

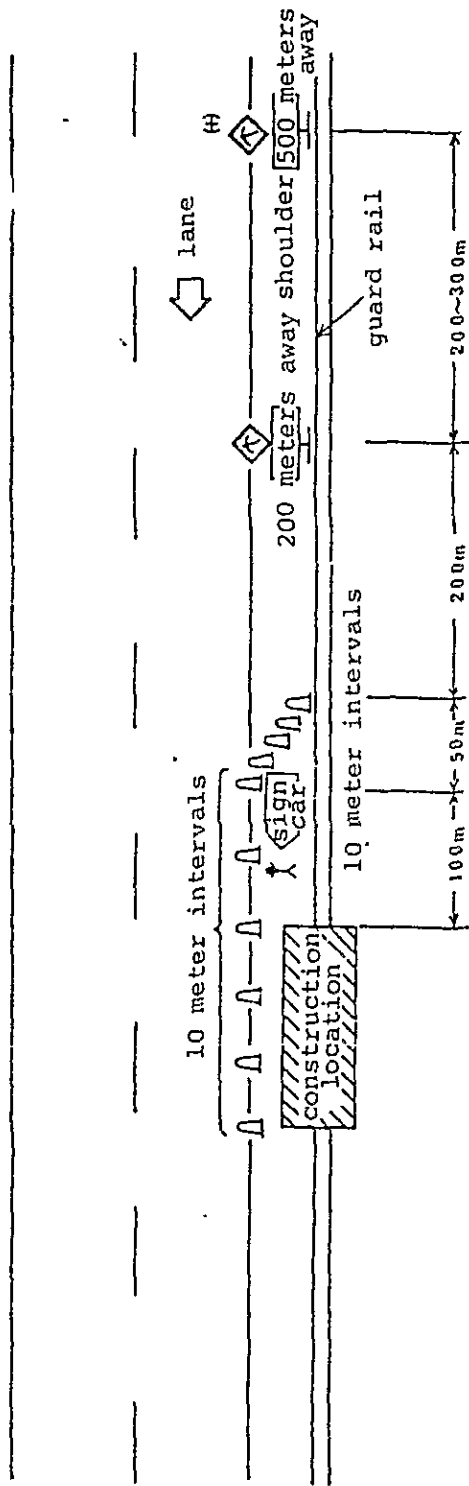
- (2) Where visibility is poor, an additional construction-in-progress sign is to be placed 400 m - 500 meters up the road.
2. Shoulder control (B) (attached Diagram 2)
 - (1) Traffic control of the shoulder (B) is for a two lane road where the width of the shoulder is 1.5 - 2 meters when the working area will take up most of the shoulder and when safety is assured.
 - (2) A guard vehicle is to be located between the traffic directing vehicle and the construction location.
However, if the guard vehicle is equipped with a warning sign, the traffic directing vehicle may be eliminated.
 - (3) The traffic control equipment, etc., is not to extend into the lane more than 40 cm.
 - (4) Where visibility is poor, a construction-in-progress sign is to be located 400 - 500 m up the road.
 3. Control of one lane (attached Diagram 3)
 - (1) Traffic control of one lane is for work being carried out in the road, and when work which may be mainly inside the guard rail is being carried out over a long period.
 - (2) When setting up traffic control of a travelling lane in a 6-lane road, the sign showing construction-in-progress at the median divider may be eliminated.
 - (3) Of the persons on guard, the person giving traffic directions may be replaced with the robot guard (hereinafter referred to as "Safety Taro").
 - (4) If traffic is heavy and in an area with poor visibility, another construction-in-progress sign is to be added, and if necessary, a guard vehicle is to be parked between the traffic directing vehicle and the location of the construction.
 4. Traffic control for work on the median
 - (1) Median traffic control (A) is for work done only on one side of the median guard rail (attached Diagram 4).
 - (2) Median traffic control (B) is for work on a median driver where there is no guard rail or on both sides of the guard

rail or on both sides of the guard rail on the median.

(Attached Diagram 5)

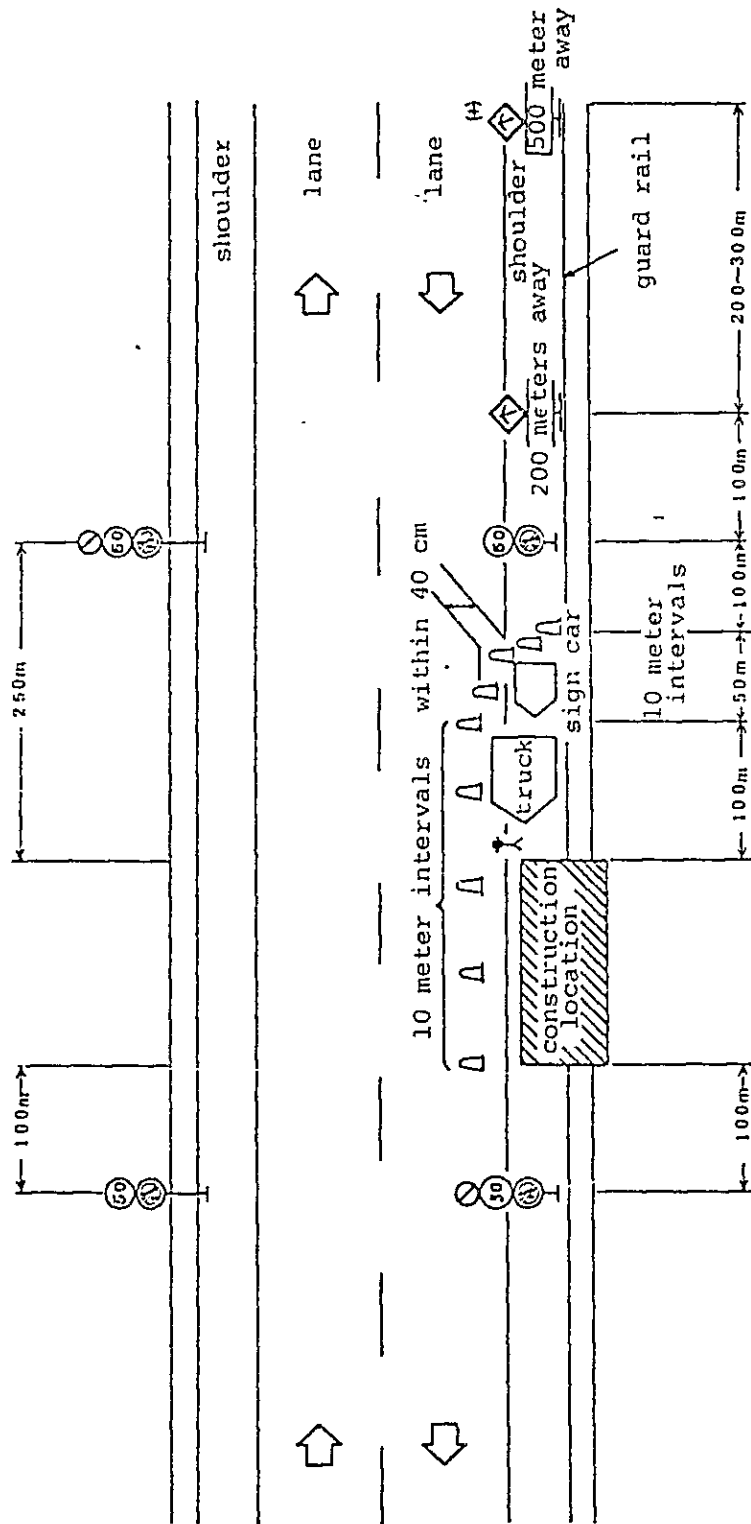
- (3) Of the persons on guard, "safety Taro" may replace the person giving traffic directions.
 - (4) In an area where traffic is heavy and where visibility is poor, an additional construction-in-progress sign is to be added. Also, in case of the necessity of using a guard vehicle, it is to be parked between the traffic directing vehicle and the construction location.
5. Traffic control involving the use of the opposite lane
(attached Diagram 6)
- (1) Traffic control involving the use of the opposite lane is to be used when there are not curve in the road, and for large scale construction.
6. Traffic control during night work
- (1) Traffic control during night work, in addition to the operation methods for daytime is to include the following items.
 - (2) With traffic control of one lane, traffic control in both directions is to include the red flashing light between the arrow sign boards and at the tapering area (wehre the lane narrows) and at the traffic control area.
 - (3) When necessary, traffic control equipment is to be lit at the tapering area by a flood light and a traffic directing vehicle is to be parked on the shoulder where there is construction-in-progress sign 500 meters up the road.

Diagram 1 Shoulder control (A)



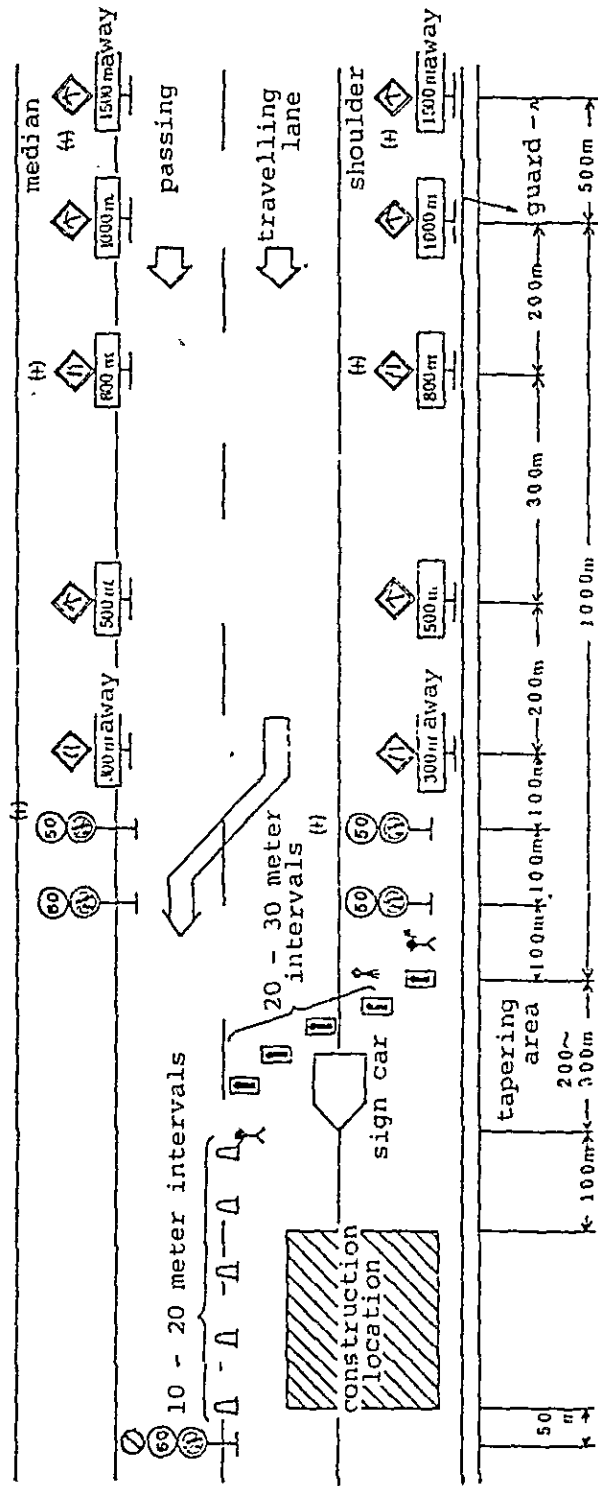
(note:) the sign (+) indicates extras are to be installed if traffic is heavy or visibility poor.

Diagram 2 Shoulder control (B)



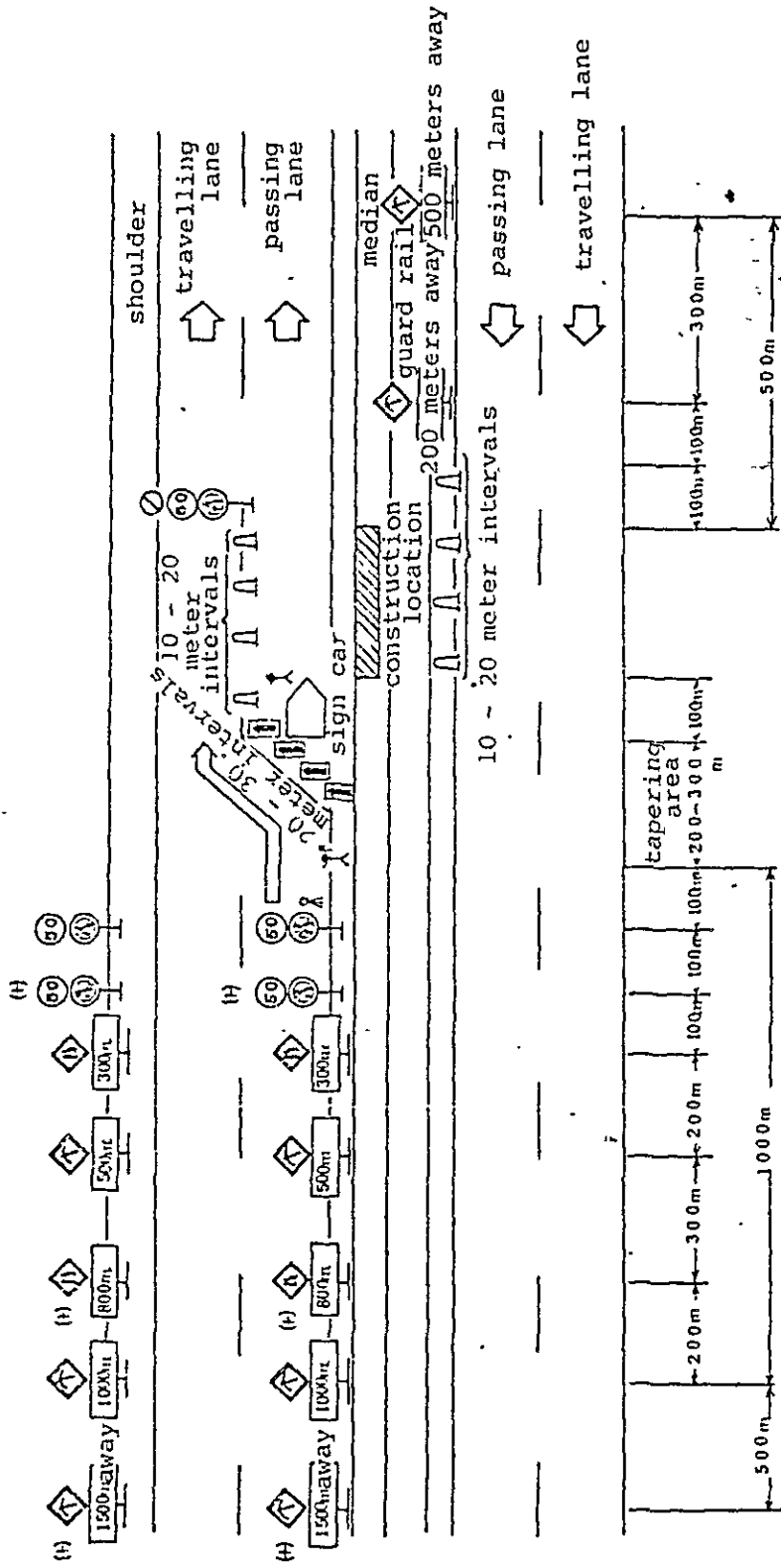
(note:) the sign of (+) indicates extras are to be installed if traffic is heavy or visibility poor.

Diagram 3 Control of one lane



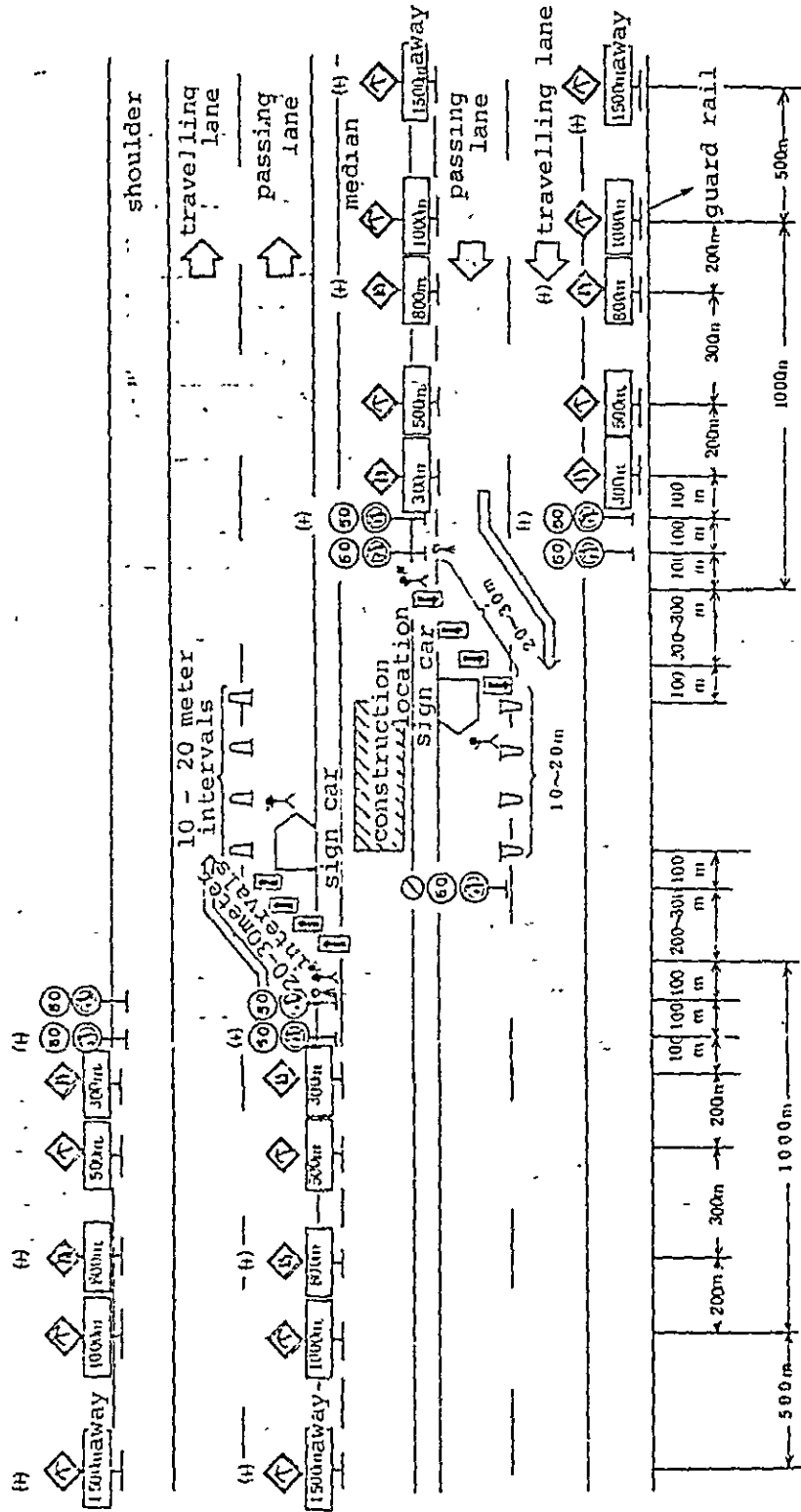
- (Note:)
1. The sign (+) indicates extras are to be installed if traffic is heavy or visibility poor.
 2. Detailed tapering area shown in the attached Diagram.

Diagram 4 Traffic control on the median (A)



(note:) the sign (+) indicates extras are to be installed if traffic is heavy or visibility poor.

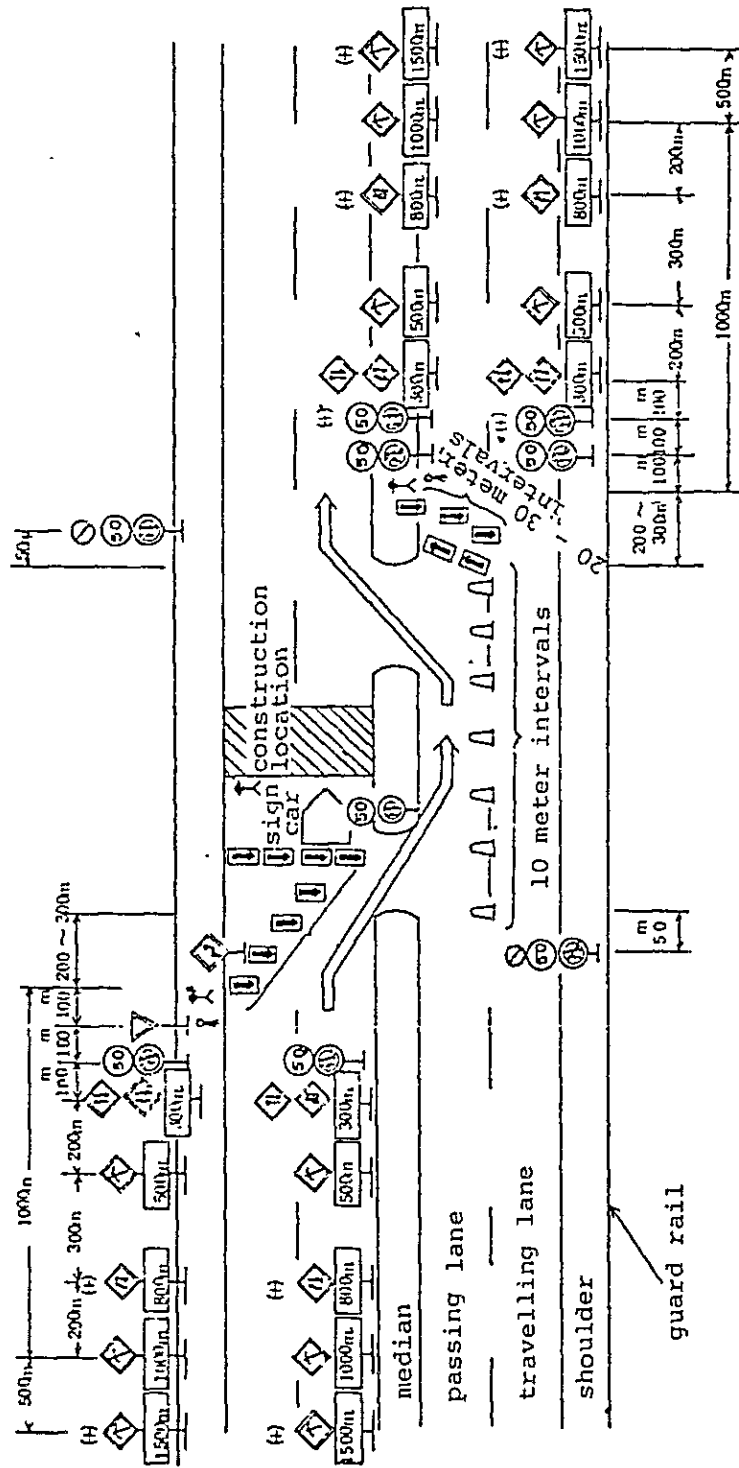
Diagram 5 Traffic control on the median (8)



(note:) 1. the sign (+) indicates extras are to be installed if traffic is heavy or visibility poor.

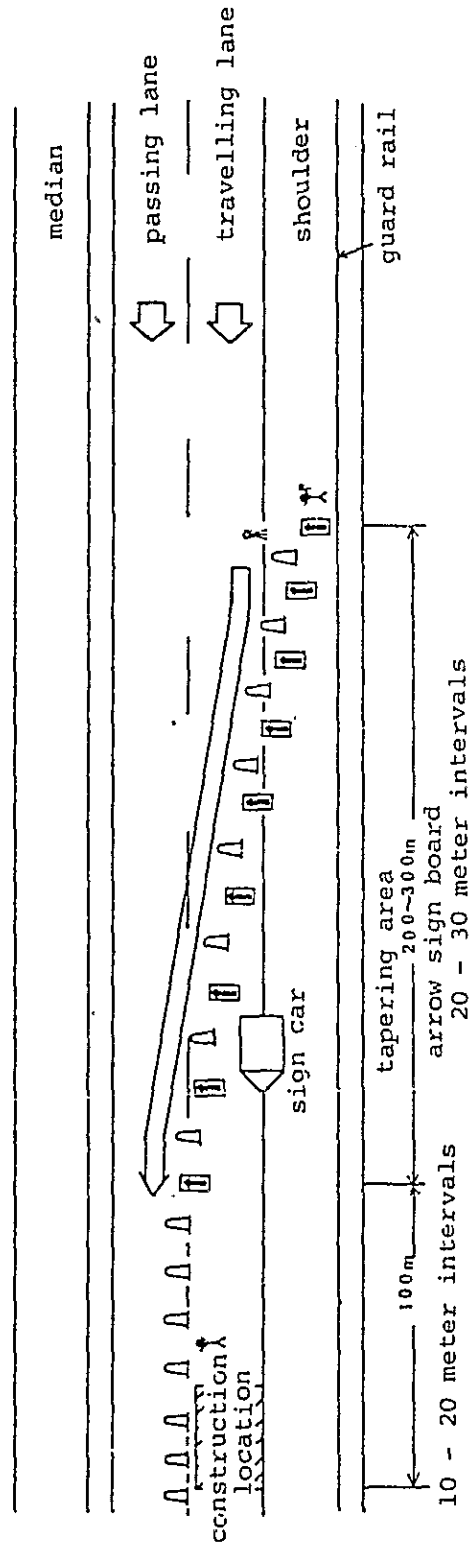
2. Detailed tapering area shown in attached diagram.

Diagram 6 Traffic control involving the use of the opposite lane











- (note:)
1. The sign (+) indicates extras are to be installed if traffic is heavy or visibility poor.
 2. Detailed tapering area shown in the attached diagram

Details of Tapering area



Explanation of Symbols

-  rotating light (flashing even in day time)
-  barricade (includes the arrow sign board)
-  rubber cone
-  rubber cone with attached light (flashing even in daytime)
-  portable rotating light (flashing even in dayment)
-  person on guard (person giving traffic directions)
-  person on guard (person keeping watch within the area)
-  traffic signalling machine

V. Suggestion on organization of ETA.

You kindly presented us your draft plan for organization of the head quarters and that of operation and maintenance office for the first stage expressway as shown in Fig. 1 and Fig. 2. We would like to suggest mainly on the organization of operation and maintenance office that is Central Administration office (the C.A.O.) and toll offices based on your draft plan.

1. General organization chart

We present a general organization chart of the ETA. in Fig. 3

2. Organization of the C.A.O.

(1) Establishment of general affairs division

It is desirable to set up general affairs division in the C.A.O. This division should be divided into two sections; general affairs section and accounting section. The general affairs section shall take charge of general affairs, legal affairs, public relations, and personnel affairs, etc. The accounting section shall take charge of procurement, payment, budget etc. in the C.A.O.

(2) Arrangement of manager of toll office

You should nominate the manager of toll office who superintends the toll collector and toll controller etc. and carry out inspections of toll revenue, public relations, accounting etc. in the toll office.

(3) Toll division in the C.A.O.

Management section and toll administration section in toll division should be combined.

Accounting section should belong to the general affairs division and toll collecting section should be attached to the manager of each toll office.

(4) Traffic control center in the C.A.O.

Toll controller section should be attached to the manager of each toll office.

As for other sections of traffic control center established in your draft plan, your plan is reasonable and we have no recommendation.

(5) Maintenance division

1) Communication section

This section should take charge of maintenance and repair works concerning traffic signals, traffic control devices, C.C.T.V. system, emergency telephone system and radio communication system.

2) Pavement and structure section

It is advisable that name of pavement section in your draft plan change to pavement and structure section.

This section shall take charge of maintenance and repair works concerning traffic signs, marking road cleaning, pavement repairs maintenance patrols to inspect pavement and structures, etc.

3) Structure section

In early stage of the expressway there will be few problems on structures, so works for structures should be absorbed into the pavement section.

4) Traffic Control devices section

It is recommended that works for traffic control devices are undertaken by pavement and structure section, and communication section.

Since such works as signs, markings and signals are insufficient work volume for one section.

5) Lighting section

Name of this section shall be changed to electricity section.

And electricity section shall take charge of maintenance and repair works concerning power supply facility, battery stand-by generators, and other electric devices as well as lighting.

6) Facility section

Name of the section is to be changed to toll machine section.

Traffic control center service shall be undertaken by communication section. Since most of all the service will be associated with communication system and such communication system shall be undertaken by one section, communication section, only maintenance and repair works of toll machine shall be undertaken.

After all, our draft plan for organization of the C.A.O. and a toll office is shown in Fig. 4.

Figure 1.

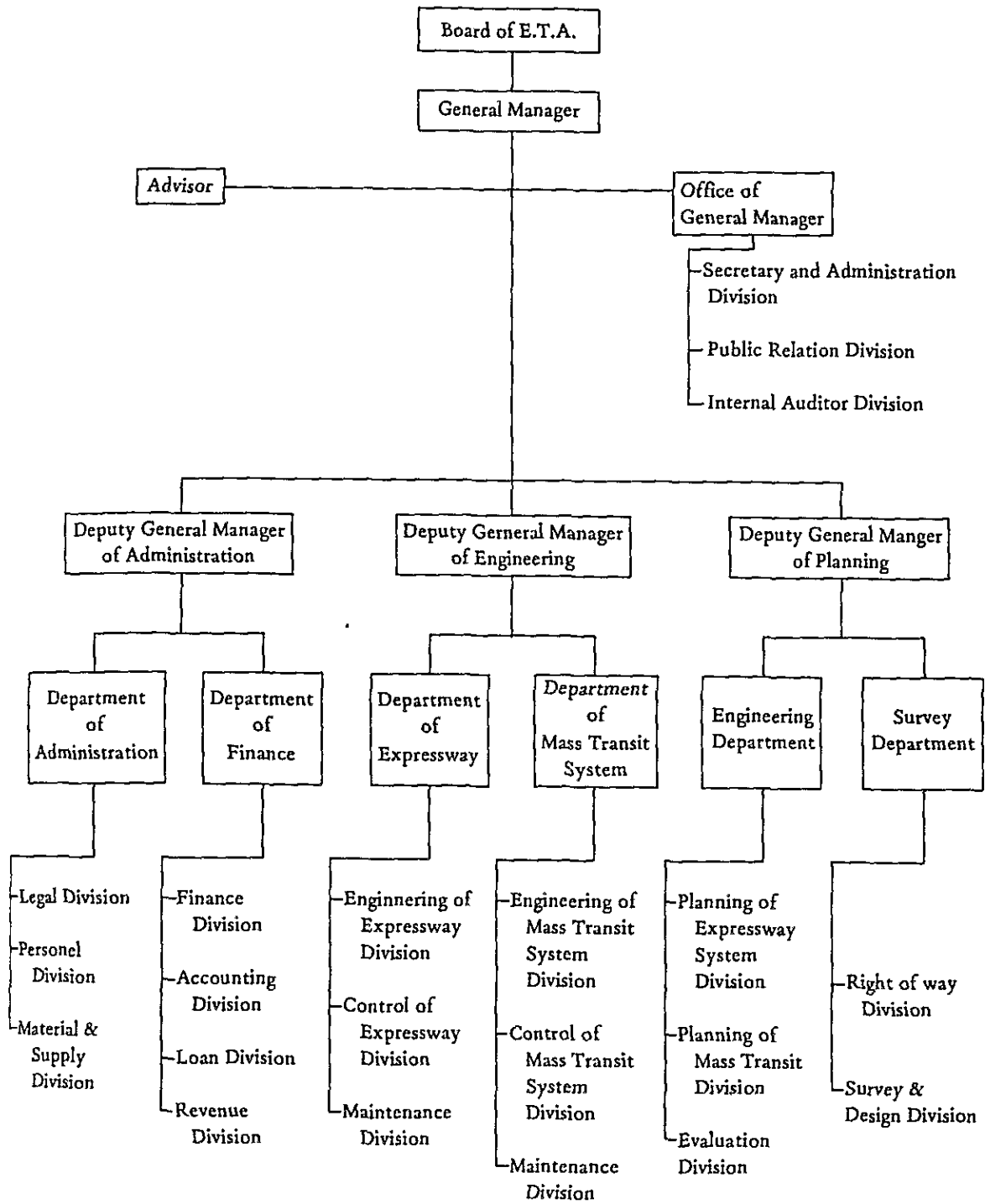


Figure 2.

ORGANIZATION
OF
THE OFFICE OF OPERATION & MAINTENANCE
FOR
THE FIRST STAGE EXPRESSWAY SYSTEM

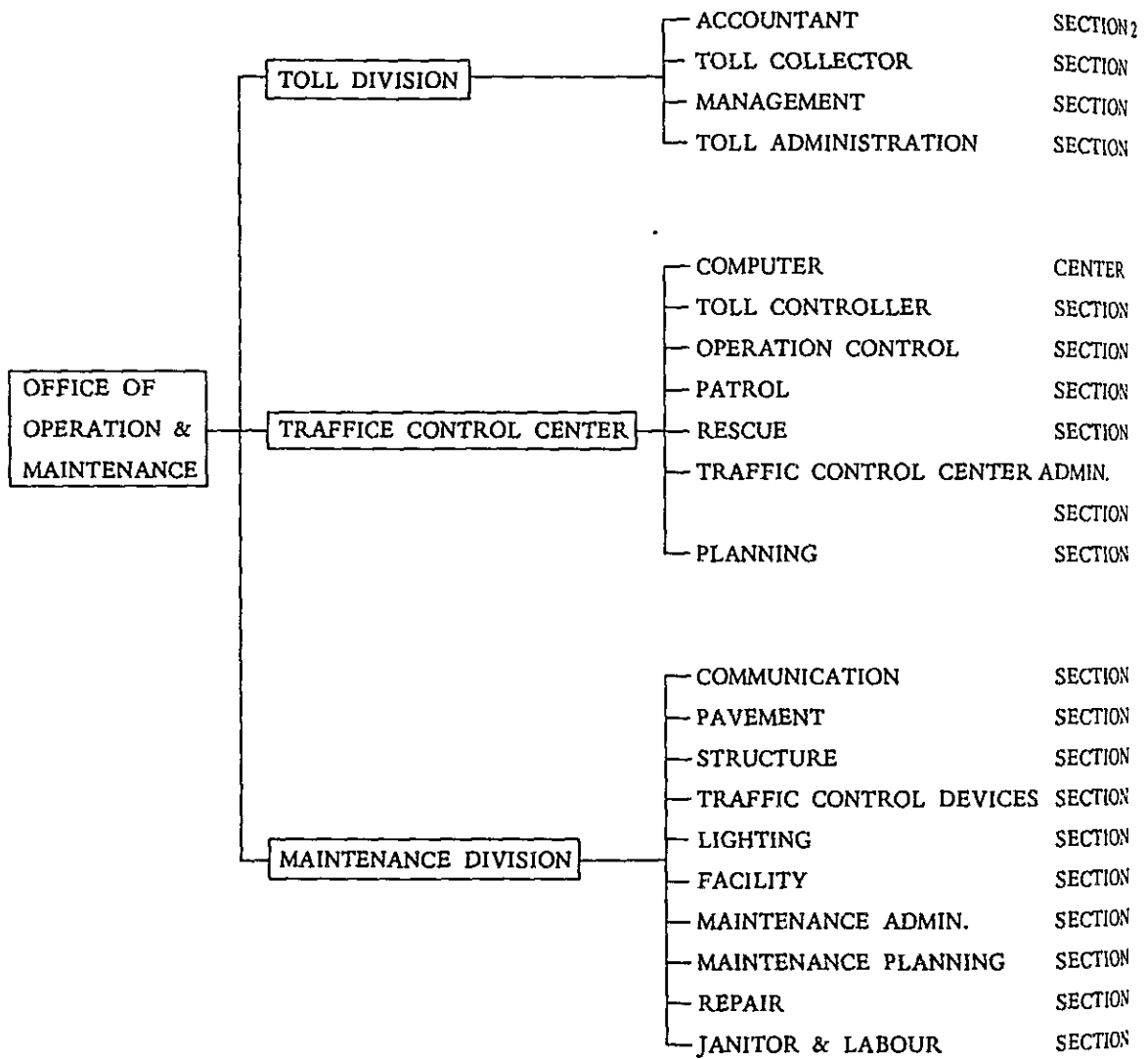


Figure 3. Organization general chart

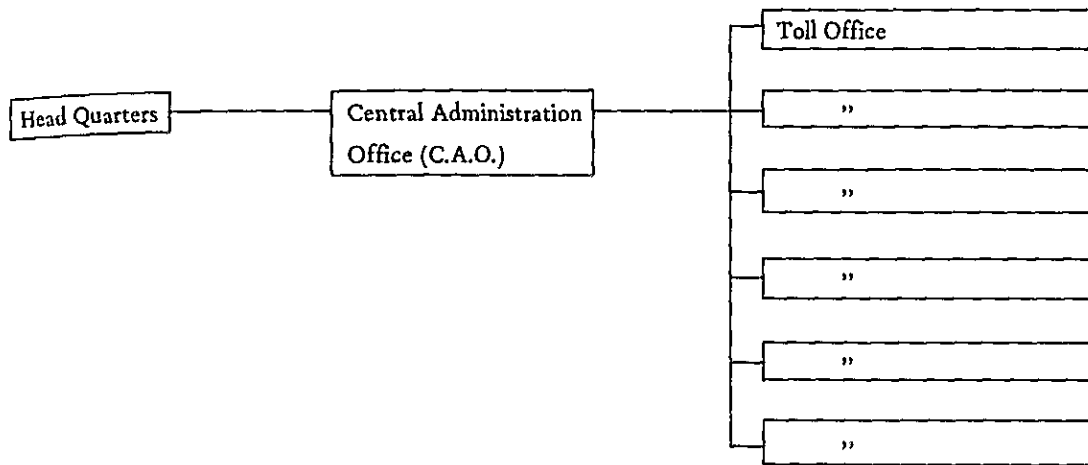
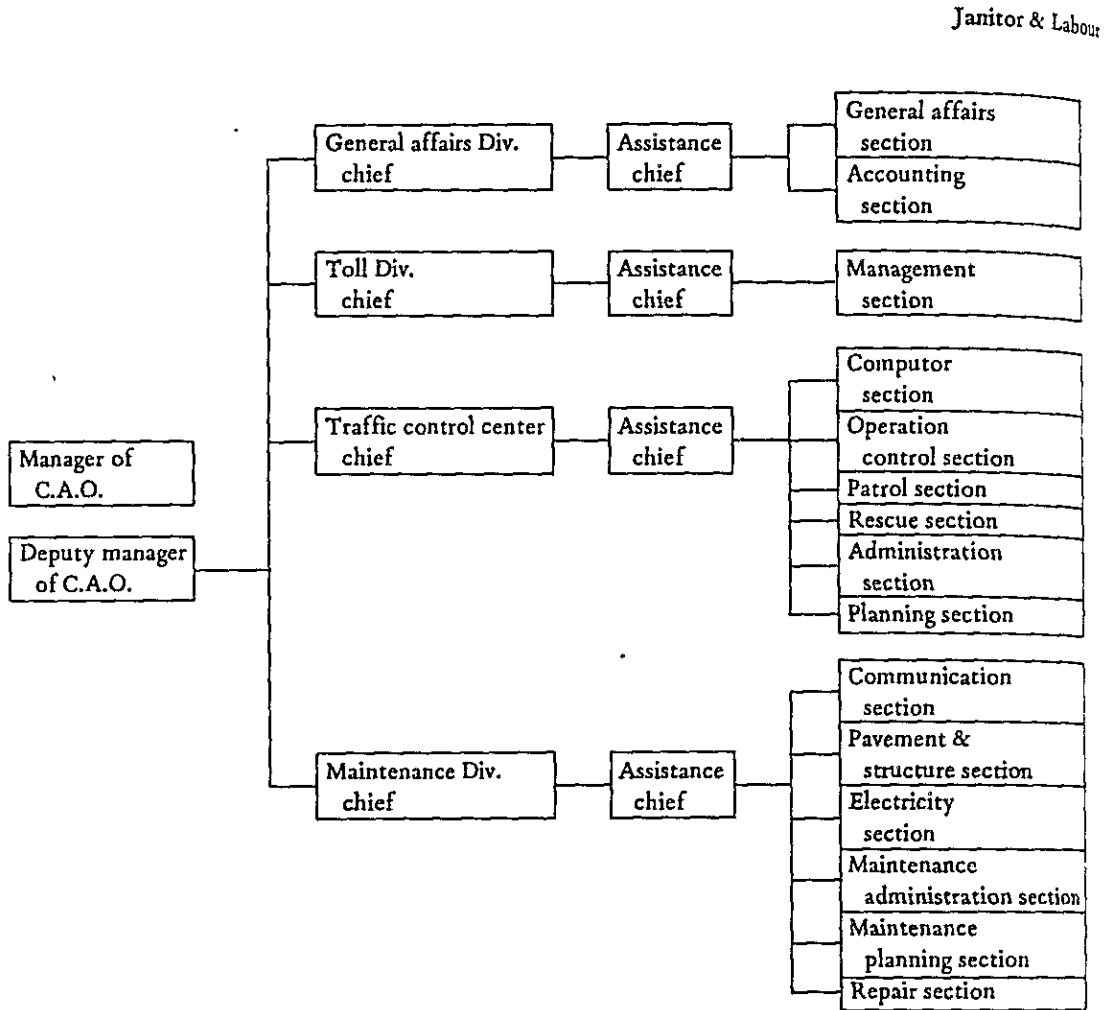
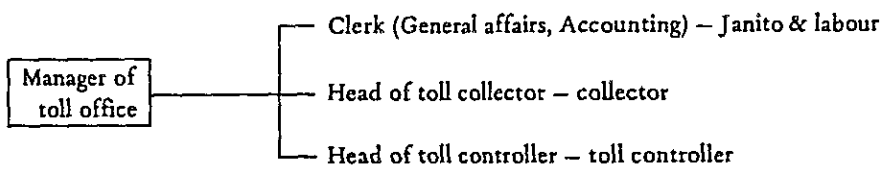


Figure 4. Organization of the C.A.O.



Organization of toll office



VI. Suggestion on accounting of toll revenue

In principle accounting of toll revenue is carried out based on the accounting regulation of ETA. But toll revenue will have to be operated all the time at the actual location, and there are a lot of money involved, so it's necessary to set up the special management system for toll revenue.

Because we have a little information about accounting regulation in ETA., we can't provide a practical comment on the accounting of toll revenue for ETA. However, we wish to introduce an outline of accounting management for toll revenue carried out on Japan Highway Public Corporation (J.H.P.C.) for your information.

(1) Accounting management for ordinary revenue

As a rule, an officer in charge of revenue investigates, preaudits, and settles the amount of revenue to be received, and then submits a bill to a debtor.

(2) Accounting management for toll revenue

Concerning the toll revenue, J.H.P.C. set up a special management rule.

Since, on the toll collection, credit and receipts take place at the same time, ordinary rule cannot be applied to the toll revenue.

For reference we show a manual for management of revenue settlement of toll revenue carried out on J.H.P.C. (Reference VI-1)

(3) Storage of received money

In our corporation one or two special designed safe having a slit for throwing the received money into them are installed in each toll office. In this case, received money is put into the bag, and then thrown into the safe.

We can throw the bag containing the received money into the safe without opening a door of safe, and once it is put into the safe it cannot be taken out unless the door of safe is opened.

You are going to have a strong room in the toll office in order to keep the received money.

We think that it might be good enough to keep the received money, but we would like to recommend the installation of above mentioned special designed safe in each toll office.

(4) Deposit of toll revenue.

It is desirable that toll revenue in the strong room is collected by a clerk of your

bank, except the suspension day of bank business, that is the clerk of bank comes to the toll office by a car and calculate a amount of money to be deposited and take then to the bank.

At that time, manager of toll office or a clerk in charge in the accounting business has to attend the calculation and confirm the amount of money.

You should make an agreement on management of collecting business for received toll revenue with your bank.

(5) Name of an account with bank

In our corporation, toll revenue is at first deposited in an account of manager of administration office or that of manager of toll office, and amount of deposit reach the fix amount, manager of administration office etc. remits money to an account of chief of fund section of finance department of head quarters.

However as you are planning to set up an revenue division, besides, the number of toll offices is limited, we believe it is better that toll revenue of each toll office be directly deposited in the account of chief of revenue division.

(6) Audit of toll revenue

Audit of toll revenue should be carried out frequently, so in our corporation management department which carries out the management of toll collecting business set up the inspection manual for toll collecting business. (Inspection manual for toll collecting business is shown in the comment on toll collecting business.)

And officers belonging to organization such as the management department, management division of operation bureaus and operation offices are carrying out the inspection.

Of course auditing office carries out the audit once or twice a year.

We would like to recommend that you should establish the inspection system cahrged by the controlling of expressway system diviison etc.

Manual for mangement of revenue settlement of toll revenue

(Purpose)

Article 1. This manual is to provide a way of management of revenue settlement concerning toll revenue and to promote a rationalization of revenue settling busienss concerning toll revenue.

(Definition of words)

Articel 2. Definition of words used in this manual is as followings:

- (1) C.A.O means Central Administration Center on expressway.
- (2) Toll office means toll office belonging to the C.A.O.
- (3) amount of received money means total amount of toll revenue actually received for cash and sold coupon ticket revenue on the toll office.
- (4) day of unable to deposit menas sunday, national holiday and supsention day of bank business.
- (5) slips of receiving means slips of receiving prescribed under article 14 of manual for toll collecting business.
- (6) slips of payment menas the slips of payment prescribed under article 14 of manual for toll collecting business.

(Revenue settlement)

Articel 3. Manager of C.A.O. and manager of toll office have to confirm the amount of received money, and and deposit them in a bank.

- ②. Manager of C.A.O. and manager of toll office have to settle the revenue based on the deposited amount.
- ③. In this case, a term of calculation should be set from hour of last time deposit to hour of this time deposit.
- ④. In the first day of toll collecting business the deposited amount prescribed in preceding clause is to be an amount pf money which is calculated by deducting an amount of prepared money for change from an amount of actually received money.

(Prepared money for change)

Article 4. In the first day of toll collecting business the manager of toll office has to receive

an advance payment from the manager of C.A.O. and use then for prepared money for change.

②. The manager of the toll office has to repay the advanced payment to the manager of C.A.O. when received money in toll office amount to the advanced payment, and he has to use the received money for the prepared money for change.

(Way of revenue settlement)

Article 5. The manager of C.A.O. and manager of toll office has to confirm the amount of received money filled in summary of slips of receiving (attached Form 1) which is made out based on the slips of receiving and actually received money, then he has to make out a slip of revenue settlement (attached Form 2) based on the summary of slips of receiveing.

But, for an amount of received money on unable to deposit day, it is possible that he confirm then with an amount of received money on next day, and make out the slip of revenue settlement on the date of the next day.

Form-1

Summary of slip of receiving

| | |
|----------------------------|---|
| Manager of the toll office | Name of the officer making and this table |
| | |

No. _____

D. mo yr.

name of toll station

| hr. – hr. | name of collector | amount (Rs) |
|-----------|-------------------|------------------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| hr. – hr. | total | |

| |
|--|
| Chief of the general administration div. |
| |

Slip of revenue settlement

| | |
|----------------------------|---|
| Manager of the toll office | Name of the officer making out this voucher |
| | |

d. mo. yr.

Name of toll office _____

Name of bank

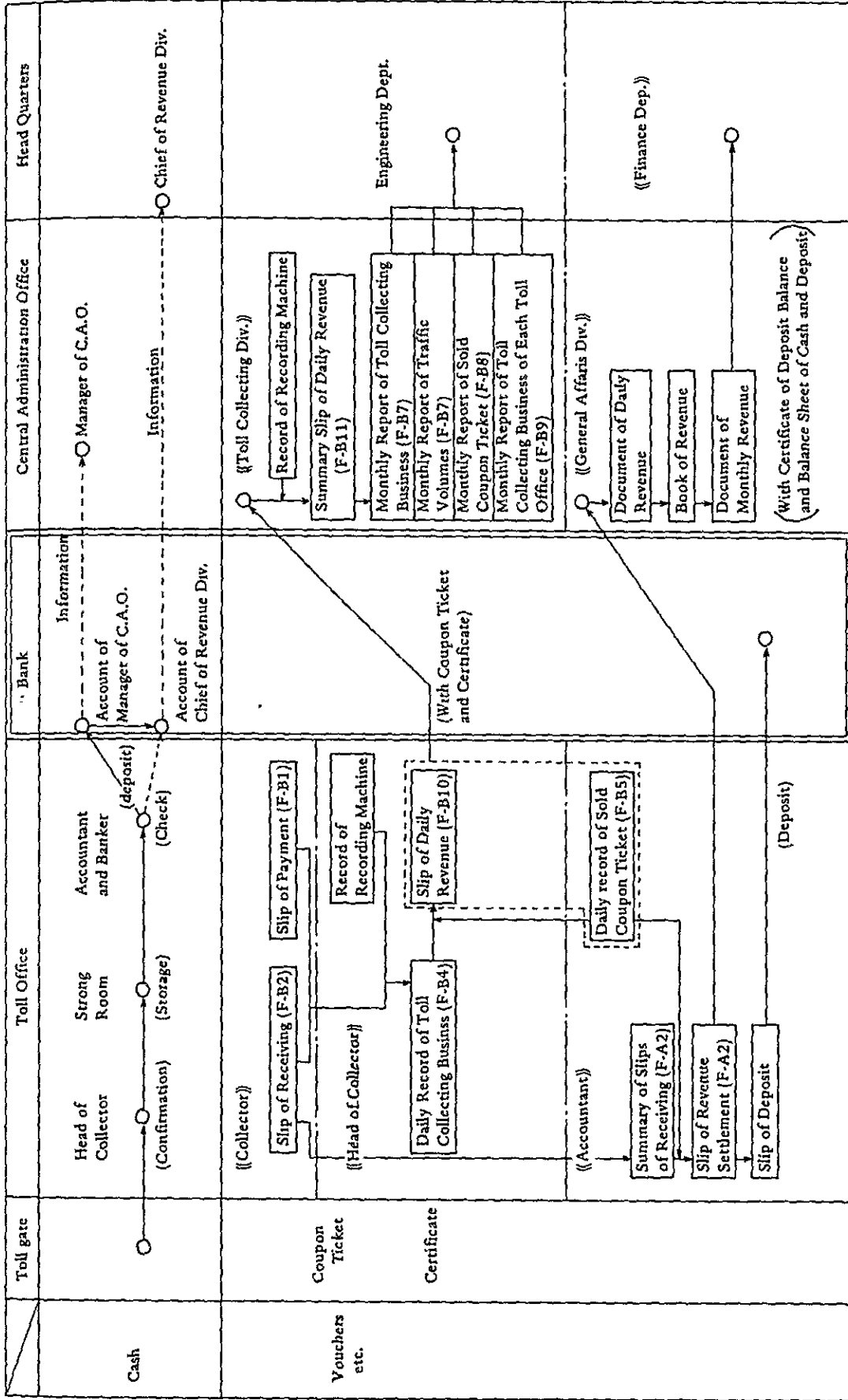
Amount of today's deposit ₪

1. Amount of prepared money for change bringing from yesterday _____ ₪ -
2. Received toll money

| Classification | An. adjustment number | d. mo. yr. | From hr. to hr. | Amount ₪ |
|--|-----------------------|------------|-----------------|----------|
| 1 The amount of actually received toll revenue | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total | | | | |
| 2 The amount of sold commutation ticked | | | | |
| | | | | |
| 3 Amount of received toll revenue from the unable to pay passer-by | | | | |
| Grand total | | | | |

3. Reduction of toll revenue paid ₪
4. Amount of prepared money for change bringing to tomorrow ₪
5. Amount of today's toll revenue (1 + 2 - 3 - 4) ₪

Flow Chart of Toll Collecting Business



VII. Suggestion on training of personnel

The expressway to be opened to traffic in 1981 is the first toll expressway in Thailand. According to our experience, it can be said that traffic operation and maintenance of an expressway is more difficult operation, maintenance should be kept.

Therefore, it is necessary that ETA should carry out training for its officials and other staff in order to set up satisfactory system for managing the expressway.

(1) Outline of training program

Training program is broken down into two categories; training in foreign countries for officials, and training locally for other staff.

(2) Training officials in foreign countries.

It is advised that the training be performed as the following.

- i. As for the foreign countries, the U.S.A, the G.B, West Germany, France or Japan is suitable for the training. As far as training for toll collecting is concerned, the G.B. and West Germany are inappropriate because they have few toll expressways.
- ii. Terms of training will be necessary at least two weeks for each training course.

Table 1 shows training program for the head quarter's staff.

Table 2 shows training program for the central Administration's staff.

(3) Training for staff in charge of practical works as toll collectors, toll controllers, traffic control center's staff, traffic patrol units, rescue units, road cleaning and maintenance patrolmen should be trained on the Job-site.

Table 3 shows training program for crews.

Program

Table 1. Training for the Headquarter's Staff

| Trained members | Subjects of training |
|--------------------------------------|--|
| Top management of ETA | <ul style="list-style-type: none"> - Present situations on toll road systems. - Financing problems of toll roads. |
| Senior staff of Engineering Division | <ul style="list-style-type: none"> - Maintenance & repairing system of expressways. - Traffic operation system of expressways. - Toll collecting system of expressways. |
| Senior staff of controlling section | <ul style="list-style-type: none"> - Actual conditions of traffic operation works in foreign countries. - Actual conditions of toll collecting service in foreign countries. - Manuals for toll collecting service and traffic operation. - Auditing system for toll collecting. |
| Senior staff of maintenance section | <ul style="list-style-type: none"> - Maintenance Standard, manual for maintenance & repairing works. - Actual conditions of maintenance & repairing works performed in foreign expressways. |
| Senior staff of land utilization | <ul style="list-style-type: none"> - Actual conditions of utilization of right of way & its problems; law concerned the utilization. |

Program

Table 2. Training for the Central Administration Office's Staff

| Trained members | Subjects of training |
|-------------------------------|--|
| Top management of the C.A.O. | <ul style="list-style-type: none"> - Actual conditions of management of operation & maintenance offices in foreign countries. - Work responsibility and cooperation with traffic police, fire brigade. - Public relations, training program for toll collectors. - Personnel management of toll collectors |
| Senior staff of the C.A.O. | <ul style="list-style-type: none"> - Actual conditions of toll collecting service in foreign countries - Auditing system for received money - Plan of distribution of toll collectors. - Manual of training for toll collectors. |
| | <ul style="list-style-type: none"> - Actual conditions of traffic operation works in foreign expressways. - Actual conditions of traffic patrolling, first aid service, and traffic control, treatment of accidents on roadway. |
| Senior engineer of the C.A.O. | <ul style="list-style-type: none"> - Actual conditions of maintenance & repair works in foreign expressways. - Method for maintenance & repairing |
| Staff of the C.A.O. | <ul style="list-style-type: none"> - Actual conditions of traffic operation. - Manual for traffic controlling, Manual for traffic control and treatment of accidents on roadway. |
| | <ul style="list-style-type: none"> - Standards for maintenance. - Manual for maintenance & repairing works on roadway. |
| | <ul style="list-style-type: none"> - Maintenance standards for toll collecting devices. - Actual conditions of maintenance for toll collecting devices in foreign countries. |

Program

Table 3. Training for crews

| Trained crew | Subjects of training | Places of training | Term |
|------------------------|--|--|---------------------|
| Toll collectors | <ul style="list-style-type: none"> - operatin of toll machine - Classification of cheicle type - Writing out of toll collecting slips - Courteous manner to users | Toll gates Toll gates or ordinary roads Toll office Toll office | two weeks |
| Toll controller | <ul style="list-style-type: none"> - Classification of vehicle types - Operation of supervisors desk | Toll gates or ordinary roads | a month |
| Traffic control center | <ul style="list-style-type: none"> - Operation of traffic control devices - Communication with agencies concerned adnd patrol vehicles - Show discipline in case of accidents | C.A.O. | One and half months |
| Traffic patrolling | <ul style="list-style-type: none"> - Operation of radio telephones - Inspection & maintenance of patrol vehicles - Practical discipline on roadway such as removal of obstacles and treatment of accidents | C.A.O & on epressway | a month |
| Rescue Units | <ul style="list-style-type: none"> - Operation of radio telephones - Inspection & maintenance of vehicles - Operation of vehicles - Practical discipline on raodway such as emergency dispatch, removal of disabled vehicles, treatment of accidents and aid | C.A.O. & on expressway | a month |
| Road cleaning | <ul style="list-style-type: none"> - Operation of vehicles - Inspection & maintenance of vehicles | C.A.O. & on expressway | two weeks |
| Maintenance patrolling | <ul style="list-style-type: none"> - Operation of radio telephones - Inspection of pavement & others | C.A.O & on expressway | two weeks |

VIII. Suggestion on Prevention of accidents

(1) Accident analysis

Before commenting on the counter measures, we'd like to bried on accident cases which often occur.

- 1) Accidents may often occur at spots around toll barrier, down hill sections where traffic congestions often happen, and sections where speed limits change.
- 2) When raining or in the twilight.
- 3) When traffic volume is large.
- 4) According to the analysis of traffic accident report on the Tomei Expressway, the factor which casues accidents is mostly associated with careless, inadequate and/or poor driving skills.

(2) Comment

Comments on prevention of accidents are as follows:

- 1) Near Din Daeng Toll Barrier, accidents rate is expected to be high because every behicle has to stop from high speed level and rear collisions may often occur.
- 2) Thin layer overlaid is sometimes used against slippery pavements.
- 3) Anti-glare screens at medians will be useful for sections with small radius curves.
- 4) Public relations for users about traffic manner on the expressway should be executed since users are unfamiliar wiht high speed driving.
- 5) Analysing traffic accidents is of vital importance to set up useful countermeasures. It is desirable that the ETA has staff in charge of the analysis.

IX. Suggestion on Public relations

Public relations about traffic manner on the expressway should be repeatedly conducted through mass communication and other methods.

Due to The Japan Highway Public Corporation, several times per year during periods of nation-wide traffic movement, leaflets and stickers are distributed to users at entrance booths and rest areas.

The Contents of P.R. are as follows:

- (1) Activities which drivers should take in case of troubles.
- (2) To wear safety belt.
- (3) To decrease speed at times of rainfall.
- (4) To keep the interval of vehicles
- (5) Parking or stopping on a shoulder is prohibited.
- (6) Usage of an emergency telephone.

X. Environmental Impact along the expressway and its prevention

Environmental problems accompanied by expressway construction and its maintenance are as follows.

- i. Air pollution
- ii. Water pollution
- iii. Noise
- iv. Vibration
- v. Obstruction of T.V reception and sunlight
- vi. Natural environment

Recently, the residents along the expressway have been demanding strongly for effective countermeasures against those problems. The J.H.P.C has been endeavoring to minimize their adverse effects on the environment as much as possible.

As for present situations and countermeasures performed in the J.H.P.C, we introduce a pamphlet "National Expressway practices in Japan-7. Environment" to you.

List of related materials

| Title | Published by | Number of copy | Remarks |
|---|--|----------------|----------|
| 78 GENERAL INFORMATION | NIHON DORO KODAN (JAPAN) HIGHWAY PUBLIC CORPORATION | 1 | English |
| Metropolitan Expressway Public Corporation 1980 | METROPOLITAN EXPRESSWAY PUBLIC CORPORATION | 1 | English |
| Hanshin Expressway Public Corporation | NIHON DORO KODAN | 1 | English |
| NATIONAL EXPRESSWAY PRACTICES in JAPAN 1980 1 General | NIHON DORO KODAN | 1 | English |
| NATIONAL EXPRESSWAY PRACTICES in JAPAN 1980 2 Planning | NIHON DORO KODAN | 1 | English |
| NATIONAL EXPRESSWAY PRACTICES in JAPAN 1980 7 Environment | NIHON DORO KODAN | 1 | English |
| NATIONAL EXPRESSWAY PRACTICES in JAPAN 1980 8 Maintenance | NIHON DORO KODAN | 1 | English |
| Study Report for Controlling Management of Honshu-Sikoku Bridge | | 1 | Japanese |
| Guide Book of Training for traffic controlling Business | NIHON DORO KODAN | 1 | Japanese |
| Guide Book of toll collecting Business for toll collector | Tokyo First Operation Bureau of NIHON DORO KODAN | 1 | Japanese |
| How to answer the questions from the expressway users | Tokyo First Operation Bureau of NIHON DORO KODAN | 1 | Japanese |
| How to drive properly on the Expressway | DORO SHISETSU KYOKAI | 1 | Japanese |
| Leaflet of Business of Traffic Controlling Office | Metropolitan Expressway Public Corporation Tokyo First Management Office | 1 | Japanese |
| Guide Book for Training | NIHON DORO KODAN | 1 | Japanese |
| Manual for works on Road Way | NIHON DORO KODAN | 1 | Japanese |
| Map of Metropolitan Expressway | Metropolitan Expressway Public Corporation | 1 | Japanese |
| Map of Metropolitan Expressway | Metropolitan Expressway Public Corporation | 1 | Japanese |
| Map of Hanshin Expressway | Hanshin Expressway Public Corporation | 1 | Japanese |

TOLLS SYSTEMS

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First Stage Expressway System in Bangkok
Bang Na-Port Section

Contract No. 5

Toll Electrical and Mechanical Specification and Conditions of Contract
(E.T.A)

4.1 General

4.1.1 - This section describes the general nature of the toll system for the Expressway, Bang Na - Port Section. There are four toll plazas as listed in Clause 2.1.3. The number of toll lanes at each plaza is also listed. The nearside lane at each plaza will be wider than the others to allow the passage of oversize vehicles and will also be used as a bus lane.

4.1.2 The equipment provided at each building shall be identical except for the quantities which will be related to the number of toll lanes. The equipment provided at the Central Administration Building shall have additional facilities as described in the Specification.

4.1.3 Toll plazas will be located so that tolls are only collected at the points of entry to the Expressway and for the directions of travel shown on the drawings. Pedestrians and pedal cycles will not pass through the toll lanes and will therefore be neither charged a toll nor registered. The system shall be of the 'Stop and Pay' type, the toll being a fixed charge depending on the class of vehicle but independent of the distance travelled on the Expressway.

4.1.4 Tolls will be collected manually from the offside of vehicles and accounted by registration keys on each collector desk. The toll equipment shall be designed to facilitate the greatest practicable flow through the plaza for a 'Stop and Pay' system.

4.1.5 The object of the system will be to ensure that correct tolls are collected and registered and that all monies and vouchers so collected are correctly brought to account in accordance with the registration. The equipment shall cause accurate and consistent registration and recording of the tolls at all rates of traffic flow and shall prevent fraudulent collection or registration by the collector.

4.1.6 Tolls will be collected in the form of 'cash' or 'voucher'. Cash transactions will be registered and accounted by the use of a 'cash' key. Voucher transactions will be registered and accounted by the use of a 'voucher' key.

4.1.7 Whatever the type and arrangement of the equipment, it is required that failure of central and common equipment at the surveillance building, other than complete failure of the special maintained supplies, see Sub-Section 3.3, shall not prevent the proper registration and collection of tolls and the failure shall not be apparent to collectors or drivers. Therefore, preference will be shown for a system making the best practicable use of individual lane logic for classifying and registering tolls on an

'autonomous booth' concept. Records will be produced at the surveillance buildings under conditions of security. Failure of surveillance building or lane processing equipment shall be immediately made known to the supervisor by suitable alarms.

4.1.8 The installation shall include all equipment necessary for the proper collection, registration and accounting of tolls and will generally comprise, collector registration desks and processors, signs, indicators, barriers, axle and vehicle detectors, power packs, toll booths, with lighting and ventilating, accounting and recording processors at the surveillance buildings, printers and all software programme sources.

4.1.9 Initially, the system will be used to collect two levels of toll only. Buses will not be charged but will pass through a toll lane (normally the nearside lane) and will be registered. The typical toll structure is shown in 4.10 of this Specification. The system shall be designed and constructed so that classes from 0 to 9 inclusive may be registered and separately accounted and each vehicle transaction properly completed by axle count and identification. The tenderer shall state in detail the means of implementing a change from a two charge structure to a ten charge structure with one 'free' class.

4.1.10 Lane signs shall be mounted over the lines of toll booths. Canopies or other mounting positions, such as Expressway soffit gantries, will be provided by others, but the Contractor will carry out all work of cabling and fitting of the signs.

4.1.11 The lane numbers and codes shown on the drawings shall form the master reference for the identification of equipment. Lanes will be identified with a code to denote the toll station identity and the lane number as follows:

| | |
|----------------------|--------------|
| Bang Na | - BN1 to BN9 |
| Soi 62 Interchange | - SO1 to SO4 |
| At Narong Road | - AN1 to AN4 |
| Kasemraj Road (East) | - KE1 to KE3 |

4.1.12 All time delays used in operating sequences shall be adjustable by hardware adjustment and shall not require software modification.

4.1.13 The Contractor shall lay all the necessary cables provide all necessary additional parts and make all the necessary connections and re-connections to enable the existing toll equipment for the Din Daeng - Port Section, installed under a previous contract, to be controlled from the Central Administration Building control desk. The Contractor shall also integrate this existing toll equipment with the data processor and associated software installed under this contract (sec 4.2.2).

4.1.14 After the change-over the Contractor shall remove and blankoff all redundant buttons and alarm lamps etc. on the Supervisor's desk at Din Daeng and also make the necessary changes to the data tolls processor at Din Daeng so that it will function only as a tolls processor.

4.1.15 So that time is synchronised throughout the system, master clocks shall be provided at each surveillance building and these shall be continually corrected by common synchronising clock signals from the overriding master clock at present at the Din Daeng building and which will be transferred to the Central Administration Building under this contract. Each surveillance building master clock shall continue to operate independently in the event of failure of the synchronising clock signals. All data processor functions requiring time shall use the master clock signals to determine the time.

4.1.16 The Authority may wish in the future to introduce a system of peak time charges at higher rates than the normal charges. It is envisaged that this will be achieved by the addition of a programme subsidiary clock giving a programme of signals to automatically change the rates of each toll at each toll station independently. The signal shall cause the individual lane processors to calculate transactions at the new rate and warn the collector of the change. It is expected that a system which requires no acknowledgement by the collector will be used and that the period of high rates will be shown on separate account print-out forms. At the end of the period a similar procedure shall accompany the change back to the normal rates. The tenderer shall state in detail the means and approximate cost by which his equipment could be modified for this requirement.

4.1.17 The Authority may wish in the future to introduce a system of Automatic Vehicle identification (AVI). If introduced this will probably be used for the recording of bus transits. The tenderer shall state in detail the means and approximate cost by which his equipment could be modified for this requirement. The AVI system shall be of the type in which a transponder is fitted to the vehicle and interrogated automatically via high frequency loops in the carriageway.

4.1.18 The Authority may wish in the future to introduce a system of credit card payment (punched or magnetic). The Tenderer shall state in

detail the means and approximate cost by which his equipment could be modified for this requirement.

4.1.19 The system of information transmission between the booths and the surveillance building may be by direct wire or by telemetry, provided that proper account is taken of the need to avoid the use of a common cable with the attendant risk of a fault causing all booths to be isolated from the tolls processor.

4.2 Toll Recording

4.2.1 Each lane processor shall process registration and classification signals and cause signs and indicators at the lanes to be operated as each transaction proceeds. The lane processor shall be automatically interrogated by the toll processor at the surveillance building to provide and to up-date information required for print-out and surveillance as described elsewhere. In the event of failure of the toll processor, information shall be stored by the lane processor until interrogated. The capacity of this storage shall be sufficient for several collector shifts. The rate of interrogation shall be sufficiently fast to allow the toll processor to display and print-out individual transactions when so instructed.

4.2.2 Each toll processor shall be interrogated by the data processor at the Central Administration Building to provide up-to-date information required for overall statistics and toll records for administration purposes.

4.2.3 All processor cabinets shall have lockable doors to prevent unauthorised access. The processor instruction keyboards shall each have a security lock which shall render the keyboard inoperable and prevent interference with the correct working of the processor.

4.2.4 All ventilation blowers, filters, etc., as are necessary for the proper working of the processors shall be included in the enclosure.

4.2.5 Each surveillance building toll processor and the Central Administration Building data processor shall have two fast printer machines. The machines shall work automatically as 'duty' and 'standby' and shall be arranged so that either machine may be switched to 'duty' with the other as 'standby'.

4.2.6 Each processor shall have a programmed sequence of checks against known functions so that a malfunction in counting or recording is automatically detected by the interrogation procedure and suitable alarms given by the supervisory equipment.

4.2.7 Each printer machine shall be instructed by the associated processor and the required data printed in plain language on fan fold paper. Facilities shall be provided for recording the data on punched tape using teletype code and for the copying of punched tapes and the reproduction in plain language of the data on the punched tapes. The Tenderer shall state in the Schedules the approximate period of time required to make each type of print-out.

4.2.8 The storage capacity of the toll processors shall be such that in the event of a failure such that print-outs cannot be made, all toll booths may be 'keyed out' at least four times or an equivalent total number of 'keys out' be made from fewer booths without the stored information required for eventual print-out being lost.

4.2.9 A sequence of rapid 'key in' and 'key out', such as may occur due to manning errors, shall not cause overloading of stores and 'over-printing' of information. The tenderer shall state in detail the means he proposes for achieving this.

4.2.10 Programming of the toll processors and any required modification to the programming of the data processor shall be made with punched tapes prepared and supplied by the Contractor. All software work shall be carried out by the Contractor. The programme shall be fed into the processors by the use of a fast tape reader unit at each processor having a reader speed of not less than 200 characters per second. Separate programme tapes shall be provided for permanent features such as system operation ("system tape") and for semi-permanent features such as toll charge checks, print-out reference times, etc. ("charge tape"). The Contractor shall supply each type of tape in six copies for each processor.

4.2.11 The programming of the lane processors shall be by such process as to avoid the need for reprogramming after power failure etc. The tenderer shall state in detail the means of programming and the means by which toll charges may be altered when required.

4.2.12 The lane and toll processors shall receive time impulses from the master clock systems supplied and installed by the Contractor and shall automatically record weeks throughout the year by number 1 to 52 and days throughout the week by number 1 to 7. The years shall be recorded but shall be adjusted manually at the processor by an agreed procedure. The adjustment of print-out reference times shall be made on the 'charge tape' for the appropriate processor and the daily print-out made automatically at the programmed reference times.

4.2.13 In the event that the printer should fail during a print-out, the processor shall, upon restoration of printing, cause a reprint of that print-out to ensure that no characters have been lost as a result of the failure.

4.2.14 Following regular and demand print-out all data required for further use, such as 'totals' shall be automatically transferred for further record.

4.2.15 Arrangements for 'on demand' print-out shall be provided at the processor unless otherwise stated. Stored data used for 'on demand' print-out shall not be destroyed until the normal regular print-out of that information has taken place. An 'on demand' lane print-out shall take immediate priority in the print-out queue after completion of a print-out already being executed.

4.2.16 Print-outs shall be made on fan fold paper with automatic means of advancement of the paper for immediate 'tear off' after 'print-out' and without requiring access to the printer mechanism. Lane and periodic print-outs shall each occupy one paper fold. Shorter print-outs may be made successively within a fold, but shall be automatically registered to a new fold if insufficient paper is left within the existing fold to contain the required print-out. Audible and visual indications shall be given at the toll monitor unit when the supply of paper in the printer is less than that required for ten normal print-outs and also when both printers have been switched to 'local' control.

4.2.17 The Contractor shall provide Perspex overlays for interpretation of the print-outs. These overlays shall be engraved and filled with the side and head titles for the various columns and lines and shall be supplied in English versions and one other language to be decided by the Authority.

4.2.18 Two sets of portable indicators shall be provided under the Contract for checks on vehicle classification in a lane. The indicators shall be manually started and reset and shall record cumulative totals of each class, axles by classification, misregistration, cash transactions, voucher transactions and the total number of axles detected by the traffic pad.

4.3 Print-out - Surveillance Buildings

4.3.1 The tolls processor at each surveillance building shall store information for the various print-out requirements stated elsewhere. The processor shall recognise not less than five hundred different collector identity token codes and six maintenance token codes. All times shall be printed in 24 hour form.

4.3.2 Lane Print-Out. The lane print-out format shall be generally as shown in 4.11, Appendix 1. "On Demand" print-out shall have priority over daily print-out except that a print-out already commenced shall be completed.

"On Demand" print-out shall be denoted by asterisks or other agreed code printed on the paper and shall also be initiated from the tolls monitor unit. When the collector inserts his token (key-in) in the identity recorder, the time, date, lane identity and token identity code shall be recorded. When the collector removes his identity token from the identity reader (key-out) the lane print-out shall be automatically printed for that toll lane as soon as printing capacity is available and shall not be distorted or overwritten by new registered information which has meantime been presented to the recorder such as a new collector taking up duty.

4.3.3 Misregistration Print - Out. A print-out shall be made automatically when a misregistration procedure has been completed to correct a mistake in registration. The lane, collector, time, date, class of incorrect registration and the class of the subsequent correct registration shall be shown and the form of print-out shall be as shown in 4.11, Appendix 2.

4.3.4 Discrepancy Print-Out. When the axle pad count is different from that represented by the collector's registration an immediate print-out shall be made showing the lane, collector, time, date, class, registered axles according to the class and pad axles. The form of this print-out is shown in 4.11, Appendix 3.

4.3.5 Unauthorised Passage Print-Out. When a lane is closed the axle pads shall continue to detect the passage of vehicles and a print-out record shall be given immediately after the detection of the passage and showing the time, date, lane and the collector's code and in the event of violation the registration class. This form of print-out is shown in 4.11, Appendix 4.

4.3.6 Faulty Axle Detector Print-Out. A faulty axle pad detected by the discriminating circuitry shall be shown by an alarm at the toll monitor VDU and by a print-out showing the time and date and identifying the lane and the pad. This print-out shall also show when detectors are switched out of use. The form of print-out is shown in 4.11, Appendix 5.

4.3.7 Individual Transaction Print-Out. When instructed at the tolls monitor unit and at the processor, the tolls processor shall produce a transaction in sequence print-out for a selected lane. The date, collector, lane and the time, class and detector axles for each transaction shall be shown. The form of print-out shall be as shown in 4.11, Appendix 6. This print-out shall normally be made on the standby printer.

4.4

Print-Out - Central Administration Building

4.4.1 The data processor at the Central Administration Building shall store the information produced by interrogation of the toll processors at the surveillance buildings. The information shall be used for the various print-outs stated below.

4.4.2 Daily Summary Print-Out. The daily summary print-outs shall be made each day for each toll station at a time referred to as "zero hour". The data processor shall automatically gather all the required data acquired over the previous 24 hours and make a print-out in each of the two forms shown in 4.11, Appendix 7 and Appendix 8. These show respectively the daily cash summary and the daily operating summary. On demand print-out shall have priority over a 'key out' print-out except that a print-out already commenced shall be completed. The 'on-demand' print-out shall cover the period from the previous 'zero hour' to the 'time of demand' and not the previous 24 hours. Each successive 'on demand' print-out between 'zero hour' reference times shall be an up-dated version of that previously obtained, irrespective of the number of print-outs demand before the next 'zero hour'. 'On-demand' print-out shall be denoted on the print-out by the time of print-out and other agreed code marking.

4.4.3 Hourly Traffic Record Print-Out. A traffic record print-out of the form shown in Appendix 9 shall be provided automatically following the normal daily summary print-outs.

4.4.4 Twenty-Four Hour Summary Print-Outs. This summary print-out shall be automatically made every twenty-four hours. The print-out will show the totals of each class of vehicle registered in directions along the Expressway and the totals of revenue for each class for all stations. The form of print-out shall be as shown in Appendix 10.

4.5 Collector Desks

4.5.1 There shall be one collector desk provided for each toll booth collector position. Each desk shall be identified according to the relevant lane number and code and shall contain the equipment required for toll registration and collection. Each desk shall be constructed of stiffened folded sheet steel with high quality durable finish and shall be shaped to fit the internal dimensions of the booth. A neat flashing strip shall be provided at the join with the booth walls to seal the gap. The top and the front edges shall be faced with securely bonded decorative laminate and the registration keyboard shall have an engraved stainless steel face. The bottom 'kick' frame shall be finished black. All equipment spaces within the desk shall have lockable access doors and draw out or swing out racks shall

be used as necessary for ease of maintenance. A knee hole shall be formed below the working surface at the right hand side.

4.5.2 The layout of the desk shall be agreed with the Engineer. The desk shall contain the following items of equipment which form part of the toll system together with all other features necessary for the proper transaction of toll collection and registration.

- (a) Clock.
- (b) Communication Set.
- (c) Collector identity reader, to read and transmit not less than 506 discrete identity numbers and codes, which shall include those already supplied for the Din Daeng - Port Section.
- (d) Indication lamp coloured white to show that the desk is operative. This lamp shall only be extinguished for loss of supply or 'Key Out'. It shall not be extinguished by faults on the recording and registration equipment.
- (e) A lane 'Open' control which shall extinguish the 'lane closed' signal and illuminate the 'lane open' signal.
- (f) A lane 'Closed' control which shall extinguish the 'lane open' signal and illuminate the 'lane closed' signal.
- (g) Two indication lamps, one of which shall be red and lit when the 'lane closed' signal is energised and the other which shall be green and lit when the 'lane open' signal is energised.
- (h) Indication that the lane barrier is fully open.
- (i) A soft buzzer to sound while the keyboard is inhibited due to misregistration.
- (j) A digital indicator to show the collector the amount of toll to be collected, according to the registration.
- (k) A lamp test button to test all lamps on the keyboard and desk.

4.5.3 The 'lane closed' and 'lane open' control circuits shall be interlocked so that the use of one automatically cancels the other.

4.5.4 A suitable stool with a short back shall be provided at each collector position.

4.5.5 The toll registration keyboards shall be interchangeable one with another and shall be fitted centrally to the top front surface of the collector desk and at a sloping angle for ease of operation. Electrical connection shall be made by plug and socket accessible only from within the lockable lower part of the desk. All key contacts shall be properly protected from dust and moisture. Each keyboard shall be fitted with:

- (a) Ten toll registration buttons, one for each class of vehicle. Initially the class 0 button shall not be fitted, the aperture being neatly blanked off.
- (b) A button to register payment made by 'cash'.
- (c) A button to register payment made by 'voucher'.
- (d) A misregistration button to cancel a registration incorrectly made as described elsewhere.
- (e) An illuminated head button to call the supervisor. This shall operate an aural call and visual signal on the toll monitor panel at the surveillance building and also the amber flashing security lamp on the canopy above the toll booth.

4.5.6 The system shall not allow misregistration to occur due to repetitive use of class, cash or voucher buttons at the wrong part of a transaction.

4.5.7 Registration buttons shall be arranged logically by agreement with the Engineer and shall facilitate fast operation by light finger touch with gloved or ungloved hands and without fouling of adjacent buttons. 'Cash', 'voucher' and misregistration buttons shall be spaced clear of each other and of registration buttons. Each registration button shall be marked with its class or function. The identity of each button shall also be engraved on the panel adjacent to the button. Registration buttons shall be illuminated to show that they have been depressed.

4.5.8 A cash handling tray shall be fitted in a recess on the flat top surface of the desk to the left of the keyboard. The tray shall be removable and shall have coin and note storing slots and clips. A cash drawer shall be provided to the left of the knee space and designed to receive the cash handling tray, described above. The drawer shall be designed so that coins and notes are not trapped in inaccessible places and will have a bolt operated from the knee hole to hold it shut or partially open. The bolt will be lockable by means of a separate padlock.

4.5.9 All necessary ventilation and dust filtering equipment shall be fitted within the desk to form a self-contained unit.

4.5.10 A single stroke registration bell shall be fitted out of sight in the collector desk and shall be loud enough to be heard outside the booth. This bell shall ring when the 'cash' or 'voucher' key is operated in proper sequence to show that a registration has been completed.

4.5.11 Key operated axle pad override switches shall be provided within the lockable equipment portion of the collectors' desks. This switch shall cause all the axle pads for that lane to be taken out of service without interfering with toll collection or registration which shall continue without requiring signals from the axle pads. All classification, toll charge, toll paid and traffic and lane signals shall continue to operate correctly and the record shall show the axle count appropriate to the registration. When the switch is used to take the axle pads out of use, the fact shall be clearly indicated at the toll monitor unit in the surveillance building and in the lane print-out, which shall also show the time of switching out of service and back into service.

4.5.12 The collector identity reader shall receive the collector's identity token, which shall be robustly made and shall be arranged so that dirt and foreign bodies etc., do not fall into any contact or interfere with the correct operation of the reader. The reader and token shall be designed to ensure that the token is properly aligned within the reader and that the reader can only read the token when correctly and fully inserted. The arrangement of coded information on the token shall be such that the code is not easily mutilated by maltreatment and is correctly recognised by the reader when the coded portion is dirty or worn due to mishandling and frequent use. So far as is practicable, the code shall be arranged so that maltreatment of the token, causing distortion of the code, shall tend to cause an alarm and indication at the toll monitor unit in the surveillance building. The tokens shall be interchangeable with those already supplied for the Din Daeng - Port Section, but have their own individual numbers.

4.5.13 The collector identity reader shall be interlocked with the toll registration equipment so that when a token is inserted:

- (a) the booth equipment shall be rendered operative and the lane open control enabled to work.
- (b) the toll processor shall memorise the information required for later printing out.
- (c) the toll monitor unit in the surveillance building shall show that the toll lane is ready to receive traffic. When the token is withdrawn, the booth shall be inoperative, the lane closed and the information detailed elsewhere shall be printed out.

4.6 Surveillance Buildings - Supervisors' Desks

4.6.1 A desk shall be installed at the Supervisor's position in each surveillance building. This will contain control switches for toll plaza and canopy lighting, master communication sets for booth communication, communication sets for communication between the Central Administration Building and other toll stations and supervisory indications and alarms for the tolls processor and power supplies. The styling of the desk and components shall be agreed with the Engineer. Control sections shall be built up from an approved matrix of tiles with matching indicators, etc., to allow flexibility in design and arrangement.

4.6.2 The desk shall also contain the toll monitor unit incorporating a visual display unit and its keyboard (VDU) for general supervision of the toll registration system. The toll monitor unit shall display the following information under normal operation.

- (a) The class of each vehicle registered in each lane in such form that less common classifications are distinctly shown.
- (b) Indication of 'lane ready'.
- (c) Indication of "Supervisor Call" for each lane.
- (d) Indication of axle pads by-passed.
- (e) Indication of incorrect toll (accompanied by loud buzzer).
- (f) Indication of unpaid toll (with means of cancelling the alarm).
- (g) Indication of barrier open with key out.
- (h) Axle pad failure (accompanied by loud buzzer).
- (i) Collector identity code.
- (j) Indication of unauthorised passage (accompanied by loud buzzer).
- (k) Indication of misregistration (accompanied by loud buzzer). At the same time information about the misregistration will be automatically shown on the lower part of the VDU screen and when the misregistration is cleared, the new correct classification shall also be displayed in the form shown elsewhere for print-out.

Operation of the keyboard using mnemonic codes shall cause the following information to be shown on the lower part of the screen, preferably without disturbing existing normal displays:

- (m) Each transaction separately for a selected lane using the format shown elsewhere for print-out. The techniques should allow several lines of information to be shown as they occur.
- (n) Display of information, as for lane print-out on demand.

So far as practicable the mnemonic codes shall be such as to give an indication of any mistake in pressing the buttons representing the code.

4.6.3 The desks shall be of high quality construction and finish. - The shape, size and arrangement of the desk shall allow the seated Supervisor a clear view of the toll area. All indications shall be clearly visible having regard to ambient lighting levels and angle of viewing for the seated Supervisor. Dimming shall be incorporated by a dim/bright switch.

4.6.4 The desks shall be of functional design with all facilities arranged on general ergonomic principles to aid maximum concentration and minimise fatigue. Unrestricted knee space shall be provided at all parts of the desk so that others may assist the Supervisor in an emergency. The working top shall have a good surface for writing. A suitable chair with free running castors of large diameter shall be provided. All components shall be flush fitted, where practicable. Low voltage signal circuits shall be properly screened and spaced from power circuits to avoid interference. The various sections of the control desk and the functional indications shall be clearly marked using engraved and filled characters to show the function of all controls, indications, instruments, etc.

4.6.5 Test switches shall be provided to test the various indicator lamps. A security alarm button shall be placed for ready operation by the Supervisor and shall be connected into the surveillance building security alarm system.

4.6.6 The Contractor shall be prepared to discuss with the Engineer and with other contractors the provision of other facilities on the desk which are not part of the equipment covered by this Contract.

4.7 Central Administration Building - Controller's Desk

4.7.1 The Controller's desk at the Central Administration Building shall contain controls for the toll equipment, traffic surveillance signs, CCTV, emergency telephones, radio communications and communication with Police and Fire authorities and with each of the other toll surveillance

buildings. The styling of the desk shall be agreed with the Engineer and the final design and layout shall be discussed after the placing of the Contract.

4.7.2 Attention shall be paid to the need for the Toll Supervisor to survey the CCTV traffic surveillance monitors without strain and under properly lit conditions.

4.7.3 The Contractor shall be prepared to discuss with the Engineer and with other Contractors the provision of other facilities on the desk which are not part of the equipment covered by this Contract.

4.7.4 Test switches shall be provided to test the various indicator lamps.

4.8 Lane Signs and Ancillaries

4.8.1 All lamps in lane and toll signs and signals shall be of types which do not deteriorate unduly due to frequent switching and supply failure and restoration. Discharge type lamps shall 'strike' without undue delay. With the exception of matrix type signs, all sign information shall be conveyed by switching ON/OFF of internal illumination. No sign information shall be visible at day or night unless the internal illumination is switched on. Signs shall have sign faces of toughened glass or other approved material to guard against damage. Sign information shall be clearly visible when switched on in bright sunlight. Dimmers shall be provided, if necessary, to reduce the levels of luminance at night time. A common manually 'dimmed' lamp supply will be considered.

4.8.2 Signs in the form of white arrows and red crosses representing 'Lane Open' and 'Lane Closed' respectively shall be fitted on the face of the canopy above each lane as appropriate. The white arrow sign shall flash at a rate of approximately 30 cycles/minute. The signs shall be provided with mounting brackets for mounting on steelwork within the canopy structure so that the face of the signs is recessed in the face of the canopy.

4.8.3 The 'Lane Open' and 'Lane Closed' signs shall be switched automatically by the operation of the collector's desk controls at the appropriate toll booths, as described elsewhere in this Specification. Where practicable, the 'Lane Closed' sign shall remain lit in the event of failure of the controls.

4.8.4 A toll lane barrier shall be provided in each lane as shown on the drawings and shall consist of a manually operated swinging arm carrying a black and reflecting yellow striped sleeve and a high intensity red lantern showing in both directions. All parts of the barrier shall be at least 200 mm from the carriageway when the barrier is fully open. The barrier shall be

robustly constructed with good access to the mechanism for maintenance. The mechanism shall be properly protected from weather and spray and all maintenance covers shall be easily removable by special key. A frangible barrier arm with securing wire rope shall be incorporated to reduce damage to violating vehicles. The barriers shall have end of travel buffers to prevent breaking the frangible joint when opened and closed roughly.

4.8.5 The lane barriers shall have interlock switches to provide correct sequences of operation of toll booth equipment and suitable devices shall be incorporated to:

- (a) Limit the movement of the barrier at each end of travel and ensure that it stays in the open and closed positions without need for clamps or catches.
- (b) Switch the barrier red lanterns 'on' as the barrier begins to close and 'off' when the barrier is fully opened.
- (c) Prevent the 'Lane Closed' sign from being extinguished and the 'Lane Open' sign from being illuminated by the collector's desk controls until the barrier is fully opened. The signs shall revert to the 'Lane Closed' sequence when the barrier has begun to close, irrespective of the collector desk controls.
- (d) Energise the indicator on the collector's desk to show that the barrier is fully open.

4.8.6 A combined toll indicator and 'Stop/Go' sign shall be positioned on the side of the toll booth to be seen by drivers stopped at the booth. The indicator sign shall be weatherproof in construction and have red 'Stop' and green 'Go' lights. It is intended that the sign shall:-

- (a) Become operative with the red 'Stop' light illuminated when a collector's identity token is properly inserted into the identity reader.
- (b) Indicate that vehicles should stop at the booth.
- (c) Serve as a visual indication to the driver of the amount of the toll due and that the toll has been registered and paid by cash or voucher.
- (d) Indicate that the vehicle may proceed.
- (e) Show the red 'Stop' light in readiness for the next vehicle classification when the misregistration key is pressed or the first axle of a classified vehicle passes over the traffic mat.

4.8.7 The toll indicator and 'Stop/Go' sign unit shall be recessed into the walls of the booth so that access is from inside the booth. The rear access cover of the units shall be hinged and shall expose the lamps for easy maintenance. It is expected that a lamp matrix type indication will be needed to provide sufficient luminance. Two digits shall be incorporated to allow for future increase in toll rates.

4.8.8 Combined vehicle classification signs and lane identity signs shall be provided and mounted over each lane on the face of the canopy, at an angle to the canopy face so as to be clearly visible from the Supervisor's position in the surveillance building. The signs shall be weather proof, recessed into the face of the canopy and shall have hoods to improve the apparent luminance.

4.8.9 The classification signs shall be of the matrix type to show the vehicle classes by digits 0 to 9. The characters formed by the matrix shall be approximately 350 mm high. A further digit matrix shall be incorporated alongside the main matrix to show special codes such as misregistration etc.

4.8.10 The classification signs shall only be operative after an identity token is properly inserted into the identity reader and the lane opening procedure has been properly followed. The sign shall be lit to show the class when a registration key is depressed and shall remain lit until the next registration sequence, whereupon it shall remain lit for a short time delay, adjustable between 0.2 seconds and 2 seconds, then extinguished for a time delay adjustable between 0.2 seconds and 2 seconds before being relit to indicate the new vehicle class. Should no further vehicles be processed during a period adjustable between 2 seconds and 10 seconds, the classification indicator shall be automatically cancelled.

4.8.11 A high intensity flashing amber security light shall be provided below the canopy and adjacent to the classification sign and shall be illuminated for 'unpaid toll', 'incorrect toll', 'Supervisor call' and 'toll booth emergency'. The amber light shall be ready for use at all times when supply is available to the booth.

4.8.12 An unpaid toll alarm shall be provided and shall give audible and visible warning of a vehicle passing through a toll lane in an unauthorised manner and before registration has been properly completed. The alarm shall comprise a loud weatherproof electric gong on the wall of the surveillance building and a buzzer in the associated toll booth and at the Supervisor's desk. The flashing amber security lamp for the particular lane shall be energised (see 4.8.11) and the lane identity shown on the toll monitor unit at the Supervisor's desk.

4.8.13 The unpaid toll alarm shall be operated if a vehicle, for which no registration has been made, passes over the axle pads and loops and the alarm shall be given continuously until cancelled at the Supervisor's desk. Such cancellation shall not prevent further alarms being given.

4.8.14 An incorrect toll alarm shall be provided and shall give audible and visible indication at the Supervisor's desk that a vehicle has passed through the toll lane with an axle count determined by the traffic pads different to that registered by the collector. The flashing amber security lamp for that lane shall be lit and the alarm given continuously until cancelled at the Supervisor's desk. Such cancellation shall not prevent further alarms being given. It is important to ensure that the incorrect toll alarm is not actuated when the second and subsequent axles of a correctly registered vehicle pass over the traffic pad. If a time delay is used to meet this requirement, the period of the delay shall be automatically graded according to the classification and the delay shall give effective discrimination between vehicles following relatively closely, e.g. between two 2-axle vehicles and one 4-axle vehicle.

4.8.15 The Supervisor call button on the collector's desk/keyboard shall cause indication of the calling lane to be given audibly and visually at the Supervisor's desk and by the flashing amber security lamp for that lane. Supervisor call signs shall be cancelled by operation of the collector's button.

4.8.16 A toll booth emergency alarm shall be provided and shall consist of a loud weatherproof hooter mounted on the wall of the surveillance building. This hooter shall be clearly heard above all traffic noise and other toll plaza alarms, such as the unpaid toll alarm at all places in the toll area. The flashing amber security lamp and the Supervisor call indication for that lane shall also be operated. The alarm shall be initiated by the collector operating a foot switch at the base of the collector desk. The switch shall be arranged for operation by a flap or plate easily accessible to the collector in an emergency, but not easily operated by accidental kicking. The alarm circuit shall be so arranged that the contact at the collector's switch shall open to sound the alarm and a break in the cabling circuit shall also cause the alarm to sound. The circuit of the alarm energising loop shall be as secure as is practicable. The alarm shall be cancelled at the toll monitor unit on the Supervisor's desk.

4.8.17 Vehicle detector loops and axle detector pad assemblies shall be fitted in the toll lanes at positions shown on the drawings or as directed by the Engineer, beyond the collecting positions. The pads shall be suitable for the near-side lane width of 5 metres and a lane width of 3 metres at all other lanes. The loops and pads shall not be required to detect

vehicles lighter than a light motor cycle or motor scooter, but shall be consistent with the presence of a vehicle to avoid spurious operation when stepped on by a pedestrian.

4.8.18 Each lane pad assembly shall consist of two or more elements arranged in two rows 'long' and 'short' elements being used to stagger any space occurring between elements within a row. Malfunction of an element shall be automatically detected and when three successive registrations show a faulty pad in the count an alarm shall be given and a fault print out made as described elsewhere in the Specification. The passage of the first axle of a vehicle over the pad shall cause the following:-

- (a) The 'Cash' (or Voucher) indication and the amount shall be extinguished at the toll indicator.
- (b) The red light shall be lit and the green light extinguished at the toll indicator.
- (c) The incorrect toll alarm inhibition mechanism shall be activated.

4.8.19 The Contractor shall set the axle pads, frames, etc., in position prior to the road Contractor concreting or surfacing the road and shall be in attendance during the concreting and surfacing to check that there is no displacement from the set position. Axle pads shall be adequately drained and sealed to prevent the mechanisms becoming waterlogged in all weather conditions. The pad and loop mountings shall be such that elements can be removed for maintenance or replaced without disturbing the underlying or surrounding ground bed. Slots for loops shall be cut and backfilled to the approval of the Engineer. The Contractor shall provide drawings showing the section and route of these slots and shall advise the cross-section of the slots in the schedules attached to the Bills of Quantities.

4.9 Typical Registration Procedure

4.9.1 General: The toll collectors' procedures and the functions of the various parts of the equipment are given below. Basic steps are given first, then the infringements which can arise. The description assumes that all power is correctly available, the toll equipment switched on ready for use, all soft-ware programmes correctly entered and the system already in operation.

4.9.2 Initial State of Equipment : Assuming that all power is correctly available, equipment switched on ready for use and the programmes correctly entered into processors, the following situation exists.

- (a) The lane closed and No Way signs are showing on the canopy at the ends of the lane and the lane closed indications at the toll monitor unit and collectors desk are illuminated.
- (b) The lane barriers are closed and the barrier stop warning lights illuminated in both directions.
- (c) The tolls indicator is extinguished.
- (d) The classification signs on the canopy are extinguished.
- (e) The vehicle class indications on the toll monitor unit are extinguished.
- (f) The axle pads are operating and will record all unauthorised passage.

4.9.3 Commencement of Shift : To commence his shift the collector unlocks the door of the booth and opens the lane barrier, (the barrier is not locked electrically and it may be opened after inserting the identity token into the reader), this extinguishes the barrier light and enables the booth equipment to be used. An indication at the toll monitor unit will indicate if the barrier is open but no collector is 'keyed-in'. The collector inserts his identity token into the identity reader and the following will occur :-

- (a) The toll equipment will record the collector's identity code, the lane number, the date and the time. This information will be printed out if the identity token is removed after more than 3 mins. have elapsed from 'key-in' or if a registration has been made prior to 'key-out'.
- (b) The collector's desk 'operative' lamp will light.
- (c) The toll indicator will become operative with the red stop signal illuminated and the associated schedule board will be illuminated.
- (d) 'Lane ready' and the lane identity will be indicated at the toll monitor unit in a flashing mode.
- (e) The indication at the toll monitor unit showing 'barrier open but no collector 'keyed-in' will be extinguished.

4.9.4 Opening the Lane : To open the lane the collector will operate the 'lane open' control and provided that his identity token is correctly inserted in the identity reader, the following will occur :-

- (a) The lane closed sign at the entering side of the canopy and the 'lane closed' lamp on the collector desk will be extinguished.
- (b) The lane open sign on the entering side of the canopy and the 'lane open' lamp on the collector desk will be illuminated.
- (c) 'Lane ready' and lane identity will be indicated at the toll monitor units in a steady mode.

The lane signs are interlocked with the barrier and if this is closed at this stage the lane closed signs will be re-established.

4.9.5 Registration of the Vehicle : A vehicle will enter the lane and will stop at the booth. The collector will assess the type of vehicle and :-

- (a) Press the respective classification button (this will inhibit use of other classification buttons until the transaction is completed). After a short time delay the classification will be indicated at the canopy and at the toll monitor units.
- (b) At this stage the registration will be stored and the appropriate buttons will be illuminated. The lane processor will assess the toll due and cause it to be displayed on the toll indicator and to the collector.

4.9.6 Misregistration : If, after classifying a vehicle but before registering the toll (see 4.9.7) the collector finds he has made a mistake in assessing the class of the vehicle he may press the misregistration button whereupon :-

- (a) The lane processor will retain the details of the incorrect registration and transmit these to the toll processor for immediate display at the toll monitor unit. The display will be accompanied by a short time buzzer.
- (b) A time delay (adjustable) will be started during which the keyboard will be inhibited from further registration. A lamp in the misregistration button will be lit to show this fact and a soft buzzer will sound in the booth during the period that the keyboard is inhibited.
- (c) A misregistration code will be shown at the classification sign on the canopy.

- (d) The toll due shown on the toll indicator will be extinguished.

The Supervisor will satisfy himself about the circumstances of the mistake (by communication if necessary) and by pressing a release button at the toll monitor unit may cancel any remaining timing period in which the keyboard is inhibited. In the event that the Supervisor takes no action in respect of the mistake the keyboard inhibition will be automatically removed after the time delay period has elapsed. When the keyboard is 'released' the keyboard inhibition light and buzzer will be cancelled. The collector may now make the correct registration whereupon the following will occur:-

- (e) The tolls processor will cause a print-out of the incorrect and correct registrations and the lane number, collector identity, date and time. The correct registration details will now be displayed at the toll monitor units together with the incorrect registration.
- (f) The new toll due will be displayed on the toll indicator and to the collector.
- (g) After a short time delay the new classification will be shown on the classification sign on the canopy and at the toll monitor units.

4.9.7 Registration of the Toll: When the collector is satisfied that he has correctly classified the vehicle and has received the toll from the driver he will press the 'Cash' or the 'Voucher' key as appropriate. Should no toll fee be payable he will nevertheless press the 'Voucher' key so that the registration is recorded and the vehicle permitted to proceed.

The pressing of the 'Cash' or 'Voucher' button will cause:-

- (a) The 'Cash' or 'Voucher' legend to be illuminated on the toll indicator.
- (b) The toll fee shown on the toll indicator and to the collector to be extinguished.
- (c) The 'Cash' or 'Voucher' information to be stored by the lane processor preparatory to the checking of the classification against the vehicle axles.
- (d) Removal of the inhibition on the keyboard so that the next registration made at this stage will be stored by the lane processor ready for use, see 4.9.8 below, but the new toll due will not be displayed at the toll indicator and to the collector until the previous vehicle has passed over the axle detector pads.

- (e) A ten second delay to be started which will switch 'off' the class indication at the canopy if no new registration has been made before this period has elapsed. (This is to save lamp life and power during quiet periods).
- (f) The single stroke gong in the booth to be sounded.
- (g) The red stop light to be extinguished and the corresponding green light to be lit.

4.9.8 The Vehicle Proceeds: The vehicle now proceeds. As the front axle passes over the axle pads the following occurs:-

- (a) This axle is detected and counted by the lane processor.
- (b) The 'Cash' or 'Voucher' legend displayed on the toll indicator is extinguished.
- (c) The red stop light is lit and the green light extinguished.

The second and subsequent axles are also detected and counted and compared by the lane processor with the axles corresponding to the vehicle registration. Details of the transaction are stored for the record.

4.9.9 Unpaid Toll: Should a vehicle pass through the lane without registration or before the 'Cash' or 'Voucher' button has been pressed to complete the transaction, the 'unpaid toll' alarm will sound, the flashing amber security light for the lane will be illuminated, a buzzer will sound in the collector desk and an indication be given at the toll monitor units. Suitable delays will ensure that this alarm is not sounded by the passage of the second and successive axles of a correctly recorded vehicle over the pads. These delays will depend upon the nature of the classification.

An unauthorised passage print-out is made and similar information displayed at the toll monitor units.

Three cases are distinguished:-

- (a) Unattended lane, booth closed.
- (b) Attended lane, the collector does not classify the vehicle or fails to reclassify after a misregistration - this is referred to as a 'violation'.

- (c) The collector classifies the vehicle but does not complete the transaction by pressing the 'Cash' or 'Voucher' button this may be referred to as an 'unpaid toll'.

4.9.10 Incorrect Toll: The collector may have misregistered the class in relation to the number of axles for the vehicle (too many) this is revealed by the axle count described earlier. At this stage the vehicle cannot be stopped but attention is drawn to the occurrence as follows:-

- (a) An 'incorrect toll' alarm is given at the toll monitor unit by visual and aural indication.
- (b) The flashing amber security light for the lane will be energised.
- (c) A discrepancy print-out is made and similar information is displayed on the toll monitor units.

4.9.11 Closing the Lane: The collector may stop the flow of new traffic to the lane by operating the 'lane closed' control on the collector desk which causes:-

- (a) The 'lane open' sign on the entering side of the canopy and the 'lane open' lamp on the collector desk to be extinguished.
- (b) The 'lane closed' sign on the entering side of the canopy and the 'lane closed' lamp at the collector desk to be lit.
- (c) The 'lane ready' and lane identity indication at the tolls monitor unit to be shown in flashing mode.

The collector may then continue with registrations until the lane is cleared, whereupon:-

- (a) He may close the lane barrier.
- (b) If the closure is temporary he may put his cash in the cash drawer, locking it as described earlier, using a padlock for which he alone is responsible and holds the key.

4.9.12 Finishing the Shift: At the end of the duty period and when the lane has been cleared of traffic and closed as described in 4.9.11 above, the collector will remove his identity token from the identity reader. Whereupon the following will occur:-

- (a) The data stored by the lane processor and transmitted to the tolls processor during the shift will be printed out.

- (b) The 'lane ready' indication on the toll monitor units will be extinguished.
- (c) The collectors desk 'operative' light will be extinguished.
- (d) The toll indicator will become inoperative.

The collector will then close the lane barrier (which extinguishes the indication on the toll monitor units showing 'barrier open but no collector keyed-in'), and lock the booth or hand over the booth to an incoming collector.

4.9.13 Axle Detector Pads:

- (a) Each detector system consists of a number of pads as described in the system description with arrangements for switching out of use but allowing registration and recording of vehicles to continue, the axles according to the classification given by the collector being recorded.
- (b) The fact of switching the pads out of use will be indicated at the toll monitor units and the time of switching 'in' and 'out' will be shown on the lane print-out for that shift.

4.9.14 Call Supervisor:

- (a) A collector can contact the control room by pressing the 'call supervisor' switch on the keyboard. This will cause the amber flashing security light for that lane to be energised and the calling lane indicated at the toll monitor unit.
- (b) The call will be cancelled by operating the collector desk button. The button head will 'stay down' and be illuminated when a call is made and released and extinguished when the call is cancelled.
- (c) The supervisor will communicate with the booth by using the communication set.

4.9.15 Toll Booth Security Alarm:

- (a) The collector can make the alarm by operating the foot switch in the base of the collector desk.
- (b) The alarm will be loud hooter at the toll plaza with energisation of the appropriate amber flashing security light for the lane. A continuous buzzer will sound at the toll monitor unit and an

indication of the lane be given at the toll monitor units. The alarm and indications will be cancelled at the toll monitor unit on the control desk.

- (c) In the event of a broken connection between the foot switch and the common circuitry at the surveillance building the alarm will sound.

4.10 Typical Vehicle Classifications

| <u>Class</u> | <u>Vehicle Description</u> | <u>Axes</u> | <u>Toll</u> |
|--------------|----------------------------|--------------|-------------|
| 1 | Motor Cycles and Mopeds | 2 | 3 Baht |
| 2 | Private Cars and Taxis | 2 | 3 " |
| 3 | Light Commercial | 2 | 5 " |
| 4 | Light Commercial | 3 | 5 " |
| 5 | Heavy Commercial | 3 | 5 " |
| 6 | Heavy Commercial | 4 or more | 5 " |
| 7 | Buses | 2 | free |
| 8 | Buses | 3 | free |
| 9 | Nil or Exempt | 2 | free |
| 0 | See below | | |

One additional class is to be left in reserve, this will be class 0. All hardware required to implement this class in the future shall be provided except that the keyboard shall be blanked off.

These descriptions are not final and are subject to discussion during the contract. The charges shown are for testing purposes. Programming, software, etc. shall be in such form as to allow testing to proceed and final decisions on tariff values to be made at a later stage probably during the time of system testing.

APPENDIX 1 Form of Lane Print-Out (Key-Out)

| <u>DATE</u> | <u>TIME</u> | <u>DATE</u> | <u>TIME</u> | <u>LANE</u> | <u>COLL.</u> | <u>REPORT</u> |
|-------------|-------------|------------------|-------------|-------------|--------------|---------------|
| In | In | Out | Out | | | |
| xxxxxx | xxxx | xxxxxx | xxxx | xxx | xxx | xx |
| 1 | 2 | 3 | 4 | 5 | 6 | Class |
| xxx | xxxx | xxx | xxx | xxx | xxx | Vehicles |
| xxx | xxxx | xxxx | xxxx | xxxx | xxxx | Cash |
| xxxx | xxxx | xxxx | xxxx | xxxx | xxxx | Vouchers |
| 7 | 8 | 9 | 0 | | TOTALS | Class |
| xxx | xxx | xxx | xxx | | xxxx | Vehicles |
| xxxx | xxxx | | xxxx | | xxxxxx | Cash |
| xxxx | xxxx | | xxxx | | xxxxxx | Vouchers |
| | | xx Discrepancies | | xx Misreg. | | |

Headings and side titles will not be printed but will appear on overlay.

APPENDIX 2 Form of Misregistration Print-Out

| | Coll. | Date | Time | Lane | | |
|-----|-------|--------|------|------|---|---|
| MIS | xxx | xxxxxx | xxxx | xxx | 3 | 2 |

Misregistration information representing class 3 changed to class 2.

Headings and side titles other than MIS will not be printed but will appear on overlay.

APPENDIX 3 Form of Discrepancy Print-Out

| Coll | Date | Time | Lane | | |
|------|--------|-------|------|----|-----|
| xxx | xxxxxx | xxxxx | xxx | D2 | DIS |

Discrepancy information representing class 5 (3 axles) registered, 2 axles detected.

Headings and side titles other than DIS will not be printed but will appear on overlay.

APPENDIX 4 Form of Unauthorised Passage Print-Out

| Date | Time | Lane | (a) | (b) | |
|--------|-------|------|-----|-----|-----|
| xxxxxx | xxxxx | xxx | xxx | x | UAP |

Unauthorised passage information:-

- (a) Print to be "OOO" when lane closed and collectors number when lane open
- (b) Class entered by the collector will appear in case of violation

Headings and side titles other than UAP will not be printed but will appear on overlay.

APPENDIX 5 Form of Faulty Axle Detector Print-Out

| Date | Time | Lane | (a) | (b) | |
|-------|------|------|-----|-----|-----|
| xxxxx | xxxx | xxx | F.X | S | ADF |

Axle detection information:-

- (a) Fault - Print to show detector number
- (b) Switched out

Headings and side titles other than ADF will not be printed but will appear on overlay.

APPENDIX 6 Form of Transactions in Sequence Print-Out

| | | |
|-------|------|-----------|
| Date | Lane | Collector |
| xxxxx | xxx | xxx |

| Time | Class | Det. Axles | (a) | Time | Class | Det. Axles | (a) |
|------|-------|---------------|-----|------|-------|---------------|-----|
| xxxx | x | x | C | xxxx | x | x | C |
| xxxx | x | x | C | xxxx | x | x | V |
| xxxx | x | x | V | xxxx | x | x | V |
| xxxx | x | x | C | xxxx | x | x | C |

If misregistrations, discrepancies, axles detector faults or unauthorised passage arise on the lane under scrutiny, the sequence will be interrupted while the relevant information is given by the appropriate print-out Nos. 2 to 5

(a) C = Cash or V = Voucher

Headings and side titles will not be printed but will appear on overlay.

APPENDIX 7 Form of Daily Cash Summary Print-Out

| | | | | | | | |
|-------|------|-------|---------|---------|-----|-------|--------------------|
| xxxxx | Date | | xx | Station | | | |
| (a) | (b) | Cash | Voucher | (a) | (b) | Cash | Voucher |
| 01 | xxx | xxxxx | xxxxx | 02 | xxx | xxxxx | xxxxx |
| 03 | xxx | xxxxx | xxxxx | 04 | xxx | xxxxx | xxxxx |
| 05 | xxx | xxxxx | xxxxx | 06 | xxx | xxxxx | xxxxx |
| | | etc. | | | | etc. | (up to 60 entries) |

Cash xxxxxxxx Voucher xxxxxxxx Total xxxxxxxx Revenue

(a) Report Number (b) Collectors Number

Headings and side titles will not be printed but will appear on overlay.

APPENDIX 8 Form of Daily Operating Summary Print-Out

| xxxxx | Date | | xx | Station | | | | | |
|----------|-------|---------|----------|---------|-----|-----|-----|------|--|
| Rep. No. | Coll. | Time On | Time Off | VEH | MIS | DIS | ADF | Lane | |
| xx | xxx | xxxx | xxxx | xxxx | xx | xx | xx | xxx | |
| xx | xxx | xxxx | xxxx | xxx | x | | x | xxx | |
| xx | xxx | xxxx | xxxx | xxx | x | x | | xxx | |
| xx | xxx | xxxx | xxxx | xxxx | | | | xxx | |
| xx | xxx | xxxx | xxxx | xx | xx | x | x | xxx | |
| xx | xxx | xxxx | xxxx | xxxx | | | | xxx | |
| xx | xxx | xxxx | xxxx | xxxx | x | x | | xxx | |
| xx | xxx | xxxx | xxxx | xxx | x | | | xxx | |
| xx | xxx | xxxx | xxxx | xxx | x | xx | x | xxx | |

xx Number of unauthorised passage - "OO" if nil

Headings and side titles will not be printed but will appear on overlay.

APPENDIX 9 Form of Hourly Traffic Record Print-Out

xxxxx Date

| NORTHBOUND | | | | SOUTHBOUND | | |
|------------|------|-------------|-----|------------|-------|---|
| (c) | (b) | (a) | (b) | (c) | | |
| 2 | 310 | xxx | 01 | xx | 225 | 1 |
| 1 | 212 | xx | 02 | xx | 270 | 1 |
| 1 | 98 | | 03 | x | 105 | 1 |
| 1 | 136 | x | 04 | | 95 | 1 |
| 2 | 225 | xx | 05 | | 75 | 1 |
| 2 | 390 | xxx | 06 | xx | 210 | 1 |
| 3 | 509 | xxxxx | 07 | xxx | 330 | 2 |
| 4 | 870 | xxxxxxxx | 08 | xxxxx | 550 | 2 |
| 4 | 890 | xxxxxxxx | 09 | xxxxxxxx | 820 | 4 |
| 4 | 810 | xxxxxxxx | 10 | xxxxxxxx | 933 | 4 |
| 3 | 712 | xxxxxxx | 11 | xxxxxxxx | 970 | 5 |
| 3 | 666 | xxxxxxx | 12 | xxxxxxx | 770 | 5 |
| 3 | 605 | xxxxxxx | 13 | xxxxxxx | 640 | 5 |
| 3 | 605 | xxxxxxx | 14 | xxxxxx | 530 | 4 |
| 4 | 730 | xxxxxxx | 15 | xxxxxx | 560 | 4 |
| 5 | 950 | xxxxxxxx | 16 | xxxxxxx | 680 | 5 |
| 5 | 1092 | xxxxxxxxxxx | 17 | xxxxxxxx | 710 | 5 |
| 5 | 1060 | xxxxxxxxxxx | 18 | xxxxxxxx | 760 | 5 |
| 4 | 847 | xxxxxxxxxxx | 19 | xxxxxxxx | 790 | 4 |
| 4 | 860 | xxxxxxxxxxx | 20 | xxxxxxxx | 840 | 4 |
| 3 | 630 | xxxxxxx | 21 | xxxxxxx | 612 | 3 |
| 3 | 440 | xxxxx | 22 | xxxxx | 612 | 2 |
| 2 | 410 | xxxxx | 23 | xx | 290 | 1 |
| 2 | 322 | xxx | 24 | xx | 250 | 1 |
| TOTALS | | 14279 | | | 12627 | |

* 10 columns, each x = 10% of an agreed range. This range shall be pre-set on the "charge tape".

| | | |
|-----|---|------------------------------------|
| (a) | = | Clock Hour ending |
| (b) | = | Vehicles in the hour |
| (c) | = | Booths open at the end of the hour |

Headings and side titles will not be printed but will appear on overlay.

APPENDIX 10 Form of Twenty Four Hour Summary Print-Out

| | xxxxx | Date | TRAFFIC | | TRA 24 H | |
|--------|---------|--------|---------|---------|-------------------|-------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | Class |
| xxxx | xxxxxx | xxxx | xxxx | xxxx | xxxx | DD + PT + RM +KE |
| xxxx | xxxxxx | xxxx | xxxx | xxxx | xxxx | SH+RS+KW+AN+SO+BN |
| xxxx | xxxxxxx | xxxxxx | xxxxxx | xxxxxx | xxxxxx | Sum |
| 7 | 8 | 9 | 0 | Totals | Class | |
| xxxx | xxxx | xxxx | xxxx | xxxxxxx | DD+PT+RM+KE | |
| xxxx | xxxx | xxxx | xxxx | xxxxxxx | SH+RS+KW+AN+SO+BN | |
| xxxxxx | xxxxxx | xxxxxx | xxxxxx | xxxxxxx | Sum | |

| | xxxxxx | Date | REVENUE | | | | REV 24 H |
|---------|---------|---------|---------|--------|--------|--------|------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 0 | Totals |
| xxxxx | xxxxxxx | xxxxxx | xxxxxx | xxxxxx | xxxxxx | xxxx | xxxxxxx Cash |
| xxxxx | xxxxxxx | xxxxxx | xxxxxx | xxxxxx | xxxxxx | xxxx | xxxxxxx Vouchers |
| xxxxxxx | xxxxxxx | xxxxxxx | xxxxxxx | xxxxxx | xxxxxx | xxxxxx | xxxxxxx Revenue |

Headings and side titles other than TRA 24 H and REV 24 H will not be printed but will appear on overlay.

| | | | | | | | | |
|----|---|-----------|----|---|-----------------|----|---|-----------------|
| DD | = | Din Daeng | PT | = | Petchaburi | RS | = | Riverside |
| RM | = | Rama IV | KW | = | Kasemraj (west) | KE | = | Kasemraj (East) |
| SH | = | Sukhumwit | AN | = | At Narong | SO | = | Soi 62 |
| BN | = | Bang Na | | | | | | |

4.11

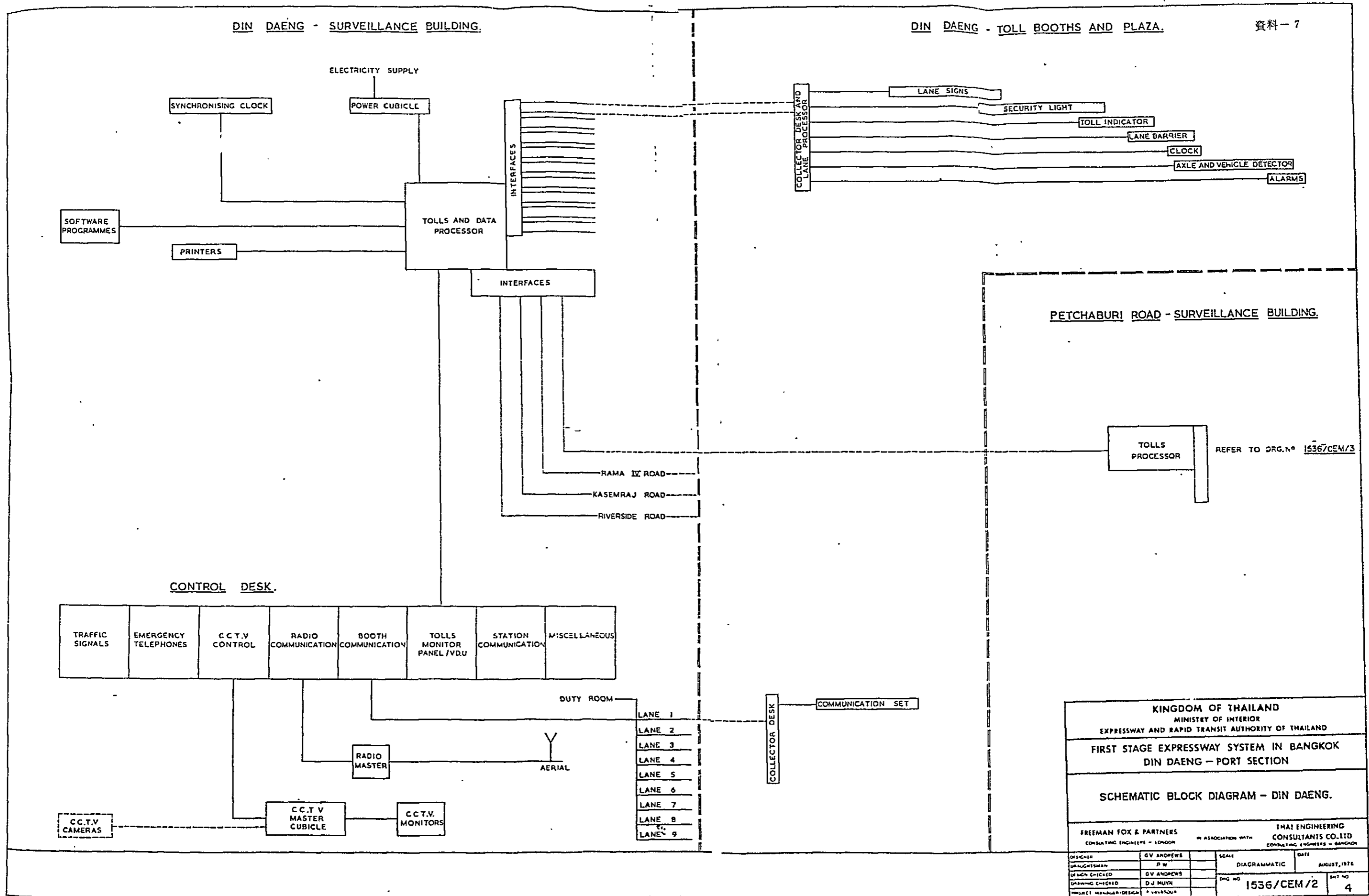
Print-Out Appendices

1. Form of lane print-out
2. Form of misregistration print-out
3. Form of discrepancy print-out
4. Form of unauthorised passage print-out
5. Form of faulty axle detector print-out
6. Form of transaction in sequence print-out
7. Form of daily cash summary print-out
8. Form of daily operating summary print-out
9. Form of hourly traffic record print-out
10. Form of twenty four hour summary print-out

DIN DAENG - SURVEILLANCE BUILDING.

DIN DAENG - TOLL BOOTHS AND PLAZA.

資料 - 7



PETCHABURI ROAD - SURVEILLANCE BUILDING.

TOLLS PROCESSOR

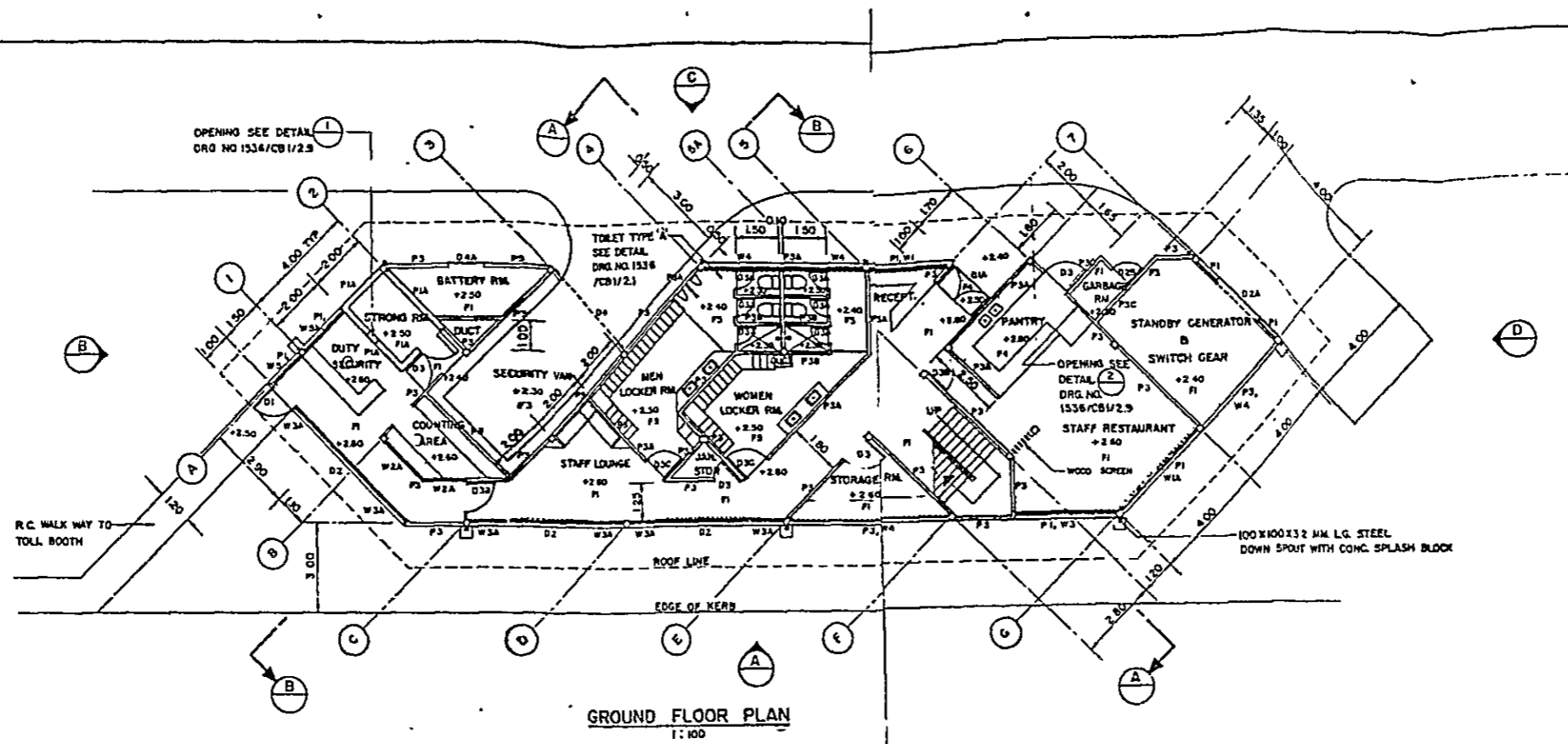
REFER TO ORG. NO. 1536/CEM/3

CONTROL DESK.

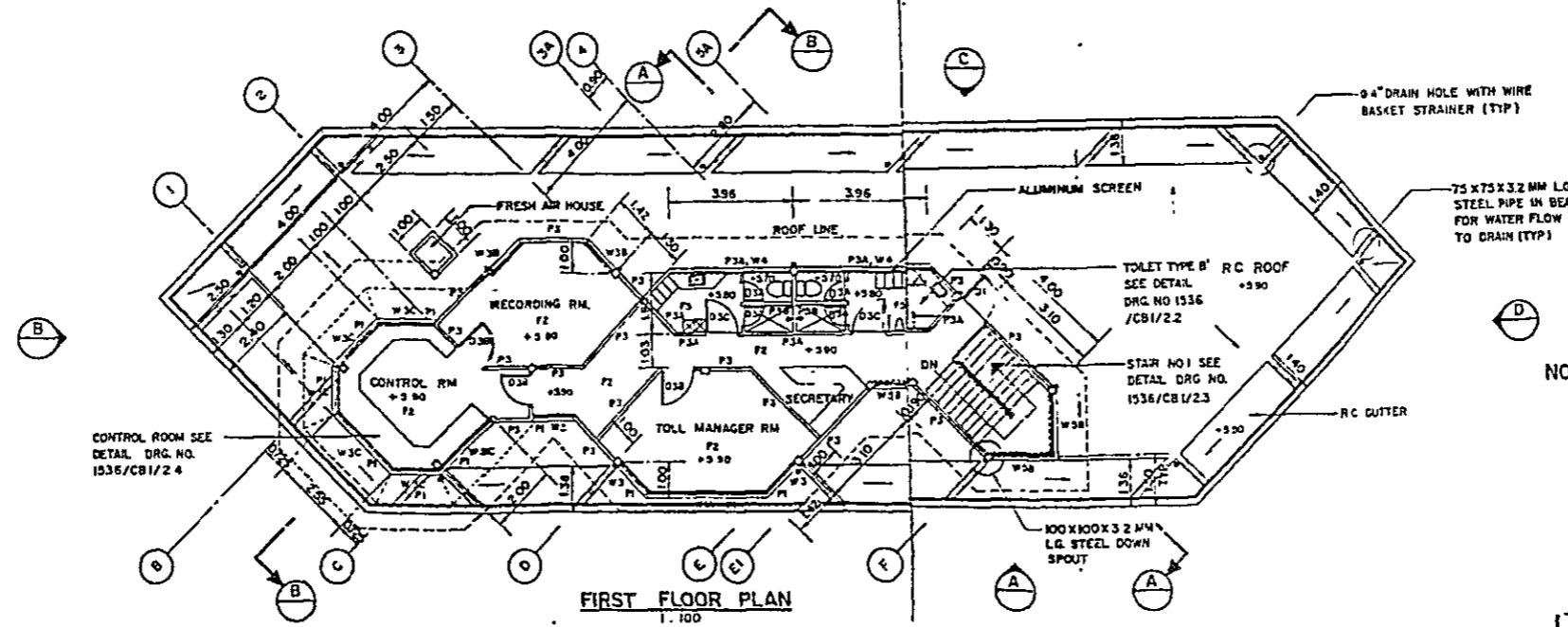
| | | | | | | | |
|-----------------|----------------------|------------------|---------------------|---------------------|--------------------------|-----------------------|---------------|
| TRAFFIC SIGNALS | EMERGENCY TELEPHONES | C.C.T.V. CONTROL | RADIO COMMUNICATION | BOOTH COMMUNICATION | TOLLS MONITOR PANEL /VDU | STATION COMMUNICATION | MISCELLANEOUS |
|-----------------|----------------------|------------------|---------------------|---------------------|--------------------------|-----------------------|---------------|

- LANE 1
- LANE 2
- LANE 3
- LANE 4
- LANE 5
- LANE 6
- LANE 7
- LANE 8
- LANE 9

| | | | |
|---|---|--|--|
| KINGDOM OF THAILAND MINISTRY OF INTERIOR EXPRESSWAY AND RAPID TRANSIT AUTHORITY OF THAILAND | | | |
| FIRST STAGE EXPRESSWAY SYSTEM IN BANGKOK DIN DAENG - PORT SECTION | | | |
| SCHEMATIC BLOCK DIAGRAM - DIN DAENG. | | | |
| FREEMAN FOX & PARTNERS CONSULTING ENGINEERS - LONDON | | THAI ENGINEERING CONSULTANTS CO. LTD CONSULTING ENGINEERS - BANGKOK | |
| DESIGNER DRAUGHTSMAN DESIGN CHECKED DRAWING CHECKED PROJECT MANAGER/DESIGN | G.V. ANDREWS P.W. G.V. ANDREWS D.J. MURPHY P. YAVATON | SCALE DIAGRAMMATIC DWG NO. 1536/CEM/2 | DATE AUGUST, 1976 SHEET NO. 4 |



GROUND FLOOR PLAN
1:100



FIRST FLOOR PLAN
1:100

NOTE :

- ALUMINUM SCREENING SHALL BE PROVIDED FOR THE WINDOWS IN THE AREA WITHOUT AIR CONDITIONING
- AIR CONDITIONING SHALL BE PROVIDED FOR THE FOLLOWING:
 1. CONTROL ROOM
 2. RECORDING ROOM
 3. TOLL MANAGER ROOM
 4. DUTY SECURITY & COUNTING AREA

PANEL SCHEDULE

| MARK | MATERIAL | THICKNESS | FINISHED | | REMARK |
|------|-----------------------|-----------|-------------|--------------|--------|
| | | | OUTSIDE | INSIDE | |
| P1 | REINFORCED CONCRETE | 010 | PAINT | PAINT | |
| P1A | " | 020 | " | " | |
| P2 | CONCRETE BROCK | 009 | " | " | |
| P3 | BRICK WITH PLASTERING | 010 | " | " | |
| P3A | " | 010 | " | GLAZED TILE | |
| P3B | " | 010 | GLAZED TILE | " | |
| P3C | " | 010 | PAINT | ENAMEL PAINT | |

FLOOR SCHEDULE

| MARK | FLOOR MATERIAL | THICKNESS | FINISHED | REMARK |
|------|---------------------|-----------|---------------------|--------|
| F1 | REINFORCED CONCRETE | 010 | TERRAZZO | |
| F1A | " | 020 | " | |
| F2 | " | 010 | VINYL ASBESTOS TILE | |
| F3 | " | 015 | PLAIN CONCRETE | |
| F4 | " | 010 | TERRACOTTA | |
| F5 | " | 010 | MOSAIC TILE | |

ALL DIMENSIONS IN THIS DRAWING ARE IN METER, OTHERWISE INDICATED :

KINGDOM OF THAILAND
MINISTRY OF INTERIOR
EXPRESSWAY AND RAPID TRANSIT AUTHORITY OF THAILAND

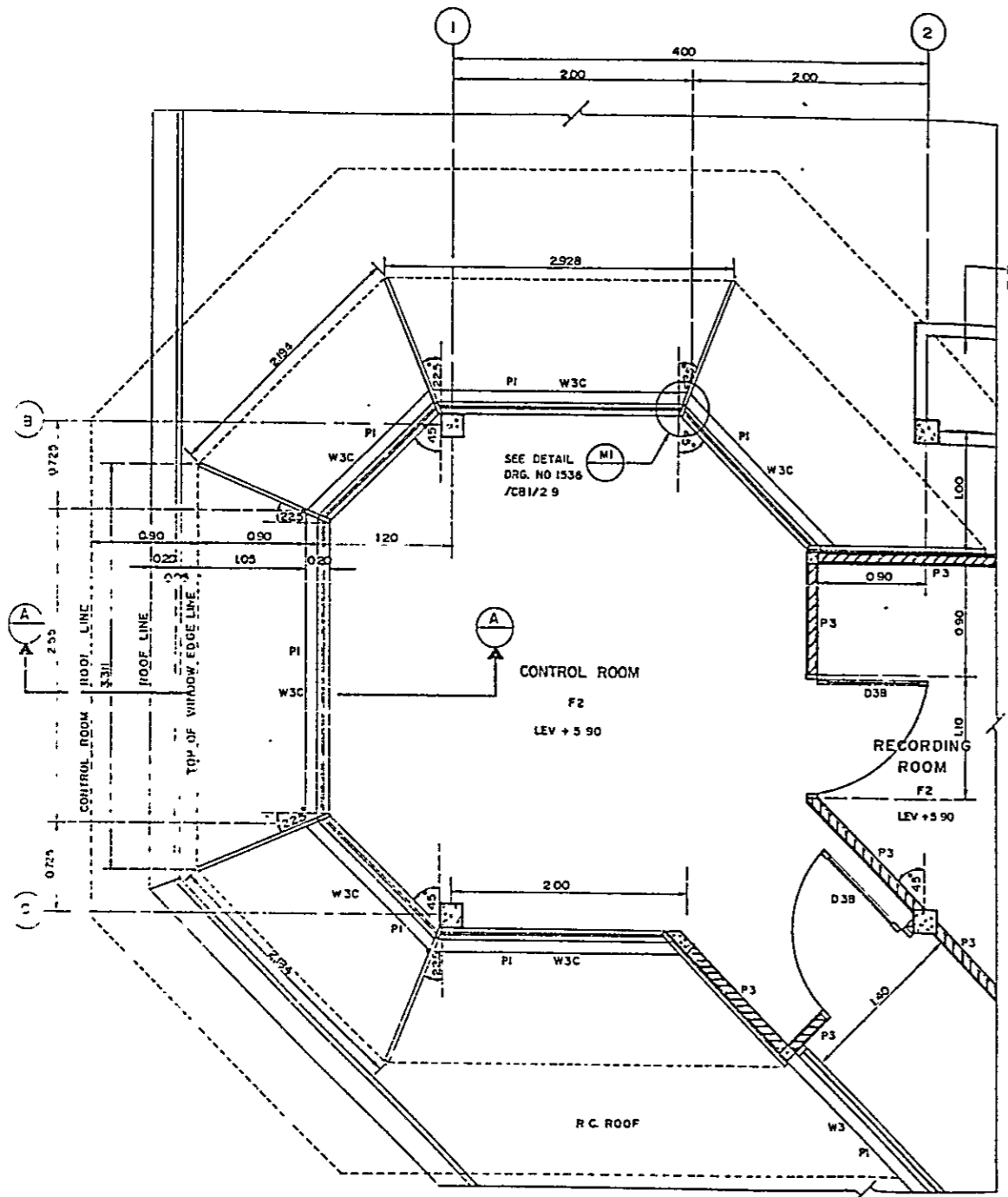
FIRST STAGE EXPRESSWAY SYSTEM IN BANGKOK
DIN DAENG - PORT SECTION

TOLL SURVEILLANCE BUILDING
AT DIN DAENG ROAD INTERCHANGE
GROUND FLOOR AND FIRST FLOOR PLANS

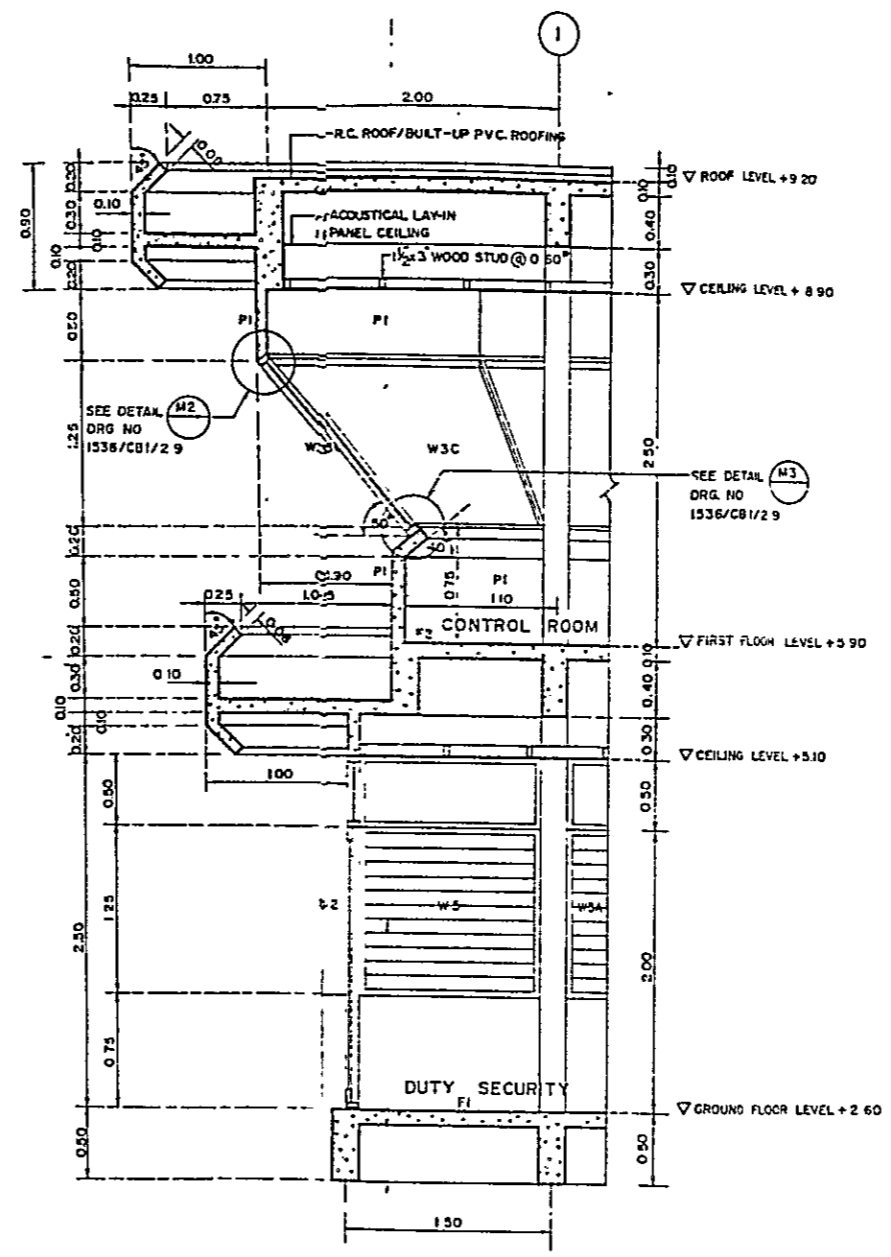
FREEMAN FOX & PARTNERS
CONSULTING ENGINEERS - LONDON

THAI ENGINEERING
CONSULTANTS CO. LTD.
LICENSED ENGINEERS - BANGKOK

| | | | | | |
|------------------------|----------------|-------------|--------------|-----------|--------------|
| DESIGNER | SUTARIN, THANI | SCALE | 1:100 | DATE | AUGUST, 1978 |
| DRAWINGSMAN | THANIT | PROJECT NO. | 1536/CB1/1.2 | SHEET NO. | 41 |
| DESIGN CHECKED | SUTARIN | | | | |
| DRAWING CHECKED | PRASARN | | | | |
| PROJECT MANAGER/DESIGN | P. VAYASORN | | | | |



PLAN CONTROL ROOM
1/25



SECTION A
1/25

ALL DIMENSIONS IN THIS DRAWING ARE IN METERS UNLESS OTHERWISE INDICATED

| | | | |
|---|---------------|---|--------------|
| KINGDOM OF THAILAND MINISTRY OF INTERIOR EXPRESSWAY AND RAPID TRANSIT AUTHORITY OF THAILAND | | | |
| FIRST STAGE EXPRESSWAY SYSTEM IN BANGKOK DIN DAENG - PORT SECTION | | | |
| TOLL SURVEILLANCE BUILDING AT DIN DAENG ROAD INTERCHANGE CONTROL ROOM DETAILS | | | |
| FREEMAN FOX & PARTNERS CONSULTING ENGINEERS - LONDON | | THAI ENGINEERING CONSULTANTS CO. LTD CONSULTING ENGINEERS - BANGKOK | |
| DESIGNER | SUTARN, THAMU | SCALE | DATE |
| DRAUGHTSMAN | WASIAN | AS SHOWN | AUGUST, 1978 |
| DESIGN CHECKED | SUTARN | DWG NO | |
| DRAWING CHECKED | PRASITON | 1536/CB1/2.4 | SHEET NO |
| PROJECT MANAGER/DESIGN | WASIAN | | 44 |

JICA

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