MAINTENANCE EQUIPMENT

4-4-1 Basic Policies

At the present time, NTC possess no maintenance facility for buses, but light maintenance is only made by using the workshop for trolley buses granted by the People's Republic of China. In addition, there are very few maintenance engineers capable of correctly judging what requires maintenance or repair and giving instructions to mechanics. Under these circumstances the efficiency and safety of maintenance works are spoiled, and as a result, safety and operating efficiency of serviced vehicles have been reduced.

For improving the circumstance described above, sufficient maintenance equipment will be introduced for securing safety of maintenance work and of vehicles and also for improving working efficiency. In addition, upbringing of future maintenance engineers will be made through introduction of vehicle inspection equipment. These are the basic policies.

Along with the basic policies stated above;

(1) It is planned to reduce the current maintenance expense;

(2) Through upbringing and upgrading of skill of engineers, it will be made possible for current personnel of NTC maintenance staff to fulfill with the demand for vehicle maintenance, which is expected to increase in the future, including that of the vehicles granted this time;

(3) Vehicle maintenance should be systematized, vehicle quality should be maintained, and bus operation improved for rate should be increased as a part of improvement of management.

4-4-2 Bus Maintenance Equipment, Tools & Parts

The followings are the specification for bus maintenance equipment, tools & parts.

	SPECIFICATION		Q'ty
A.	Vehicle Inspection Equipment		
1.	Brake tester		1
	* Axle weight allowance	: 10,000 kg	
	* Roller dia x length	: 120 x 1,000 mm or more	
	* Motor	: 3ϕ440V·2.2kw x 2	
	* Max. brake force per wheel	: 3,000 kg	

	SPECIFICATION		Q'ty
	* Air lifter	: Equiped	
2.	Auto lift, twin post		2
	* Max, capacity	: 10 ton x 10 ton	
	* Wheel base adjustable range	: 2,000 mm	
	* Working pressure	: 10 - 12 kg/cm^2	
	* Lift	: 1,500 mm	
	* Ram dia.	: 335 - 395 mm	
	* Operation system	: Manual type	
3.	Side slip tester		1
	* Approval No. by the ministry of Transportation of Japan No. 239, No. 288, No. 317, No. 368		
	* Axle weight allowance	: 10,000 kg	
	* Power source	: 1ϕ220V, 50/60 Hz	
4.	Speed meter tester		1
	* Axle weight allowance	: 10,000 kg	
	* Roller dia. x length	: 185 x 1,000 - 1,200 mm	
	* Speed measuring range	: 0 - 120 km/h	
	* Check alarm	: 40 km/h	
5.	Toe-in gauge		1
	* Measuring range	: 800 - 2,100 mm	
B.	Jack & others		
1.	Garage jack		2
	* Capacity	: 10 ton	
	* Body length	: 1,555 - 1,650 mm	
	* Lift	: 400 - 410 mm	
	* Net weight	: 105 - 170 Kg	
2.	Transmission jack		1
	* Capacity	: 800 kg or more	
	* Overall length	: 900 - 1,200 mm	
	* Lift	: 500 - 600 mm	
	* Net weight	: 70 - 90 kg	
3.	Diff-jack		1
	* Capacity	: 500 - 600 kg	
	* Lift	: 450 - 650 mm	
4.	Engine service jack		1
	* Capacity	: 1,600 - 1,800 kg	
	* Overall length	: 1,500 - 1,700 m/m	
	* Lift	: 200 - 250 mm	

	SPECIFICATION		Q'ty
	* Net weight	: 200 - 250 kg	
5.	Chassis spring jack		1
	* Capacity	: 500 kg or more	
	* Lift	: 500 mm or more	
	* Application	: For bus	
6.	Portable oil jack		5
	* Capacity	: 10 ton	
	* Closed height	: 245 mm up to.	
	* Raise	: 150 mm	
	* Max. height	: 480 mm	
7.	Rigid Rack, 2 pcs/set		2
	* Capacity	: 5,000 kg	
	* Min. height	: 650 mm up to.	
	* Max. height	: 1,000 mmmormmore	
	* Net weight	: 15 kg up to.	
8.	Hydraulic press		1
	* Capacity	: 30 - 35 ton	
	* Distance between frame	: 600 mm or more	
	* Screw stroke	: 140 - 150 mm	
	* Ram dia.	: 100 - 105 mm	
9.	Hand chain block ..... Complete with gear trolly		2
	* Capacity	: 1.5 ton	
	* Weight	: 25 kg up to.	
	* Lift	: 2.5 m	
C.	Car washing equipment		
1.	High pressure car washer		1
	* Output volume	: 900 - 1,600 ℓ/h	
	* Normal pressure	: 80 kg/cm^2	
	* Max. pressure	: 100 kg/cm^2	
	* Motor	: 3ϕ440V.3.7-5.5 kw	
2.	Parts cleaner		2
	* Dimention	: 600 x 100 x 1,100 or more	
	* Motor	: 1ϕ220V.70-100 w	
3.	Automttic car washer ... with pipe required between washer and water tank		1
	* Time required to wash	: 60 - 70 sec/bus	
	* Brush motor	: 3ϕ440V.0.75 kw x 2	

	SPECIFICATION		Q'ty
	* Dimension	: 3,897 x 5,030 x 2,620 mm	
	* Used water	: 100 - 120 ℓ/bus	
D.	Lubricating Equipment		
1.	Chassis lubricator ... Gun with hose 2.5 m		2
	* Pump output	: 400 - 460 g/min	
	* Output pressure	: 230 kg/cm^2 or more	
	* Used air pressure	: 3-7 kg/cm^2	
	* Tank capacity	: Pail-can	
2.	Oil bucket pump		3
	* Pump output	: 40 - 50 cc/stroke	
	* Nozzle with vinyl hose	: 2 m	
	* Container with carrier	: 20 - 26 ℓ	
3.	Grease gun ..... Lever Type		5
	* Capacity	: 200 - 300 cc	
	* Output pressure	: 150 kg/cm^2 or more	
	* Output	: 1.40 - 1.60 cc/stroke	
4.	Oil measure		2
	* Made of Copper	: With a lid	
	* Capacity	: 2 ℓ	
5.	Drum can carrier		1
	* Load capacity	: 250 kg	
	* Length	: 1,500 - 1,600 mm	
E.	Tire & brake service equipment		
1.	Wheel dolly ..... Hydraulic, hand operation		1
	* Capacity	: 500 - 600 kg	
	* Applicable tire size	: 650 x 1,000	
2.	Tire Changer ..... Heavy duty		1
	* Oil pressure required	: 7 - 10 ton	
	* Applicable tire	: 650 x 1,000	
	* Motor	: 3ϕ440V·1.5 Kw	
	* Dimension	: 700 x 1,200 x 1,460 mm	
3.	Tire spreader ..... Outward spreading		2
	* Length	: 980 mm	
	* Net weight	: 4.2 kg	
4.	Tube test tank ..... With stand		1
	* Tank capacity	: 100 - 120 ℓ	
	* Dimension	: 1,000 x 300 x 450	

	SPECIFICATION		Q'ty
5.	Brake drum lathe		1
	* Brake drum dia.	: 250 - 650 mm	
	* Brake drum width	: 250 mm	
	* Feed/spindle revalution	: Rough 0.5 mm	
		: Finish 0.1 mm	
	* Motor	: 3ϕ440V·0.75 - 1 kw	
6.	Air power revetter		1
	* Capacity	: 5 ton	
	* Punch holder stroke	: 30 - 45 mm	
	* Air pressure required	: 10 kg/cm^2 up to.	
F.	Air Compressor & others		
1.	Compressor ..... Two-stage & auto drain		2
	* Motor out put	: 3ϕ440V, 7.5 kw	
	* Piston displacement	: 700 - 900 ℓ/min	
	* Working pressure	: 11.0 - 14 kg/cm^2	
	* Tank capacity	: 260 - 320 ℓ	
2.	Air transformer		2
	* Pressure gauge	: 0 - 10 kg/cm^2	
	* Air outlet	: 1/4" PF	
3.	Spray gun set ..... Suction type		3
	* Container	: 1,000 ℓ	
4.	Infra-red dryer		1
	* Power source	: 1ϕ220V·1.5 kw	
	* Bulb No.	: 250 w x 6 pcs.	
G.	Body bumping service		1
1.	Hydro power		
	* Capacity	: 10 ton	
	* Consists of	: 10 ton pump unit - 1 set	
		: Stand case with wheels - 1 set	
		: Various attachments - 3 pcs	
	* Ram stroke	: 150 mm	
2.	Fender tool set		1
	* Consists of	: Pad, 4 kinds (each 1 pc)	
		: Hammer, 4 kinds (each 1pc)	
		: Flange tool 1 pc	
		: Curved spoon 1 pc	
		: Metaric case 1 pc	

	SPECIFICATION		Q'ty
3.	Tinner shear set		2
	* Consists of	: Straight 270 mm (each 1 pc)	
		300 mm	
		Circular 270 mm (each 1 pc)	
		300 mm	
		Radius 270 mm (each 1 pc)	
		300 mm	
4.	Gasoline torch lamp		2
	* Tank capacity	: 1,000 ℓ	
	* Net weight	: 1,400 - 1,500 gr.	
5.	Bycho type screw clamp set		1
	* Consists of 2 clamps	: 75 mm capacity ... 1 pc	
		: 150 mm capacity .. 1 pc	
6.	Hand operated rivetter with rivet kit		1
		: 4-2,4-3,5-2, 100 pcs each	
		5-4, 50 pcs	
	* Capacity	: 2.4,3.2,4.0,4.8 mmϕ	
7.	Air operates rivetter		1
	* Capacity	: 2.4 - 4.8 mm ϕ	
	* Air pressure required	: 5 - 6 kg/cm^2	
8.	Vice grip wrench		3
	* Opening width	: 47 - 50 mm	
	* Gripping power	: 1,500 - 2,000 kg	
9.	Arc welder ..... With helmet, Safty holder and other welding accessories		1
	* Capacity	: 250 A	
	* Rated duty cycle	: 20 %	
	* Secondary current adjustable	: 50 - 255 A	
	* Welding rod	: 2 - 6 mm dia.	
10.	Cast iron anvil	: Weight 70 - 80 kg	1
11.	Cast iton swage block	: Weight 50 - 60 kg	1
12.	Surface plate	: Dimension 600 x 600 x 100 mm	1
13.	Solid bar bench vise		1
	* Width	: 125 mm	
	* Net weight	: 40 - 50 kg	
H.	Electrical testing equipment		
1.	Diode tester ..... Polarity check is alse possible		2

	SPECIFICATION		Q'ty
	* Meter	: Color coded for OK or BAD	
	* Power source	: 1ϕ220V·50 Hz	
2.	Circuit tester		2
	* Measuring range	: DCV- 0-2,20,50,500V DCA- 0-5,50,500mA ACV- 0-25,50,250,500V Resistance 5(x1,10,x100) Kohm	
3.	Augo megger		2
	* Voltage	: 500V	
	* Resistance	: 0 - 100 Mohm	
4.	Volt-Ampere meter		2
	* Adjustable range of resistance	: 0 - 20A	
	* Measurable range	: DCV- 0-10,0-20,0-40V DCA- -6,-0,-60A	
	* Test cord length	: 1m or more	
5.	Battery tester		2
	* Battery applicable	: 6,12,24V·50 - 500 AH	
	* Measurable range	: 0 - 32 V	
6.	Battery hydrometer		5
	* Length	: 320 - 350 mm	
7.	Battery charger		
	1) Normal charging and booster		1
	* AC input	: 1ϕ220V·50 Hz	
	* DC output	: 12 - 24V·0 - 100A	
	* Net weight	: Abt 48 kg	
	* Rectification	: Silicon diodo unit for full-wave rectification	
	* Dimension	: 310 x 430 x 740 mm	
	2) Silicon quick charger		1
	* AC input	: 1ϕ220V·50 Hz·1.4 KVA	
	* DC output	: 12 - 24V·20A	
	* Net weight	: Abt 16 kg	
	* Rectification	: Silicon diodo unit for full-wave recification	
	* Dimension	: 360 x 220 x 200 mm	
I.	Engine repair equipment		
1.	Surface grinder		1
	* Grinder store size	: 280 - 350 mm	

	SPECIFICATION		Q'ty
	* Operative table dimension	: 368 x 1,250 mm or more	
	* Grinder store rpm	: 1,800 - 2,200 rpm.	
	* Grinder motor	: 3ϕ440V·2.2 kw	
2.	Con-rot aligner		1
	* Con-rot available dia.	: 50 x 105 mm	
	* Dimension	: 650 x 230 x 170 mm	
	* Con-rot available length	: 150 x 420 mm	
3.	Valve refacer		1
	* Chuck capacity	: 6 - 14.5 mm	
	* Valve-face angle	: 0°, 15°, 30°, 45°, 60°, 75°, 90°	
	* Valve head	: 100 mm up to.	
	* Motor (Chuck, Wheel, pump)	: 1ϕ220V·	
4.	Valve seat grinder		1
	* Capacity valve saat	: 45 - 90 mm	
	* Grinding wheel, each one of roughing & finishing	: 41, 48, 51, 54, 57, 63 mm	
	* Driving motor	: 1ϕ220V·200 W	
5.	Valve lapper air type		1
	* Air pressure requires	: 2 - 8 kg/cm^2	
	* Net weight	: Abt 1.2 kg	
6.	Valve lapper hand type		1
	* Length	: 285 mm	
	* Dia	: 30 mm	
7.	Valve seat cutter..... Complete assortment for milling valve seat		1
	* Capacity	: 34 - 64 mm dia.	
		: Consisting of 15° 36,38,42,44,46,48, 52,54,56,58,64 30° 36,42,52,58 45° 34,36,42,46,52,56,62, 75° 34,36,42,46,54,60	
8.	Piston ring compressor		1
	* Capacity	: 50 - 125 mm	
	* Net weight	: Abt 300 gr	
9.	Cylinder gauge		1
	* Capacity	: 50 - 150 mm	

		SPECIFICATION	Q'ty
	* Measurable length	: 250 mm	
	* Graduation	: 1/100 mm	
10.	Valve lifter		1
	* Capacity	: 50 - 225 mm	
	* Net weight	: Abt 3.5 kg	
	* Length	: 400 mm	
11.	Diesel injection pump tester ...	With injection pump special tool set	1
	* Injection pump	: 8 Cylinders	
	* Revolving range	: 0 - 4,200 rpm	
	* Motor	: 3ϕ440V·50 Hz	
	* Disc for timing adj.	: 360° graduated	
12.	Nozzle tester		1
	* Pressure gauge	: 0 - 500 kg/cm^2	
	* Fuel tank	: 400 - 600 cc	
	* Mim. Scale	: 10 kg/cm^2	
13.	Cylinder liner puller		1
	* Capacity	: 75 - 155 mm	
	* Net weight	: Abt 14 kg	
14.	Diesel compression gauge		1
	* Measurable capacity	: 0 - 70 kg/cm^2	
	* Min. increment	: 1 kg/cm^2	
15.	Vacuum gauge		1
	* Graduaction	: 0 - 76 cm Hg. 0 - 0.5 kg/cm^2	
J.	Air and electric tools		
1.	Impact wrench		2
	* Capacity bolt size	: 40 mm	
	* Complete with sockets	: 32,35,41 mm	
	* Air consumption	: 0.8 - 1.3 m^3/min	
2.	Portable air grinder		1
	* Capacity	: Chuck 6 mm	
	* No load speed	: 25,000 rpm	
3.	Electric drill		
	1) Small-size		2
	* Capacity	: 6.5 mm	
	* Motor	: 1ϕ220V	
	2) Medium-size		1

	SPECIFICATION		Q'ty
	* Capacity	: 13 mm	
	* Motor	: 1ϕ220V	
	3) Corner drill		1
	* Capacity	: 20 mm	
	* Motor	: 1ϕ220V	
4.	Bench drilling machine		1
	* Capacity	: 23 mm	
	* Swing	: 430 - 450 mm	
	* Motor	: 3ϕ440V·400W	
	* Max. grill stroke	: 120 - 130 mm	
5.	Electric bench grinder .....With eye shield & stand for electric grinder		1
	* Capacity (Wheel size)	: 255 mm	
	* Power input	: 3ϕ440V·750W	
6.	Electric hand grinder		2
	1) Small-size		
	* Capacity (Wheel size)	: 100 mm	
	* Power input	: 1ϕ220·300 - 500 W	
	2) Medium-size		1
	* Capacity (Wheel size)	: 180 mm	
	* Power input	: 1ϕ220V·350 - 900W	
7.	Electric hand shear		1
	* Capacity	: Steel 2.0 mm	
	* Power input	: 1ϕ220V·200 - 400W	
K.	Hand tools		
1.	Open end spanner set	: 8 x 9, 10 x 12, 12 x 14, 14 x 17, 19 x 21, 23 x 26 mm	20
2.	Single end spanner set	: 24,26,27,29,30,32,35,36, 38,41,46,50,54,58,60,63, 65,67,70mm	1
3.	U-Bolt nut wrench	: 23 x 26, 24 x 27, 26 x 32, 29 x 32, 30 x 32, 32 x 35, 32 x 36 mm	1
4.	Offset wrench set	: 10 x 12, 12 x 14, 14 x 17, 17 x 19, 21 x 23, 23 x 26 mm	20

		SPECIFICATION	Q'ty
5.	Single offset box wrench	: 24, 26, 27, 29, 30, 32, 35, 36, 38, 41, 46, 50mm	1
6.	Socket wrench set .... 1/2" sq.	: 8, 10, 11, 12, 13, 14, 17, 19, 21, 23, 24, 27mm : Spinner handle, Bar, Extention bar, Universal joint	10
7.	Socket wrench set .... 3/4" sq.	: 24, 26, 27, 29, 30, 32, 34, 35, 36, 38, 41, 46, 50, 54, 58, 63 mm : Spineer handle, Extention bar (3 pcs), Universal joint, others.	1
8.	Wrench		
	1) T type wrench	: 8, 9, 10, 12, 14, 17, 19, 21, 23 mm	1
	2) Hold flexible wrench	: 10, 12, 14, 17 mm	1
	3) Universal joint wrench	: 10, 12, 14, 17, 19, 21mm	1
	4) L type wrench	: 10, 12, 14, 17, 19, 21mm	1
	5) Adjustable pipe wrench	: 150, 350, 900 mm	1
	6) Water pump plier	: 250mm	1
	7) Speed handle	: 400, 450 mm	1
	8) Bolt clipper	: 300, 600 mm	1
	9) Solderless terminal kit	: Terminal plier, Terminal, Case 85 x 245 x 25 mm	1
	10) Universal chain wrench	: 490, 670 mm	1
	11) Attack driver set	: Driver, Adapter	1
	12) Torque wrench	: 1,000-8,500, 2,000-10,000 kgf.cm.	1
9.	Wrench & others		
	1) Adjustable wrench	: 100, 300 mm	20
	2) Combination plier	: 200 mm	20
	3) Long nose plier	: 150-170 mm	20
	4) Chain nose cutting plier	: 150-170 mm	20
	5) Cutting plier	: 200 mm	20
	6) Cutting nipper	: 150-170 mm	20
	7) Screw-driver	: Length (-) 50,100,200mm	20

		SPECIFICATION	Q'ty
		(+) 50,100,200mm	20
		(-) 300mm	5
	8) Chisel flat	: Flat chisel 19 x 165mm	20
	9) Center punch	: Length 120-130 mm	20
	10) Leather punch	: 8, 10, 12, 15, 19mm	5
	11) Ball peen hammer	: Weight 450 gr	20
	12) Copper hammer	: Weight 450 gr	2
	13) Test hammer	: Weight 250 gr	10
	14) Wood hammer	: Length 360 mm	3
	15) Big hammer	: Weight 2.3, 3.5 kg	1
	16) Scraper blade	: Length 190-250 mm	20
	17) Tool box	: Dimension 187x450x150mm	5
	18) Tool tray	: Dimension 415x250x90, 450x300x120, 600x450x150mm	2
10.	Puller set		1
	1) Gear puller		
	2) Bearing puller		
	3) Wheel hub puller		
	4) Universal wheel hub puller		
	5) Bushing inserter & remover set		
11.	Adjustable reamer		1
	* Range	: 38.00-46.00, 46.00-56.00 mm	
12.	Tap & die set .....With tap wrench & die handle		1
	1) Tap	: 6, 8, 10, 12, 14, 16, 18, 20, 22 mm, 3pcs/ea.	
	2) Die	: 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 mm, 3pcs/ea.	
13.	File set		
	1) Rough, Medium, Fine	: Length 300 mm Flat, Half-round, Round, Square, Triangul	3
	2) Rough, Medium, Fine	: Length 150 mm Flat, Half-round, Round, Square, Triangul	5
	3) Wood file handle	: 3 pcs	3

		SPECIFICATION	Q'ty
14.	Vise		
	* Nominal size	: 150 mm	3
	(Jaw opening)	: 155 mm	
	* Nominal size	: 100 mm	2
	(Jaw opening)	: 105 mm	
15.	Screw extractor set		5
	* Size of screw used	: 4.8-6.4, 6.4-8.0,	
		: 8.0-11.0, 11.0-14.3,	
		: 14.3-19.0	
16	Electric soldering iron		3
	* Capacity	: 1φ220V·200W	
17	Work bench		3
	* Table size	: 1,700 x 600 x 750 mm or more,	
	* Max load on table	: 2--3 ton	
18	Tool caddy ..... 4 step type		15
	* Dimension	: 330 x 660 x 825 mm with rubber wheels	
19.	Service creeper ..... Made of wood		5
	* Dimension	: 430 x 910 mm with pillow	
20.	Tool cabinet ..... Made of steel		2
	* Dimension	: 781 x 781 x 1,500 mm	
21.	Garage lamp		5
	* Cord	: 10 m	
22.	Hand truck ..... One wing type		2
	* Load capacity	: 500 kg	
	* Dimension	: 1,200 x 750 x 850 mm with 4-wheels	
L.	Measuring instrument		
1.	Vernier caliper		
	* Measuring range	: 0-150 mm	8
	* Measuring range	: 0-300 mm	2
2.	Outside micrometer		1
	* measuring range	: 0-150 mm	
3.	Caliper set		1
	1) Outside caliper	: 0-200 mm	
	2) Inside caliper	: 0-200 mm	
4.	Steel compass		1
	* Measuring range	: 0-200 mm	

		SPECIFICATION	Q'ty
5.	Steel rule		
	* Measuring range	: 0-2 m	5
	* Measuring range	: 0-50 m	1
6.	Thickness gauge		20
	* Size	: 0.04, 0.05, 0.06, 0.07, 0.08, 0.10, 0.15, 0.20, 0.30 mm	
7.	Screw pitch guage		5
	* Ditch size	: 0.25-6.0, 60°	
8.	V-Block		1
	* Size	: 90 x 150 x 65 mm	
9.	Straight edge	: 1,000 mm	1
10.	Surface gauge	: 300 mm	1
11.	Steel square	: 250 x 125 mm	1
12.	Drill guage	: 1-13 mm	1
13.	Thermometer	: 0-100°C	5
14.	Tachometer etc.		
	* "Hasher" type hand taxhmeter revolution	: 10,000 rpm	2
	* Hand spring balancer	: 20 kg	2
M.	Other equipment & tool		
1.	Industrial sawing machine ... Single needle, lockstitch, unison feed		1
	* Sawing speed	: Up to 2,500 rpm	
	* Max. stitch length	: 7 mm	
	* Needle bar stroke	: 33.36 mm	
	* Motor	: Clutch motor 3ϕ440V·400W	
2.	Air hammer		1
	* Capacity	: 1/40 ton	
	* Impacts per min.	: 225	
	* Effective dia. of processed goods	: 50 mm	
	* Max. stroke	: 250 mm	
	* Motor	: 3ϕ440V·2.2kW	
3.	Anvil	: 70-75 Kg	1
4.	Swage block	: 70-75 Kg	1
5.	Tong set	: Flat, Round, Square, Bent nose	1

	SPECIFICATION		Q'ty
6.	Hammer set	: 4.5 kg & 2.3 kg	1
7.	Circular saw		1
	* Saw	Max. dia. 405 mm	
	* Table size	: 100 x 900 mm	
	* Revolution speed	: 2,700, 4,300 rpm	
	* Motor	: 3ϕ440V·2.2 kw	
8.	Copier		1
	* Copying width	: 450 mm (A2)	
	* Paper feed	: 50-900 m/h	
	* Source of light	: Fluorescent lamp (80W) x 6	
	* Dimension	: 800 x 680 x 440 mm	
	* Complete with transformer		
9.	Auto voltage regulator		
	1) 3ϕ440V $\pm$5%	: Output 30 KVA	1
	2) 1ϕ220V $\pm$5%	: Output 30 KVA	1
10.	Diesel measuring pump		1
	* Heavy duty single pump	: Stationary, Pumping capacity, 40 ℓ/min	
	* Meter	: 4-Piston meter with on exterior adjustment device.	
	* Pump	: Rotary vane pump with a strainer and pressure relief valve	
	* Motor	: 3ϕ220V·400W	
	* Hose & Nozzle	: 3/4" vingle blade, Auto-stop	
	* Fuel tank	: 10,000 ℓ x 2 with std. Accessories & necessory piping connecting material, etc.	
11.	Small lathe		1
	* Swing over bed	: 240 mm	
	* Bed size	: 800 x 130 mm	
	* Motor	: 1ϕ220V 400-500W	
	* Distance center to center	: 340 mm	
	* Spindle revolution	: 300-1,200 rpm	
12.	Cut engine		1
	* Diesel engine	: 6 cylinders, with fly-wheel, and without radiator	

4-5 MAINTENANCE AREA

4-5-1 Basic Policies

NTC possess no private maintenance facility for urban buses as described in paragraph 4-4-1,(Basic Policies), and a trolley bus workshop of NTC granted by the People's Republic of China is used. A maintenance area will be constructed as a part of this for the purpose of improving safety of urban buses and operation management. The maintenance area will be capable of conforming with about one hundred vehicles with future increase in the number of vehicles taken into account.

The main purpose of the maintenance area is to enable operation of vehicles of necessary number at all times, and therefore, it should be provided with the functions of maintenance, inspection, repair, fuel supply, cleaning and parking of buses. The facilities with these functions will be arranged for effective use of the site. The workshop for maintenance, inspection, and repair, the gasoline stand, and the parking area will be arranged along functional work line.

The buildings will incorporate modern technology with locally available construction techniques and materials adopted. The design will be matched with the climate and nature of Nepal.

The above mentioned are the basic policies for the construction plan.

4-5-2 Facilities

The followings are summaries for each facilities.

(1) Work Shop

- Work shop is composed of Maintenance Repairment, Administration Area, Store Area, Working Area and Personal Service Area.
- Structure: Steel-frame and brick resistant wall
- Story: One floor
- Floor area: 1,102 m^2

(2) Test Yard

- Test Yard is used for tests of the speed, brake and sideslip
- Structure: Brick resistant wall
- Story: One floor
- Floor area: 90 m^2

(3) Paint/Oil Store

- This building is storage of paint and oil.
- Structure: Brick resistant wall
- Story: One floor
- Floor area: 25 m^2

(4) Other facilities

- Inspection Pit
- Gasoline Stand
- Car Washer
- Parking
- Pavement & Marking
- Fence & Gates
- Gate Office

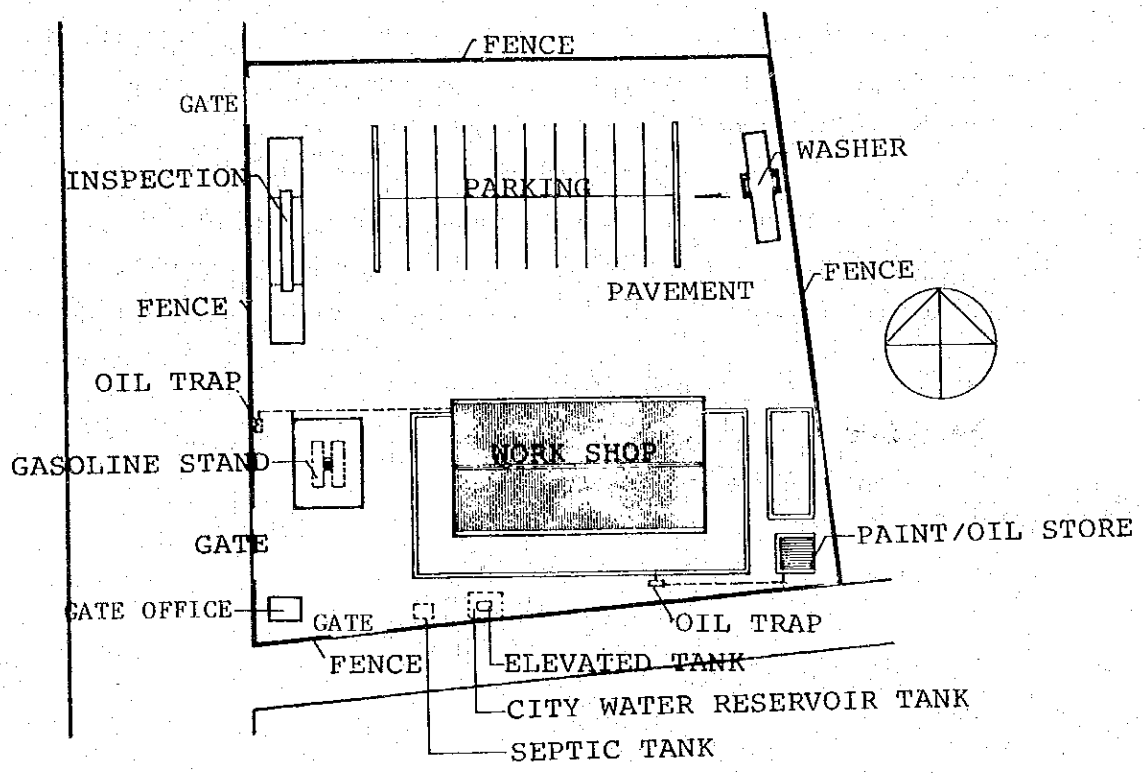


Fig. 4-2 Facilities

4-6 BUS TERMINALS AND BUS STOPS

4-6-1 Bus terminals

The existing terminal is facing public spaces in Kathmandu City such as the broad lawn park extending from Ratna Park to Tundikhel, the road (King's way) running in north and south directions toward the King's Place and Rani Pokhari Pond. The population density of over 570 persons/ km^2 in the heart of Kathmandu is extremely high under the current situation of being without high-rise residence, and the public spaces mentioned above

are very valuable. Bus terminals will be newly provided at three places, that is, Ratna Park, Shahid Gate and Jamal in these public spaces. Each one of these terminals shall not obstruct the view of this area, and influence shall be minimized to pavement, drain ditches, fences, external gates, trees and other existing facilities as much as possible.

4-6-2 Bus stops

Seven routes of four systems were designed in section 4-1 as the routes to be operated by NTC. However, improvement is required to the other routes with many passengers, Route F-17 Bishalugar and Route E-15 Balaju cannot be denied due to their high degree of utilization, even through they were excluded from newly designed routes because of insufficient width of road. Route D-12 Air Port are hardly used by general passengers, but a bus end terminal will be provided for indicating presence of bus transportation with improtance of the airport taken into consideration. Bus stop facilities will be provided along the following eleven routes of seven systems based on the considerations stated above.

A	JORPATI	1. JORPATI
		2. GAUSARA
B	LAGANKHEL	5. PATANDHOKA
		6. LAGANKHEL
C	KIRTIPUR	9. KIRTIPUR
		10. NAIKAP
D	AIR PORT	12. AIR PORT
E	BALAJU	15. BALAJU
		16. BANSBARI
F	TANGAL	17. BISHALUGAR
I	RING ROAD	19. SWAYANBU

4-6-3 Standard Facilities

- Shelter : Shelter with simbolized function for passengers waiting
- Hand-Rail : Handrail for inducing passengers.
- General Information Board : This board shows all service routes of the city buses.
- Information Board : This board shows each routes of the city bus.

4-7 IMPROVEMENT PROCEDURE OF TRANSPORT OPERATION MANAGEMENT

Bus operation organizations of KTM have common structure of problem occurence as Fig. 4-3 Diagram of Problem Occurence. Private bus companies have placed emphasis on operation management and restrained problem occurance to increase profit. On the other hand, in order to improve the operation service, new buses, maintenance equipments, maintenance facilities, and visual information will be provided to the project. (Refer Fig. 4-3 Diagram of solution of problem)

At the opportunity of the project, the following items are desired to be advanced.

(1) Establishing operation plan conforming to demand.
  (1)-1: Disposition of buses on route with profit.
  (1)-2: Budgting for income based on operation plan.
(2) Increasing collection rate of income.
  (2)-1: Training & instruction of conductor.
  (2)-2: Improvement of passenger on-off system.
  (2)-3: Simplification of fare system (same fare for distance within 4 - 5 km).
(3) Suitable stationing of staff to each division.
(4) Stabilizing profit by budgeting income at st.

At end of this chapter, mini bus should be specified. This type of bus were not written in the minutes on basic survey, but were strongly required by Nepalese officials.

This mini bus is able to suit for the narrow road in the surburb of Kathmandu, and extends the bus operation area. Therefore, service and income will increase.

However, if two type of buses are introduced, new problems will occur in the field of management, operation, and maintenance. Then as a future subject, further study shall be required.

FIG. 4 - 3 DIAGRAM OF PROBLEM OCCURENCE

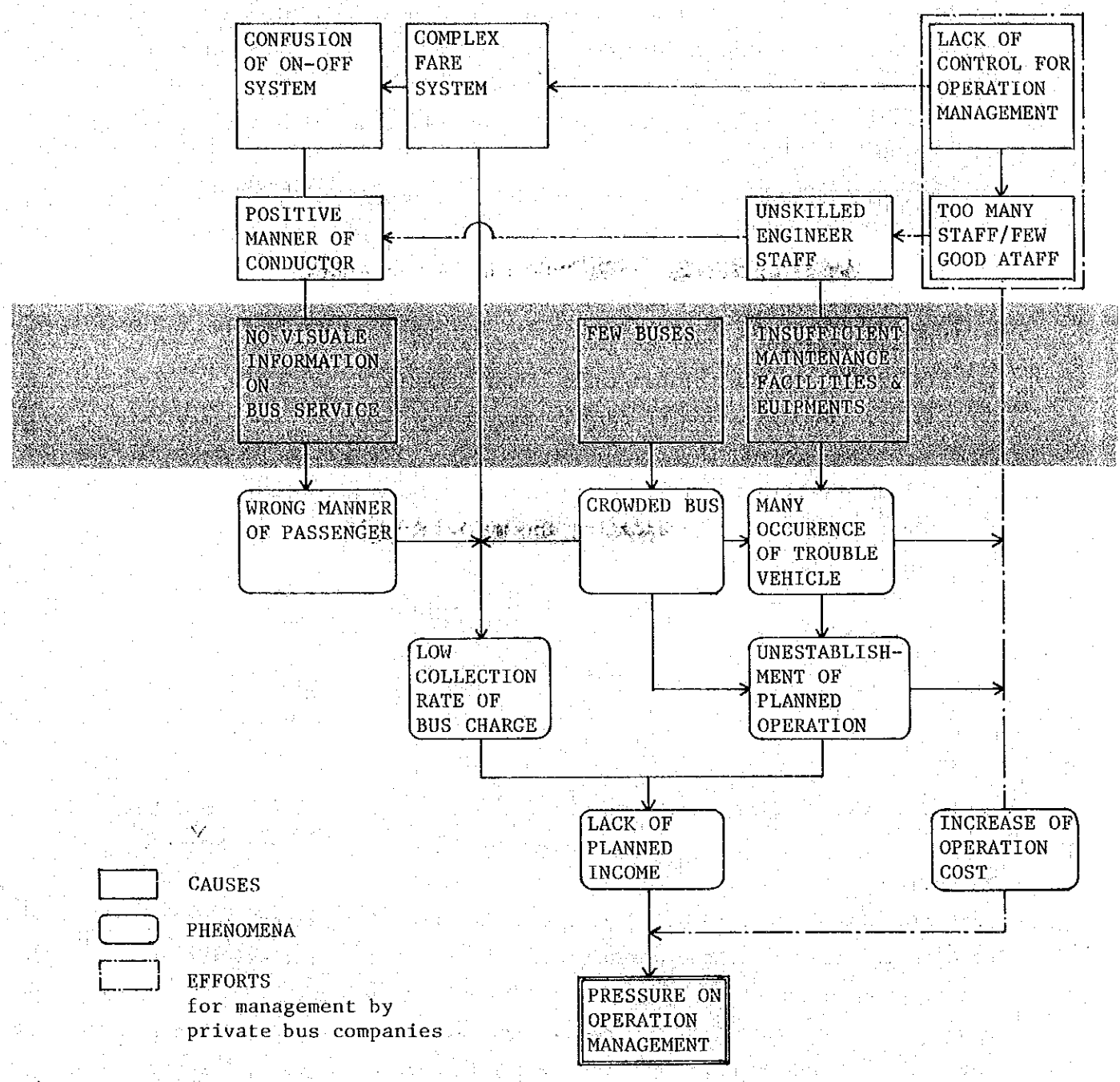
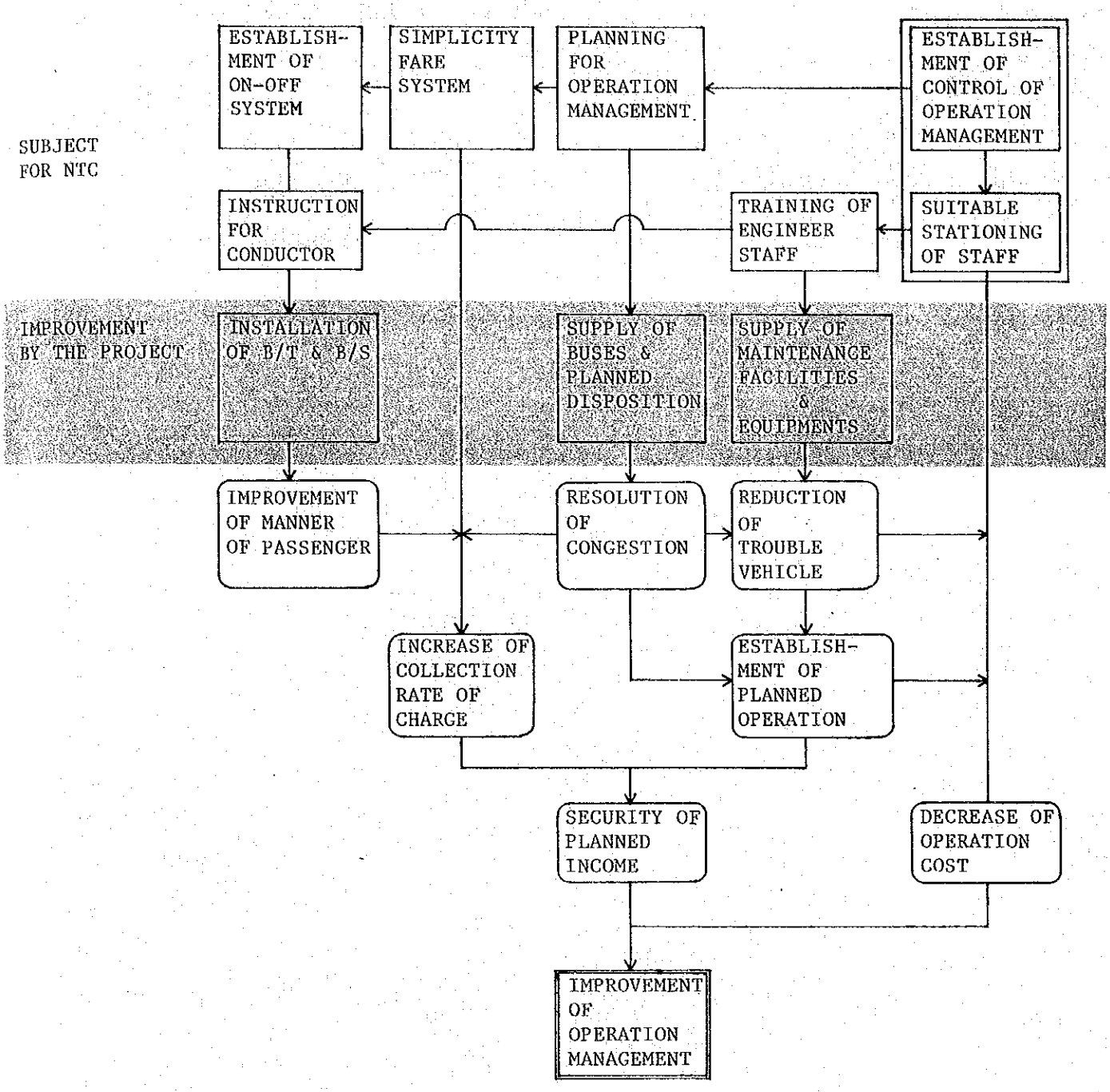


DIAGRAM OF SOLUTION OF PROBLEM



PRELIMINARY DESIGN

CHAPTER 5 TRANSIT GARGO VEHICLE

5-1 TRUCK TYPE

New trucks will be selected out of the following three types.

Type VT: van truck, payload 10-12t

Type ST: semi-trailer truck, payload 10-12t

Type FT: full-trailer truck, payload 8-10t or 8t + (607t)

1 Type VT

Because this is an enlarged type of existing truck and driving technique is comparatively easy, introduction is possible. Its running fare can be reduced by 30 percent or more, if operation cost rate is suitablly kept.

Trucks of this type run on main trunk roads except for Kathmandu corridor route.

Compared with trailer type trucks with same payload, gross vehicle weight is light and accordingly, this type is advantageous with respect to running cost and adaptability to roads.

2 Type ST

Identical to Type VT with respect to running cost. This type is disadvantageous because linearity and width of roads are wrong and driving is difficult in general. A truck of trailer type, is able to be disconnected from the trailer section and to be operated without the trailer section during the inspection time at the customs and also during loading time for delivery and collection of cargoes. However, because the demand is small and time loss is ignorably small at the customs and during delivery and collection of cargoes at the present time, it is judged that this merit cannot be fully utilized.

3 Type FT

The transportation capacity per truck is the largest and then reduction of transportation cost can be most highly expected for this type. Particularly when the trailer section is disconnected, 8t trucks are able to go directly to Kathmandu, and trans-loading of cargoes is not required. However, the period with sufficient demand, export demand in particular, is limited, and it is not necessary to travel in the form of full trailers through a year. In this case, running cost increases after all, and it is more disadvantageous than other types. In addition, because the traction and loaded vehicles cannot be completely separated unlike semi-trailer truck, it is not possible to utilize idle time at customs and during cargo handling. It is also disadvantageous from the standpoint of

driving technology because it is necessary to balance weight on loading cargoes.

Table 5-1 summarizes the comparative evaluation stated above.

TABLE 5-1 EVALUATION FOR TRUCK TYPES

TYPE OF TRUCK	VAN	SEMI-TRAILER	FULL-TRAILER	
LOADING WEIGHT	10-12 ton	10-12 ton	8-10 ton	8+(6-7) ton
RUNNING COST (ton.km)	+1	+1	0	+2
FEASIBILITY OF INTRODUCTION TO MAIN ROAD	+1	+1	+1	0
SUITABILITY TO FLUCTUATION OF IMPORT DEMAND	+1	+1	+2	0
EASINESS OF DRIVING TECHNIQUE	+2	+1	+1	0
ARRANGEMENT OF VEHICLE OPERATION	+2	+1	+1	0
EVALUATION	+7	+5	+5	+2

Concerning to loss time due to loading/unloading and procedures on custom, every type of trucks can be considered under same condition from point of cost, because average demand for transportation will remain low.

Due to the above reasons, trucks of van type and large size having not less payload than that of the existing trucks will be introduced.

About 7 trucks are designed for rising up future capacity, developing demand, and creating profit.

5-2 SPECIFICATION FOR TRUCKS

1. The trucks will be mainly used for cargo transportation between Calcutta and Birganj, but it is necessary to provide structure and equipment satisfying metereological conditions during cold season and hot season to higher extent than that for buses because they are expected to be extensively used within the Kingdom of Nepal.

2. Besides, it is necessary to exercise care with the matters described for buses (section 4-2) in general.

Item	SPECIFICATION
FORM	In anticipation of improved transportation efficiency, the trucks shall be of van type providing maximum pay load and the loadage shall be 10 ∿ 20t maximum.
Chassis	1. The maximum speed with maximum pay load shall be around 85 ∿ 90 km/h. 2. Drive is of 6 x 4 system because it is expected that the trucks will be used for driving on mountains in accordance with future consolidation of roads. 3. The wheelbase will exceed 5.9 m maximum. However, the minimum turning radius should be around 12 m at maximum. 4. Tyre size will be 10.00-20 and 11.00-20 because of the size of the vehicle. 5. The rear overhang should be within two thirds of the wheelbase. 6. It is suitable that the fuel tank capacity is about 200ℓ x 2 minimum when the distance (one way) between BIRGANJ and Calcutta (about 810 km) is accounted.
Driver's cab	Because the operation will be of long distances, a sleeper berth for one person shall be provided.
Size and weight	By condition of the roads between Birganj and Calcutta, the height is limited upto 14 ft (4.2 m). But the stability and other factors considered, both size and weight shall accord to the Japanese safety standard.
Body	1. The body shall be van type, and the internal capacity of about 37 m^3 is considered suitable. 2. The floor and wall surfaces in the van interior shall be lined, and the floor surface in particular shall be lined with sheet iron for preventing damage due to the load. 3. A door of folding type shall be provided on the rear side. The door(s) should be provided with locks.
Other items	Items in section 4-2 "Specification for Buses", shall also be applicable to trucks except for those matters which are only adopted to buses and which are inconsist to the specifications for trucks.

5-3 SPECIFICATION FOR TRUCK MAINTENANCE EQUIPMENT

5-3-1 Basic Policies

As already described in section 4-4 (Bus Maintenance Equipment), maintenance facilities and maintenance equipment in Birganj are insufficient and are old type, resulting in reduced working efficiency and safety. Therefore, introduction of truck maintenance equipment is really essential.

Basic policies of introduction of maintenance equipment are;

(1) To improve efficiency and safety of maintenance works; and

(2) To enable performance of smooth maintenance work even when the number of vehicle increases in the future including the supplied vehicles so that no obstruction will occur in operation of trucks and to contribute to improvement of management of truck transportation.

5-3-2 Truck Maintenance Equipment, Tools & Parts.

The followings are the specification for truck maintenance equipment, tools & parts.

	SPECIFICATION		Q'ty
1.	Grage Jack		1
	* Capacity	: 10 ton	
	* Body length	: 1,555-1,650 mm	
	* Lift	: 400-410 mm	
	* Net weight	: 105-170 Kg	
2.	Wheel dolly ..... Hydraulic, hand operation		1
	* Capacity	: 500-600 Kg	
	* Applicable tire size	: 650 x 1,000	
3.	Compressor		1
	* Motor out put	: 3ϕ440V 7.5 KW	
	* Piston displacement	: 800-1,000 /min	
	* Working press	: 8-9.9 Kg/cm^2	
	* Jank capacity	: 260 ℓ	
4.	Tire changer		1
	* Capacity	: 500-600 Kg	
	* Applicable tire size	: 650 x 1,000	
5.	Impact wrench		
	* Capacity bolt size	: 40 mm	
	* Complete with sockets	: 32, 35, 41 mm	

	SPECIFICATION		Q'ty
	* Air consumption	: 0.8-1.3 m^3/min	
6.	Micrometer		1
	* Measuring range	: 0-150 mm	
7.	Cylinder gauge		1
	* Capacity	: 50-150 mm	
	* Measurable length	: 250 mm	
	* Graduation	: 1/100 mm	
8.	Compression gauge		1
	* Measurable capacity	: 0-70 Kg/cm^2	
	* Min. increment	: 1 kg/cm^2	
9.	Portable air grinder		1
	* Capacity	: Chuck 6 mm	
	* No load speed	: 25,000 rpm	
10.	Electric drill		1
	1) Small-size		
	* Capacity	: 6.5 mm	
	* Motor	: 1ϕ220V	
	2) Medium-size		
	* Capacity	: 13 mm	
	* Motor	: 1ϕ220V	
11.	Porto power		1
	* Capacity	: 10 ton	
	* Consist of	: 10 ton pump unit---1 set Stand Case with wheels --1 set Various attachments---3 pcs.	
	* Ram stroke	: 150 mm	
12.	Air transformer		1
	* Pressure gauge	: 0-10 Kg/cm^2	
	* Air outlet	: 1/4 PF.	
13.	Spray gun set ..... Suction type		1
	* Container	: 1,000 ℓ	
14.	Thicnness gauge		2
		: 9 blades, each size 0.15-0.80 mm	

5-4 IMPOVEMENT PROCEDURE OF TRANSPORT OPERATION MANAGEMENT

5-4-1 Short Term Objective

Means to secure the demand for truck transportation are specified in the following.

(1) The change of charge system

The fixed system shall be changed to the floating system. As a result, charge rate can be timely changed by manager of Birganj Office.

(2) Installation of Facilities for cargo reservation

One way loading will be reduced by installation of reservation center especially for export cargo at Kathmandu and Biratunagar.

(3) P.R. To Nepalese exporter and improvement of service

P.R. Activity shall be strengthen to Nepalese exporters as no exporter knows container cargo service of NTC.

(4) Improvement of function of Culcutta Office for transit cargo transportation.

In near future, it is required to increase the staff at the office and transport timely by improvement of cargo transport capacity through Calcutta and prompt treatment of the documents.

About two trucks shall be always stationed at Calcutta in high demand season.

5-4-2 Middle & long term objective

Triangle transportation are considered to connect among Calcutta, Birganj, and Biratunagar. There are many export goods at Biratunagar. In middle & long term it is planned to transport these cargo for Calcutta and return with loading import goods from Calcutta on the route, Birganj - Janakupur - Biratunagar in Nepal.

Effective operation will be possible if sufficient export cargo are secured at Biratunagar, if timing of import and export transpotation match each other, and if the road are partially (50 km) improved between Calcutta and Biratunagar. In future, many routes, such as Biratunagar - Bhirawa and so on, can be developed if export goods and import demand increase.

5-4-3 Training Center

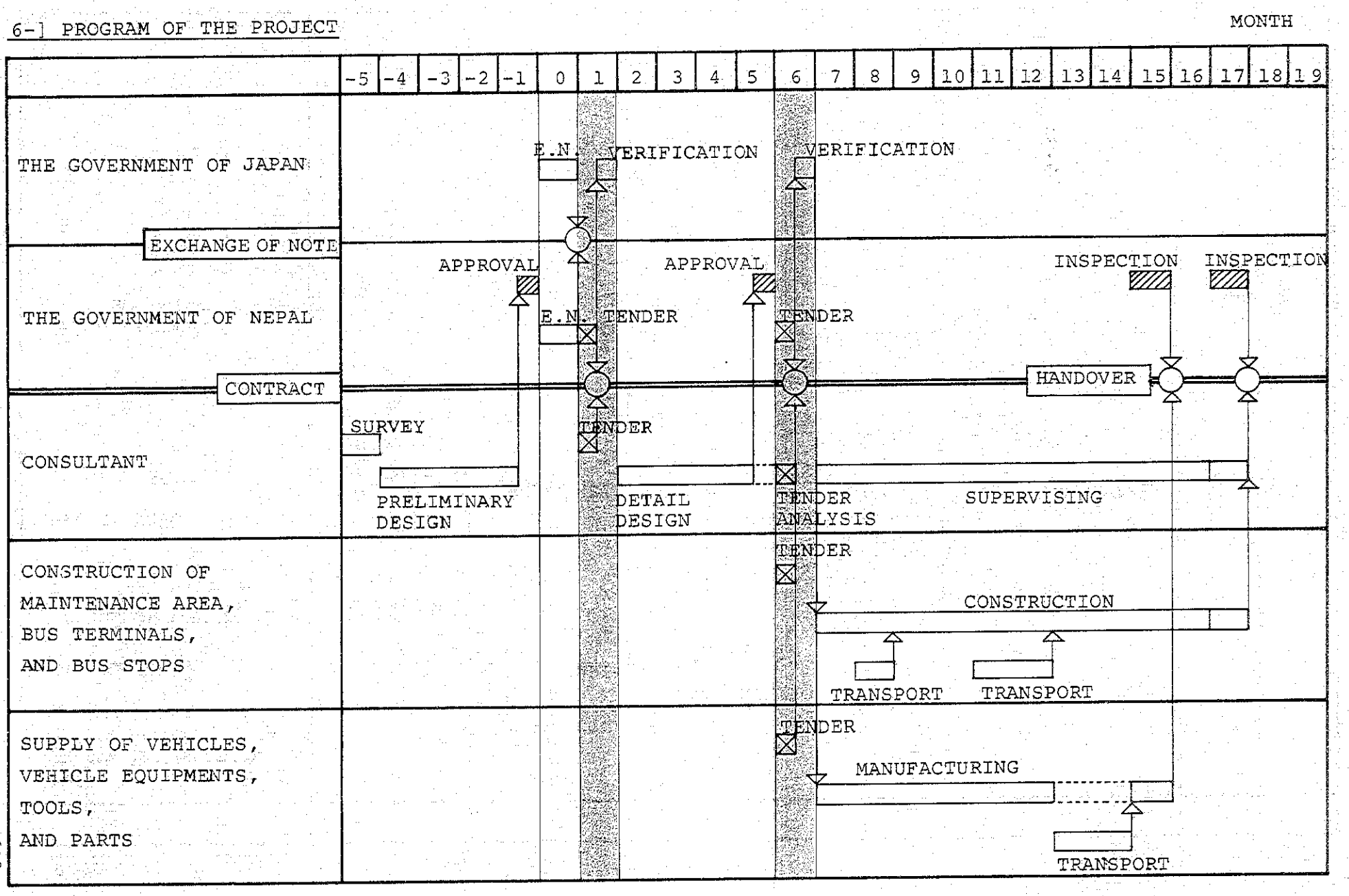
In Nepal, there is no training center for learning driving technique. Every driver learns by himself and gains driving hcence. Therefore, driving technique remains at low level.

Traing center is required for education of persons concerning to driving, vehicle maintenance, vehicle operation management.

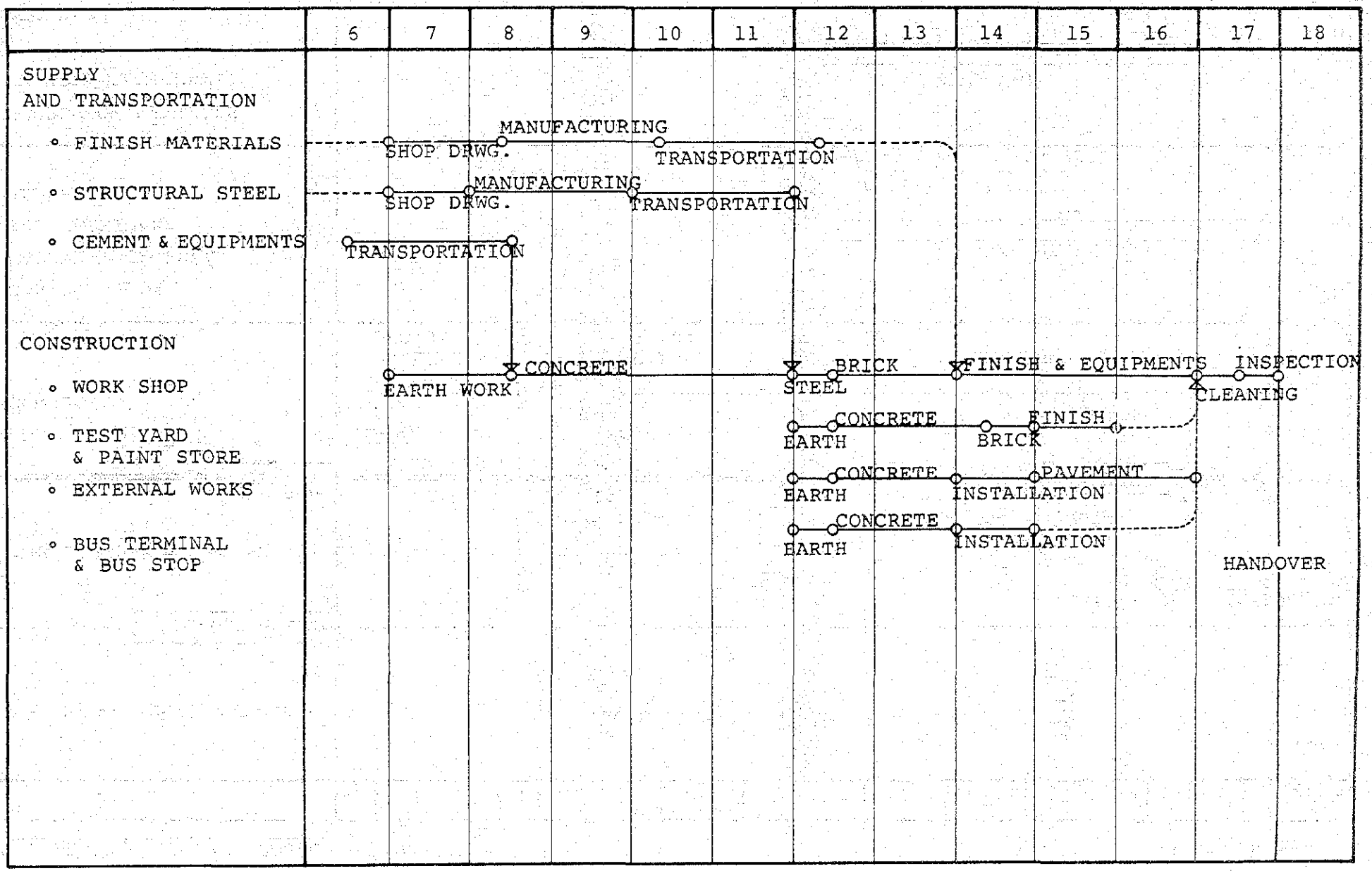
PRELIMINARY DESIGN

CHAPTER 6 PROGRAM AND SCOPE OF THE PROJECT

6-] PROGRAM OF THE PROJECT



6-2 PROGRAM OF CONSTRUCTION OF M/A,B/T & B/S



6-3 SCOPE OF THE PROJECT

Items Included in the Scope of the Project.

A. BUSES

* Supply of city buses with parts.
* Transportation to receiving point in Kathmandu.

B. TRUCKS

* Supply of van-type trucks with parts.
* Transportation to receiving point in Kathmandu.

C. MAINTENANCE EQUIPMENTS, TOOLS, & PARTS FOR VEHICLES

* Supply, transportation, and installation of vehicle maintenance equipment, tools, and parts.

D. MAINTENANCE AREA (M/A)

* Construction of maintenance facilities as follows.
  - Work shop
  - Test yard
  - Paint/Oil store
  - Inspection pit
  - Gasoline stand
* Construction of external works within M/A as follows.
  - Fences, three gates, and gate office
  - Paving with marking
* Supply, transportation, and installation of mechanical and electrical equipment for each facilities.
* All items above mentioned are shown in
  "DRAWING",
  "SPECIFICATIONS FOR MECHANICAL EQUIPMENTS", and
  "SPECIFICATIONS FOR ELECTRICAL EQUIPMENTS".

E. BUS TERMINALS (B/T) AND BUS STOPS (B/S)

* Construction of 50 (Fifty) shelters (S.).
  - 4 (Four) at Jamal
  - 20 (Twenty) at Ratna park
  - 16 (Sixteen) at Shahid gate
  - 10 (Ten) at final B/S's at routes
* Construction of 5 (Five) General information boards (G.I.B.).
  - 1 (One) at Jamal
  - 2 (Two) at Ratna park

- 2 (Two) at Shahid gate

* Construction of 162 (one hundred Sixty two) information board (I.B.).
  - 1 (One) at Jamal
  - 4 (Four) at Ratna park
  - 5 (Five) at Shahid gate
  - 20 (Twenty) at final B/S's of routes
  - 132 (One hundred thirty two) at B/S's in the midway
* Construction of 20(Twenty) hand rails(H.R.) including final B/S's at routes.
  - 1 (One) at Jamal
  - 4 (Four) at Ratna park
  - 5 (Five) at Shahid gate
* All items above mentioned are shown in "DRAWING".

Items provided and prepared for the project by the government of Nepal.

* Necessary information and data for execution of the project, such as design, construction, transportation, supply, etc.
* Necessary measures and assistance for works in the project, such as design, construction, transportation, supply, etc.
  - Temporary power supply to the project sites for M/A.
  - Temporary water supply to the project sites for M/A, B/T's, B/S's.
  - Temporary land for temporary office, working area, stock yard, etc.
  - Custom clearance on expences for materials, equipments, vehicles, and machines to be used for the project on disembarkation in the Kingdom of Nepal.

Items whose expense and cost for the Project born by the government of Nepal.

* Topographic survey and soil investigation for the project site for M/A.
* Site clearing, such as demolition and removal of obstacles, site preparation, and levelling within the project sites for M/A and B/T before site hand-over.
* Brick fence clearing and site preparation for B/T at Jamal.
* Main city water supply, (piping size 5 inches) for M/A up to the point in the project site 1 m inward from border.
* Drainage and sewage lines for M/A to the nearest catch basin to the border in theproject site.
* Electric supply with necessary capacity (11KV 100KVA if possible) for M/A upto the receiving point in the project site.
* Telephone wiring for M/A.
* Landscaping and gardening.

* Furnitures and other interior accessories for M/A.
* Lettering of information (such as Terminal map, bus route, name of B/S, bus number, bus company, time schedule and so on) on G.I.B. & I.B..

Establishment of bus movement information for passengers is strongly expected after sufficient study by the completion of this project.

PRELIMINARY DESIGN

CHAPTER 7 DRAWINGS

7-1 MAINTENANCE AREA

-WORK SHOP EXTERIOR & INTERIOR FINISH SCHEDULE

-TEST YARD, PAINT/OIL STORE EXTERIOR & INTERIOR FINISH SCHEDULE

-SPECIFICATION FOR MECHANICAL EQUIPMENTS

-SPECIFICATION FOR ELECTRICAL EQUIPMENTS

-SITE PLAN

-WORK SHOP

-TEST YARD, PAINT/OIL STORE

-EXTERIOR FACILITIES

7-2 BUS TERMINAL/BUS STOP

-LOCATION OF B/T & B/S

-LOCATION OF B/T & B/S FOR EACH ROUTES

-LOCATION OF THREE BUS TERMINALS

-TERMINAL SHELTER

-JAMAL TERMINAL SITE PLAN

-RATNA PARK TERMINAL SITE PLAN

-SHAHID GATE TERMINAL SITE PLAN

WORK SHOP

EXTERIOR FINISH SCHEDULE

	DOORS & WINDOW	
WALL BRICK ROOF ASPHALT STRIP SINGLE CORRUGATED METAL ROOFING	DOOR: STEEL (GALVANIZED) WINDOW: ALUMINUM INSECT SCREEN LOUVER: STEEL (GALVANIZED) OVERHEAD DOOR: ALUMINUM	DRAIN: CAST IRON 100øVP EAVES GUTTER: STEEL OP MARKING

INTERIOR FINISH SCHEDULE

NO.	LOCATION	FLOOR	BASE/WAINSCOT	WALL	CEILING	REMARKS
101	MAINTENANCE REPAIRMENT	CONCRETE STEEL TROWEL FINISH with HARDNER	CEMENT PLASTER	(BRICK POINTED) CEMENT PLASTER PAINTED	1/2"PLYWOOD PAINTED	HOIST RAIL(1t), AUTO LIFT BASE, MARKING CHANNEL
102	TYRE	Do.	Do.	Do.		
103	PAINTING	Do.	Do.	Do.		LARGE BASIN x 1
104	SEAT REPAIR	Do.	Do.	Do.		LOCKER
105	SAWING	Do.	Do.	Do.		LOCKER
106	CARPENTRY	Do.	Do.	Do.		LARGE BASIN x 1 LOCKER
107	ELECTRIC ROOM	LIGHT-WEIGHT CONCRETE with HARDNER	Do.	Do.		PIT
108	COMPRESSOR ROOM	CONCRETE STEEL TROWEL FINISH with HARDNER	Do.	Do.		
109	BATTERY	CONCRETE STEEL TROWEL FINISH with EPOXY COATING	Do.	Do.		LARGE BASIN

NO.	LOCATION	FLOOR	BASE/WAINSCOT	WALL	CEILING	REMARKS
110	MACHINE TOOLS	CONCRETE STEEL TROWEL FINISH with HARKNER	CEMENT PLASTER	(BRICK POINTED) CEMENT PLASTER PAINTED		LOCKER
111	TOOLS	Do.	Do.	Do.		
112	BLACKSMITH & DENTING (Including WELDING)	Do.	Do.	Do.		LARGE BASIN LOCKER
113	ELECTRICITY	Do.	Do.	Do.		
114	STORE	Do.	Do.	Do.		
115	CIRCULATED PARTS	Do.	Do.	Do.		
116	INJECTION	Do.	Do.	Do.		
117	TOILET	TERRAZO TILE	T.TILE	Do.	GYPSUM BOARD	
118	SHOWER ROOM	Do.	Do.	Do.	Do.	
119	OFFICE	Do.	Do.	Do.	Do.	SINK BASIN LOCKER
120	MEETING ROOM	Do.	Do.	Do.	Do.	
121	BED ROOM	Do.	Do.	Do.	Do.	TWO STORIED BED x 5

TEST YARD

EXTERIOR FINISH SCHEDULE

	DOORS & WINDOWS	
WALL BRICK ROOF ASPHALT STRIP SINGLE	WINDOW: ALUMINUM OVERHEAD DOOR: ALUMINUM	DRAIN: CAST IRON 100 øVP

INTERIOR FINISH SCHEDULE

No.	LOCATION	FLOOR	BASE/WAINSCOT	WALL	CEILING	REMARKS
201	TEST YARD	CONCRETE STEEL TROWELL FINISH with HARDNER	CEMENT PLASTER	CEMENT PLASTER PAINTED	PAINTED	BRAKE/SPEED TESTER BASE, SIDE SLIP TESTER BASE

PAINT/OIL STORE

EXTERIOR FINISH SCHEDULE

	DOORS & WINDOWS	
WALL BRICK ROOF CORRUGATED METAL ROOFING	DOOR: STEEL (GALVANIZED) LOUVER: STEEL (")	DRAIN: CAST IRON 100 øOP EAVES GUTTER: STEEL OP

INTERIOR FINISH SCHEDULE

NO.	LOCATION	FLOOR	BASE/WAINSCOT	WALL	CEILING	REMARKS
301	OIL STORE	CONCRETE STEEL TROWELL FINISH with HARDNER	CEMENT PLASTER	CEMENT PLASTER PAINTED	---	PIT
302	PAINT STORE	Do.	Do.	Do.		PIT

SPECIFICATIONS FOR MECHANICAL EQUIPMENTS

ITEM	SPECIFICATION	Q'ty
ELEVATED TANK	: EFFECTIVE CAPACITY $1m^2$ DIMENSION 1m x 1m x 1.5m FRP PREFABRICATED PANEL-TYPE	1
LIFT PUMP	: ENCLOSED, DRIP-PROOF, CENTRIFUGAL CAPACITY 40mm x 100ℓ/min. x 15m x 0.75KW x (440V, 3ø, 50Hz)	2
SEPTIC TANK	: CAPACITY $5.5m^3$ DIMENSION 2.46m x 2.16m x 2.3m FRP PREFABRICATED PANEL-TYPE	1
OIL TRAP	: CAPACITY $1.5m^3$ DIMENSION 2.1m x 0.7m x 0.95m CAST-IN-PLACE CONCRETE	2
ELECTRIC WATER HEATER	: STORMING CAPACITY 20 lit. HEATER 1.5KW x (220V, 1ø, 50 Hz)	1
WATER CLOSET	: VITREOUS CHINA, EASTERN-STYLE WITH W/TRAP, HIGH TANK, FLUSHING PIPE, AND OTHER ACCESSORIES	2
WATER BASIN	: WALL HANGING, VITREOUS CHINA, 560m x 457,mm, W-FAUCET 1/2" x 1 WITH PLUG & CHAIN, WITH P-TRAP AND ACCESSORIES	2
SLOP SINK	: WALL HANGING, VITREOUS CHINA, 560mm x 455mm x 635mm, W-FAUCET, WITH WAST & CAST IRON P-TRAP AND ACCESSORIES	1
RESERVOIR TANK	: CAPACITY $20m^3$ DIMENSION 4m x 3m x 2m	1

SPECIFICATIONS FOR ELECTRICAL EQUIPMENTS

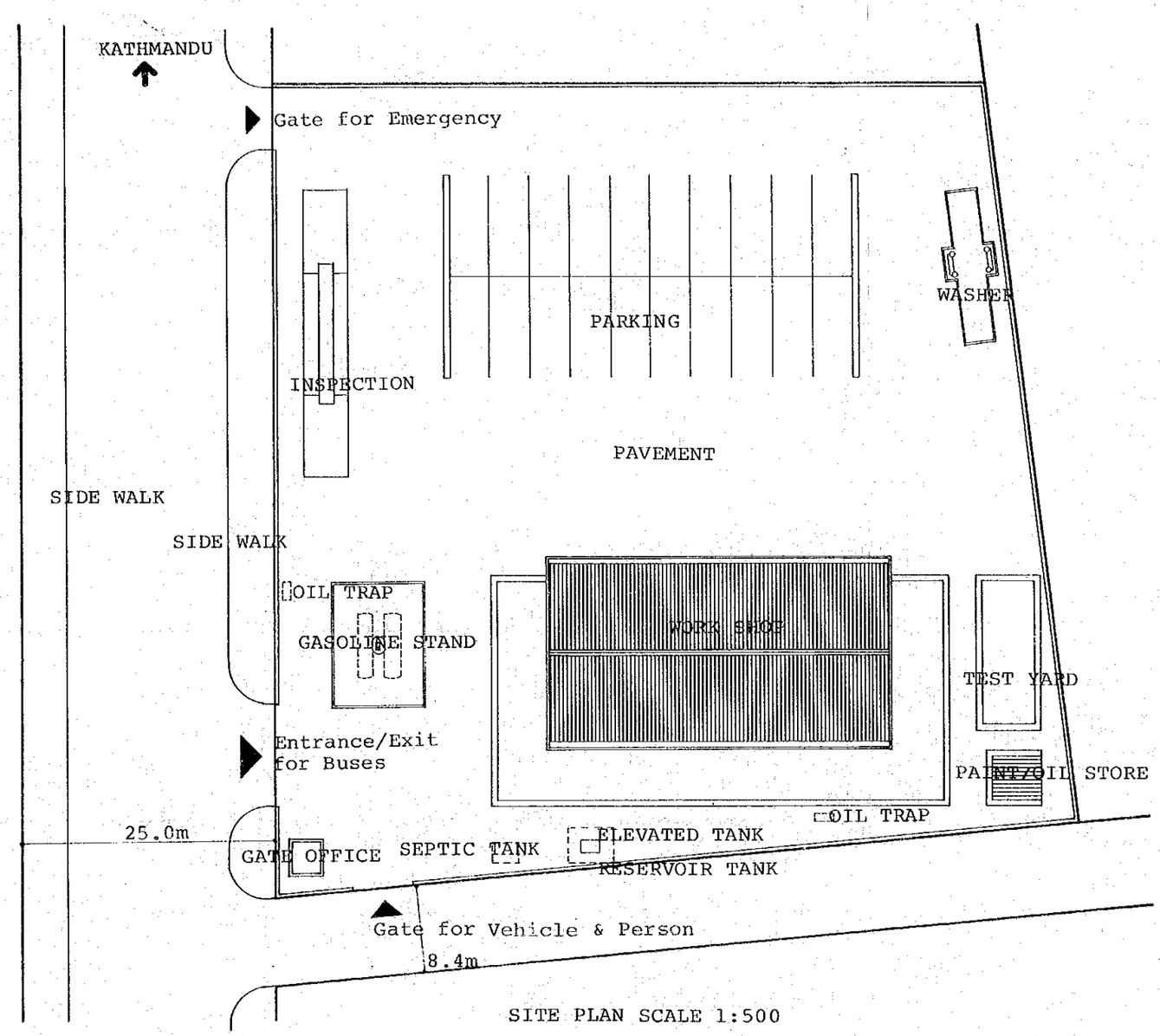
ITEM	SPECIFICATION	Q'ty
RECEIVEING LINE:	11KV, 3ø4W, 50Hz (IF POSSIBLE)	-
TRANSFORMER	: 11KV/440V, 3ø4W, 100KVA (DEPENDING ON RECEIVING LINE)	1
INDUCTION VOLTAGE REGULATOR	: 440V ± 10%, 3ø4W, 100KVA	1
TRANSFORMER	: 220V/127V (IF NECESSARY)	-
FLUORECENT LUMP	: 40W x 2 SURFACE & V-TYPE 300 luxes for ADMINISTRATION AREA	-
DITTO	: 40W x 2 SURFACE WITH REFLECTOR 300 luxes for WORK SHOP AREA	-
DITTO	: 40W x 2 SURFACE WITH REFLECTOR 150 luxes for STORE AREA	-
NATRIUM LUMP	: 400W x 2 Y-TYPE STEEL POLE AND WALL MTD. TYPE 10 luxes for OUT-SIDE	-
DITTO	: 400W x 2 Y-TYPE STEEL POLE AND WALL MTD. TYPE 20 luxes for GASOLINE STAND	-
NATRIUM FLOOD LIGHT	: 1KW x 2 for Illuminating Building	
CONSCENTS	: 1ø220V for all area 3ø440V in accordance with necessity	

SPECIFICATIONS FOR MECHANICAL EQUIPMENTS

ITEM	SPECIFICATION	Q'ty
ELEVATED TANK	: EFFECTIVE CAPACITY $1m^2$ DIMENSION 1m x 1m x 1.5m FRP PREFABRICATED PANEL-TYPE	1
LIFT PUMP	: ENCLOSED, DRIP-PROOF, CENTRIFUGAL CAPACITY 40mm x 100ℓ/min. x 15m x 0.75KW x (440V, 3ø, 50Hz)	2
SEPTIC TANK	: CAPACITY $5.5m^3$ DIMENSION 2.46m x 2.16m x 2.3m FRP PREFABRICATED PANEL-TYPE	1
OIL TRAP	: CAPACITY $1.5m^3$ DIMENSION 2.1m x 0.7m x 0.95m CAST-IN-PLACE CONCRETE	2
ELECTRIC WATER HEATER	: STORMING CAPACITY 20 lit. HEATER 1.5KW x (220V, 1ø, 50 Hz)	1
WATER CLOSET	: VITREOUS CHINA, EASTERN-STYLE WITH W/TRAP, HIGH TANK, FLUSHING PIPE, AND OTHER ACCESSORIES	2
WATER BASIN	: WALL HANGING, VITREOUS CHINA, 560m x 457,mm, W-FAUCET 1/2" x 1 WITH PLUG & CHAIN, WITH P-TRAP AND ACCESSORIES	2
SLOP SINK	: WALL HANGING, VITREOUS CHINA, 560mm x 455mm x 635mm, W-FAUCET, WITH WAST & CAST IRON P-TRAP AND ACCESSORIES	1
RESERVOIR TANK	: CAPACITY $20m^3$ DIMENSION 4m x 3m x 2m	1

SPECIFICATIONS FOR ELECTRICAL EQUIPMENTS

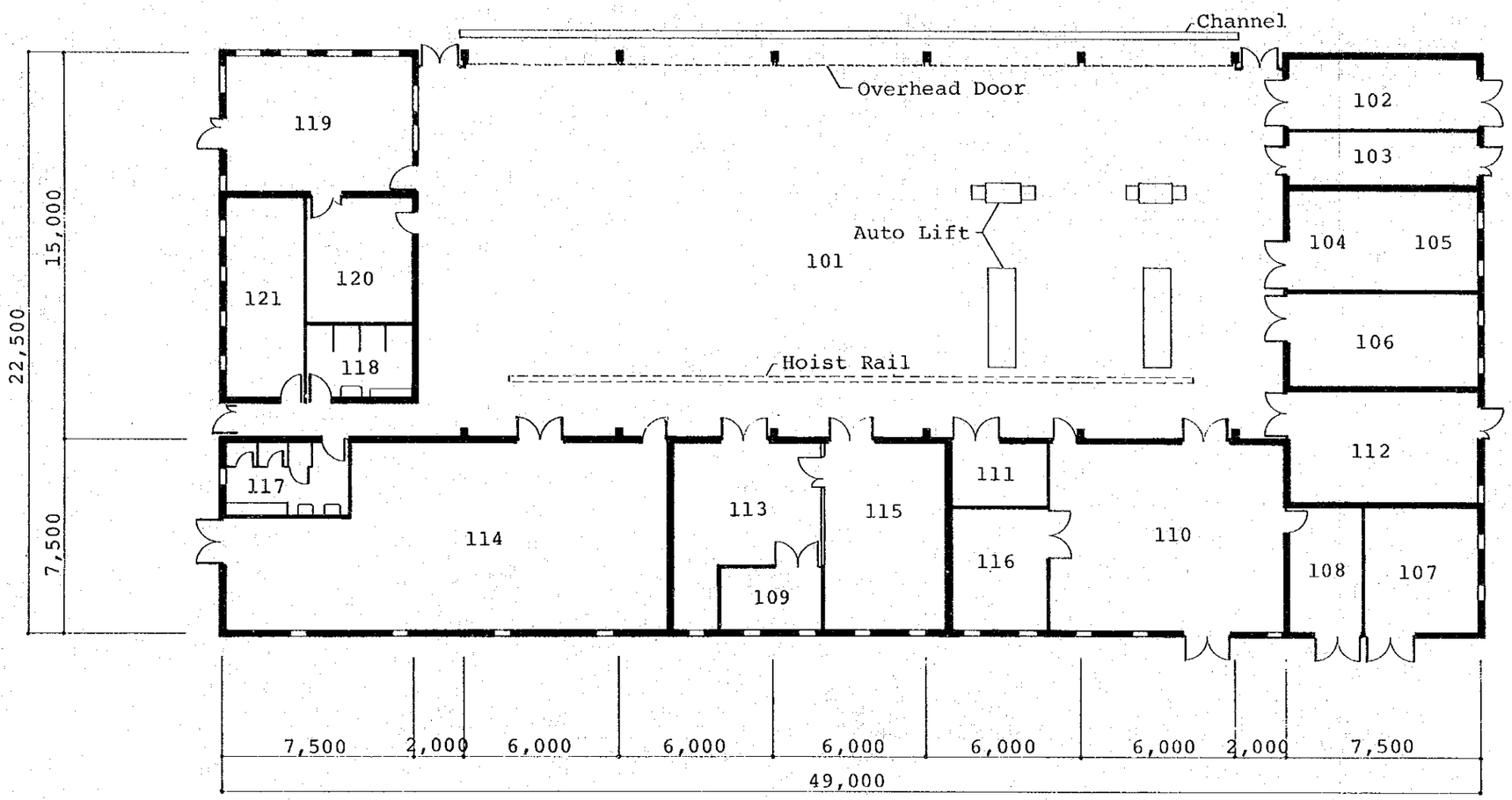
ITEM	SPECIFICATION	Q'ty
RECEIVEING LINE:	11KV, 3ø4W, 50Hz (IF POSSIBLE)	-
TRANSFORMER	: 11KV/440V, 3ø4W, 100KVA (DEPENDING ON RECEIVING LINE)	1
INDUCTION VOLTAGE REGULATOR	: 440V ± 10%, 3ø4W, 100KVA	1
TRANSFORMER	: 220V/127V (IF NECESSARY)	-
FLUORECENT LUMP	: 40W x 2 SURFACE & V-TYPE 300 luxes for ADMINISTRATION AREA	-
DITTO	: 40W x 2 SURFACE WITH REFLECTOR 300 luxes for WORK SHOP AREA	-
DITTO	: 40W x 2 SURFACE WITH REFLECTOR 150 luxes for STORE AREA	-
NATRIUM LUMP	: 400W x 2 Y-TYPE STEEL POLE AND WALL MTD. TYPE 10 luxes for OUT-SIDE	-
DITTO	: 400W x 2 Y-TYPE STEEL POLE AND WALL MTD. TYPE 20 luxes for GASOLINE STAND	-
NATRIUM FLOOD LIGHT	: 1KW x 2 for Illuminating Building	
CONSCENTS	: 1ø220V for all area 3ø440V in accordance with necessity	



SITE PLAN SCALE 1:500

SITE PLAN
SCALE 1:500

MAINTENANCE AREA

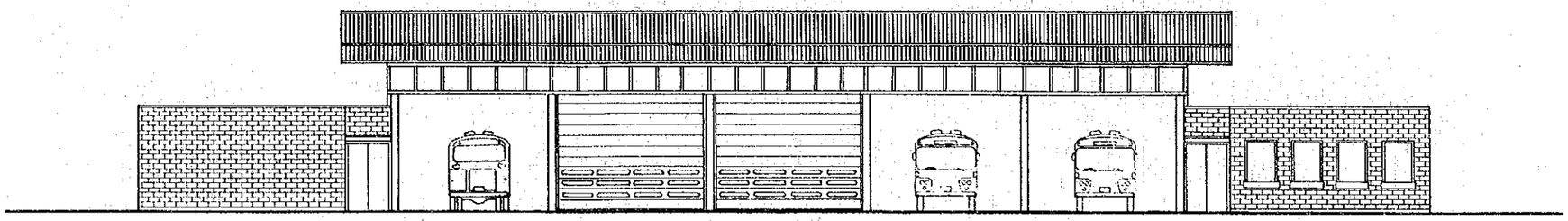


AREA SCHEDULE

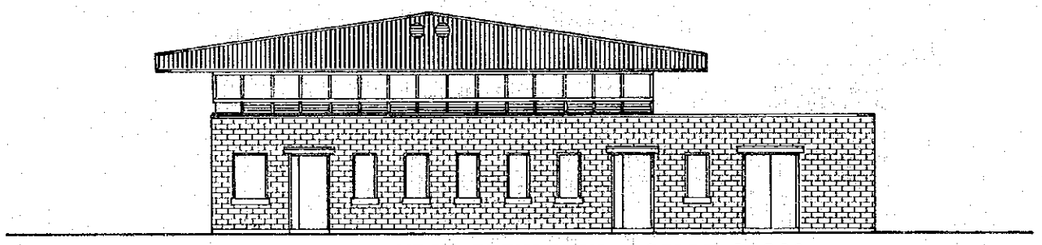
No.	Location	Area m^2
101	MAINTENANCE REPAIRMENT	517
102	TYRE	21
103	PAINTING	17
104	SEAT REPAIR	31
105	SAWING	
106	CARPENTRY	30
107	ELECTRIC ROOM	23
108	COMPRESSOR ROOM	15
109	BATTERY	10
110	MACHINE TOOLS	68
111	TOOLS	10
112	BLACKSMITH and DENTING (Including WELDING)	34
113	ELECTRICITY	36
114	STORE	114
115	CIRCULATED PARTS	38
116	INJECTION	20
117	TOILET	15
118	SHOWER ROOM	12
119	OFFICE	43
120	MEETING ROOM	22
121	BED ROOM	26
TOTAL		1102

PLAN
SCALE 1:200

MAINTENANCE AREA : WORK SHOP



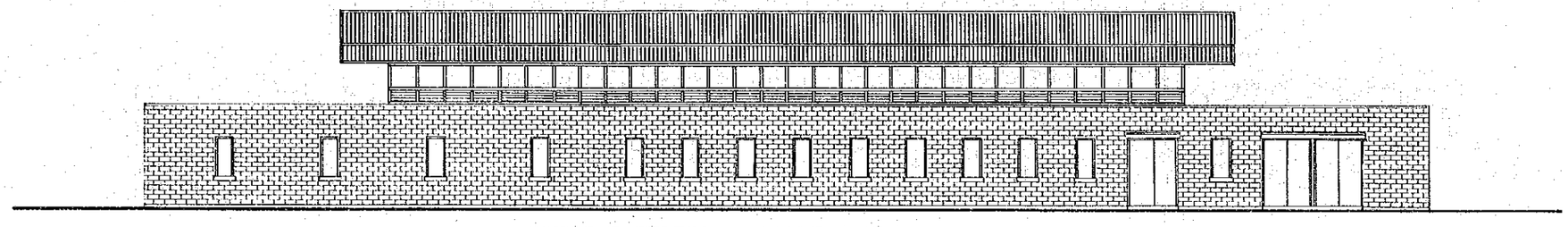
NORTH ELEVATION SCALE 1:200



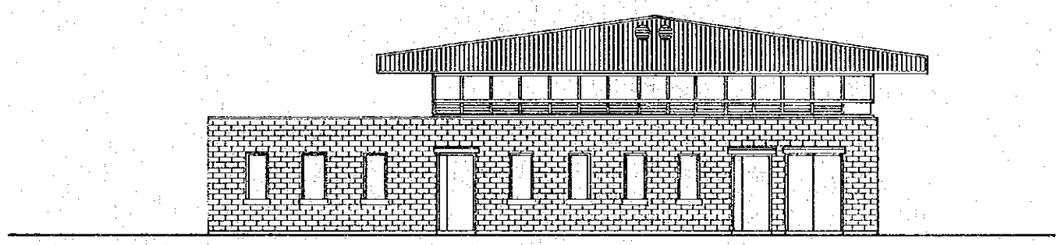
WEST ELEVATION SCALE 1:200

ELEVATION
SCALE 1:200

MAINTENANCE AREA : WORK SHOP



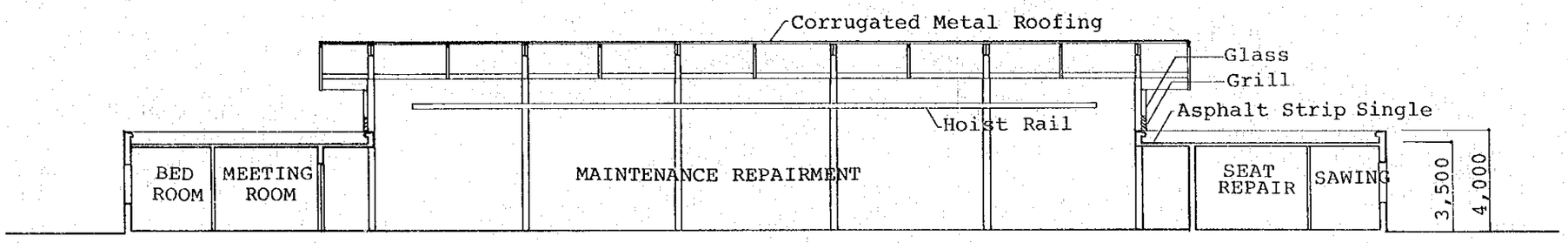
SOUTH ELEVATION SCALE 1:200



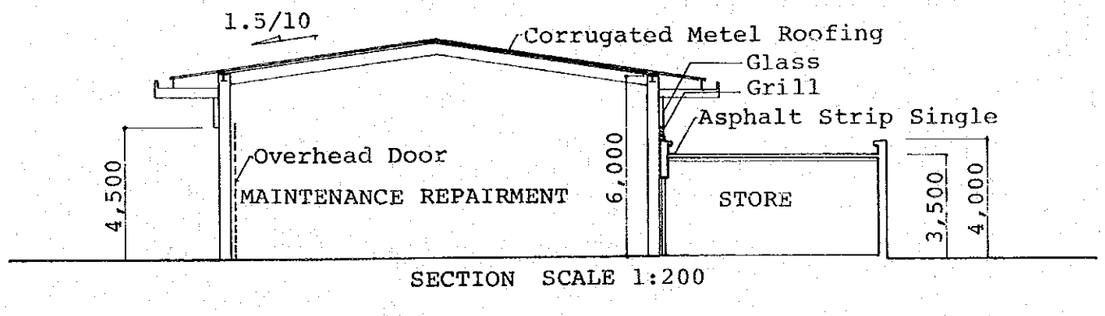
EAST ELEVATION

ELEVATION
SCALE 1:200

MAINTENANCE AREA : WORK SHOP



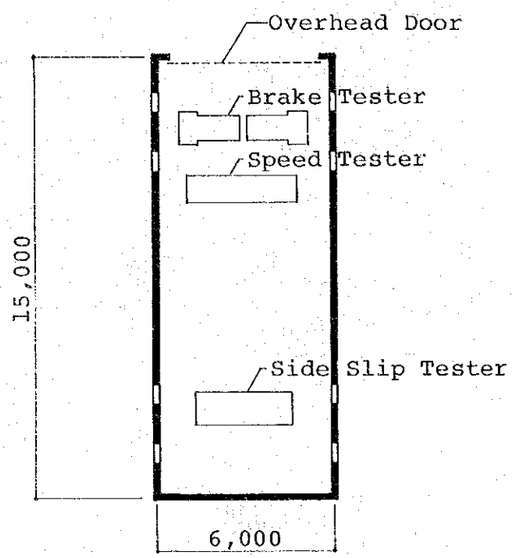
SECTION SCALE 1:200



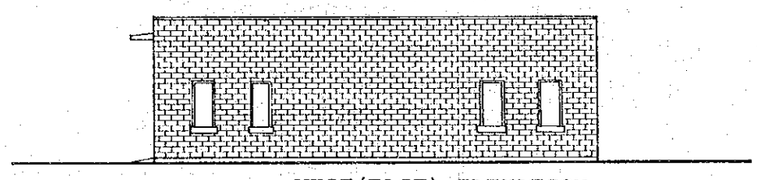
SECTION SCALE 1:200

SECTION
SCALE 1:200

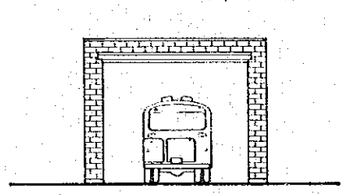
MAINTENANCE AREA : WORK SHOP



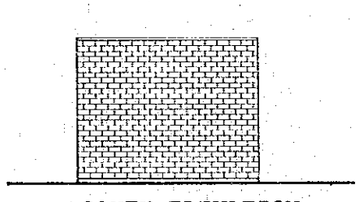
TEST YARD PLAN SCALE 1:200 90m^2



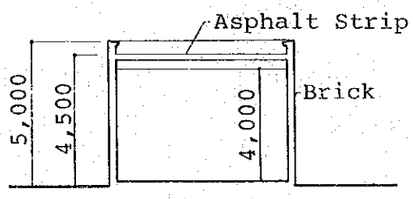
WEST(EAST) ELEVATION



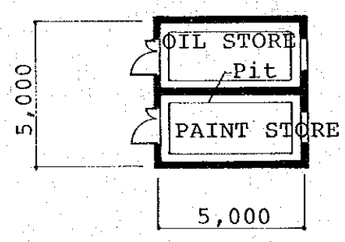
NORTH ELEVATION



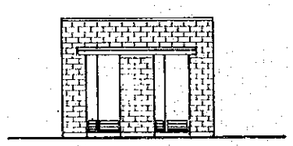
SOUTH ELEVATION



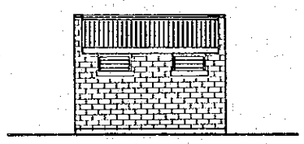
SECTION



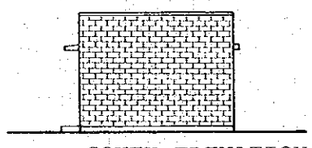
PAINT/OIL STORE PLAN SCALE 1:200 25m^2



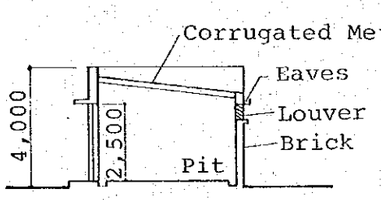
WEST ELEVATION



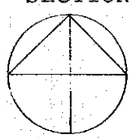
EAST ELEVATION



SOUTH ELEVATION

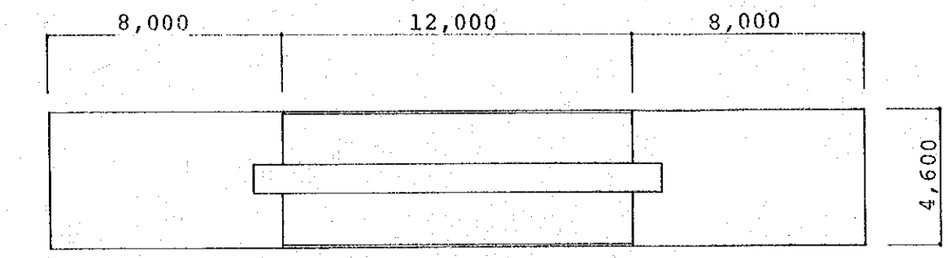


SECTION

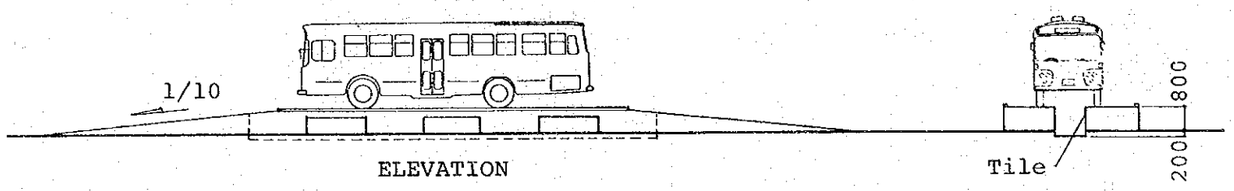


PLAN
ELEVATION
SECTION
SCALE 1:200

MAINTENANCE AREA : TEST YARD . PAINT/OIL STORE

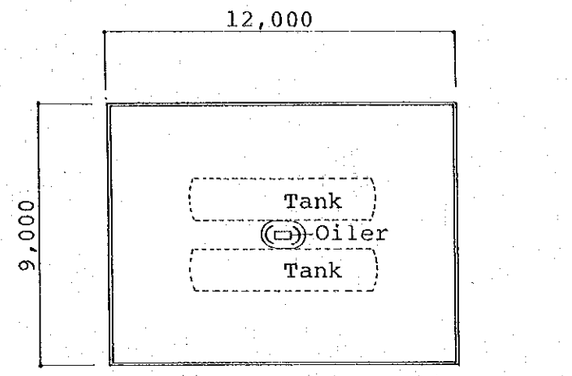


INSPECTION PLAN SCALE 1:200

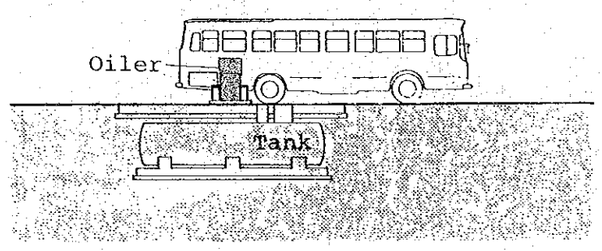


ELEVATION

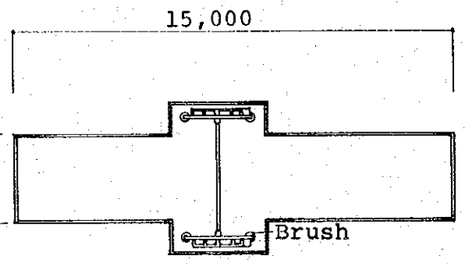
SECTION



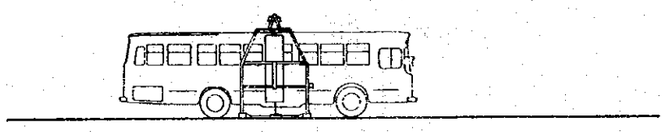
GASOLINE STAND PLAN SCALE 1:200



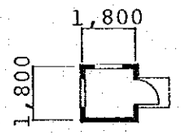
; SECTION



WASHER PLAN SCALE 1:200

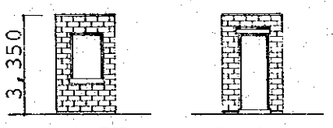


ELEVATION



PLAN

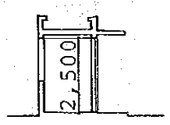
SCALE 1:200



NORTH

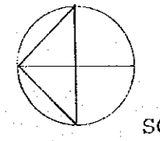
SOUTH

ELEVATION



SECTION

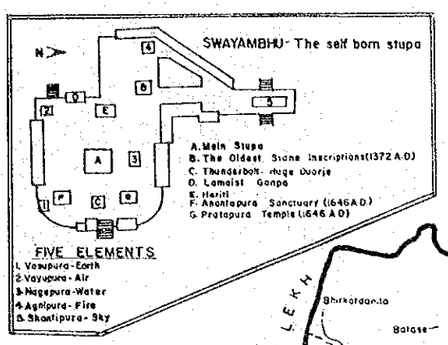
GATE OFFICE



PLAN
ELEVATION
SECTION
SCALE 1:200

MAINTENANCE AREA : EXTERIOR FACILITIES

KATHMANDU VALLEY



LOCATION OF B/T & B/S FOR EACH ROUTES

A ROUTE

RATNA PARK
↓
SHAHIDGATE
↓
DILLIBAZAR
↓
MAITIDEVI
↓
BANESWAR
↓
(2) GAUSALA
↓
JAIBAGESWARI
↓
MITRA PARK
↓
CHABAHIL
↓
CHOOCHEPATI
↓
BOUDHA
↓
(1) JORPATI

(PRESENT:START AT
BHRIKUTI MANDAP)

B ROUTE

RATNA PARK
↓
SHAHIDGATE
↓
SINGHA DURBER
↓
THAPATHALI
↓
KOPUNDOLE ——→ (6) INAR ↓ (5) PATANDHOKA
↓
SHREEMAHAL
↓
PULCHOWK
↓
JAWALAKHEL
↓
MANBHAWAN
↓
KUMARIPATI
↓
(6) LAGANKHEL

(PRESENT:SAJHA ROUTE)

(PRESENT:PRIVATE)

C ROUTE

RATNA PARK
↓
SHAHIDGATE
↓
TRIPURESWAR
↓
NTL TEKU
↓
KALIMATI ——→ SOALTEE HOTEL STOP
↓ ↓
KULESWAR RABIBHAWAN
↓ ↓
T.U. GAET LAMOPATI
↓ ↓
GIRLS HOSTEL KALANKISTHAN
↓ ↓
BORS HOSTEL DHUNGA
↓ ↓
(9) KIRTIPUR ADDA
(T.U. MAIN STOP) ↓
NAIKAP

(PRESENT:N.T.C)

(PRESENT:PRIVATE ROUTE)

D ROUTE

BHRIKUTI MANDAP BUS PARK
↓
SINGHA DURBAR
↓
MAITIGHAR
↓
BANESWAR
↓
TINKUNE
↓
SINA MANGAL
↓
AIR PORT

(PRESENT:MINI BUS ROUTE)

E ROUTE

RATNA PARK
↓
RASTRIYA NACHGHAR
↓
KESHARMAHAL
↓
LAINC HOUR DAIRY
↓
CHETBHAWAN
↓
LAZIMPAT
↓
PANIPOKHARI
↓
MAHARAJGUNT
↓
SHEETALNWAS
↓
DHARA
↓
BRAMHA COTTAGE
↓
THOOL PASAL
↓
SALLAGHARI
↓
BANSBARI

(PRESENT:MINI BUS
PRIVATE ROUTE)

LAINC HOUR DAIRY
↓
ASCAL HOSTEL
↓
SORHAKUTEE
↓
NAYABAJAR
↓
BALAJU INDUSTRIAL GATE
↓
(15) BALAJU
↓
(PRESENT:MINI BUS ROUTE)

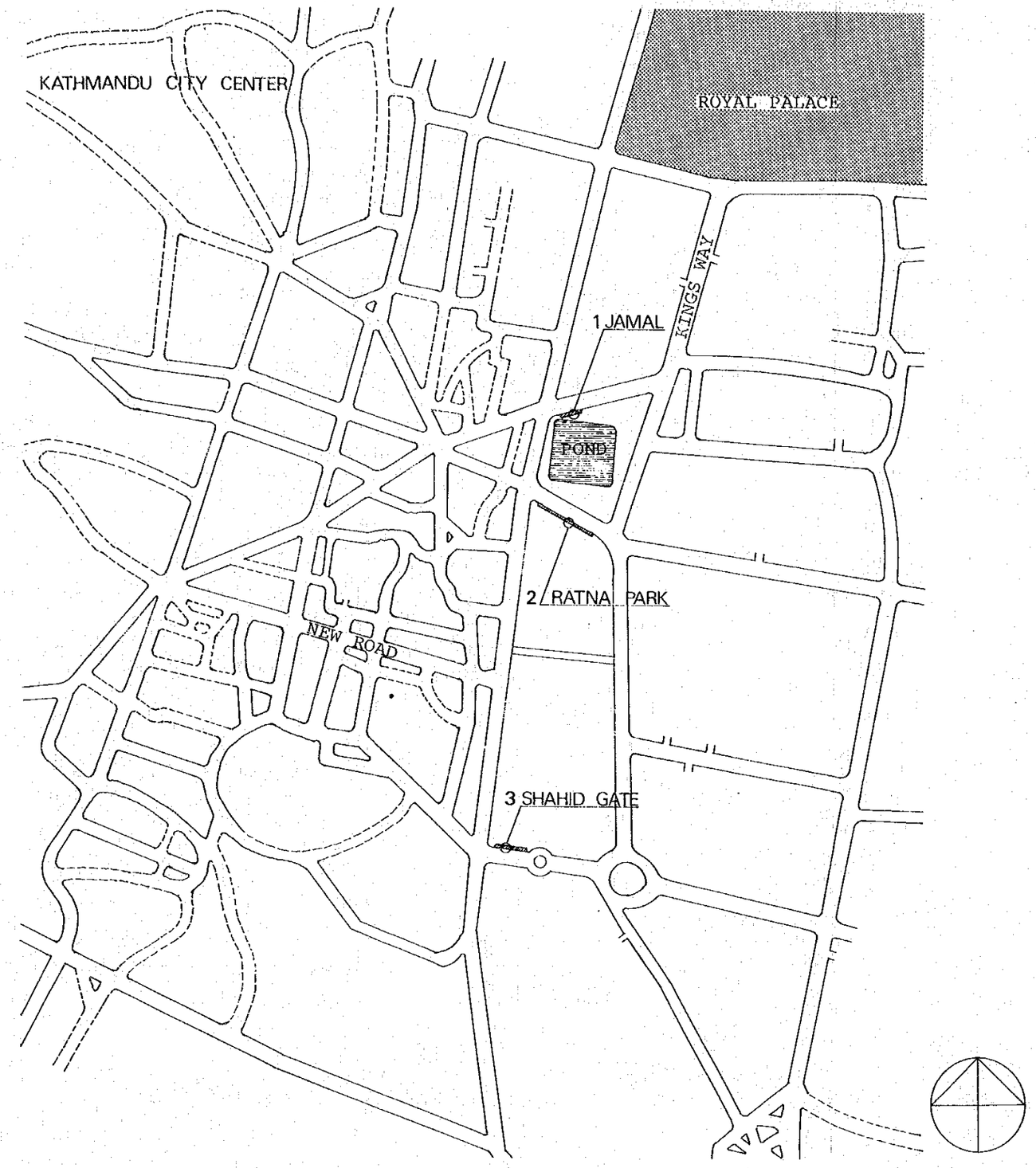
I ROUTE

BALAJU-RING ROAD CROSS POINT
(TENTATIVE)
↓
(UNDETERMINED)
↓
SWAYAMBUNUTH

F ROUTE

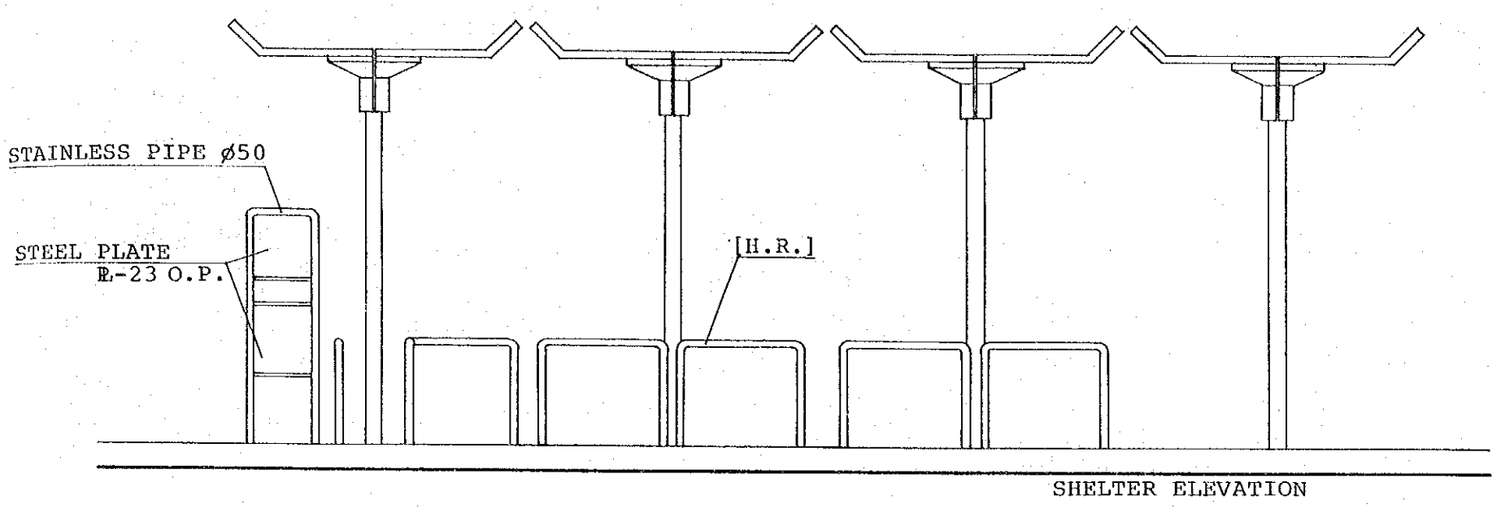
RATNA PARK
↓
JAINEPAL CHITRAGAHR
↓
NAG POKARI
↓
GAIRIDHARA
↓
TANGAL
↓
BHAGBATI BAHAL
↓
KAMAL POKHARI
↓
DILLIBAZAR
(CHARKHAL ADDA)
↓
PUTALI SADAK
↓
SINGHA DURBAR
↓
SHAHIDGATE
↓
RATNA PARK

(MINI BUS ROUTE)

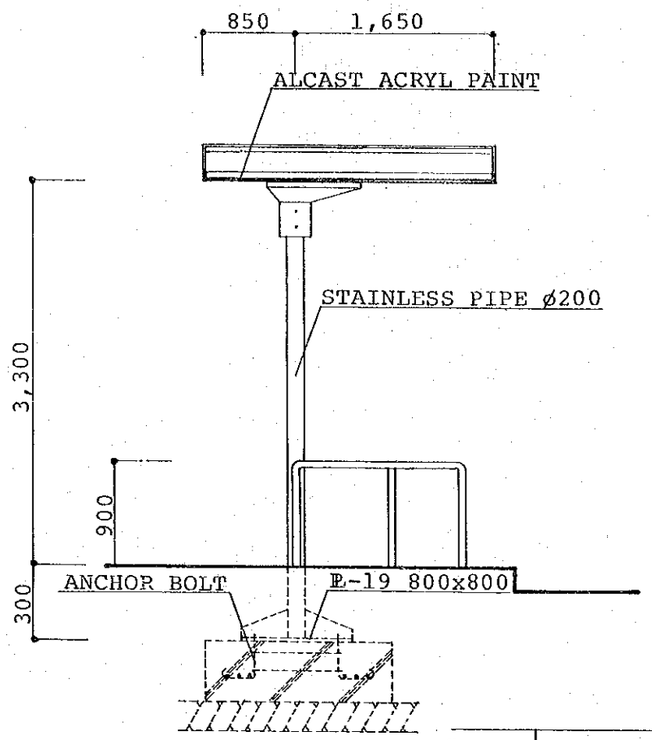


LOCATION OF THREE BUS TERMINALS

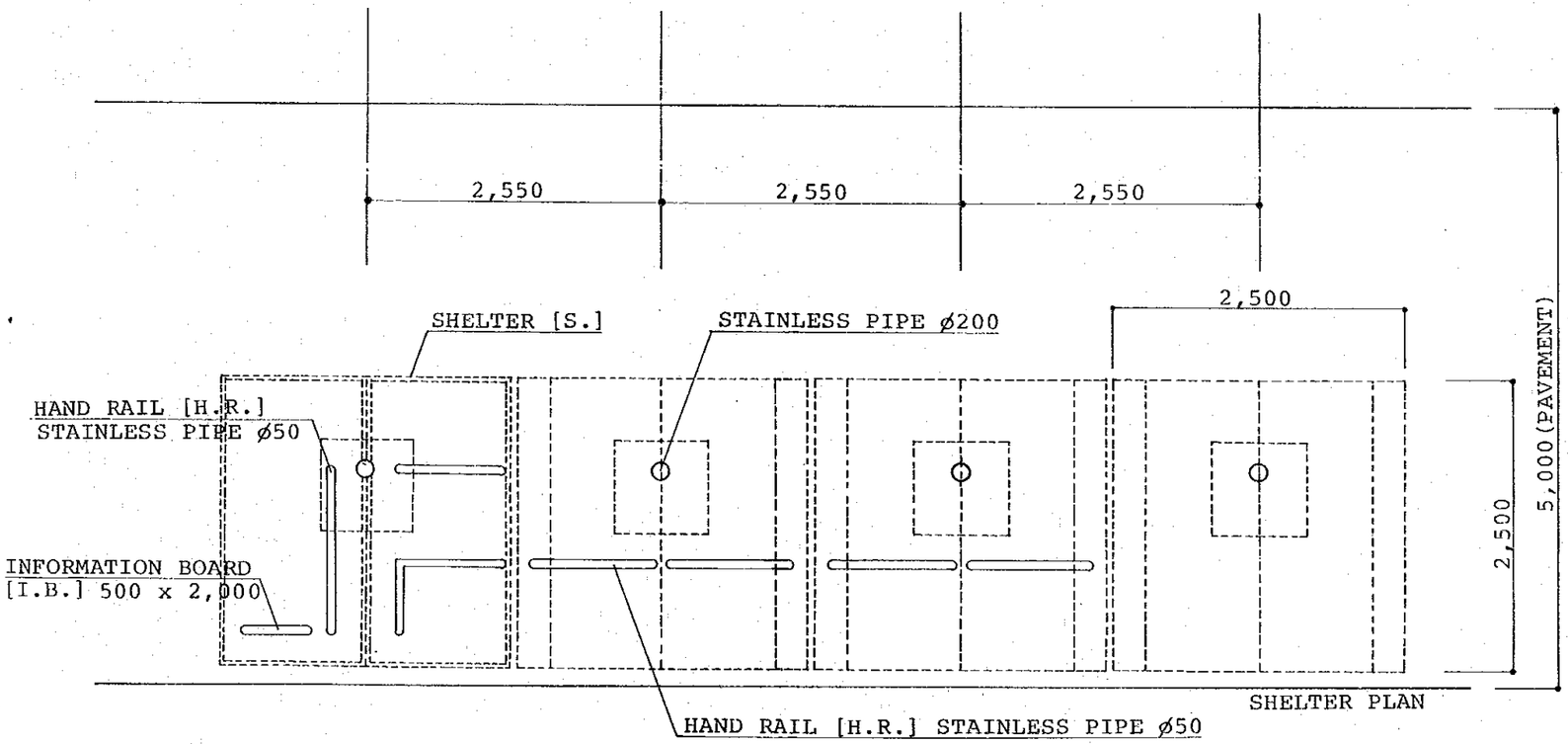
BUS TERMINAL / BUS STOP



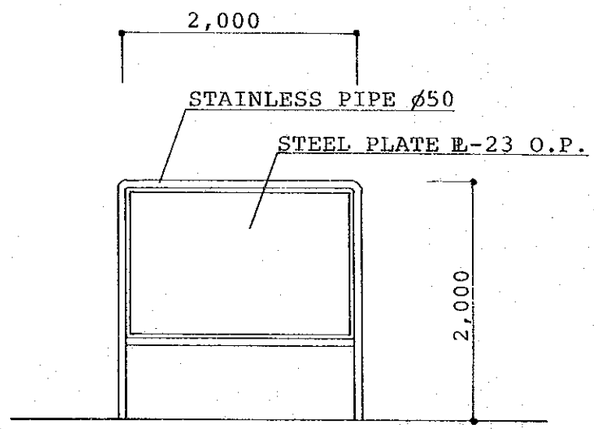
SHELTER ELEVATION



S.	68
G.I.B.	5
I.B.	162
H.R.	20 UNIT

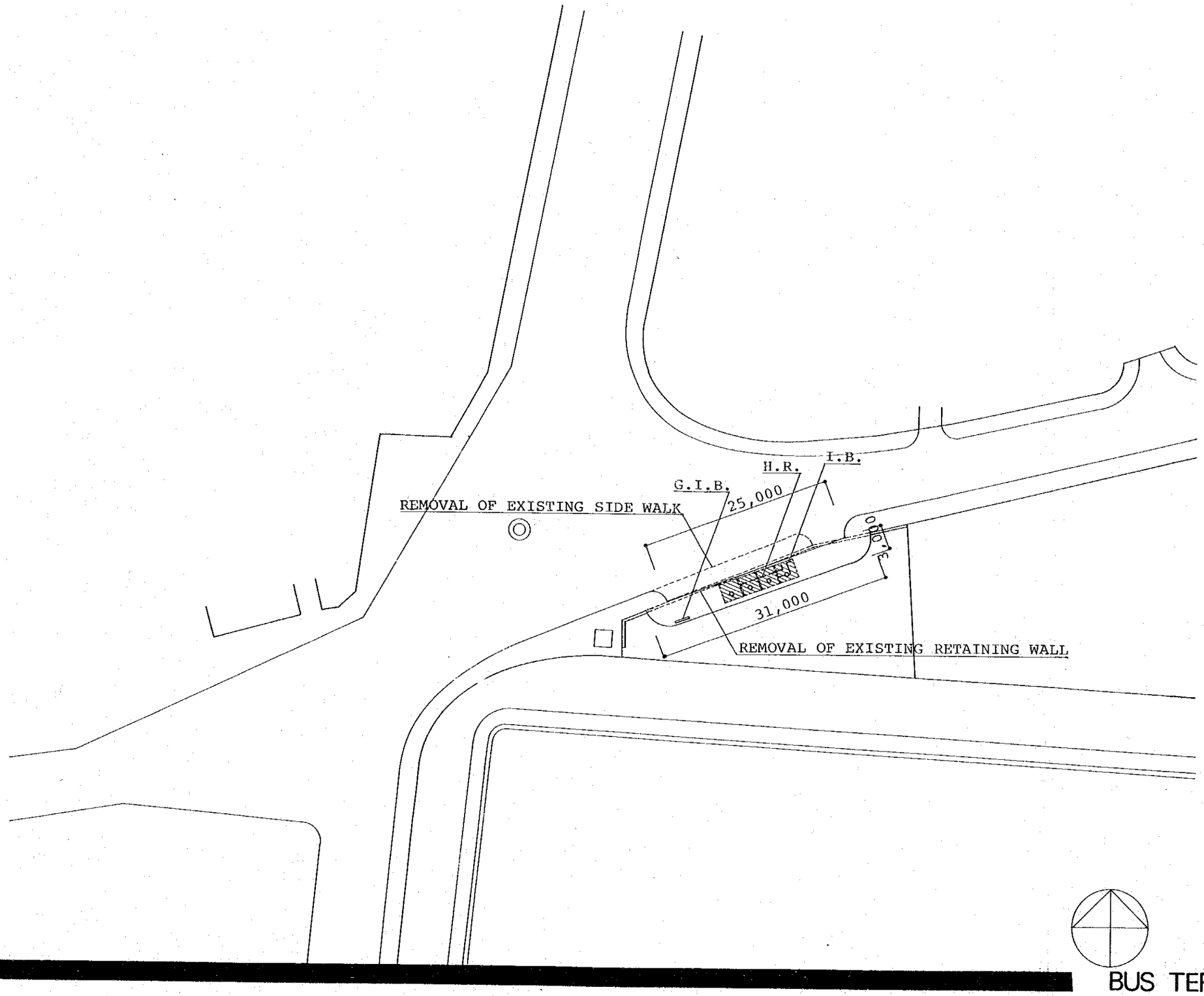


SHELTER PLAN



GENERAL INFORMATION BOARD [G.I.B.]

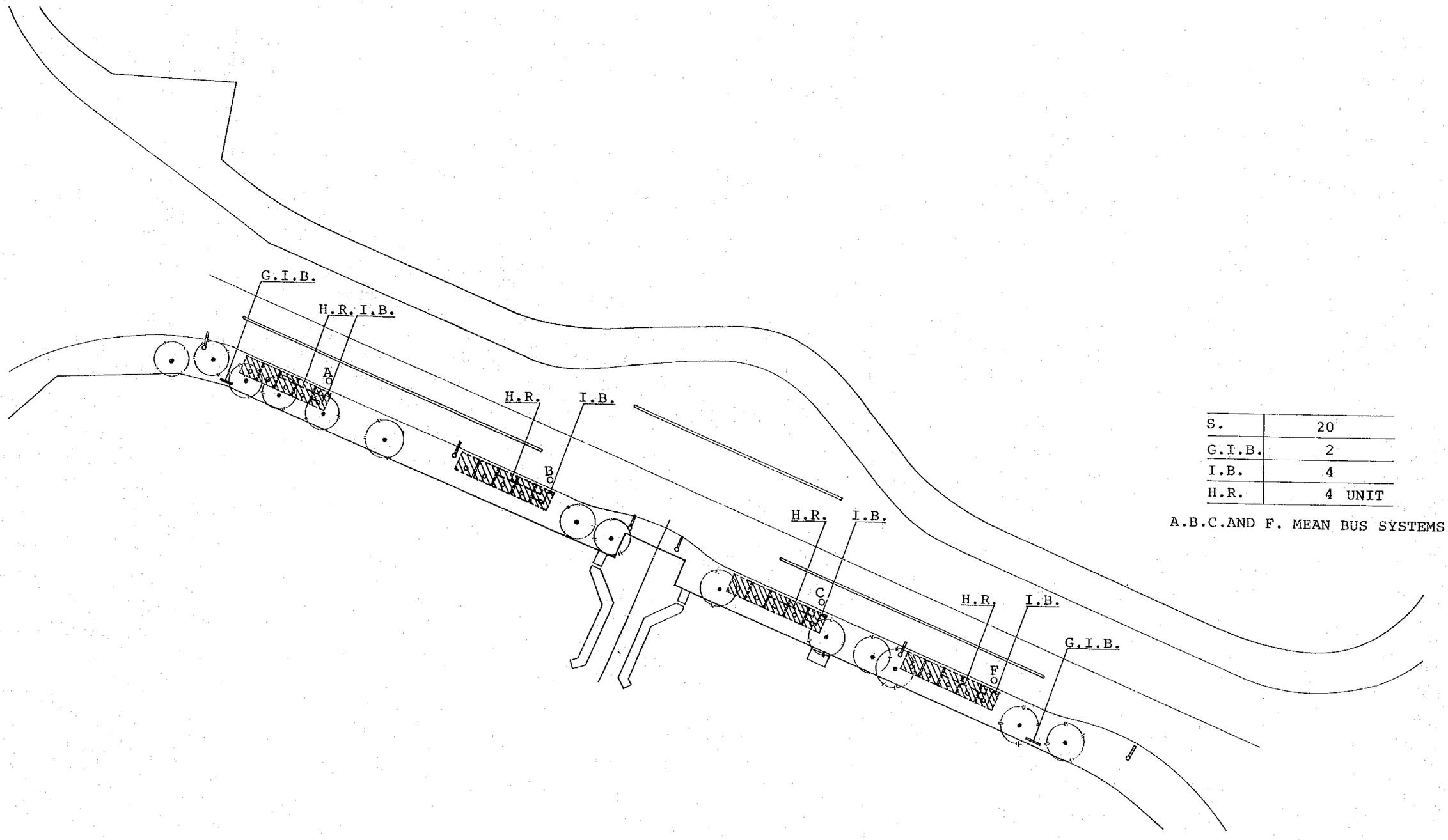
TERMINAL SHELTER
SCALE 1:50



S.	4
G.I.B.	1
I.B.	1
H.R.	1 UNIT

JAMAL TERMINAL SITE PLAN
SCALE 1:500

BUS TERMINAL / BUS STOP

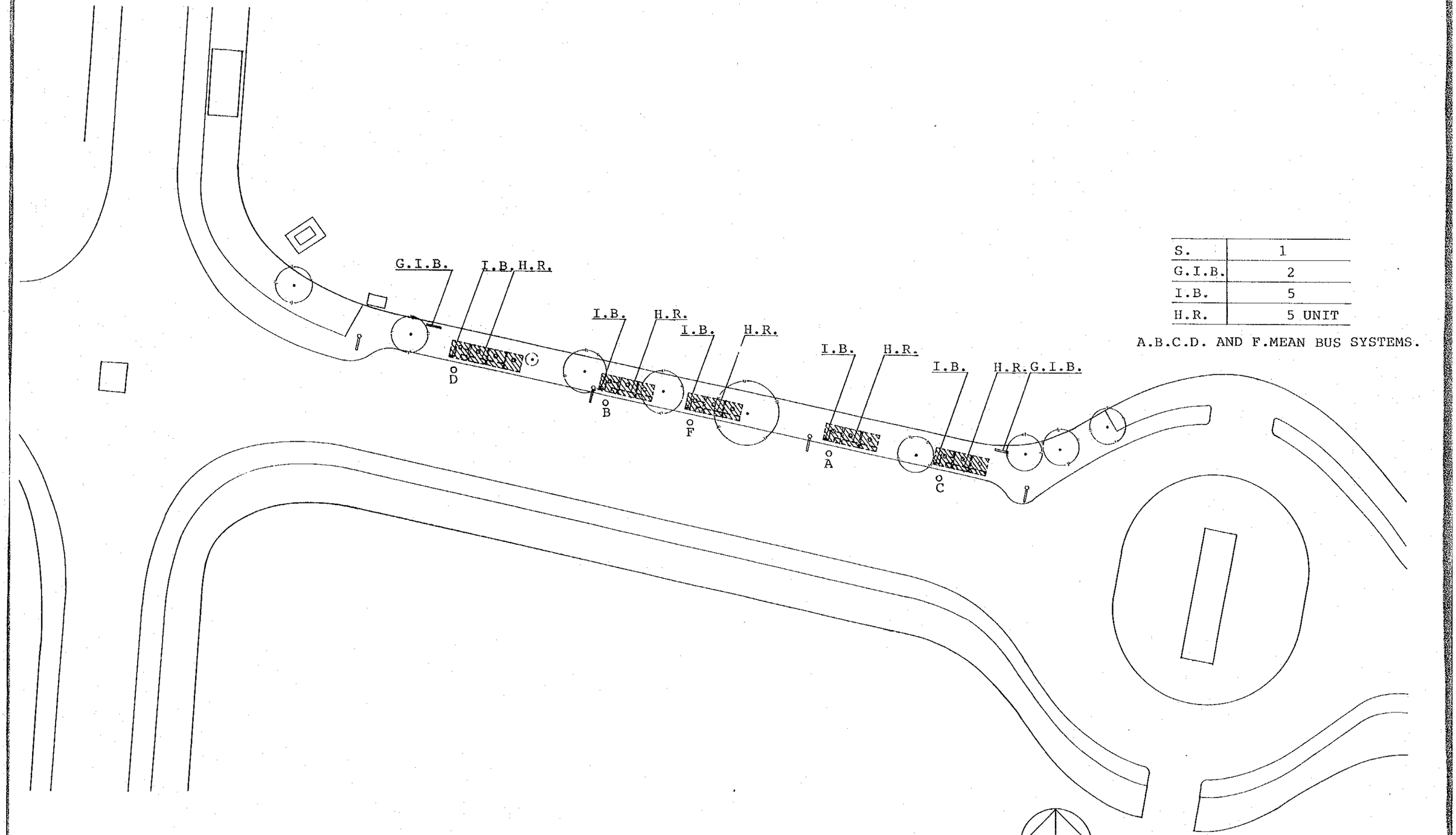


S.	20
G.I.B.	2
I.B.	4
H.R.	4 UNIT

A.B.C.AND F. MEAN BUS SYSTEMS.

RATNA PARK TERMINAL SITE PLAN
SCALE 1:500

BUS TERMINAL / BUS STOP



S.	1
G.I.B.	2
I.B.	5
H.R.	5 UNIT

A.B.C.D. AND F.MEAN BUS SYSTEMS.

SHAHID GATE TERMINAL SITE PLAN
SCALE 1:500