

KERALA PUBLIC WORKS DEPARTMENT MANUAL

PREFACE

1. The need to have a comprehensive departmental manual for the use of the Officers of the Public Works Department and other Civil Engineering Departments of the Kerala State who follow the Kerala Public Works Code rules in the day to day administration and execution of public works has been long felt by Government keeping this in view, Government appointed Sri. M. P. Subramonia Iyer, Executive Engineer, Public Works Department to prepare the Kerala Public Works Department Manual under the advice and guidance of Sri. C. S. Padmanabha Iyer, Retired Chief Engineer, Public Works Department.

2. The Kerala State is perhaps the pioneer in bringing out such a Manual for adoption by the Civil Engineering Departments of the State.

3. The Kerala Public Works Department Manual is an original work and a compendium of practical working instructions to be followed by the rank and file of the Public Works Department and pertains to the investigation, design, estimating, tendering, execution and maintenance of all types of works generally carried out by the various wings of the Public Works Department like Buildings and Roads, Projects, Irrigation etc. It has been compiled with reference to day to day practices adopted in this State and elsewhere and with due regard to various Government Orders and Departmental Circulars issued from time to time. Besides, a special chapter is devoted to the, Duties, Responsibilities and Powers of Officers of various grades both on the clerical and technical side. Apart from this, there are special chapters for Land Acquisition, Stores, Tools and Plant, Budgetting, Electrical works in Government Buildings and execution of works departmentally. Important Government **Orders**, Departmental Circulars, Charts, Standards, Tables etc. are given as Appendices at the end of each chapter.

4. The provisions in the Kerala Public Works Department Manual will not supersede those given in the various codes like Kerala Public Works Department Code, Kerala Public Works Account Code, Kerala Financial Code etc.

5. Every Officer of the Public Works Department engaged in and connected with the execution of Public Works is expected to be conversant with the contents of this Manual and to follow the instructions therein strictly carefully in the discharge of his/her duties.

6. Any errors, omissions or variations from the codes may be brought to the notice of Government for issue of corrections and amendments whenever necessary.

T. V. SWAMINATHAN,

Special Secretary (Public Works).

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ORGANISATION AND SET UP OF THE PUBLIC WORKS DEPARTMENT

1. General.

1.1-1. The P.W.D. is in charge of the design, construction and maintenance of all Public Works undertaken by the State Government, such as Buildings, Roads, Bridges, Irrigation and Navigation Works etc., irrespective of the source of funds for the same. It has also to maintain buildings, roads, irrigation systems and other structures belonging to the State Government even if, in some cases, these were not constructed by this Department.

1. 1-2. With the increase in the tempo of construction and specialisation in several branches, Government have transferred the responsibility for design, construction and maintenance of some classes of works to other departments and agencies such as Public Health Engineering Department.

1. 1-3., The work of the Department is carried out mainly through two branches, viz- the Irrigation Branch and the Buildings and Roads Branch each with an organisational set up covering the entire State. In addition, special branches are created as and when necessary, to take up special works, projects etc. When such special branches are created Government will issue orders regarding allocation of work between the special branch and any other branch, which is affected. General matters, which are common to more than one branch such as Establishment, Workshops, Stores etc., are handled by one of the Chief Engineers (generally the senior most) or divided between the several Chief Engineers as Government may direct.

1. 1-4. The Irrigation branch deals with Major and Minor Irrigation works, Flood control, Inland Navigation, Anti sea Erosion works, Fishing harbours and Marine works, Land Reclamation, Water Resources and Miscellaneous public improvements connected with rivers, water courses etc.

1. 1-5. The B & R branch deals with Public Buildings, including Water Supply and Electrification, Roads, Bridges, and miscellaneous public improvements other than those related to rivers, and water courses.

2. General Organisational Set Up.

1. 2-1. Each branch of the department is under the Administrative control of a Chief Engineer. There will be one or more Superintending Engineers under him each in charge of a circle. Each circle consists of a number of divisions in charge of Executive Engineers. The Divisions are divided into a number of subdivisions in charge of Assistant Engineers and the subdivisions in turn are divided into a number of Sections under charge of Junior Engineers.

1. 2-2. As indicated above, the lowest executive unit of the organisational set up is the section whose jurisdiction may be territorial or functional. In the case of territorial sections, all the works of the particular branch within the area of jurisdiction of the section will be in charge of the Section Officer or Junior Engineer. In the case of sections other than territorial sections, the Section Officer or Junior Engineer will be in charge of specific works or specific functions. For carrying out executive and supervisory functions the section will have the required number of Overseers, Work Superintendents, and other Executive Staff like drivers, operators, etc. Where the section is in charge of departmental execution of works, there will also be the required workers usually under the N. M. R. In addition to executive functions, the Section Officer (Junior Engineer) has to maintain the initial records of all transactions relating to works, supplies and services under his charge and render accounts to his superior authority as prescribed in the rules. For assisting him in the ministerial work there will usually be a clerk attached to his office.

1. 2-3. The work of a number of sections is controlled by a sub-division under the charge of a Subdivision Officer (Assistant Engineer), who generally is vested with powers, within certain limits, to sanction estimates, enter into contracts and make payments. The Assistant Engineer has also to guide subordinate officers in the matter of investigation and preparation of estimates, and take all steps necessary to examine that works under charge of the subdivision are properly executed. He has to maintain and render accounts as prescribed in the rules or orders in force. To assist the Assistant Engineer in the discharge of his duties, necessary ministerial and technical staff are provided in the subdivision offices.

1. 2-4. The main executive unit of the department is the division in charge of an Executive Engineer, who controls the work of all the subdivisions under his jurisdiction. The Executive Engineer is responsible for the proper execution of all works in his division and also in guiding and controlling the subordinate technical officers in regard to investigation, design, estimates etc. He has also powers of sanctioning estimates and entering into contracts within certain limits. As the disbursing officer of the department all payments for works, supplies and services are made in the divisions and subdivisions under him and the Executive Engineer has to render the prescribed accounts to the Accountant General. The division office has generally two branches the Technical (Drawing branch) and Accounts branch. The Technical branch is under a Technical Assistant in the cadre of Assistant Engineer (or under one or more Head Draftsman in the cadre of Junior Engineer) with the necessary complement of technical subordinate staff such as Draughtsman, Tracer etc. The Accounts branch is under the overall control of a Divisional Accountant with necessary ministerial staff.

1. 2-5. The Administrative unit of the department is the circle in charge of a Superintending Engineer who is responsible to the Chief Engineer for the administration and general professional control of public works within his circle. The Superintending Engineer has also powers of sanctioning estimates and entering into contracts within the limits prescribed in the delegation of powers. The Circle Officer will generally have a Personal Assistant of the rank of Assistant Engineer who will assist the Superintending Engineer in the managements of the office and control of the technical branch. There will also be generally a Financial Assistant to assist in financial matters. There will be technical branch and administrative branches with

suitable officers and staff.

1.2-6. The Chief Engineer is the administrative and a professional head of the branch of the department he is in control of and is responsible for its efficient working. He is also the professional adviser to Government on all matters relating to his branch. The Chief Engineer is generally assisted by the Deputy Chief Engineer of the rank of Superintending Engineer. The office organisation will include a design and technical wing under the charge of officers of the rank of Superintending Engineer/Executive Engineer, an Administrative wing under the charge of an Administrative Assistant and a Financial wing under charge of Financial Assistant with necessary officers and staff in each branch. In addition to the above, the Chief Engineer in charge of B & R will have an Architectural wing under the charge of a Senior Architect and an Electrical wing under the charge of an Executive Engineer (Electrical). To deal with matters common to all branches, the Chief Engineer (General), who is in charge of Establishment, will be assisted by an Administrative Officer with necessary complement of staff. The procurement and control of Stores will be dealt within the concerned Chief Engineer's Office by a Stores wing under the control of an Executive Engineer (Stores).

3. Workshops

1.3-1. For the general maintenance and repairs of Tools and Plant and minor structural fabrication work regional workshops are established at 3 places viz., Mavelikara, Chalakudy and Calicut. These workshops are attached to the concerned B & R circle having jurisdiction over the area. Even though the workshops are under the administrative control of the B & R circles they are expected to render service to the Divisions of the other branches of the department when necessary.

1.3-2. In addition to the above regional workshops the workshops attached to Malampuzha Project and the Irrigation Workshop at Alleppey can also be availed of by the various Divisions of the Department for maintenance and repairs of Tools and Plant and for minor structural fabrication. These workshops are under the administrative control of the respective Irrigation Division.

1.3-3. In regard to the major Projects, separate workshops are established as part of the Project work at suitable places. These are generally of a temporary nature and the workshops may be closed after the project work is completed or retained in a reduced scale as a Service Workshop for the operation and maintenance of the completed project. The staff pattern will be dependent on the size and character of the workshop.

1.3-4. A general Engineering Workshop is set up in Trivandrum mainly to function as production shop where major fabrication work such as roof trusses, small sluice gates etc., and manufacture of certain spare parts such as roller wheels etc., are undertaken. This workshop is under a Superintendent of the rank of Executive Engineer who works under one of the Chief Engineers.

4. Stores

1.4-1. The procurement of stores is centralised and made by the Chief Engineer (in charge of

Stores) with the help of the Executive Engineer (Stores) in his office. The stocking and distribution of stores for various divisions are done through district stores one of which is established in each Revenue District. These District Stores are under the charge of Assistant Engineers who are empowered to act as Divisional Officers. The actual custody and accounting of Stores is under the charge of Junior Engineers. The Executive Engineer of Stores in the Chief Engineers Office also exercises overall control of the operation of the various District Stores.

1.4-2. In the case of projects and other works of large magnitude the stocking and distribution of stores are done through one or more separate stores for the project. The operation of each is under the control of an officer of the Project who is either an Executive Engineer or who is empowered to act as a Divisional Officer. The procurement of routine items like cement, steel etc., for the Projects also is arranged through the Executive Engineer (Stores) in the Office of the Chief Engineer in charge of the Stores. Specialised items like spares, etc., are procured by the authority in control of the Project under the normal Stores Purchase Rules.

1.4-3. There is also a small store for Electrical and Radio materials attached to one of the Buildings Division in each B & R Circle. This store is under the Administrative Control of the Executive Engineer of the Buildings division concerned. The actual custody of the Stores is with a subordinate of the Radio Assistant Engineer of the Electrical wing of the P. W. D. who operates the stores and keeps and renders accounts of transactions. The procurement of stores is arranged by the Chief Engineer (B&R) with the assistance of the Executive Engineer (Electrical) in his office.

5. Electrical Works

1.5-1. Each B &- R division has attached to it a Junior Engineer (Electrical) or Assistant Engineer (Electrical) together with necessary subordinate staff for carrying out electrical works of buildings under the charge of the division. Each Buildings Division of the B&R branch has an Assistant Engineer (Electrical) together with a complement of subordinate staff for the same purpose. Where there is no Assistant Engineer (Ele.) attached to a division but only a Junior Engineer (Ele.), the Assistant Engineer (Ele.) of the nearest division will exercise technical control over the Junior Engineer (Ele.). There is an Executive Engineer (Ele.) in the office of the Chief Engineer, B&R who assists the Chief Engineer on all matters concerning Electrical works including preparation of specifications, data, etc.

1.5-2. In Projects and in Irrigation divisions dealing with Lift Irrigation etc., electrical works are carried out through qualified personnel forming part of the organisation of the Project or concerned division. Such personnel will follow the same norms, specifications, data, etc., as are followed in the B&R branch. Where necessary, the services of the Executive Engineer (Ele.) in the Chief Engineers' office can also be availed for advice on matters connected with electrification with the approval of the Chief Engineer, B&R.

6. Radio Wing.

1.6-1. The P. W. D. has to assist the Panchayats and local bodies in testing and installing community radio receiver sets and a testing and installing community radio receiver sets and

arranging repairs thereof. There are three, Radio Assistant Engineers appointed for this purpose one in each circle of the B&R branch. For administrative purposes they work under the Buildings division nearest to their Headquarters. The Radio Assistant Engineers have a complement of subordinate staff of Junior Engineers, Mechanics, etc.,. There is also a small workshop under each Assistant Engineer (Radio) to carry out the tests and repairs.

1.6-2. The Radio Assistant Engineers are also in charge of a few Public Address systems, which are installed and operated by them on occasions as ordered by Government. The Public address system fitted in the Legislative Hall, Trivandrum is also to be maintained and operated by the Radio Wing of the P. W. D.

7. Architectural Wing.

1. 7- 1. There is an Architectural wing in the office of the Chief Engineer B&R consisting of a Senior Architect and Assistant Architects, etc. Though primarily intended for the B&R branch, the assistance of this wing may be availed of for architectural designs in the other branches also whenever needed with the approval of the Chief Engineer, B&R.

8. Peechi Research Station.

1.8-1. There is a research station at Peechi primarily for hydraulic concrete and soil mechanics research. This station is under the control of the Superintending Engineer, Investigation, Research and Planning Circle, Peechi. There is one joint Director also in the rank of an Executive Engineer. There are Deputy and Assistant Directors in charge of various divisions of the Institute. The services of the Institute are available for all branches of the P.W.D. The Institute can also take up research work on behalf of other public bodies etc., subject to such terms as may be prescribed by the Chief Engineer.

9. Establishment

1.9-1. The establishment of the Department can be broadly grouped into Technical and Ministerial branches. Each branch has State Service comprising of Gazetted Officers and a subordinate service comprising of non-gazetted officers. The various services and the categories of officers included therein are given in Appendix 1 (a).

1.9-2. In addition to the above there are several categories of executive employees who were formerly in the work charged establishment. Such persons have also been taken over to the regular establishment but they have not all been grouped and fitted into the branches of services referred to in para 1.9-1. Until this is done they will continue to remain as a separate group.

1.9-3. Officers in the respective services are governed by the rules of recruitment, seniority, promotions, etc., applicable, to the particular service. Special statutory rules have been issued in respect of the following services.

1. Kerala Engineering Service (G. O. Ms. 150/65/ PW dated 17-5-1965)

2. Kerala Engineering Service Ele. Branch (G. O. MS. 25/67/PW dated 3-2-1967)
3. Kerala Engineering Service Radio Branch (G. O. MS. 25/67/PW dated 3-2-1967)
4. Kerala General Service (G. O. (P) 464/PD dated 28-11-1966)
5. Kerala Engineering Subordinate Service (G.O. MS. 1390/PW dated 20-11-1958)
6. Kerala Engineering Subordinate Service - Ele. Branch (G. O. MS. 330/65/PW dated 29.11.65)
7. Kerala Engineering Subordinate Service-Radio Branch (G. O. Ms 26/67/PW dated 3-2-1967)
8. Kerala Last Grade Service [G. O. (P) 82/PW dated 8.3.1966]

In respect of other services until statutory rules are prescribed, recruitment, seniority, promotion, etc., will be based on Executive orders of Government or any other authority delegated by Government to issue such orders.

APPENDIX I (a)

(Referred to in para 1.9.1)

- | | |
|-----------------------------|----------------------------|
| i. Chief Engineer | |
| ii. Superintending Engineer | |
| iii. Deputy Chief Engineer | Kerala Engineering Service |
| iv. Executive Engineer | |
| v. Assistant Engineer | |
| i. Senior Architect | |
| | Kerala Architectural |
| ii. Assistant Architect | |

i.	Electrical Engineer	
ii.	Assistant Engineer (Ele) [including Special Assistant Engineer (Ele.)]	Kerala Engineering Service (Ele. Branch)
i.	Assistant Engineer (Radio)	Kerala Engineering Service (Workshops branch)
i.	Junior Engineer (including Head Draftsman and Dredger Captain)	
ii.	Draftsman/ Overseer I Gr.	
iii.	Draftsman/ Overseer II Gr.	Kerala Engineering Subordinate Service
iv.	Tracer	
v.	Blue Printer	
i.	Architectural Head Draftsman	
ii.	Estimator 1 st Grade	
iii.	Estimator 2 nd Grade	
iv.	Delineator	Kerala Architectural Subordinate Service
v.	Artist	
vi.	Architectural Draftsman	
i.	Junior Engineer	
ii.	Overseer I Grade	
iii.	Overseer II Grade	
iv.	Lineman	Kerala Electrical Engineering Subordinate Service
v.	Assistant Lineman	
vi.	Helper	

i.	Junior Engineer (Radio)	Kerala Engineering Subordinate Service (Radio Branch)
ii.	Radio Mechanic	
i.	Junior Engineer/ Head Draftsman	
ii.	Store Keeper	
iii.	Draftsman I Grade (Including Foreman)	
iv.	Draftsman II Grade	
v.	Tools Keeper	
vi.	Charge hands	
vii.	Tracer	Kerala Engineering Subordinate Service (Workshops Branch)
viii.	Electrician	
ix.	Fitter	
x.	Mechanic	
xi.	Smith	
xii.	Operator	
xiii.	Driver	
xiv.	Oiler	
i.	Administrative Officer	
ii.	Financial Assistant I Grade	
iii.	Administrative Assistant	
iv.	Financial Assistant II Grade	Kerala State Service
v.	Divisional Accountant	
vi.	Senior Superintendent	

- i. Junior Superintendent
- ii. Head Clerk
- iii. Fair Copy Superintendent
- iv. Upper Division Clerk
- v. Upper Division Typist
- vi. Stenographer
- vii. Lower Division Clerk
- viii. Lower Division Typist

Ministerial Subordinate Service

i.	Scientific	
ii.	Information Assistant	
iii.	Canal Officer	
iv.	Steward I Grade	
v.	Steward II Grade	
vi.	Laboratory Assistant	
vii.	Jetty Superintendent	
viii.	Caretaker	
ix.	Lock Superintendent	
x.	Canal Clerk	
xi.	Mechanic I Grade	
xii.	Foreman	
xiii.	Special Officer (Lift Irrigation)	
xiv.	Catter Pillar Driver	
xv.	Sergeant	General Subordinate Service
xvi.	Canal Inspector	
xvii.	Mechanic II Grade	
xviii.	Steam Roller Driver	
xix.	Syrang	
xx.	Modeller	
xxi.	Greaser	
xxii.	Maistry	
xxiii.	Gate Sergeant	
xxiv.	Boat Driver	
xxv.	Head Gardener	
xxvi.	Attender	
xxvii.	Laboratory Attender	

DUTIES, RESPONSIBILITIES AND POWERS OF OFFICERS OF THE P. W. D.

2. 1. In this chapter, the terms 'Duty' 'Responsibility' and 'Power' will have the meanings given below unless there is anything repugnant to the context or meaning.

'*Duty*'.-means what an officer should do or should cause to be done, in the discharge of his official obligation.

'*Responsibility*'.-means what an officer is answerable for either solely or jointly with such of his subordinates as are also concerned.

'*Power*'.--means the authority to take decision on a particular matter and implement the same in accordance with rules or orders on the subject.

2.2. The duties and responsibilities of some of the officers of the department are given in Appendices attached. As regards other officers they should continue carry out such duties and hold such responsibilities as at present based on existing rules, orders of superior officers and or conventions until they are modified.

2.3. In the different chapters of this manual, among other things, the duties and responsibilities of various officers in regard to the subject matter dealt with in the chapter are given in detail. These are also to be considered as part of the duties and responsibilities of the different officers even if a specific mention of the same is not made in Appendices attached.

2.4. In addition, the following should be considered as part of the duties of every officer of the department.

(a) Every offices should, if called upon by his superior officers carry out as a temporary measure, in addition to his duties and responsibilities, those of another officer who is on leave or otherwise not available.

(b) If an officer has to be absent from his post on leave or for other reasons, he, or his superior officer should make necessary arrangement., for the conduct of the work in the absence of the officer.

(c) Every officer should bestow adequate care on the protection of Government property entrusted to his charge.

(d) Every officer should guide and control the work of his subordinates.

(e) Every officer should carry out such work as he may he called upon to do from time to time by Government or the Chief Engineer.

(f) Every officer must safeguard the interest of the State particularly, in emergencies and unforeseen circumstances.

(g) Every officer should co-operate with other officers of the departments and officers of other departments wherever necessary for the proper conduct of Government business.

(h) P. W. D. Officers in charge of works should see that the provisions of the safety code and protection arrangements are strictly observed. Inspecting officers should pay particular attention to this matter.

(i) Wherever necessary, adequate fencing or other means of isolating, weak spots in structures under use should be provided until the weakness is removed. In addition warning notices should also be displayed.

(j) In respect of structures under maintenance of the P. W. D. vulnerable portions should be inspected and if any weakness is noticed steps should be taken urgently to strengthen or replace the weak portions of the structure. Chief Engineers should issue appropriate detailed instructions in this regard applicable to various types of structures like buildings, bridges and culverts, roads, dams, other irrigation works etc.

(k) An accident will be considered a major one, if it-

(i) involves loss of life or

(ii) involves serious injury to any person

(iii) involves loss of property likely to cost Rs. 1 lakh or more

(iv) would cause serious disruption of normal life in the area affected, such as by interruption to main lines of communication etc.

2.5. In case a major accident involving structures under construction or under maintenance by P. W. D. occurs, the following procedure should be followed.

(a) The Work Superintendent or Subordinate in charge should inform the Junior Engineer and Assistant Engineer and Executive Engineer of the accidents by the quickest possible means. The Police Inspector having jurisdiction over the area should also be informed in cases of death or serious injury to person and in cases where criminal cases may be involved.

(b) The Junior Engineer and Assistant Engineer concerned should, on receipt of information about the accident either through message from Work Superintendent or through any other source proceed to the spot within the shortest time possible and either organise or assist in rescue operations. The Assistant Engineer or in his absence the Junior Engineer should send a telegraphic or similar message to the Executive Engineer, the Collector of the District, the Superintending Engineer and Chief Engineer briefly giving details of the accident. Where the accident involves electrocution, the Electrical Inspector should also be informed.

(c) The Executive Engineer on receipt of information either from the Work Superintendent or Assistant Engineer or Junior Engineer, should send a telegraphic or similar message to the Secretary to Government, Public Works Department giving brief details of the

accident. He should also proceed to the spot within 24 hour, of the accident or in as short a time as possible and hold a preliminary enquiry on the cause of the accident etc. and submit a detailed report to the Superintending Engineer and the Chief Engineer within 3 days of the completion of the enquiry. This enquiry should be independent of any Police enquiry in the matter.

(d) The Superintending Engineer should, on receipt of information through inspect the site within 3days or as short a time as possible and ascertain personal enquiry the causes of the accident, the adequacy of relief measures, and also find out best means of restoring normal activities in the affected area. His report should be sent to Chief Engineer independently of the Executive Engineer's report within 3 days after his inspection.

(c) The Chief Engineer should inspect the site within a week of the occurrence or as early as possible and make such personal enquiries as he feels necessary in order to furnish a full report of the accident to Government, detailing the causes, the action taken thereafter and action to be taken to restore normalcy in the area. In addition, this report should contain information as to whether there is prima facie negligence or dereliction of duty on the part of any Government servant and if so, make recommendations regarding disciplinary proceedings to be taken against the delinquents.

POWERS

2. 6. The powers delegated to the various officers of the department in regard to administration, technical and financial matters are given in Appendices attached. In addition to the above, the following powers must be considered as inherent in the exercise of the duties of each job

(a) When an officer has to control the work of other Officers under him he has the right to guide, instruct and direct the subordinate officers in regard to the performance of their duties, and.

(b) Should there be any disobedience, malingering, insolence, etc, it is open to the officer controlling him to initiate disciplinary proceedings after reporting the matter to the higher authority.

(c) If there is obstruction in the discharge of the duties of any officer by an outsider, it will be proper for the officer to have the obstruction removed either directly or with the help of the police.

APPENDIX II (a)

Delegation of Powers to the Officers of Public Works Department

<i>Sl No</i>	<i>Officer to whom delegated</i>	<i>Nature of power delegated</i>	<i>Government order delegating the powers</i>
1	2	3	4
		ADMINISTRATIVE POWERS	
1	The Chief Engineer	<p align="center">Appointments & Transfers</p> <p>To sanction appointments up to and including the lowest gazetted post, subject to Public Service</p> <p>Recruitment Rules.</p> <p>To order transfers and postings of all officers whom he is competent to appoint.</p> <p>Leave</p> <p>To sanction all kinds of leave except study leave and special disability leave to officers under him and also to make arrangements for additional charge and sanction charge allowance under Rule 53 (b)(ii) and (iii), K. S. Rs.</p> <p>Creation of Posts</p> <p>To sanction creation of part-time contingent posts and to make appointments to such posts.</p> <p>Change of Headquarters on working arrangement</p> <p>To detach officers from one office and fix another office as their headquarters as a working arrangement for a period not exceeding six months depending on the</p>	<p>G. O (P) 248/PD. dated 24-4-1962</p> <p align="center">do</p> <p align="center">do</p> <p align="center">do</p> <p align="center">do</p>

		<p>exigencies of Public Service. In such instances, they are empowered to authorise the payment of T. A. and meet the M. O. Commission for sending their pay where found necessary.</p> <p>Tours</p> <p>To make tours outside the State in the adjoining districts of neighbouring States after intimating Government and to sanction advance T. A. 15 days before the actual journey.</p> <p>To sanction advance T. A. to the subordinate officers 15 days before the actual journey is to be performed, on condition that the amount will be refunded immediately if the journey is subsequently disallowed by Government. In cases where Government so order after the officer had made all arrangements, cancellation charges, if any, paid by the officer will be borne by Government</p> <p>Punishment</p> <p>To impose penalties of censure and withholding of increments on the various officers serving under him.</p> <p>Recovery from pay</p> <p>To effect recovery from pay of officers up to and including the lowest gazetted posts.</p> <p>To sanction House Construction Advances of N.G.Os</p>	<p>G.O. (P) 248/PW dated 17.6.1968</p> <p>G.O. (MS) 194/PW dated 13-7-1965</p> <p>do</p> <p>G. O. (MS) 254/64/0&M dated 18-7-1964.</p>
		FINANCIAL POWERS	

		<p>Works</p> <p>To issue administrative sanction to original works up to Rs. 5 lakhs.</p> <p>To issue technical sanction to original works without any monetary limit.</p> <p>To issue initial sanction to estimates of maintenance works.</p> <p>To sanction contribution works up to Rs. 2 lakhs.</p> <p>To issue administrative sanction for electrification works up to Rs. 1 lakh</p> <p>To issue technical sanction for electrification works without any monetary limit.</p> <p>To issue technical sanction for municipal works without any monetary limit subject to the limits prescribed in the Kerala Municipalities Rules.</p> <p>To sanction investigation of schemes costing upto Rs. 25,000.</p> <p>To sanction excess over estimates and sanction for revised estimates up to Rs. 5.000 or 35% whichever is higher.</p> <p>Tenders</p> <p>To accept tenders without any monetary limit.</p> <p>To accept tenders in excess of original estimate without monetary limit in individual items subject to an overall maximum of 15%.</p> <p>To waive calling of tenders up to Rs. 25,000.</p> <p>Payment of bills</p> <p>To sanction payment of bills without</p>	<p>G. O. (P) 128/PW dated 17-6-1968</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p>
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		monetary limit.	
		Lease	do.
		To lease usufructs and trees without monetary limit	
		To sanction auction of right for conduct of ferries, canteens, etc. including confirmation, without monetary limit.	G. O. (P) 128/PW dated 17.6.1968
		Survey Report	do.
		To sanction survey reports of unserviceable articles including Tools & Plants and Plants and improvements in acquired lands and trees (both living and dead) without monetary limit.	
		To sanction survey reports of buildings without monetary limit.	do.
		Stores & Machinery	do.
		To sanction purchase of Tools and Plants charged to works without monetary limit.	
		To sanction purchase of other Tools and, Plants (except vehicles) without monetary limit.	do.
		To sanction purchase of materials other than Tools and Plants without monetary limit.	do
		To sanction Tools and Plants estimates - repairs and carriage without monetary limit.	do
		Miscellaneous	
		To sanction repairs to motor vehicles, vans, cars and jeeps up to Rs. 5,000 at a time and other motor vehicles up to Rs. 10,000 at a time.	do
		To sanction valuation of buildings without monetary limit.	

	<p>To issue rent certificate without monetary limit.</p> <p>To sanction write off of stores up to Rs. 1000 at a time</p> <p>To sanction refund of revenue without any monetary limit.</p> <p>To sanction reappropriation up to Rs. 1 lakh.</p> <p>To sanction renting of private building up to Rs. 500.</p> <p>To sanction local purchase of stationery up to Rs. 250 at a time, subject to the annual limit of Rs. 2,500.</p> <p>To sanction purchase of books without monetary limit.</p> <p>To sanction purchase of furniture without monetary limit, subject to budget provision and subject to the condition that the standards prescribed with regard to the items of furniture for each member of staff are followed.</p> <p>To sanction printing of forms, pamphlets, notices, etc., up to Rs. 200 and subject to the annual limit of Rs. 1,500 and subject to the schedule of rates prescribed by the Superintendent of Government Presses.</p> <p>To sanction advertisement charges without monetary limit subject to the rates approved by the Director of Public Relations.</p> <p>To sanction photographic charges up to Rs. 250.</p> <p>To sanction contingent expenditure.- (non-recurring) up to Rs. 1000 in each case.</p> <p>To sanction demurrage charges including</p>	<p>do.</p> <p>do.</p> <p>do</p> <p>do</p> <p>do</p> <p>do</p> <p>do</p> <p>do</p> <p>G. O. (P) 283/Fin dated 8-7-1965.</p>
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		<p>wharfage up to Rs. 500.</p> <p>To sanction shifting of Telephones.</p> <p>Miscellaneous</p> <p>To sanction all cases of reimbursement of medical expenses subject to the conditions and limitations under the Government Servants' Medical Benefit Rules, 1965</p> <p>To sanction all cases of temporary withdrawals both in normal cases and in cases requiring special sanction and non-refundable withdrawals from Provident Fund Deposits subject to the other conditions and limitations under the Rules of the Fund.</p> <p>To execute agreements in respect of advances sanctioned under the schemes for the grant of house construction in the case of N. G. Os. under his administrative control.</p> <p>To execute assignments and reassignments of insurance policies offered as collateral security by N. G. Os. under his administrative control.</p> <p>To execute release deeds in respect of properties mortgaged to Government by N. G. Os. under his administrative control.</p> <p>To sanction expenditure on repairs to motor vehicles by approved workshops up to RS, 2,000 in each case without any annual limit.</p> <p>To sanction investigation of' arrear claims except claims which cannot be verified by audit owing to the limited period of preservation of records.</p> <p>To replace minor parts of departmental motor vehicles under his control upto Rs. 20 at a time without inspection and certificate by the Assistant Engineers of the Regional Engineering Workshop subdivisions.</p>	<p>do.</p> <p>Notification No. 695301 M3/64 PD. dated. 22-2-1965.</p> <p>do.</p> <p>G. O. (P) 311/PD dated 19.9.1967</p> <p>G.O. (P) 31/68/Fin. dated 22-1-1968</p> <p>G. O. (MS) 32/PW. dated 17.2.1969</p>
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		<p>Fund.</p> <p>Confidential Records.</p> <p>To record opinion about members of the staff in their Confidential Reports and prepare the Confidential Records of the Superintendents and Administrative Assistants and submit them direct to the Chief Engineer.</p> <p>Vigilance Officer</p> <p>The Administrative Officer being the Vigilance Officer of the Department will attend to the entire vigilance work in the P.W.D. including O&M work.</p> <p>Disciplinary powers</p> <p>To institute disciplinary proceedings against those whom he is competent to appoint.</p> <p>Miscellaneous</p> <p>To dispose of papers of a routine nature.</p> <p>To address Government on routine matters and to communicate with Government on all matters on the lines of the Chief Engineer's orders.</p> <p>To address the Accountant General direct in all matters except in cases where the provisions of the concerned Acts or Rules there under require that the orders and instruments have to be signed by the Chief Engineer himself.</p> <p>To organise and distribute work in the headquarters unit in respect of staff whom he is competent to appoint.</p> <p>To conduct fortnightly review of the "Register of Establishment Audit objections" and to conduct monthly inspection of the "Register of Draft Para".</p>	<p>do</p> <p>do</p> <p>do</p> <p>do</p> <p>do</p> <p>do</p> <p>do</p> <p>do</p>
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		To conduct administrative inspection of all offices in the P.W.D. and forward reports with review thereof to the respective Chief Engineer.	do
		FINANCIAL POWERS	
		<p>To incur non-recurring contingent expenditure up to Rs. 500 in each case subject to budget provision and in accordance with the Rules in- the Kerala Financial Code.</p> <p>To sanction investigation of arrear claims which are not more than 5 years old, excluding time-barred claims.</p> <p>To sanction purchase of items of furniture from P. W. D. Workshop or any Government agency subject to budget provision and according to the standards prescribed.</p> <p>To sanction purchase of stationery locally in urgent and unforeseen cases up to Rs. 50 in each case, subject to a maximum of Rs. 250 per annum</p> <p>observing Stores</p>	<p>G. O. (Ms) 162/PW dated 3-8-1967</p> <p>do</p> <p>do</p>

		<p>Purchase Rules.</p> <p>To sanction reimbursement of medical expenses of subordinates subject 10 rules.</p> <p>To write off unserviceable articles including damaged and worn out articles, books etc., in the headquarters unit up to a book value of Rs. 100 in each case, subject to an annual limit of Rs. 1.000.</p> <p>To countersign T. A. bills of non-technical Gazetted Officers in the headquarters unit below the rank of the Administrative Officers.</p> <p>To sanction T. A. bills for December and previous months preferred after March of the succeeding years</p> <p>To exercise the powers of the Chief Engineer regarding temporary withdrawals from Provident Fund Deposits of subordinates in the Department.</p>	<p>do</p> <p>do</p> <p>do</p> <p>do</p>
		ADMINISTRATIVE POWERS	
3	Deputy Chief Engineer	To sign Increment Certificates of non-gazetted technical staff of the headquarters unit.	G. O. (Rt) 930/PW dated 27-4-1968

4	Superintending Engineer	<p>Appointments and Promotions</p> <p>To make appointments on the sanctioned non-gazetted establishments of the Circle.</p> <p>To make appointments of menials charged to office contingencies in sanctioned posts.</p> <p>Punishments</p> <p>To dismiss, downgrade, suspend and discharge or accept the resignation of any officer whom he is competent to appoint subject to the procedure laid down by Government in the matter of disciplinary action against Government servants while inflicting any of the punishments.</p> <p>Leave</p> <p>To grant earned leave to all subordinates except Divisional Officers and Sub divisional Officer and casual leave to all officers under him. He may also post them for special duty for definite periods when the exigencies of service necessitate such postings, provided the total strength of the particular cadre is not thereby exceeded. He is also competent to recommend removals and transfers of Divisional Officers from his Circle.</p> <p>To issue administrative sanction to original works upto Rs. 2 lakhs.</p> <p>To issue technical sanction for Minor Irrigation works up to Rs. 15 lakhs and Rs. 10 lakhs in other works.</p> <p>To sanction contribution works up to Rs. 50,000.</p> <p>To issue administrative sanction for electrification works up to Rs. 25,000.</p> <p>To issue Technical sanction for electrification</p>	<p>K. P. W. D. Code para 15</p> <p>Para 15 (iv) K.P.W.D.Code.</p> <p>G. O. (P) 128/PW dated 17-6-1968</p> <p>G. O. (P) 128/PW dated 17-6-1968</p> <p>do.</p>
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	<p>works up to Rs. 25,000.</p> <p>To issue technical sanction for Municipal Works up to Rs. 10 lakhs, subject to the limits prescribed in the Kerala Municipalities Rules.</p> <p>To sanction investigation of schemes costing up to Ra. 1 0,000.</p> <p>To sanction excess over estimates and sanction for revised estimates up to Rs. 2,500 or 25% whichever is higher.</p> <p>To accept tenders without any monetary limit.</p> <p>To accept tenders at the rate of overall 10% and individual 50%.</p> <p>To sanction waiving of tender calls up to Rs. 20,000.</p> <p>To sanction payment of bills without monetary limit.</p> <p>To sanction auction of right for conduct of ferries, canteens, etc. including confirmation, without monetary limit.</p> <p>To sanction Survey Report of unserviceable articles including Tools and Plants and improvements in acquired lands and trees (both living and dead) up to Rs. 25,000 based on book value or value in land acquisition award wherever available and if not available on value, as assessed by the Executive Engineer concerned.</p> <p>To sanction Survey Reports of buildings up to Rs. 25,000 based on book value or value in land acquisition award, and if not available, on value assessed by the Executive Engineer concerned.</p> <p>To sanction purchase of Tools & Plants charged to work up to Rs. 2 lakhs, subject to Stores Purchase Rules and subject to budget provision.</p>	<p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>G. O. (P) 128/PW</p>
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	<p>To sanction purchase of other Tools & Plants up to Rs. 25,000 subject to Stores Purchase Rules and subject to budget provision.</p> <p>To sanction purchase of materials other than Tools & Plants up to Rs. 10,000 at a time subject to Stores Purchase Rules.</p> <p>To sanction Tools & Plants estimates-repairs and carriage without monetary limit.</p> <p>To sanction repairs to vans, cars and jeeps up to Rs, 1,000 at a time.</p> <p>To sanction repairs to other vehicles up to Rs. 2,000 at a time.</p> <p>To sanction valuation of buildings up to the value of Rs. 10 lakhs.</p> <p>To issue rent certificate without monetary limit.</p> <p>To sanction write off of stores up to Rs. 1,000 at a time</p> <p>To sanction write off of irrecoverable amounts up to Rs 1,000 a time.</p> <p>To sanction refund of revenue without monetary limit only in cases where it is clear that the Government are not entitled to the amounts.</p> <p>To sanction reappropriation without monetary limit.</p> <p>To sanction renting of private buildings up to Rs. 300.</p> <p>To sanction local purchase of stationery up to Rs. 100 at a time and subject to annual limit of Rs. 1,500.</p> <p>To sanction purchase of books up to Rs. 250 subject to annual limit of Rs. 1,000.</p>	<p>dated 17.6.1968</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do</p> <p>do</p> <p>do.</p>
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		<p>To sanction purchase of furniture up to Rs.500 subject to annual limit of Rs. 5,000 and subject to budget provision and on condition that the standards prescribed with regard to the items of furniture for each member of staff are followed.</p> <p>To sanction printing of forms, pamphlets, notices, etc. up to Rs. 150 subject to annual limit of Rs. 1,000 and subject to the schedule of rates prescribed by the Superintendent of Government Presses.</p> <p>To sanction advertisement charges without monetary limit, subject to the rates approved by the Director of Public Relations.</p> <p>To sanction photographic charges up to Rs. 100</p> <p>To sanction non-recurring contingent expenditure upto Rs. 500 in each case.</p> <p>To sanction demurrage charges including wharfage upto Rs. 100.</p>	<p>do.</p> <p>do</p> <p>do</p>
5	Personal Assistant to the Superintending Engineer, Minor Irrigation Circle, Trivandrum	<p>Provident Fund</p> <p>To sanction second and third advances from General Provident Fund up to Rs. 750 to the staff working in the circle office</p>	G.O. (Rt) 1943/PW dated 15-11-1968.
6	Executive Engineer	<p>Appointments & Promotions</p> <p>To make appointments against sanctioned last grade posts in the division permanent or temporary subject to Public Service Recruitment Rules and Public Service (Cons.) Regulations and to appoint through Employment Exchange part time or seasonal work Establishment employees against sanctioned posts in accordance with rules and orders applicable for recruitment through Employment Exchange.</p>	G.O.(P) 86/73/PW dated 30.4.1973

		<p>To make appointments of menials charged to office contingencies in sanctioned posts.</p> <p>Punishment</p> <p>To dismiss, downgrade, suspend, retire under rules discharge or accept the resignation of any officer whom he is competent to appoint, subject to the procedure laid down by the Government in the matter of disciplinary action against all Government servants while inflicting any of the punishments. In very serious cases of fraud he may exercise the power to suspend the section officer provided however that all such cases are reported to the Chief Engineer for ratification.</p> <p>To remove N.M.R. workers of P.W.D. from rolls.</p> <p>Leave and transfer</p> <p>To grant leave to any officer whom he is competent to appoint, to sub overseers, and to A the members of his office establishment except the divisional office manager and casual leave to all officers under him. To transfer within his own division all subordinates whom he is competent to appoint as also supervisors, overseers, sub-overseers and assistant draftsmen</p> <p>To sanction payment of gratuity to N. M. R. workers</p>	<p>Part 34 of KPWD Code</p> <p>Memorandum No. EB1-58549/60/PW dated 14-12-1960</p> <p>Para 34 of the K.P.W.D Code.</p> <p>G. O. (MS) 116/PW dated 7-4.1965</p>
		FIANCIAL POWERS	
		<p>To issue administrative sanction to original works upto Rs. 1 lakh</p> <p>To issue technical sanction-to original works upto Rs. 2 lakhs.</p> <p>To sanction estimates of maintenance Works in all cases where initial sanction will be issued by the Chief Engineer, subject to the special</p>	<p>G. O. (P) 128/PW dated 17-6-1968</p>

	<p>concerned.</p> <p>To sanction Survey Reports on buildings up to Rs. 10,000.</p> <p>To conduct auction on all sanctioned survey reports above Rs. 3,000 and to confirm it on the spot if the bid amount is not less than 75% of the value.</p> <p>To purchase Tools and Plant charged to works upto Rs. 1 lakh subject to Stores Purchase Rules and subject to budget provision.</p> <p>To purchase other Tools and Plants up to Rs. 5,000 subject to Stores Purchase Rules and subject to budget provision.</p> <p>To purchase materials other than Tools and Plants up to Rs. 2,500 at a time subject to Stores Purchase Rules.</p> <p>To sanction Tools & Plants estimates,-repairs and carriage up to Rs. 2,000.</p> <p>To sanction repairs to motor vehicles such as vans, cars and jeeps upto Re. 500 at a time.</p> <p>To sanction repairs to other motor vehicles up to Rs. 1,000 at a time.</p> <p>To sanction valuation of buildings costing up to Rs. 2 lakhs.</p> <p>To issue rent certificate up to Rs. 200.</p> <p>To sanction refund of revenue without monetary limit in cases where it is clear that the Government are not entitled to the amounts.</p> <p>To sanction reappropriation of funds up to Rs. 10,000.</p> <p>To sanction renting of private buildings up to</p>	<p>G.O. (Ms) 126/PW dated 29-6-1968</p> <p>G. O. (P) 128/PW dated 17-6-1968</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p>
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		<p>Rs 100.</p> <p>To purchase articles of stationery locally up to Rs. 50 subject to the annual limit of Rs. 500.</p> <p>To purchase books upto Rs. 100 subject to the annual limit of Rs. 500.</p> <p>To purchase items of furniture up to Rs. 250 subject to the annual limit of Rs. 2,000 and subject to the budget provision and to the condition that the standards prescribed for each member of staff are followed.</p> <p>To sanction printing of forms, pamphlets, notices etc., upto Rs. 100 subject to the annual limit of Rs.500and subject to the schedule of rates prescribed by the Superintendent of Government Presses.</p> <p>To sanction advertisement charges without monetary limit subject to the rates approved by the Director of Public Relations.</p> <p>To sanction photographic charges upto Rs. 50.</p> <p>To sanction non-recurring contingent expenditure upto Rs. 200 in each case.</p> <p>To sanction demurrage charges including wharfage upto Rs. 25.</p> <p>To order shifting of his office telephone.</p> <p>To sanction temporary withdrawals from Provident Fund up to Rs. 750.</p>	<p>do.</p> <p>G. O. (Ms) 92/PW dated 15-4-1966</p>
		ADMINISTRATIVE POWERS	
7	Assistant Engineer	<p>Leave.</p> <p>To grant all kinds of leave except study leave and disability leave to all N. G. Os. in the subdivision, except junior Engineers, Overseers Grade 1 and U. D. Clerks, and casual</p>	<p>Para 39of the K. P. W. D. Code</p>

		<p>leave to all officers under him.</p> <p>Punishment.</p> <p>To enquire into cases of suspension against N. M. R. workers.</p> <p>To place the N.M.R. workers out of job for one month and also to reduce their rank in the seniority list.</p> <p>To conduct annual inspection of the Service Books of N.M.R workers.</p> <p style="text-align: center;">FINANCIAL POWERS</p> <p>To issue administrative sanction for original works up to Rs.10,000.</p> <p>To issue technical sanction to original works up to Rs.20,000.</p> <p>To issue administrative sanction to electrification work up to Rs.1,000.</p> <p>To issue technical sanction to electrification works up to Rs.1,000.</p> <p>To issue technical sanction to Municipal works up to Rs.20,000 subject to the limits prescribed in the Kerala Municipalities Rules.</p> <p>To pass excess over estimates and sanction for revised estimate up to Rs.100 or 5% whichever is higher.</p> <p>To accept tenders up to Rs.20,000.</p> <p>To accept tenders at the rate of overall 5% and individual 10% in excess of the original estimate.</p> <p>To sanction waiving of tender calls up to Rs.1,000.</p> <p>To order payment of bills up to Rs.2,500 in respect of first and final bills and up to</p>	<p>Memorandum No 58549/EBI/60/PW dated 14-12-1960</p> <p>do</p> <p>G. O. (P) 128/PW dated 17-6-1968</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p>
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		Rs.10,000 in respect of intermediate bills.	
		To leave usufructs and lands up to Rs.1,000 at a time.	do.
		To sell in auction the right for conduct of ferries canteens etc., including confirmation up to Rs.1,000.	do.
		To sanction Survey Report of unserviceable articles including Tools & Plant and improvements in acquired lands and trees (both living and dead), based on book value or value in land acquisition award wherever available and if not available, on value as assessed by the Executive Engineer concerned.	do.
		To sanction Survey Report of buildings up to Rs.2,000 based on value in land acquisition award and if not available, on value assessed by the Executive Engineer concerned.	do.
		To conduct auction on sanctioned Survey Reports up to Rs.3,000 and to confirm it on the spot if the bid amounts is not less than 75% of the value.	do.
		To purchase Tools & Plants charged work up to Rs.1,000 subject to Stores Purchase Rules and subject to budget provision.	
		To purchase materials other than Tools and Plants up to Rs.100 at a time subject to Stores Purchase Rules.	
		To purchase other Tools and Plants up to Rs.250 subject to Stores Purchase Rules and subject to budget provision.	do.
		To sanction Tools and Plants estimates, repairs and carriage up to Rs.100.	
		To sanction repairs to motor vehicles such as vans, cars and jeeps up to Rs.100 at a time.	
		To sanction repairs to other motor vehicles	G. O. (P) 126/PW

		<p>up to Rs.200 at a time.</p> <p>To sanction valuation of buildings up to Rs.20,000.</p> <p>To issue rent certificate up to Rs.50.</p> <p>To purchase articles of stationery locally up to Rs. 10 subject to the annual limit of Rs. 100</p> <p>To purchase items of furniture up to Rs. 1 00 subject to the annual limit of Rs. 1,000 and subject to budget provision and the condition that the standards prescribed with regard to the items of furniture for each member of staff are followed.</p> <p>To sanction printing of forms, pamphlets, notices etc. up to Rs. 50 and subject to the annual limit of Rs. 300 and subject to the schedule of rates prescribed by the Superintendent of Government Presses</p> <p>To sanction advertisement charges up to Rs. 100 subject to the rates approved by the Director of Public Relations.</p> <p>To sanction photographic charges up to Rs. 25</p> <p>To sanction non-recurring contingent expenditure up to Rs. 50 in each case.</p> <p>To sanction shifting of his office telephone</p>	<p>dated 29-6-1967</p> <p>G. O. (P) 128/PW</p> <p>dated 17-6-1968</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p> <p>do.</p>
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			do.
			do.
			do.
			do.
			do.
8	Assistant Engineer Regional Engineering Workshop subdivisions	<p>To scrutinise repair bills of all departmental vehicles received from approved private workshops.</p> <p>To fix the upset value of unserviceable vehicles of all Departments</p> <p>To inspect and issue certificates to the effect that parts of departmental vehicles are not fit for further use</p> <p>To include private workshops in or exclude from the approved list of workshops for the purpose of repairs of Government vehicles.</p> <p>To conduct periodical inspection of the workshops in their respective jurisdiction.</p> <p>To execute the bilateral agreement with the</p>	<p>G. O. (Ms) 63/PW dated 11-3-1966</p> <p>G. O. (Rt.) 118/PW dated 24-10.1966</p> <p>do</p> <p>G. O. (Ms) 176/PW dated 7-3-1903</p>

		<p>approved workshop and to be custodians of the agreement.</p> <p>To attend to the work of petrol-testing of Departmental motor vehicles.</p>	<p>G. O. (Ms) 7/PW dated 7-1-1969</p>
9	Junior Engineer	To conduct auction on sanctioned Survey Reports up to Rs..500 and to confirm it on the spot if the bid amount is not less than 75% of the value	G. O. (Ms) 126/PW dated 29-6-1967

APPENDIX 11 (b)

DUTIES AND RESPONSIBILITIES OF WORK SUPERINTENDENTS

1. When a Work Superintendent or other Technical subordinate is posted to the supervision of works, carried out on contract he must exercise proper care over the execution on the works and in particular attend to the following:

(a) See that the plans and specifications are followed in the execution of each item of work. Assist in setting out or in checking setting out of the structure.

(b) Check the quality of materials on arrival at site and at the time of usage on work to see that they comply with specifications.

(c) Watch the proportion of ingredients in mortars, concrete etc. and see that they are as per standards specified for the particular item of work concerned.

(d) Check and see whether the workmanship in the execution of work is good.

(e) Check whether proper care and protection is taken to avoid accidents or danger to workmen and third parties or to adjacent properties.

(f) Watch whether the general conditions of contract are faithfully observed by the contractor.

(g) In the event of violation of any of the items (a) to (f) above, report the matter to the Junior Engineer then and there and abide his orders.

(h) Keep work spot order book as per rules.

(i) Keep an account of the daily usage of departmental materials of the work and record the same in work spot order book.

(j) Take charge of unserviceable or dismantled materials obtains during the execution of a work and arrange for their disposal as ordered b higher officers.

(k) Keep a watch over the proper use of tools and plant if an issued to contractor.

(1) Carry out any instructions received from higher officer from time to time regarding proper execution of the work.

2. When a Work Superintendent or other Technical subordinate is posted to supervise execution of works through departmental labour, his duties will also include the following:

(a) Rendering assistance to the Junior Engineer or higher officers in setting out the work.

(b) Sending timely intimation to the Junior Engineer of the requirements of materials, Tools and Plant etc. so that there is no interruption or slackening due to lack of these.

(c) Receiving, temporarily storing, accounting and issuing departmental materials required for execution of the work.

(d) Receiving, temporarily storing and issuing departmental Tool' and Plant to the labour as and when required and returning then to the store or such other place as directed by the Junior Engineer when the Tools and Plant are no longer required.

(c) Mustering the labour twice every day and keeping the NMR as per rules.

(f) Allotting work to individual workmen or groups of workmen in such a manner as will ensure efficient performance of the work.

(g) Taking such protective measures as are necessary to ensure safety of workmen and third parties as also of properties -likely to be affected by the execution of the work.

(h) Keeping a close watch of the performance of the work and if necessary re-arrange work and/or regroup workers to improve performance.

(i) Maintaining a record of the out turn of work every day, including issues of departmental materials if any, periods of working of departmental machinery if any was employed. All this information may be noted down in a work spot order book and the duplicate and triplicate copies of the same sent as Daily Reports.

(j) Assisting the Junior Engineer or other departmental officer in disbursing wages to the workmen after identifying them.

(k) Carry out any instructions received from higher officers from time to time regarding execution of work.

3. When a Work Superintendent or other Technical Subordinate is posted to the general charge of the maintenance of certain Roads, Bridge Canals or Buildings or other structures, then his duties also will include,:

(a) Making systematic examination of the various works under his charge and reporting the condition and maintenance requirements to the Junior Engineer.

(b) Where urgent: steps are to be taken either for protection of property or life or restoring communications, as for instance prevention of breaches in canals or flood banks, cutting and removing fallen trees from roads etc. these should be arranged then and there and the fact reported to the Junior Engineer and Assistant Engineer. Departmental labour should as far as possible be employed for such purpose.

(c) Supervising maintenance works and keeping accounts of materials used, departmental Tools & Plant employed etc.

(d) Control the work done by watchmen, ferrymen, lascars and other such persons who are to work under the . Work Superintendent's direction.

(e) Carry out supervisory and other duties on original or maintenance works done on roads, buildings or other structures under his charge in accordance with paragraphs (1) & (2).

4. When a Work Superintendent is posted to the charge of maintenance of an irrigation work or system, he should in addition to carrying out duties of supervision of works etc., vide paras 1, 2 & 3 also carry out the following duties.

(a) Arrange and supervise operation of sluices, surpluses, intakes, lock gates etc. at such times and in such manner as per general or special instructions of superior officers.

(h) Examine carefully the various parts of the structures or portions of canals under his charge at close intervals and report to higher authorities any signs of weakness, damages etc.

(c) Watch whether the distribution of water for irrigation is in accordance with orders of superior officers and take steps to correct irregularities if any noticed after making report of the same.

5. General

The Work Superintendent should assist the departmental officers in all matters regarding execution of works, investigation and preparation of estimates, taking measurements,

investigation on matters referred to in petitions from public, making plans and collection of details of structures for valuation purposes, or issue of stability certificates or fair rent etc.

DUTIES AND RESPONSIBILITIES OF OVERSEERS

1. Overseers are employed either for supervision of works or for survey and investigation or for technical work in offices

2. When employed for supervision of works, their duties will be similar to what has been detailed in respect of Work Superintendents. It may sometimes happen particularly in important work that Overseers and Work Superintendents are both posted for supervision in the same work at the same time. In such cases, the more important item of work should be under the charge of the Overseer or Overseers while the comparatively less important item must be dealt with by Work Superintendents. The senior most officer posted at any work site for direct supervision will be the officer who should, in addition to supervision, co-ordinate the work of other subordinates.

3. When Overseers are posted for survey and investigation, checking, setting out etc., they will be responsible for the correctness of the survey work, leveling or any other field work or collection of data entrusted to their charge.

4. An Overseer posted for technical work in an office will have the responsibilities and duties are analogous to a Draftsman in the concerned office. (These duties are noted separately).

DUTIES AND RESPONSIBILITIES OF JUNIOR ENGINEERS

1. A Junior Engineer posted in charge of a section is responsible for:

(a) The proper execution of all works in his section or under his charge, In particular this will include:

(i) Setting out or checking the same to see that works are carried out according to approved plans.

(ii) Quality control- (see para 7-2 Chapter) "Execution of works through contractors".

(iii) Forecasting and reporting the requirements of materials, Tools and Plant etc. required for works sufficiently early so that they could be arranged for and got supplied in time.

(iv) Taking and recording measurements and assisting in check measurements.

(v) Scrutinising contractor's bills and recording accounts of materials issued for works.

- (vi) Watching the progress of works and taking steps to remove bottlenecks if any.
 - (vii) Ensuring, in the case of contract works, that all the conditions of contract are properly observed and taking appropriate action if any of these is violated.
 - (viii) Keeping close watch of Departmental works and taking necessary steps for efficient performance of the same.
- (b) The up keep and maintenance of structures under his charge.
- (c) Survey and Investigation and collection of all field data necessary for construction of new works or alterations and additions to existing works or maintenance of existing structures which fall within his jurisdiction.
- (d) Seeing that subordinate executive staff are posted in the required places and that these persons are well acquainted with their duties.
- (c) Controlling the work of subordinate staff.
- (f) The safe custody and rendering proper account (as per rules) of cash, materials, scientific instruments, Tools and Plant etc. entrusted to him or which pass through the section accounts.
- (g) Making arrangements for claiming and disbursing pay and allowances etc., for all subordinate staff and labour as per rules.
- (h) Arranging urgent necessary action in case of an emergency to protect life and Government property.
- (i) Furnishing information required in so far as they relate to his section, to answer interpellations in the Assembly, Parliament etc.
- (j) Making on the spot enquiries and submitting reports on matters referred to the junior Engineer by superior officers.
- (k) Making timely arrangements for disposal of unserviceable or surplus materials, Tools and Plant, Scientific instruments etc.
- (1) When called upon to do so preparing and, submitting valuation report of buildings and structures.
2. When a Junior Engineer is posted to the charge of an Irrigation Section, he is also responsible for
- (a) The proper distribution of water for Irrigation and the operation of various sluices, gates etc. under his charge subject to any general or special instructions issued in this regard by higher officers.

(b) Closely watching the progress of cultivation of lands irrigated from sources under his control so as to assess the water requirements of different areas from time to time.

3. When a junior Engineer is posted to the charge of a B & R Section he is also responsible for.

(a) The inspection and issue of annual fitness certificate to school buildings situated within his jurisdiction.

(b) Inspection and furnishing of details necessary for issue of stability certificates of buildings when called upon.

(c) Inspection preparation of plans and collecting required data for the working out of fair rent of buildings when called upon to do so.

(d) Inspection and report of the stage of progress of buildings built with the aid of loans from Government.

4. When a Junior Engineer is posted as Custodian of Stores, he is responsible for:

(a) Receiving articles ordered to be stocked in stores, verifying the quality with specifications, and the quantity as per the order and keeping them under safe custody in suitable places in the Stores. 1

(b) Recording measurements of such receipts and completing the goods received sheet and Bin Card in accordance with the rules.

(c) Ensuring proper storage of articles in the stores by taking necessary precautions to prevent deterioration due to storage, damages due to fire and other hazards and loss due to unauthorised removal of stores.

(d) Ensuring the accuracy of measuring instruments like weighing balances, tapes etc., by frequent checks and adjustments.

(e) Ensuring that only articles covered by proper indents and approved by the Stores Officer are issued out of the stores and that the issue is made to the person authorised to receive the same.

(f) Keeping proper accounts and submitting proper returns as per rules of the receipts, issues and balances of different articles.

(g) Arranging, for taking delivery of goods consigned to the stores and authorised to be received therein, from railway stations, harbour, transporting agents premises etc., in accordance with general or special instructions without causing delay, demurrage or any avoidable expenses.

(h) Controlling the work of labour employed in handling of stores within the stores premises and keeping such account records as are necessary and prescribed from time to time for any payment that may have to be made to the labourer either directly or indirectly.

(i) Bringing, to the notice of higher authorities articles which are in short supply so that action may be taken for procurement of the same in time.

(j) Reporting to higher authorities the availability of surplus articles, which have not been, indented for the last 6 months or more so that steps may be taken for their early disposal.

(k) Bringing to the notice of higher authorities cases where articles are likely to get deteriorated.

(l) Frequently inspecting the different stores to detect deterioration of articles if any and if so to arrange for their disposal as per rules.

(m) Controlling the work of subordinates in the Stores.

(n) Verifying bills pertaining to Store transactions and processing the same in accordance with rules.

DUTIES AND RESPONSIBILITIES OF ASSISTANT ENGINEERS

1. An Assistant Engineer in charge of a subdivision is responsible for the proper execution of all works in the subdivision. This will include:

(a) Arranging contracts within his powers following the prescribed rules.

(b) Forecasting the requirements of important materials to be supplied departmentally and making arrangements to procure them according to prescribed rules.

(c) Forecasting requirements of various Tools and Plant.

(d) Checking and approving setting out of works.

(e) Inspecting and passing foundations of structures with open type foundations, excepting massive structures like dams.

(f) Conducting soil bearing and other tests where necessary as per general or special instructions.

(g) Personally supervising important items of works like reinforced concrete etc. which should be arranged to be done in his presence.

(h) Ensuring quality control.

(i) Giving suitable guidance to subordinates in regard to works under construction.

(j) Watching and taking steps to see that progress as per programme is maintained.

(k) Administering the contract to ensure that the terms and conditions are adhered to.

(l) Cheek measuring works as per rules.

(m) Scrutinising and passing bills and making payments as per rules.

(n) Obtaining timely orders regarding deviations from and additions or deletions to the works as per sanctioned estimates if found necessary during execution and taking follow up action by submission of Revised Estimate, Deviation Statement etc,

(o) Maintaining the prescribed accounts and furnishing the concerned account returns to the appropriate authorities as per rules and instructions.

(p) Where Departmental work is undertaken., giving guidance in the matter of deployment of available labour and recruitment of fresh labour where unavoidable.

(q) Watching performance of work by departmental labour and giving timely instructions where necessary.

(r) Passing departmental labour rolls and ensuring prompt payment.

2. The Assistant Engineer is also responsible for conducting proper investigation and preparing Plans and Estimates for new works in accordance with general and special instructions in this regard. This will include:

(a) Giving suitable directions to subordinates regarding information to be collected and nature and extent of survey work to be done.

(b) Checking site surveys, levels, nature of soil, sub soil, result of borings and all field data.

(c) Verifying information about source and availability of principal construction materials and certifying the conveyance involved.

3. The Assistant Engineer is also responsible for the proper maintenance of structures under his charge and this should include:

(a) Periodically inspecting the structures particularly the vulnerable parts in accordance with general or special instructions in this regard.

(b) Initiating timely action for special repairs where these are needed to prevent deterioration of structures under maintenance.

(c) Making arrangements for the execution of maintenance works according to predetermined timetable to suit the conditions.

(d) Maintaining standard measurement books as prescribed in rules with regard to items of works regularly required to be done.

(e) Wherever any operations are involved as for instance in ferry service or sluice gates etc., ensuring that the operations to be carried out are in accordance with the designed scheme.

4. The Assistant Engineer is responsible for the administrative control of the subordinates in his subdivision and this will include the following:

(i) See that subordinates staff and labour as required are posted in the concerned sections and if any vacancies exist, move for the same being filled up while at the same time make interim arrangements for carrying on the work.

(ii) Periodically examine the adequacy or otherwise of subordinate executive staff and labour and move for additional staff or for transfer of surplus staff according to circumstances.

(iii) Control the work of the subordinate staff and see that lapses in regard to proper discharge of duties by any such personnel are dealt with promptly according to rules.

(iv) See that the subordinate staff and labour are paid their dues promptly.

(v) Periodically examine whether Government materials, Tools and Plants etc., under control of his subdivision are properly looked after and where necessary take steps to correct inadequacies.

5. When an Assistant Engineer is in charge of a subdivision Controlling Inland Navigation he should also function as a Canal Officer and carry out all the duties and responsibilities attached to that post as prescribed in the Act and Rules applicable to his jurisdiction.

6. When an Assistant Engineer is posted as Stores Officer he is responsible for the proper functioning of the Stores under his control. This will include:

(i) Ensuring that adequate and suitable accommodation is available for the various articles to be stored.

(ii) Ensuring security for the Stores through suitable watch and ward arrangements.

(iii) Forecasting requirements of different articles to be stocked and taking timely action for the procurement of the same in accordance with rules or instructions in this regard.

(iv) Placing orders for supply of articles in accordance with rules or instructions and processing all orders either made by himself or by superior authority so that all the requisite procedures are completed in time for receipt of articles.

(v) Making arrangements for transport and handling of articles from points of supply such as Railway Station, Harbour etc. to the Stores through Contract or otherwise.

- (vi) Making arrangements for handling of stores within the, store premises.
- (vii) Check measuring articles received.
- (viii) Giving suitable instructions to custodians of stores and other subordinates regarding operation of the stoics.
- (ix) Scrutinising the indents received and passing them for issue or otherwise dealing with them in accordance with rules and taking follow up action through invoice etc.
- (x) Passing and payment of bills connected with stores transactions in accordance with rules.
- (xi) Frequently inspecting the stores and making surprise checks of few articles in the stores now and then and taking follow up action based o such cheeks.
- (xii) Taking timely action to prevent deterioration if any of the items stocked in the stores.
- (xiii) Arranging disposal of unserviceable articles as per rules.
- (xiv) Maintaining accounts as per rules and rendering the required accounts to the Accountant General and other authorities as per rules.

DUTIES AND RESPONSIBILITIES OF EXECUTIVE ENGINEERS

1. The Executive Engineer is responsible for the proper execution of all works under his charge. For this purpose he should take timely action to:

- i. get estimates prepared and sanctioned.
- ii. move and obtain possession of land required for the execution.
- (c) forecast and take steps to provide required materials and Tools and Plant for departmental work and for meeting departmental obligation in contract work.
- (d) inspect works during execution and give instructions where required.
- (e) invite tenders and make contract arrangements as per rules.
- (f) provide adequate staff for proper supervision.
- (g) arrange periodical payments and watch expenditure.
- (h) deal with such other matters as may be found necessary for proper execution.

2. He is also responsible for the proper maintenance and upkeep of al structures under the maintenance charge of the division. In particular, hi should see that.

(a) the structures are systematically and carefully inspected by himself or through his subordinates particularly vulnerable portions thereof.

(b) timely action is taken to carry out essential works to prevent deterioration.

(c) regular maintenance works are carried out at the appropriate time.

3. In regard to new works, the Executive Engineer is responsible for guiding and controlling proper investigation, and design of works and preparation of estimates.

4. As the disbursing officer of the department in regard to works, supplies and services under his charge he has to exercise proper control over the expenditure on these items in accordance with the rules and orders in force and render proper accounts for the same to the Accountant General in the prescribed manner. His responsibility in this regard is detailed in the K. P. W. A. Code.

5. The Executive Engineer should exercise administrative control over in the entire establishment of his division and regulate the establishment expenditure in accordance with rules and orders in force. He should also conduct periodical inspections of the subdivision offices under his control at least once in an year with a view to see that the administration of the subdivision is carried on properly in accordance with rules and or special instructions.

6. As an ex-officio member of the District Development Council, the Executive Engineer should keep the council informed about the progress of works and other activities of his division and also give technical advice on matters connected with works if called upon. He should keep the Superintending Engineer informed of the decision of the council in regard to matters concerning his division.

7. In the case of Executive Engineer in charge of Project and in other special cases, the control of some stores may vest with the Executive Engineer. He should then exercise all the controls required in the matter of procurement, stocking, issuing and accounting of stores as a Divisional Officer in charge of stores.

8. Executive Engineers posted to Irrigation division in charge of maintenance of Irrigation works should in addition to maintenance proper control the operation of the irrigation works in accordance with approved rules of operation and the requirements of the benefited land.

9. Executive Engineers posted to divisions controlling Inland Navigation should supervise and control the work of the Canal Officers and officers concerned in this matter in accordance with the Act and Rules applicable to the area.

10. The Executive Engineer is responsible for the collection, remittance and accounting of P. W. D. Revenue realisable through the Division. He has to maintain proper D. C. B. statements and furnish quarterly statements to the Accountant General in respect of irrigation revenues, which is collected through Revenue authorities. The Executive Engineers are also required to furnish to the Revenue authorities list of completed works. He should exercise proper control to see that the dues to Government are collected and remitted in time and leakages are prevented.

11. In case of emergencies such as when serious natural calamities occur, the Executive Engineer should assist the Districts Collector and other authorities in protecting life and property threatened with damage within the limit of his jurisdiction.

DUTIES AND RESPONSIBILITIES OF SUPERINTENDING ENGINEER

A Superintending Engineer in charge of a circle has to exercise Administrative and Technical control over the various divisions under his jurisdiction in order to ensure efficient functioning of the departmental activities in that circle. His responsibilities will include.

1. Issue of appropriate instructions in regard to investigation for new works wherever necessary.

2. Giving guidance in the matter of design to be followed for major works or works of a complicated nature.

3. Periodically revising the schedules of rates in the various division subject to discretion of the Chief Engineer where required.

4. Scrutinising estimates and revised estimates, supplemental estimate requiring sanctions of authorities higher than the Executive Engineer and sanctioning them or seeking sanction therefore in accordance with the delegation of powers

5. Inviting tenders and arranging contracts of works, supplies etc, in accordance with rules and the delegation of powers.

6. Periodically inspecting all important works and also works which require his guidance in the matter of execution, Inspections should be purposeful and should cover examination of quality, progress, difficulties execution etc. Inspection notes should be prepared in the form given in App. XVI (C) of the Chapter on Execution of works through contractor and sent to the Chief Engineer.

7. Planning, and arranging supplies of departmental materials to be supplied for various works, Tools and Plant to be provided etc.

8. Distributing funds allotted as lump sum between various divisions according to rules.

9. Watching expenditure against budget grant as a subordinate controlling officer and taking timely steps to move for reappropriations, surrender of funds or supplemental grant as may be found necessary.

10. Ensuring that sanctioned staff is made available in the various offices etc. under his jurisdiction by recruitment, promotion, transfer or otherwise as per rules.

11. Inspecting the division offices under his jurisdiction annually with a view to see that the work of the divisions is carried out efficiently. The inspection should cover the following:- and results of such inspection noted in the questionnaire attached.

- (i) The adequacy of staff in the division.
- (ii) The distribution of technical and ministerial staff.
- (iii) Reasons for not filling up sanctioned posts in time.
- (iv) The adequacy of scientific and mathematical instruments and their condition.
- (v) The adequacy of Tools and Plant and the staff to man them.
- (vi) Forecast of requirements of departmental materials and steps taken to procure them through the division.
- (vii) Adequacy of arrangements for conveyance of the required materials from the Stores to different work sites.
- (viii) List of works in which land acquisition will be involved and action taken in each case.
- (ix) Number of budgeted work, for which estimate have to be prepared and sent and steps taken.
- (x) Works started without adequate funds and steps taken to regularise.
- (xi) Works started without Administrative sanction or Technical sanction.
- (xii) Review of expenditure vis-à-vis budget provision with regard to under various heads.
- (xiii) Stage of Investigation of new works number of new works to be investigated etc.
- (xiv) Test check of design, and estimate etc., sanctioned by Executive Engineer.
- (xv) Adherence to type designs wherever necessary
- (xvi) Case study of estimates, which have exceeded by more than with a view to eliminate such excesses in future estimates.
- (xvii) Safety precautions taken for works
- (xviii) Examinations of various registers like Revenue Registers, Acquittance Roll etc.
- (xix) Test check of entries in service books and verification of leave sanctioned etc.
- (xx) Review of overtime allowances paid, if any.
- (xxi) Examination of wages paid if any, with reference to rules of Factory Act.

(xxii) Verification of building maintenance register, road charts, etc.

(xxiii) Adequacy of Labour gang, in different sections of roads.

(xxiv) Availability of sufficient number of quarries.

(xxv) Review of road traffic statistics.

(xxvi) Review of pending replies if any to remarks of Audit Reports, Inspection Reports and Public Accounts Committee, Estimates Committee, etc.

(xxvii) Review of Inspection notes of the Executive Engineer of subordinate offices.

12. Controlling the matters connected with the establishment under his jurisdiction such as leave, transfers and postings, promotions, disciplinary action etc.

13. Collecting and coordinating all necessary information for the preparation of budget estimates of the circle under his jurisdiction.

14. Giving technical advice or opinion on matters within his jurisdiction referred to him by Government, other heads of department etc.

15. Direct relief and protection measures to be taken with the resources available under his jurisdiction in the event of unforeseen calamities like flood, fire etc. In the event of such work being organized by other departments, cooperating with such work to the extent necessary.

16. Suggesting measures for improving the technical and administrative efficiency of the department taking into account the technical development, which have taken place and other relevant matters.

QUESTIONNAIRE

(Vide item 11 under Superintending Engineer)

1. Is the division having adequate staff? if not, indicate where it is deficient.
2. Are the technical and ministerial staff distributed properly according to requirements?
3. Are there sanctioned posts left vacant; if so why?
4. Are there sufficient number of scientific and mathematical instruments? Are they in good working condition? If there is deficiency indicate the same.
5. Are the tools and the plant and the staff to man them adequate?

6. Have steps been taken to forecast and procure the requirements of departmental materials through the District Stores ?
7. Are the arrangements for conveyance of the required materials from the stores to different work sites adequate?
8. Has action been taken and followed up in all cases where land acquisition is involved? If not indicate cases where delays are noticed.
9. Have estimates been prepared for all budgeted works; if not what are the steps taken ?
10. Have steps been taken to regularise works started without adequate funds? Give details.
11. Are there works started without Administrative Sanction or Technical Sanction? If so give details and reasons.
12. Has a Review of expenditure vis-à-vis budget provision been made with regard to works under various heads? If so where performance budget has been introduced, has the review of the performance been made in accordance with the performance budget?
13. Have estimates been prepared and sanctioned for all budgeted works? If not, indicate the present position regarding estimates as given below:
 - (a) No. of works not yet investigated,
 - (b) No. of works investigated and in the design stage.
 - iii. No. of works where estimate is under preparation or scrutiny.
 - (d) No. of works where investigation design or estimate is held up on account of some special reasons.
14. Has a test check of the designs approved by the Executive Engineer been made? If so, are these in accordance with standards followed in the Department? Where type designs are available are these being adopted?
15. Are there cases where the actual cost of work has exceeded or is likely to exceed the Sanctioned Estimate by more than 50%? If so, make a case study and indicate the principal reasons for the excess and how such large excess can be avoided in future.
16. Have all safety precautions been taken in the works under execution ?
17. Have the various registers like Revenue Register Tender Register, Building maintenance register, Acquittance roll been examined? What are the general conclusions after a review of the register?
18. Are service books kept up-to-date?

19. Has a test check of overtime allowances paid been made? If so, does this disclose any abnormalities or irregularities?
20. Has a test check been made regarding wages of workers to whom Factory Act is applicable ? If so does this disclose any irregularity?
21. Has the Executive Engineer inspected the Subdivision office and Stores if any under his control during the year? If so review any one of the infection registers of the Executive Engineer and indicate the findings.
22. Are labour gangs in different sections of roads adequate?
23. Are sufficient number of quarries available?
24. Is road traffic statistics conducted and details kept in proper form?
25. Are there pending replies to remarks of Audit reports, inspection reports and public accounts, committee estimates committee etc? If so give details.

APPENDIX 11 (c)

DUTIES AND RESPONSIBILITIES OF SENIOR ARCHITECT

The main function of the Senior Architect is to advise the Chief Engineer or other Technical Officers of the P. W. D. on all questions referred to him relating to building projects. His responsibility will include;

- (1) giving advice on selection of site
- (2) preparation of master plans and layouts
- (3) preparation of plans, sections and elevations and interior layout of building to suit the requirements and preparation of detailed drawings and specifications of component parts of buildings.
- (4) Scrutiny of plans, sections, elevations etc. of buildings which may have been made by some other officer and are referred to him for expert advice.
- (5) Preparation of type designs for various types of building commonly in use and for special features in buildings and revising existing type designs from time to time as found necessary.

(6) Preparation of detailed specifications for items generally involved in building construction other than those, which are included in the detailed standard specifications of the department.

(7) Inspection of major building works during construction at suitable intervals with the approval of the Chief Engineer and giving instructions to field staff regarding various features of the work. Where any such instructions necessitate revision of the sanctioned estimate the same should be routed through the authority competent to sanction the revised estimate.

(8) Distributing the work in his branch to various subordinate officers, giving guidance to them in the manner in which work has to be done, and controlling their work.

DUTIES AND RESPONSIBILITIES OF JUNIOR ARCHITECT

(1) His function is to assist the Senior Architect to finalise the Architectural design of major buildings.

(2) He will be responsible to the Senior Architect on all matters regarding selection of site, preparation of master plans, preparation of detailed plans, specifications etc. with regard to any building project assigned to him.

(3) He should guide and control the work of subordinate technical and administrative staff.

(4) He will also carry out any other specific work allotted to him by the Senior Architect.

DUTIES AND RESPONSIBILITIES OF ASSISTANT ARCHITECT

(1) He is responsible for the preparation of Architectural Designs of Minor Building Projects and preparation of detailed working drawings

(2) He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF ASSISTANT ARCHITECTURAL ENGINEER

(1) He is responsible for:

(a) Scrutiny of architectural drawings in the matter of structural stability of various component parts.

(b) Working out designs of parts particularly those which are vulnerable due to restricted size on account of architectural or other considerations.

(c) Preparing structural working drawings with sufficient details and specifications.

(2) He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF QUANTITY SURVEYAR

(1) He is responsible for:

(a) Preparation of estimates of quantitatively different items of work involved in various building projects as per designs made out.

(b) Preparation of specifications of special items based on instruction from Senior or junior Architect.

(2) He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF ARCHITECTURAL ASSISTANT

(1) He is responsible for the preparation of detailed architecture drawings and scrutiny of the drawings prepared by the Draftsman.

(2) He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF ARCHITECTURAL HEAD DRAFTSMAN/ JUNIOR ENGINEER

(1) He is responsible for the preparation of detailed working drawings and scrutiny of the drawings prepared by the Draftsman.

(2) He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF ARCHITECTURAL DRAFTSMAN (ARCHITECTURAL WING)

He is responsible for:

(a) Preparation of drawings based on instructions given to him by higher Technical Officers.

(b) Preparation of tracings of drawings.

(c) Plotting survey work, reducing and plotting level sections etc. based on field data furnished to him marking contours in survey drawings.

(d) Checking plotted sections and surveys received from subordinate offices with field book entries including checking, reduction of levels.

(c) Carrying out any other specified work allotted to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF DELINEATOR

1. He is responsible for:

(a) Preparation of drawings based on instructions given to him by higher Technical Officer.

(b) Preparation of tracings of drawings.

2. He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF ESTIMATOR

An Estimator in any of the P. W. D. Offices should carry out the following duties:

(a) Calculate quantities of various items of work involved from the designs and drawing of structures and prepare detailed estimate.

(b) Prepare data for items of work based on schedule of rates and information received from field regarding leads and lifts involved etc.

(c) Check the estimate received from subordinate offices.

(d) Carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF ARTIST

1. He is responsible for.

(a) The preparation of architectural presentation drawings of projects.

(b) Preparation of drawings showing colour schemes for buildings etc.

2 He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

DUTIES AND RESPONSIBILITIES OF MODELLER

1. He is responsible for the preparation of models of layout, buildings etc.
2. He will also carry out any other work that may be specifically assigned to him by his Superior Officers.

APPENDIX-II (d)

DUTIES AND RESPONSIBILITIES OF DRAFTSMAN

A Draftsman in any of the P. W. D. offices should carry out the following duties.-

- (a) Prepare drawings based on instructions given to him by Junior Engineer, Assistant Engineer or other higher Technical Officers.
- (b) Prepare tracings of drawings.
- (c) Plot survey work reduce and plot level sections etc. based on field data furnished to him. Mark contours in survey drawings.
- (d) Check plotted sections and surveys received from subordinate officers with field book entries including checking reduction of levels.
- (c) Calculate quantities of various items of work involved from the designs and drawings of structures and prepare detailed estimate.
- (f) Prepare data for items of work based on schedule of rates, and information received from field regarding leads and lifts involved- etc.
- (g) Check the estimates received from subordinate offices.
- (h) Check issue of materials and hire charges of tools and plant issued on, works against requirement as per data in contractor's bills.
- (i) Assist in preparing annual indent of principal materials, tools and plant etc.
- (j) Assist in drafting and checking tender schedules and agreements.
- (k) Tabulate tenders if called upon to do so.
- (1) Carry out any other work that may be specifically assigned.

DUTIES AND RESPONSIBILITIES OF HEAD DRAFTSMAN/ JUNIOR ENGINEER (DESIGNS)

A Head Draftsman/Junior Engineer (Designs) working in a P. W. D. office is responsible for the following:-

(a) Preparing designs and drawings of structure etc. based on general or special instructions received from higher technical officers using field data received from site.

(b) Scrutinising drawings of structures prepared by draftsman working under him.

(c) Scrutinising drawings of structures received from subordinate offices.

iv. Plotting survey work, reducing and plotting levels based on field data furnished to him. Mark any contours and proposals in survey drawings.

v. Scrutinising plotting work done by draftsmen working under him.

vi. Checking plotted sections and surveys received from subordinate offices with the corresponding field book entries including reduction of levels.

vii. Preparing detailed estimate for structures etc., based on approved drawings and designs.

(h) Checking detailed estimates received from subordinate offices.

(i) Checking issue of materials and hire charges of tools and plant on works against data requirements in contractor's bills.

(j) Preparing annual indent of materials, tools and plant etc.

(k) Preparing tender schedules and agreements.

(l) Tabulating tenders.

(m) Preparing notes on technical matters referred to him.

(n) Checking the work of draftsman or other technical subordinates working under him.

(o) In addition to the above he should also carry out any other work that may be specifically assigned to him by his superior officers.

DUTIES AND RESPONSIBILITIES OF TECHNICAL ASSISTANT/

ASSISTANT ENGINEER (DESIGNS)

A Technical Assistant/Assistant Engineer (Designs) working in a P.W.D. Office is responsible for the following:-

(a) Preparing designs for structures as per general or special instructions received from his superior officers and based on field data received from the site.

(b) Preparing drawings of structures based on designs made by him or as per instructions received from superior officers.

(c) Checking the design calculations of structure etc., received from subordinate offices.

(d) Scrutinizing drawings of structures etc., received from subordinate offices with particular emphasis on adequacy of foundations, stability of various component parts and verification of dimensions with reference to design.

(e) Scrutinizing estimates received from subordinate offices. Test checking estimates prepared by subordinate technical staff in his office. In making scrutiny or test check, important-items should be selected for the same.

(f) Preparing tender schedules and agreements.

(g) Tabulating tenders.

(h) Preparing notes on technical matters referred to him.

(i) Checking indents for materials required by contractors etc. for various works.

(j) Preparing annual indents for materials, tools and plant etc., as per general or special instructions received from superior officers.

(k) Arranging the issue of timely reminders on technical references remaining unanswered from subordinate offices.

(l) If the above duties are got done through subordinate technical staff test checking the work of the subordinate.

(m) Distributing the work in the office among the staff working under him and giving them timely and necessary instructions regarding the work to be done.

(n) In addition to the above he should also carry out any other work that may be specifically assigned to him by his superior officers.

In the case of Personal Assistants to Superintending Engineers, they should carry out all the above duties as the Technical Assistant in the office and in addition assist the Superintending Engineer in carrying out the administration of the office.

DUTIES AND RESPONSIBILITIES OF DESIGN ENGINEER

1. The Design Engineer is primarily responsible to Chief Engineer for making out design for structures, based on general or special instructions received from Chief Engineer or Superintending Engineer (Designs) or Deputy Chief Engineer. During the course of evolution of a design, he should keep the Chief Engineer/Superintending Engineer (Designs) or Deputy Chief Engineer informed of the lines on which the design is being made and make such changes as are ordered to be made by them. -

If details for the proper evolution of a design are insufficient or are lacking, he must forthwith call for the same from the concerned officers and at the same time keep Chief Engineer informed of the position.

2. He is also responsible for making an overall check of the design calculations of the structures either prepared under his direction or received from subordinate offices and detailed check of particularly vulnerable portions.

3. He must distribute the design work between the various Assistant Engineers (Design) and give them instructions from time to time regarding the design.

4. Where the Design Engineer is in charge of scrutiny of estimates also, he has to distribute the work of scrutiny between the various Technical Assistants under him and also exercise an overall check of the estimates before they are put up to the Chief Engineer/Deputy Chief Engineer for further action³.

5. He should also carry out any other work, which may be assigned specifically to him by his superior officer.

APPENDIX-II (e)

DUTIES AND RESPONSIBILITIES OF LOWER DIVISION & UPPER DIVISION CLERKS/ACCOUNTANTS

1. Clerks will have to carry out any or all ministerial duties involved in the business transactions of the office to which they are attached as prescribed in the Manual of Office Procedure. The actual scope of their work in any office will be decided by the head of the ministerial section with the approval of the head of the office. Clerks (LD Clerks and UD Clerks) in the PWD Office will also some times have to function as accountants.

2. The responsibilities of clerks will include:

- (i) Maintaining files and registers up-to-date
- (ii) Safe custody of registers, files, papers, documents, books or any other valuables entrusted to their care
- (iii) Putting up papers including correspondence files, connected files, notes, etc for orders of competent authority without delay.
- (iv) Bestowing special attention on the disposal of urgent references by specially bringing such matters to the notice of their superior officers personally wherever necessary.
- (v) Taking prompt action on unanswered reference by issue of timely reminders, putting up draft, D.O. letters etc.
- (vi) When posted as Accountants carrying out the accounting work in the office such as checking bills, posting of accounts, maintaining various account registers, compiling accounts, preparation of returns etc., as prescribed in K.P.W.A. Code and other Codes.
- (vii) When holding posts involving handling of cash, safe custody of cash, timely remittance of cash to Treasury, maintenance and rendering of prescribed accounts etc., as per rules.
- (viii) Carrying out any other duties of a ministerial nature assigned to them by Superior Officers.

3. Where Clerks hold the post of *Head Clerks* having Supervisory control over the ministerial staff of the office, they will also be responsible for:

- (i) The distribution and scrutiny of the work of each Clerk.
- (ii) The scrutiny of bills, and other files attended to by the Clerks, submission of returns on the due dates, maintenance of accounts etc.
- (iii) Ensuring that cash and other valuables are kept in safe custody and that cash book and other records as prescribed in the rules are properly maintained.
- (iv) The Head Clerks will also carry out any other specific work assigned to them by their Superior Officers.

DUTIES AND RESPONSIBILITIES OF JUNIOR SUPERINTENDENTS/

SENIOR SUPERINTENDENTS

1. A Junior Superintendents/Senior Superintendents will function as the -1 Always of sections in accordance with the procedure prescribed in the Manual

of Office Procedure and will assist the head of the office in the administrative control of the ministerial staff working in that section.

Their responsibilities will include:

(i) The proper distribution of work among the staff under their control with the approval of the head of the office.

(ii) The marking of the papers received in the office to the concerned clerks and seeing that the papers are duly delivered to the Clerks concerned.

(iii) The scrutiny of the papers and files attended to by the Clerks in their section.

(iv) Putting up notes on papers requiring orders of superior authorities.

(v) Ensuring the safe custody of cash and other valuables and documents entrusted to their care by the head of the office, proper remittance of cash to the treasury, and maintenance of cash book and other accounts in the proper form as per rules.

(vi) The scrutiny of personal registers and such other registers needed for the prompt business transactions of every office in the manner detailed in the Manual of Office Procedure and K. P.W. Codes.

(vii) Making temporary arrangement for carrying out the work of the section by suitably distributing the work attended to by a clerk or other subordinate absent, on leave etc., for short periods.

(viii) Ensuring prompt action being taken on urgent matters.

(ix) Ensuring the orderly arrangement of files registers etc., by the clerks to enable any file being traced out without much difficulty.

(x) Periodically reviewing the old files and records with a view to close them as per rules laid out in the Manual of Office Procedure.

(xi) Controlling the work of Class

(xii) Carrying out any other duties specially assigned to them by Superior Officers.

DUTIES AND RESPONSIBILITIES OF ADMINISTRATIVE ASSISTANTS

The Administrative Assistant is to assist the Chief Engineer in the management of the office, work. His responsibilities will include:

(i) Guiding and controlling the work of all the ministerial staff in the office to ensure that business rules/Manual of Office Procedure are properly observed.

(ii) Reviewing the work of the section heads under his control to see that they carry out the work systematically and promptly.

(iii) Ensuring prompt action being taken on important and urgent matters and where necessary bringing such cases personally to the notice of the Chief Engineer/Deputy Chief Engineer/Administrative Officer.

(iv) Examining relevant documents and notes and issuing orders of purely routine matters subject to general or special instructions of Chief Engineer/Deputy Chief Engineer/Administrative Officer.

(v) Making temporary arrangements for carrying out the work on subordinate ministerial or Class IV officers who may be absent, on leave etc.

(vi) Maintaining order and discipline in the office, in accordance with instructions of C. E./Dy. C. E.

(vii) Ensuring timely preparation, encashment and disbursement of pay and allowances.

(viii) Seeing that registers, books, accounts etc. as per prescribed rules are maintained and kept up-to-date and to checking accuracy of postings at intervals.

(ix) The safe custody of documents and other valuables entrusted to his care.

(x) Scrutinising files, notes etc. on matters requiring orders of higher authority and putting up such cases promptly with his own remarks.

(xi) Ensuring safe custody of office furniture and maintenance of accounts, thereof.

(xii) Exercising supervisory control over the custodians of typewriter, stationery and other valuables.

(xiii) Carrying out any other duties specifically assigned to him by superior officers.

DUTIES AND RESPONSIBILITIES OF THE DIVISIONAL ACCOUNTANTS

1. The Divisional Accountant's main function is to assist the Executive Engineer/Divisional Officer in exercising financial control over the transactions of the Division and in maintaining accounts of the transactions correctly in accordance with rules in force.

2. The main duties and responsibilities of the Divisional Accountants are detailed in paras 77 to 84 and also in some of the subsequent paragraphs of the K.P.W.A. Code.

3. The Divisional Accountant is also in overall control of the ministerial establishment of the division office. In this capacity his responsibilities will

(a) Proper distribution of work with the approval of the head of office.

(b) Marking of papers received in the office to the concerned clerks

(c) Preparation of budget, making proposals for reappropriation etc, under instructions from the Executive Engineer.

(d) Scrutiny of all papers involving or relating to financial transactions and other important papers dealt with in the Divisional Office.

(e) Putting up notes on papers requiring orders of superior authorities.

(f) Controlling the work of subordinates entrusted with the safe custody of cash, valuables, documents, etc.

(g) Making temporary arrangements for carrying out the work of the section by suitably distributing the work attended to by a clerk or, other subordinate absent, on leave etc. for short periods.

(h) Ensuring prompt action being taken on urgent matters.

(i) Carrying out any other duties specially assigned to them by superior officers.

DUTIES AND RESPONSIBILITIES OF FINANCIAL ASSISTANTS

The Financial Assistant is to assist the Chief Engineer /Superintending Engineer in exercising financial control in the working of the department.

His responsibilities will include

1. Preparation / scrutiny/ finalisation of Budget Estimates in accordance with rules in force and orders of the Chief Engineer/ Superintending Engineer.

2. Making arrangements for distribution of L.S. allotments in the sanctioned budget based on directions of the Chief Engineer/ Superintending Engineer.

3. Reconciliation of Departmental Accounts with figures booked in the Accountant General's Office.

4. Assisting the Chief Engineer/ Superintending Engineer in controlling the Departmental Revenue and Expenditure which includes:

(i) Watching the progress of departmental revenue and expenditure and issuing instructions to the subordinate officers of the Department to keep the expenditure within allotments when any likelihood of excess is anticipated.

(ii) Reporting to the Chief Engineer / Superintending Engineer deviations from rules relating to expenditure noticed on the part of the subordinate officers.

(iii) Initiating and dealing with proposals relating to reappropriations, reallotments, supplementary grants, surrender of savings, etc.

(iv) Scrutinising expenditure statement relating to plan schemes.

5. Scrutiny of all cases involving

(a) Abandonment of Revenue

(b) Refund of Revenue

(c) Enhancement of Revenue and

(d) Write off of departmental dues and liabilities.

6. Scrutiny of all proposals involving financial commitments sent to Government/Chief Engineer/Superintending Engineer.

7. Review of progress in the disposal of audit objections and dealing with audit inspection reports.

8. Internal audit of the accounts of the Chief Engineer/Superintending Engineer's office.

9. Inspection of accounts of subordinate offices under orders of the Chief Engineer/ Superintending Engineer and submission of notes of such inspection for his perusal and orders.

10. Verification of claims for pension or gratuity.

11. Issue of instructions to departmental officers regarding.

(i) Maintenance of accounts and observance of Accounts rules and

(ii) Correct accounting of stores and observance of store Rules.

12. The proper maintenance of accounts relating to loans sanctioned and/or disbursed by the department and to watch the prompt recovery of such loans.

13. Test audit of the accounts of institutions, which receive grants-in-aid or loans from the Government and furnish utilisation certificates wherever required.

14. Advising the Chief Engineer/Superintending Engineer on all matters relating to Finance. Accounts and application of Code Rules.

15. Guiding and controlling the work of all the ministerial staff under him are properly.

16. Reviewing the work of the Section heads under his control to see that they carry out their work systematically and promptly.

17. Ensuring prompt action being taken on important and urgent matters and where necessary bringing such cases personally to the notice of the Chief Engineer/Deputy Chief Engineer.

18. Examining relevant documents and notes and issuing orders on purely routine matters subject to general or special instruction of Chief Engineer/Deputy Chief Engineer.

19. Making temporary arrangements for carrying out the work of subordinates who may be absent, on leave etc.

20. Scrutinising files, notes etc. on matters requiring orders of higher authority and putting up such cases promptly with his own remarks.

21. Carrying out any other duties specifically assigned to him by superior officers.

APPENDIX II (f)

DUTIES AND RESPONSIBILITIES OF HELPER

(ELECTRICAL WING)

His duties will include.-

(a) Attending to fuse calls.

(b) Rectifying minor defects of lights, fans etc,

(c) Cleaning the installations.

(d) Assisting other staff as per the directions of the junior Engineer or Overseer or Lineman.

- (c) Renewing bulbs and tubes, replacing starter, choke and condenser in fittings.
- (f) Maintaining a diary of the works attended.
- (g) Any other duties that may be specifically assigned to him by his superior officers.

DUTIES AND RESPONSIBILITIES OF ASSISTANT LINEMAN

(ELECTRICAL WING)

His duties will include:-

- (a) Attending to petty repairs to the installations, such as changing switches, holders, flex wire etc.
- (b) Rectification of defects in O. H. Lines, changing of street light bulbs.
- (c) Attending to fuse calls tracing out and locating faults and helping other staff as per the directions of the Junior Engineer/Overseer or Lineman.
- (d) Reporting within 24 hours to the Lineman/Overseer or the Junior Engineer, defects in the installation inspected by him.
- (c) Maintaining a diary of the works attended.
- (f) Any other duties that may be specifically assigned to him by his superior officers.

DUTIES AND RESPONSIBILITIES OF LINEMAN

(ELECTRICAL WING).

1. His duties will include:-

- (a) Checking the installations and arranging rectification of faults and petty maintenance works found necessary.
- (b) Attending to such works of urgent nature for immediate restoration of supply.
- (c) Collecting details for the preparation of estimates.
- (d) Keeping watch over progress and reporting to the Junior Engineer about the same.
- (e) Checking the quality of materials on arrival at site and at the time of usage on work to see that they comply with specifications.
- (f) Checking whether the workmanship in the execution of work is good.
- (g) Checking whether the work is executed as per agreement conditions.

(h) In the event of violation of any of the items (a) to (f) above, reporting the matter to junior Engineer then and there and abide by his orders.

(i) Maintaining work spot order book as per rules.

(j) Keeping an account of the daily usage of departmental materials on the work.

(k) Taking charge of unserviceable or dismantled materials obtained during the execution of work and arranging for their disposal as ordered by higher officers.

(l) Keeping account of Tools and Plant if any issued to Contractor.

(m) Fair copying estimates and keeping inventory register of the installation under his jurisdiction.

(n) Maintaining a diary of works attended.

(o) Carrying out instructions received from higher officers from time to time regarding proper execution of the work and any other duties that may be specifically assigned to him by his superior officers.

2. When a lineman is posted to supervise execution of works through departmental labour, his duties will also include:

(a) Rendering assistance to the junior Engineer or higher officers in marking out the work.

(b) Sending timely intimation to the junior Engineer of the requirements of materials, Tools and Plant etc. so that there is no interruption or slackening due to lack of these.

(c) Receiving, temporarily storing, accounting and issuing departmental materials required for execution of the work.

(d) Receiving, temporarily storing and issuing departmental Tools and Plant to the labour as and when required and returning them to the store or such other place as directed by the junior Engineer when the Tools and Plant are no longer required.

(e) Mustering the labour twice every day and keeping the labour roll as per rules.

(f) Allotting work to individual workmen or groups of workmen in such a manner as will ensure efficient performance of the work.

(g) Taking such protective measures as are necessary to ensure safety of workmen and third parties as also of properties likely to be affected by the execution of the work.

(h) Keeping close watch of the performance of the work and if necessary, rearranging work and/or regrouping works to improve performance.

(i) Maintaining record of the out turn of work every day, including issues of departmental materials if any, periods of working of departmental machinery if any employed. All this information may be noted down in a work spot order book and the duplicate and triplicate copies of the same sent as Daily Reports.

(j) Assisting the Junior Engineer or other departmental officer in disbursing wages to the workmen after identifying them. _

(k) Carrying out instructions received from higher officers from time to time regarding execution of work.

DUTIES AND RESPONSIBILITIES OF OVERSEER II GRADE

His duties will include:

- (a) Inspecting the Electrical installations.
- (b) Collecting details for the preparation of estimates.
- (c) Preparing estimates for electrical works.
- (d) Preparing inventory register.
- (c) Any other duties that may be specifically assigned to him by his superior officers.

DUTIES AND RESPONSIBILITIES OF OVERSEER I GRADE

Ms duties will include..

- (a) Overall supervision of the work in the section.
- (b) Arranging shift duty of the staff And allocation of work to subordinates.
- (c) Maintenance of stores, Tools and Plant.
- (d) Maintaining M. S. Accounts.
- (e) Scrutiny of the inventory Register maintained by IInd Grade Overseers.
- (f) Marking of points for works, Supervision of works and taking required follow up action.
- (g) Periodical inspections of installations
- (h) Preparation of tender schedule, tender documents etc.
- (i) Any other duties that may be specifically assigned to him by his superior officers.

DUTIES AND RESPONSIBILITIES OF JUNIOR ENGINEER

(ELECTRICAL WING)

The general responsibilities defined for a Junior Engineer will apply *mutatis mutandis* to the Junior Engineer (Electrical wing) also. In addition he will also be responsible for:

- (a) Guiding and controlling the work of the Electrical staff attached to the section.
- (b) Arranging rectification of defects reported to him by the field staff and restoring supply.
- (c) Safe maintenance of installations.
- (d) Periodical testing of the installations and noting the test readings and taking timely action for rectification of defect when the test readings are not within the permissible limits.
- (e) Preparing the estimates for electrification works.
- (f) Inspecting works in progress and giving necessary instructions
- (g) Carrying out any other duties that may be specifically assigned to him by his superior officers.

DUTIES AND RESPONSIBILITIES OF ASSISTANT ENGINEER

(ELECTRICAL WING)

The general responsibilities defined for the Assistant Engineer will apply *mutatis mutandis* to the Assistant Engineer (Electrical wing) also. in addition he will also be responsible for:

- (a) Scrutinising the estimate prepared by the Junior Engineer where necessary making site inspection and holding discussions with concerned officials before finalising the estimate and putting up to the concerned Executive Engineer of the Civil Wing for approval.
- (b) Assisting the concerned Executive Engineer **in** preparing and checking tender documents, tabulation statements, contract documents etc. in connection with Electrical works carried out by the Division.
- (c) Inspecting works during execution, exercising quality control check measuring works, scrutinising bills etc.

(d) Carrying out instructions received from higher officer from time to time regarding proper execution of the work.

(c) Carrying out any other duties that may be specifically assigned to him by superior officers.

DUTIES AND RESPONSIBILITIES OF EXECUTIVE ENGINEER (ELECTRICAL WING)

The Executive Engineer, Electrical, will function as Technical Assistant to Chief Engineer, (B&R) in the matter of all Electrical and Radio works. His responsibilities will include:

(i) Preparation of specifications for materials and works involved in Electrification and Radio works for approval of the Chief Engineer and keeping the specifications up-to-date.

(ii) Examining the quality of different makes of electrical materials and with the Chief Engineer's sanction preparing list of approved makes for use in Electrical and Radio works for the guidance of subordinate officers.

(iii) Preparing schedule of rates for the different items of works involved in the Electrification and Radio works of the P. W. D. or Chief Engineer's approval and revising the schedule every year.

(iv) Reviewing the work of the Assistant Engineers (Electrical) in various divisions by:

(a) test checking estimates sanctioned by them or by the Executive Engineer P. W. D. on their recommendations.

(b) test checking contract document of electrical works carried out under advice of the Assistant Engineer (Electrical).

(c) Inspecting at least 3 major works in every District subject to a minimum of 50 works in an year.

(d) Inspecting the electrical installations of at least 2 major installations in every subdivision every year and also installations in important buildings such as hospitals to see if these are properly maintained. For this purpose an installation will be considered as major when the total connected load exceeds 10 K. W.

Proper reports after inspection and test cheek vide (a) to (d) above should be put up to Chief Engineer.

(v) Taking initiative in suggesting technical improvements in the execution and maintenance of electrical and radio works.

(vi) Examining relevant documents and notes and issuing orders on routine matters subject to any general or special instructions of the Chief Engineer.

(vii) Examining relevant documents and notes and suggesting nature of disposal in cases requiring Chief Engineer's attention.

(viii) Representing the department in conferences and discussions concerning Electrical and Radio works when the Chief Engineer or Deputy Chief Engineer is unable to be present and taking follow up action after informing the Chief Engineer.

(ix) Scrutinizing estimates received from subordinate officers and estimates prepared by subordinate technical staff in his office.

(x) Preparing annual indents for materials, Tools and Plant, etc. as per general or special instructions received from superior officers.

(xi) Arranging the issue of timely reminders on technical references remaining unanswered from subordinate offices.

(xii) Distributing the works in the office among the staff working under him and giving them timely and necessary instructions regarding the work to be done.

(xiii) In addition to the above he should also carry out any other work that may be specifically assigned to him by his superior officers.

Appendix II (g)

DUTIES AND RESPONSIBILITIES OF THE TECHNICAL OFFICERS OF THE RADIO BRANCH OF THE PUBLIC WORKS DEPARTMENT

Executive Engineer, Radio.-

I. The Executive Engineer (Radio) shall function as Technical Assistant to the Chief Engineer (B & R) in the matter of all radio works.

II. (1) Review of monthly progress reports regarding works under the Radio Subdivisions and issue of directions wherever necessary.

(2) Periodical Inspection of all major and important works under the Radio Subdivisions.

(3) Review of stock materials for Radio Works and arranging supply of requirements wherever necessary.

(4) Inspection of all, works under the Radio Subdivisions like P. A. System, Internal Telephone system, Community listening centres, servicing stations under the various Sections maintained by the Department and sound equipments in buildings.

(5) Suggesting technical improvements in the execution and maintenance of radio works.

(6) Examining relevant documents and notes in respect 'of radio works and issuing orders on routine matters subject to any general or special instructions of the Chief Engineer.

(7) Technical control of all works connected with the Radio Wing subject to the overall control of the Chief Engineer.

(8) Any other work not mentioned in the above, relating to the Radio Wing, assigned by the Chief Engineer or Deputy Chief Engineer.

Assistant Engineer, Radio:-

The general responsibilities defined for an Assistant Engineer, General Branch, Public Works Department will apply, *mutatis mutandis*, to the Assistant Engineer, Radio and in addition:-

(1) Scrutiny of estimates prepared and making site inspections wherever necessary for finalising the estimates.

(2) Inspection of works during execution and giving guidance and instructions to subordinates.

(3) Inspection of Community Listening Centres, Servicing Stations, Public Address Installations, other equipments and works and installations..

(4) Maintenance and procurement of stock in the stores attached to the Subdivision including distribution of requirements for replenishing buffer stocks.

(5) Verification of buffer stocks, dismantled materials etc., in the sections under him.

(6) Issue of certificates of unserviceability of Community Listening Sets or other equipments according to rules.

(7) Collection of registration fee or any other dues from panchayats or other departments and institutions.

(8) Any other duties that may be specifically assigned to him by his superiors.

Junior Engineer, Radio:-

The general responsibilities defined for a Junior Engineer, General Branch, Public Works Department will apply, *mutatis mutandis*, to the Junior Engineer, Radio and in addition:-

(1) Installation, maintenance and working of Radios, Audio Visual Equipments, P. A. Installations etc., within his jurisdiction.

(2) Distribution of works among the members of staff and taking up works himself whenever necessary.

(3) Guiding and controlling the members of staff of his section.

(4) Inspection of Community Listening Centres and other equipments and installations, according to instructions.

(5) Maintenance of buffer stock and tools and plant including procurement of spares and equipments.

(6) Preparation and prompt submission of periodicals and M. S. Accounts.

(7) Recommendation of unserviceable radios, audiovisual equipments and accessories for disposal.

(8) Preparation of estimates and execution of works.

(9) Assisting the Assistant Engineer in the collection of dues from Panchayats or other departments or institutions.

(10) Any other duties assigned to him by his superiors.

Radio Mechanic:-

(1) Installation and repairs of radio sets and other equipments.

(2) P. A. Installations.

(3) Using discretion in respect of works in emergency.

(4) Assisting the Junior Engineer in the preparation of records, periodicals etc., and in office work.

(5) Assisting the Junior Engineer in the preparation of estimates and execution of works.

(6) Any other duties specifically assigned to him by his superior officers.

[Vide G. O. (P) No. 204173/PW. dated 1-10-1973]

Duties and Responsibilities of Stewards, Butlers, Caretakers, Managers or other Officers in charge of Rest Houses, Tourist Bungalows etc.

The officer in direct charge of Rest Houses, Camp Sheds, Tourist Bungalows etc., of the P. W. D. by whatsoever, designation he is called should attend to the following duties:-

1. Keep the rooms and premises in a clean and tidy condition. See that rooms are swept at least once every day and also immediately after any occupant vacates the room.

2. See that the furniture provided in each room is kept in its proper place and kept daily dusted.

3. See that the bath room and lavatory fittings in every room are functioning satisfactorily, and if any defect is noticed, set right the same locally if it can be arranged and if not report to the junior Engineer for urgent action.

4. See that the electrical equipments are kept in good order, fused bulbs replaced etc.

5. In the case of rest houses not provided with running water, see that water required for washing is made available in the bath rooms for occupants.

6. See that beddings linen, crockery, cutlery etc. are kept in clean and usable condition.

7. Provide sufficient linen for the use of occupants of each room according to prescribed standards.

8. In the case of rest houses, which are not electrified, see that lamps are trimmed, filled with oil and kept ready for the use of the occupants and for general lighting.

9. Where gardens exist see that the garden is watered, trimmed and kept clear of rubbish.

10. Maintain the occupation register and see that every occupant fills up the required columns on arrival and on leaving.

11. Collect the rent due from the occupants and send the collections together with copy of the occupation register to the concerned officer every 15 days or at such intervals as prescribed.

12. Where reservations are ordered by the Collector see that the rooms are kept so reserved without being allowed to be occupied. In case there is no reservation by the Collector, the rooms are to be made available to occupants according to the order of prior to of their asking for the same. This however is subject to any other reservation made by the Executive Engineer in charge of the bungalow.

13. Keep accounts of furniture, linen, crockery and cutlery and any other item entrusted to his charge and make periodical checks to see that they are all available.

14. Arrange washing of linen, bedclothes etc., and keep account of item so arranged to be washed.

15. Where the rest house is provided with catering arrangements, arrange supply of good food and drinks as prescribed to the occupants at the approved schedule of rates. This schedule of rates should also be exhibited in public.

16. Control the work of such subordinates in the rest house as are placed under his charge and report to superior officers cases requiring sanction of appointment of substitutes, institution of disciplinary proceedings etc.,

17. See that unnecessary fans and lights are switched off at the appropriate time and the use of water and electricity economically controlled without any inconvenience to occupants.

18. They will also carry out any other duties that may be specifically assigned to them by their Superior Officers.

Duties and Responsibilities of Drivers of Departmental Motor Vehicles

Their duties will include:

1. Drive the vehicles carefully within the prescribed speed limits observing all the traffic regulations.

2. Keep the vehicles in road worthy condition. This will include washing and cleaning of vehicles except in the case of buses and lorries for which special cleaners will be appointed to assist. When cleaners are appointed, supervise the work of cleaners to see that the vehicle is properly cleaned and kept fit for operation.

3. Check water levels in radiator and battery, oil level in crankcase, fuel level in fuel tank and tyre pressures every day before the vehicle is taken out.

4. Once a fortnight check oil level in gearbox and crankcase.

5. Attend to routine maintenance as prescribed such as topping up of oil, filling radiator, cleaning of oil and fuel filters, inflating tyres, applying grease where required, etc.

6. When the vehicle is taken out for servicing point out any items needing special attention and be available at the servicing station or work- shop to see that servicing is done properly.

7. When the vehicle is taken for maintenance or for special repairs, assist in the completion of the repairs or carry out such other jobs as are ordered to be done by the officer in charge of the vehicle.

8. In case of accidents the driver should report the matter to the nearest police station and the officer in charge of the vehicle and abide by instructions of the police in regard to further movement of the vehicle.

9. Be in charge of the tools and spares of the vehicle entrusted to him.

10. Keep account of materials like fuel, lubricating oil etc. entrusted to his care.

11. Maintain log books as prescribed.

12. Take order from the officer in charge of the vehicle in regard to trips to be made, passengers or materials to be carried etc.

13. They will also carry out any other duties that may be specifically assigned to him by their Superior Officers.

Duties and Responsibilities of Drivers of Road Rollers

Their duties will include: -

1. Drive the road rollers with care and safety observing traffic regulations to the site where rolling work is to be done.

2. Keep the roller in working condition and report to the superior officers defects if any for necessary repair work being arranged.

3. Make a routine check of all the points needing daily inspection such as fuel level in the case of Diesel Engines, water level in the boiler in the case of steam engines, lubricating oil levels and such other features as may be prescribed either generally or for the particular equipment.

4. Carry out the rolling work in the prescribed manner making as many passes as are necessary and are directed to be done.

5. Attend to routine maintenance as prescribed such as topping up of oil applying grease, where required etc.

6. Whenever the rollers are left at roadside after the day's work it is his duty to see that the danger light is put in front of the roller. This is to avert the chances of other vehicles colliding against the roller.

7. When the roller is taken for maintenance or for special repairs, assist in the completion of the repairs or carry out such other jobs as are ordered to be done by the officer in charge of the roller.

8. Be in charge of the tools and spares of the roller entrusted to him.

9. Keep account of materials like fuel, lubricating oil etc. entrusted to his care.

10. Maintain log books as prescribed. [vide G. O. (P) No. 110173/PW dated 4-6-1973]

11. They will also carry out any other duties that may be specifically assigned to them by their Superior Officer.

Duties and Responsibilities of Drivers or Operators of Equipments like Concrete Bitumen Mixers, Pile Drivers, Pumps, Compressors etc.

1. Attend to routine day-to-day maintenance of the equipment such as oiling, cleaning etc.

2. Check up various parts of the equipment as prescribed before starting it for use.

3. Operate the equipment and during the operation check whether it is working smooth. If any faulty performance is noticed, stop and investigate the cause of the same and take corrective steps at site to the extent possible.

4. When the equipment is taken for maintenance or for special repairs assist in the completion of the repairs or carry out such other jobs as are ordered to be done by the officer in charge of the vehicle.

5. Be in charge of the tools and spares of the equipment entrusted to him.

6. Keep account of materials like fuel, lubricating oil etc. entrusted to his care.

7. Maintain log books as prescribed. [Vide G. O. (P) No. 110173/PW dated 4 6-1973]

8. They will also carry out any other duties that may be specifically assigned to them by their Superior Officers.

CHAPTER III

INVESTIGATION AND DESIGN OF WORKS -GENERAL

3. 1. General.

3.1.1 *General*.-It is most important that every work is properly investigated and all relevant data collected and correlated before finalizing the design and estimate for the work. Wrong choice of site or designs based on incorrect or insufficient data can result in considerable avoidable expenditure and needless delays. Hence proper attention should be given to careful investigation and furnishing of full and correct field data required.

3.1.2 Investigation may often have to be carried out in two phases; viz. preliminary investigation and detailed investigation. In the preliminary investigation phase, various alternative sites or

alignments etc. should be examined and a comparative study of the merits of the different alternatives possible to serve the purpose intended should be made. Based on such study, the final choice of the site or alignment as well as broad features of the proposals should be made. In the detailed investigation phase, all the data required for designing the work at the site or along the alignment finally chosen should be collected.

3.1.3 In some cases however, it may not be necessary to pass through the two phases of investigation as for instance, when the site is already fixed or where no alternative proposal is possible. In such cases detailed investigation may be conducted straight away at the available site.

3.1.4. The nature of field data to be collected will naturally vary with the type of work required. These are further discussed in the succeeding paragraphs dealing with investigation and design of some important kinds of work such as Roads, Bridges, Buildings, Irrigation works, etc. As a general rule, it is necessary to have site surveys with contours and or spot levels covering the area where the proposed work is to be located, longitudinal and cross sections at suitable places, the flood levels, tide levels etc. at relevant sites, the nature of soil sub-soil, its safe bearing capacity, source of important construction materials etc. Wherever realignment of telegraph posts, telephone lines, cables, water mains etc. are involved, the site survey should show their present location and the extent of realignment required so that the concerned Department may be addressed to prepare an estimate of cost of such realignment.

3.2. *Trial Pits*-3.2.1 The bearing capacity of the subsoil may be found out by digging trial pits and conducting simple plate bearing tests. When the loads to be carried are large or where the foundation soil has poor bearing capacity trial borings may be necessary to investigate the soil characteristics for considerable depths. The advice of the Peechi Research Station may be sought regarding field data to be collected where weak soils are found to

exist for considerable depth.

3.2.2 In general, the Assistant Engineer in charge will be responsible to arrange the preliminary investigations i.e., he will indicate the various alternatives to be considered, and the preliminary data to be collected to enable a final choice, being made. The Junior Engineer concerned should conduct the preliminary investigation on the lines indicated by the Assistant Engineer and furnish all necessary information. On the basis of the preliminary investigation, the Assistant Engineer must send a report through the Executive Engineer to the authority competent to issue technical sanction for the work giving the comparative merits of the different alternatives studied and his own recommendations. The authority so competent to accord technical sanction should then make a final choice of the alternatives examined, or if additional data is required, he should call for the same. After the final choice is made, detailed investigation should be conducted. In regard to certain important types of work, the data to be collected 'at the time of detailed investigation are given in the paragraphs which follow. In other cases, the authority competent to accord technical sanction should indicate the nature of the same while ordering detailed investigation. The Assistant Engineer must frequently inspect the investigation work and check important details. The Design Engineer responsible for designing the work should also inspect the site and investigation work so as to acquaint himself with all the site conditions.

3.2.3 Where there **is** no necessity to have a preliminary investigation, the Assistant Engineer should indicate the data to be collected and arrange the detailed investigation through the junior Engineer concerned.

3.2.4 In the case of works for the use of other Departments of the State or for Local Bodies etc., the Executive Engineer or the Assistant Engineer must keep the local officers of respective Departments or Local Bodies informed of the investigation work being done. The opinions of the officers of the concerned Department or Local Body may also be taken into account in regard to choice of site and features required for the work. Technical details however should be the responsibility of the P.W.D.

3.2.5 The bench marks and survey reference points should be carefully selected and properly described so that there is no likelihood of these being missed when the work is taken up for execution. Wherever possible, the benchmarks may be connected to the nearest permanent M. S. L. Bench Mark.

3.2.6 It is necessary that every year a suitable lump sum is provided in the P.W.D. Budget for investigation of works. This provision should be utilised for expenses in connection with the investigation. When the total cost of investigation is likely to be less than Rs. 250 the investigation work may be done on a memo of cost basis. In other cases, an estimate for investigation should be got sanctioned, the funds being met from the L. S. provision.

3.2.7. For major projects, the investigation is carried out by special staff appointed for this purpose. In such cases the investigation work will be directed by the highest technical officer so specially posted. The cost of the investigation staff should also be included in the investigation estimate for projects.

CHAPTER IV

INVESTIGATION AND DESIGN OF WORKS - ROADS

4. 1. Standards and classification

4.1. 1. *Standards and classification.*-The standards prescribed for different classes of roads, are given in Appendix IV

4. 1. 2. Before the investigation of new road, or improvements to an existing road, the classification of the new road or the existing road after improvements should be decided and the investigation conducted so as to reach the standard prescribed for that class of road. Where there are no special reason, the lowest classification, may be adopted when new roads are constructed. However, where the road may have to be subsequently improved to a higher standard within about 15 years, the land width alone may be increased to the next higher classification as it will be extremely difficult to acquire the land at a later stage when the areas get more developed.

4. 1. 3. In regard to improvements to an existing road, the classification and standard to be followed may be decided by reference to traffic census and other relevant conditions.

4. 1. 4. Within 5 kilometres of Municipal towns or important markets if an approach road to the town or market is formed or improved, it should have sufficient land width at least to take 2 lane traffic and foot-paths.

4. 1. 5. In the case of widening of existing roads, the alignment should be chosen after studying different alternatives i.e. extra widening on one side, or the other side, or on both sides. This is particularly important in built up areas.

4. 1. 6. In finalising the alignment and gradients, as far as possible, the earth obtained by cutting should be utilised for filling, provided heavy additional costs due to leads are not involved thereby. Soils, which are unsuitable for embankments, as for instance silt and certain types of clay should not be used for this purpose even though they may become available from the cutting portion of the road. Where sandy soil is obtained by cutting and is to be used in embankments there should be a proper shrouding or cover of good earth for at least 50 cm thickness over the top and sides of the embankment. Where rocky formation is met with, it should be examined whether rock blasting can be reduced by realignment or altering the gradients and the final alignment should be made only after such a study.

4. 1. 7. As far as possible, the standard, prescribed in regard to land width, and the geometrics of the road should be fully adhered to through out the length of the road. If however, in some sections such adherence to standards prescribed is not possible due to the high cost involved or other reasons the sanction of the Chief Engineer must be obtained for relaxing standards in the design for the new road or improvements to an existing road.

Note:- The roads taken over by Public Works Department from Panchayats and other roads under Public Works Department which do not satisfy the standards prescribed for "other District roads" will be known by the new classification "Village roads". They will remain as "Village roads" even after improvements until they are further improved to the standards of "other District roads". The geometries of these "Village roads" will be the same as those specified in the Indian Roads Congress draft standards except in the matter of land width.

[Vide- G.O. (P) No 184/75/PW dated 29-9-1975]

4. 1. 8. Where improvements to town roads are involved, raised and paved foot-paths should be provided if the road has sufficient width. At important bus stops, if possible, extra width should be provided so that the clear width of the road is not obstructed by parked buses taking in and letting down passengers. Traffic islands should be provided at all important junctions. The design of such features may be got done in the Chief Engineer's office.

4.2. Embankments

4. 2. 1. *Embankments*.-Where heavy embankments are involved proper investigation of the supporting soil should be made to ensure that there is no foundation failure. The design should take into account, the characteristics of the foundation soil.

4. 2. 2. Embankments should be well consolidated so as to provide a hard base to take the road pavement. The side slopes of embankments should not be steeper than the natural slope of the soil and should preferably be at least 2 to 1. Where this slope is not possible due to non-availability of land the toes should be protected by retaining walls of suitable height. The slopes of embankment should be protected against erosion by turfing. If slope pitching is found necessary, this should be done after the embankment settles down as otherwise the pitching may get dislodged due to subsidence. When pitching is done on a slope there should be a suitable gravel or metal backing for at least 15 cm. thickness to serve as a filter. There should also be adequate weep holes.

4. 2. 3. If any portion of a road embankment is submergible, the design of that portion of the road should provide for adequate side protection so that the road embankment is not damaged during floods.

4. 2. 4. Embankment drains must be provided at intervals not exceeding 15 metres and should consist of paved brick drains or half round R. C. gutters. Provision should be made for guard rails and kerb stones in all embankments above 2 metres height. Where the toe of embankment is likely to get eroded by flow of drainage water, toe protection through revetment or pitching should also be provided.

4, 3. Culverts and Drainage

4. 3. 1. *Culverts and Drainage.*-Provision should be made for adequate drainage of the roads. It should have side drains on both sides normally and on the hill side where the road formation is partly in cut and partly in fill. The size of side drains should be at least 50 cm. x 25 cm. and have adequate slope.

4. 3. 2. Culverts of adequate size should be located where there are drainage courses, crossing the road. In addition there should be culverts at minimum intervals of 1/4 km. so that side drains do not over-flow.

4. 3. 3. Ventway of culverts should be adequate and no culvert should be less than 60 cm. x 60 cm. If pipe culverts are employed, there should be a minimum of 75 cm earth cushion on the pipes.

4.4 Sub grade and Pavement.

4.4.1 *Subgrade and Pavement.*-The road surface or pavement should rest on a well consolidated subgrade. Where the road is formed in sandy tracts, a subgrade of laterite chips at least 30 cm. thick should be laid and consolidated before the road pavement is done. Where there is clayey soil below the road formation suitable sand drains should be formed in the clayey extra and a layer of sand at least 15 cm. thick should be laid on top of the same. There should be adequate foundation for the road surface or pavement. In the case of new metalled roads it is advisable to provide 15 cm. thickness of soling with stone metal of 10 cm. to 15 cm. size. In the case of widening of existing roads also, the same procedure should be followed for providing a safe foundation for the road surface. Where bitumen surface is proposed to be adopted for the first time in any road, it should be examined whether there is adequate crust thickness for the road surface. A minimum of at least 20 cm. thickness of metalled surface including soling if any is necessary before a bitumen surface is

provided. If bituministic concrete is to be employed, there should be a minimum of 30 cm. crust thickness.

4.5 Drawings.

4. 5. 1 *Drawings.* -The drawings and field data to be furnished in respect of road projects will be:-

4.5.2 Index map.- Showing the general topography on a large scale (1 crn.=500 metres) of the road and important towns and industrial centres served by the road. This should also, show existing and proposed road connecting with the road to be constructed, improved, railways, waterway and other means of communication etc.

4.5.3 *Preliminary survey and location plan.*- (Usually tracing of village maps) showing the proposed alignment, diversions, curves, width of right-of- way, building and control lines, village boundaries etc. if alternative alignment have been considered the lines of such alternative alignment may also be marked in the preliminary survey.

4.5.4 The detailed ground plans showing the centre line, boundaries of the right-of-way, contours, existing structures, drainage courses, tanks and ponds, description of soils, quarries, curve data, location of drainage crossings, distance of cross sections benchmarks, north point, etc. etc.

4.5.5 The longitudinal section (to the same horizontal scale as the plan) (1 cm.= 10 metres) showing the datum line, ground levels, soil classifications, kilometre stones, drainage crossings, positions of cross sections. etc.

4.5.6 *Land plans and area list.*-These are prepared to the scale of the village or settlement plans and show wells, buildings, nature of crop etc.

Schedules of land to be acquired should accompany the land plans.

4.5.7 *Detailed cross-sections.*-Showing the existing levels, side drains, catch drains, avenues, land width, building lines, control lines etc. (1 cm. = 1 metre).

4.5.8 Where there is not much variation in the cross sections and where a few typical ones will serve the purposes, these may be incorporated in the drawing showing the plan and longitudinal section.

4.6 General

4. 6. 1 *General.*-Where high embankments are involved (above 3 metre and where the supporting soil is weak) nature of the supporting soil and sub-soil and bearing capacity of the same should be furnished.

4.6 2 Information regarding quarries (including borrow pits) from which materials for construction are to be obtained should be furnished. If any quarry has to be acquired, land plan and area list for the same should also be prepared.

4.6.3 In case the full quantity of soil available from cutting cannot be used for filling in the road work, the place or places where the additional soil is to be dumped should be indicated.

APPENDIX IV (a)
Standards for roads in Kerala State

Sl No	Description	National Highway (Meters)	West Coast road (Meters)	Provincial Highway (Meters)	District road (Meters)	Other District road (Meters)	Village road (Meters)	Remarks
1	Land width:- i. Open agricultural areas	25.0	18.25	25	15	12 (Both open areas and urban areas)	7	As per Govt of India letter No. III-119/28/56 dated 24.5.60 for West Coast Road
	ii. In built up areas	25.0	12	25	11		7	
	iii. Bypasses	45	30	..	..		..

2	(a) Width of formation	12	10	10	7	7	6	For Village Road taken over by Government or if not taken over by Government the land width shall be 8 m on level ground where no cutting or formation of embankment is involved minimum additional land width subject to the maximum of 12 m may be allowed. The standards specified are minimum approved by Govt of India for NH and West Coast Road in Kerala
	i. In plains							
	ii. In hilly sections	(a) In bank 7 meters clear between gutters and parapet wall on valley side (b) In cutting 28' clear between drains	7 Excluding drains and parapet	7	7		4	
			0.6	0.6	0.6	0.6	0.6	
			1.2	1.2	1.2	1.2	1.2	
			1.8	1.8	1.8	1.8	1.8	
			2.4	2.4	2.4	2.4	2.4	
	(b) Extra widening of formation on curves - For radius upto 150 meters and more Between 150 M and 90 M " 90 m & 60 m " 60 m & 30 m Below 30 m	0.6 M 1.2 1.8 2.4						
3	(a) Width of pavement in straight reaches	7	3.5 for one lane traffic	7	5.5	3.8	3	

	(b) Extra widening of pavements in curved sections:- For radius above 450 M	..	nil (upto 240)	..	..	..	..
	300 M to 450 M	0.3	0.3	0.3	..	..	..
	150 M to 300 M	0.6	(between 240 M to 150 M)	0.6	0.3	0.3	0.3	
	60 M to 150 M	0.9	0.6 (between 150M to 60 M)	0.9	0.6	0.6	0.6	
	30 M to 60 M	1.2	0.9 between 90M & 30 M	1.2	0.9	0.9	0.9	
	Below 100 M	1.2	1.2 upto 100 M	1.2	1.2	1.2	1.2	
4	Cross fall:-							
	i. Earth gravel or stabilized soil						1 in 24	
	ii. Water bound macadam	1 in 36	1 in 36	1 in 36	1 in 36	1 in 36	1 in 36	
	iii. B.T.Surface	1 in 60	1 in 60	1 in 60	1 in 48	1 in 48	1 in 48	
	iv. C.C.Pavement	1 in 72	1 in 72	1 in 72	1 in 72	1 in 72	1 in 72	
5	Gradients:-							
	(a) In plains	1 in 30	1 in 30	1 in 30	1 in 30	1 in 30	1 in 20	
	ruling	1 in 20	1 in 20	1 in 20	1 in 15	1 in 15	1 in 15	
	Limiting (For short distances not excluding 300 in mile)	1 in 15	1 in 15	1 in 15	..	..	..
	Exceptional							

	(b) In hills ruling	1 in 20	1 in 20	1 in 20	1 in 15	1 in 15	1 in 15	
	Limiting	1 in 15	1 in 15	1 in 15	1 in 12	1 in 12	1 in 12	
	Exceptional	1 in 12	1 in 12	1 in 12	..	..	..
6	Horizontal curves							
	i. Flat or rolling	300 Ruling	300 Ruling	300 Ruling	240 Ruling	240 Ruling	90 Ruling	
	(a) In plains	240 absolute	240 absolute	240 absolute	15 absolute	15 absolute	45 absolute	
	(c) In rolling country							
	Ruling minimum							
	Absolute minimum	300		..	..	..	..
		240	240 absolute	..	..	..	..
	(ii) Hilly:-							
	(a) In semighat	120 Ruling	..	500 Ruling	90 Ruling	90 Ruling	45 Ruling	
	Stretches	90 absolute	50 absolute	90 absolute	50 absolute	50 absolute	30 absolute	
			30 "	..	..	..	..
	(b) In ghat section	90 absolute						

7	Vertical curves 1. Summit curves	Square parabolas Cubic parabolas	Square parabolas Cubic parabolas	Square parabolas Cubic parabolas	.. ..	.. ..	.. ..	For No 11, summit curve to be square parabolas and valley curves to be cubic parabolas: For W.C. road, summit curves to be parabolas and valley curves to be cubical parabolas
8	(a) Sight distance for flat country – (Stopping) Non- overtaking sight distance	120 (for 80 KM/hr)	120 (for 80 KM/hr)	120 (for 80 KM/hr)	90 for 60 KM/hr	90 for 60 KM/hr	35 for 30 KM/hr	
	Ghat sections	60 (30 MPH)	60 (30 MPH)	..	..	..	..
	Overtaking sight distance	435 for 80 KM/hr	435 for 80 KM/hr	435 for 80 KM/hr	300 for 65 KM/hr	300 for 65 KM/hr	90 for 30 KM/hr	
	(b) Sight distance for hilly country Stopping distance Overtaking distance	60 for 50 KM 180 for 50 KM/hr 180 for 50 KM/hr	60 for 50 KM/hr 180 for 50 KM/hr	60 for 50 KM/hr 180 for 50 KM/hr	50 for 40 KM/hr 135 for 40 KM/hr	50 for 40 KM/hr 135 for 40 KM/hr	30 for 20 KM/hr 60 for 20 KM/hr	
9	Structures:- Culverts width	12 between outside faces of parapets	10 between outside faces of parapets	10 between outside faces of parapets	7 inside width	@	6 inside	
	Bridges width	7 clear inside	7 inside width	7 inside width	7 inside width	#	3.5 inside	

10	Super elevation (C) = $3V^2/80R$ subject to a maximum of 0.067 where V design speed in Mph and R radius of curve in feet	Calculate 'C' for V 80km/hr & 50 km/hr for flat & hilly countries respectively	Calculate 'C' for V 50 mph for flat & hilly countries	Calculate 'C' for 50 mph for flat & hilly countries	Calculate 'C' for V 65 km/hr for flat & hilly countries	Calculate 'C' for V 65 km/hr for flat & hilly countries	Calculate 'C' for 35km/hr & 25 km/hr for hilly countries	
11	Type of surface	C.C. or B.T.	C.C. or B.T.	C.C. or B.T.	C.C. or B.T. above 1000 tons & WBM for traffic below 1000 tons	W.B.M. surface	WBM above 2000 tons traffic earth or gravel below 2000 tons	

@ To have a width on roadway equal to the width of roadway less thickness of parapets

Bridges upto 15 M span to have single lane decking subject to the maximum of 4.5 M clear roadway.

Note: When containerization is introduced over any particular road, such modifications in the dimensions and features as are then found necessary for the particular roads concerned will be specifically ordered on the basis of a separate circular. In the case of affected roads, the specifications as indicated in the circular will supercede those given in this appendix.

(Vide G.O.(P) No. 31/73/PW dated 6-2-1973)

APPENDIX IV (B)

The Standard Prescribed for other District Roads

Public Works (Buildings & Communications II) Department.

ORDER

G. O. (Ms) No. 126 72/PW.

Dated, Trivandrum, 23rd June 1972.

Read:- Letter No. CB7-3/71 dated 14-1-1971 from the Chief Engineer, (G, B & R)

The Village roads now under the control of the Public Works Department and the Panchayat roads that have been taken over by the Public Works Department are classified as other District Roads and Government now consider it necessary to fix certain standards for other District Roads so that improvements and construction of such roads could be standardised. The Chief Engineer,

(General) Buildings and Roads) has accordingly suggested to prescribe the following geometric and general standards for other District Roads.

1. Geometric standard.

(a) Land width of a minimum of 40' (12M) in both urban and open areas.

(b) Width of carriage way 3.8M (Single lane)

(c) Width of roadway 70.M. (Single lane)

2. Regarding other Geometric Standards such as gradient, crossfall, sight distance etc. those prescribed for District Roads should be adopted for other District Roads also.

3. Culverts on "other District Roads" should have a width of roadway equal to the width of the roadway less thickness of parapet.

4. Bridges up to 15 M span should have single lane decking subject to a minimum of 4.5 M. clear road way.

5. No black topping of any kind should be done in the first instance on "other District Roads". Increasing the crust thickness providing a B.T. surface need be taken up only subsequently, subject to availability of funds.

6. Mere gravelling may not be sufficient for "other District Roads". These roads should have Water Bound Macadam (W. B. M.) surface.

Government have examined the suggestion in all its aspects and are pleased to fix the standards as suggested by the Chief Engineer for "other District Roads" except in regard to village roads taken over by Government (or to) be taken over by Government where the land width may be only 8 metres on level ground where no cutting or formation of embankment is involved. Where such cutting or formation of embankment is involved necessary minimum additional land width subject to the maximum of 12 metres may be allowed.

By order of the Governor,

R. GOPALASWAMY,

Secretary.

To

The Chief Engineer, (G, B&R)

The Superintending Engineers

The Executive Engineers (B&R)

All District Collectors

The Director of Panchayats

The Local Administration and Social Welfare Department Office of the Minister (Works)

The Public Works (Special) Department,

GOVERNMENT OF KERALA

Public Works (G) Department

ORDER

G. O. (Ms) 118/75/PW.

Dated, Trivandrum, 6th June 1975.

Read: 1. G. O. (Ms) 126/72/PW dated 23-6-1972.

2. Letter No. GA6-76338/74 dated 24-3-1975 from the Chief Engineer (B and R).

In the G. O. read above it was ordered that in the case of village roads taken over by Government or to be taken over by Government the land width might be only 8m on level ground where no cutting **or** formation of embankment was involved. Where such cutting or formation of embankments was involved, necessary minimum additional bandwidth subject to the maximum of 12 m. was allowed. In view of the difficulty in forming the road especially in reaches where cuttings and formation of embankments are involved, Government are now pleased to order that where necessary additional land in excess of 8 m. will be acquired before taking up improvements to such roads.

Accordingly, the G. O. read above will be amended by adding the following at the end of the last para- "Where necessary additional land in excess of 8 m. may be acquired at Government cost before taking up improvement".

By order of the Governor,

P. K. ADDULLA,

Special Secretary.

To

The Chief Engineer, General, Buildings and Roads

The Director of Panchayats

Local Administration and Social Welfare Panchayats Department

The Office of Minister (Works)

The Public Works (D) (H) Departments.

Stock File.

[Vide G. O. (P) 55176/PW dated 1-3-1976.]

CHAPTER V

INVESTIGATION AND DESIGN OF WORKS-BRIDGES

5. BRIDGES

5. 1 Selection of sites

5. 1. 1. The site of a bridge should be carefully selected after considering the following points.-

(a) In the case of a bridge in a National or State Highway or Major District Road, the location should be such as to have the minimum detour, from the general alignment of the road.

(b) The location of the bridge should be convenient from the point of view of institutions like markets, schools and hospitals and other centres of population on either side of the bridge.

(c) The approach on both sides should be straight and there should not be steep gradients.

Note- "When the designs of the approaches to Bridge are made the same should conform to the specification and restriction given in accordance with IRC Standards on vertical curves and as per general conditions specified in geometrics of roads published by IRC".

[Vide G. O. (P) 78173/PW. dated 11-4-1973.]

(d) The course of the river or stream over which the bridge is constructed should have a straight reach for at least 100 metres on either side of the proposed crossing and there should be no tendency for erosion on either bank within this distance.

(e) Narrow crossings should be preferred.

(f) Good foundations should be available at reasonable depths below bed level.

(g) A site, which provides for overall economy in cost taking into account the bridge cost as well as approaches is preferable.

5 1.2 Some times more than one site may have to be examined at the preliminary stage and comparisons made regarding cost and relative advantages and disadvantages. Based on such study, the final choice of site should be made.

5. 2 Investigation

5.2.1 After the site is finalised a complete investigation of the site should be made and the following data and drawing should be prepared and submitted.

(a) *An index map*.-to a suitable small scale (topo sheets scale one cm. to 500 M or 1/50,000 would do in most cases) showing the proposed location of the bridge, the alternative sites investigated and rejected, the existing communications, the general topography of the country, and the important towns etc., in the vicinity.

(b) *A contour survey plan*.-of the stream showing all topographical features and extending to the distance shown below (or such other greater distances as the Engineer responsible for the design may direct) upstream and downstream of any of the proposed sites and to sufficient distance on either side to give a clear indication of the topographical or other features that might influence the location and design of the bridge and its approaches. All sites for crossings worth consideration should be shown on the plan.

(i) 100 m. for catchment areas less than 3 square km. (scale not less than one cm. to 10 m. or 1/1000),

(ii) 300 m. for catchment areas of 15 square km. (scale not less than one cm. to 10 m. or 1/1000).

(iii) One and a half km. for catchment areas of more than 15 square km. (scale not less than one cm to 50 m. or 1/5000).

.Note:- (i) Maps in inch units may be used until the maps in metric units become available.

(ii) In different country and for crossings over artificial, channels .the engineer responsible for the design may permit discretion to be used regarding these limits of distance, provided that the plans give sufficient information on the course of the stream and the topographical features near the bridge site.

(c) A site plan to a suitable scale showing details of the site selected and extending not less than 100 m upstream and downstream from the centre line of the crossing and covering the approaches to a sufficient distance which, in the cast of a large bridge, should not be less than 500 m. on either side of the stream. The plan should include all information that is essential for complete and proper appreciation of the project. The normal requirement are given below:-

(i) The name of the stream or bridge and of the road.

(ii) The approximate outlines of the banks, the high water channel (if different from the banks,) and the low water channels with contours at suitable level intervals in the bed and beyond the banks and the line of the deepest points along the dry weather channel.

(iii) The direction of flow of water at maximum discharge and if possible, the extent of deviation at lower discharges;

(iv) The alignment of existing approaches and of the proposed crossing and its approaches.

(v) The angle and direction of skew if the crossing is aligned on a skew;

(vi) The alignment of a suitable ferry bridge or ferry for use till construction is over.

(vii) The name of the nearest inhabited identifiable locality at either end of the crossing on the roads leading to the site.

(viii) Reference to the position (with description and reduced level) of the benchmark used as datum.

(ix) The lines and identification numbers of the cross sections and longitudinal section taken within the scope of the site plan, and the exact location of their extreme points;

(x) The locations of trial pits or borings, each being given an identification number;

(xi) The location of all mullahs, buildings, wells, out crops and rocks and other possible obstructions to a road alignment.

*Note:-*In the case of a crossing over and obstruction other than stream the same requirements will hold *mutatis mutandis*.

(d) Cross sections of the river covering the reach 50 m. upstream and 50 m. downstream of the proposed bridge site to a scale not smaller than 1 cm = 10 m. indicating the following information.

(i) The bed line upto the top of banks and the ground line to a sufficient distance beyond the edges of stream, with levels at intervals sufficiently close to give a clear outline of markedly uneven features of the bed ground, or showing right and left bank and names of villages on each side.

(ii) The nature of the surface soil in bed, banks and approaches with trial pit or bore hole sections showing the levels and nature of the various strata down to hard strata suitable for foundations and the safe intensity of pressure on the foundation soil, (as far as practicable, the spacing of trial pits or bore holes should be such as to provide a full description of all sub strata layers along the whole length and width of the crossing);

- (iii) The low water level;
- (iv) The ordinary flood level;
- (v) The highest flood level and the years in which it occurred. State if the flood level is affected by backwater and if so, give details;
- (vi) The catchment area, maximum discharge and corresponding average velocity at the sight of the crossing.
- (vii) The estimated depth of scour or, if the scour depth has been observed, the, depth of scour, with details of obstructions or of any other special causes responsible for the scour.
- (viii) Whether the stream is tidal, if so, low tide level, and highest tide level.

(e) *A longitudinal section* of the stream showing the site of the bridge with the highest flood level, of the ordinary flood level, the low water level, and the bed levels at suitably spaced intervals along the approximate centre line of the deep water channel between the extreme points to which the contour survey mentioned earlier extends. The horizontal scale shall be the same as for the survey map and the vertical scale not less than one cm. to 10 cm. or 1/1000.

(f) A note giving as far as possible the following particulars relating to the catchment area:

- (i) The size of the catchment.
- (ii) A map of the catchment.
- (iii) The nature of the catchment; whether under forests, under cultivation, urban etc.,
- (iv) Storage in the catchment, if available artificial or natural.

(g) A chart of the periods of high flood levels for as many years as the relevant data are recorded.

(h) A note giving important details of the bridges, if any, crossing the same river within a reasonable distance of the proposed bridge.

(i) The minimum permissible vertical channel clearance and the basis on which it has been determined mentioning any special requirements for navigation.

In the main Navigation route between Quilon and Shornur, the vertical clearance for navigation shall be 5 metres above the highest water level.

In other important navigation routes the clearance shall be 4 metres.

In minor navigation channels and stream the clearance shall be 2 metres. If the road is submersible, then the clearance should be provided above the maximum water level at which navigation will take place under the bridge.

(j) *Foundation Details.*

(i) The nature of bed material and soil strata below the same along the centre line of the proposed bridge should be carefully investigated and details furnished.

If rock is available at reasonable depth below bed, the same should be located and the level at which rock will be met with ascertained by trial pits or borings;

If rock is not available but a hard stratum exists within about 2 metres of the bed trial pits at suitable intervals may be taken to such stratum and the depth as well as nature of the hard stratum noted. Load bearing tests should also be conducted to ascertain bearing capacity of the hard stratum;

Borings should be taken in all other cases, the depth of bore hole extending to 6 metres or where firm foundation is available whichever is deeper. The borings may be taken at suitable interval along the cross sections of the river or stream at the centre line of the proposed bridge or as near thereto as practicable.

The samples of soil material obtained at different depths when taking boring should be carefully preserved for laboratory examination if necessary.

If undisturbed specimens of soil are necessary the advice of the Peechi Research Station may be sought.

(ii) If any test pile has been driven at or near the site, the data observed during driving of the pile.

(iii) If any load bearing test has been conducted the result of such test.

(iv) If the soil samples obtained by borings have been tested in the laboratory the result of such test.

(k) Any other information affecting design.

5.3 Determination of maximum flood discharge

5.3.1. *Determination of maximum flood discharge.*-The maximum discharge the bridge is expected to pass should be determined by a consideration of at least two of the following methods:-

(a) From the rainfall and other characteristics of the catchment.

(1) By use of an empirical formula, applicable to that region-Ryve's formula may be adopted.

(b) From the hydraulic characteristics of the stream such as cross sectional area, and slope of the stream.

(c) From the records available if any, of discharges observed on the stream at the site of the bridge, or at any other site in its vicinity.

5.3.2 Where possible, all three methods should be adopted and compared, the final figure for discharge being suitably fixed by the Engineer responsible for the design.

5.4 Fixation of spans and pier sites

5.4.1 *Fixation of spans and pier sites.* -Based on the field data and the standards to be followed for the bridge, the number of spans and the location of piers should be designed in the design office and market in the site survey.

5.4.2 In the case of simply supported spans, the most economical span is one where the cost of the superstructure of one span is equal to the cost of one pier and foundation. As far as possible the economical span should be worked out and adopted unless local conditions necessitate a different design.

5.4.3 After the location of the pier sites are marked in the Plan borings should be taken at the site of such piers when borings had not been taken previously. There should be at least one boring at each pier site. The depth to which borings should be taken and the location and the number of holes must be indicated by the Design office. If soil samples have to be collected along with borings, this will have to be done in consultation with Peechi Research Station.

5.5. Standards to be followed

5.5.1 *Standards -Width.*-For National Highway the width of decking for bridges between kerbs shall be 24' (7.5m) In State Highways and major district roads, the width shall be 22' (6.7 m.) and in all other cases 14 (4.3 m.), In the case of bridges in town roads, provision should be made for foot-paths 1.5 metres wide on either side.

5.5.2 *Loadings* -For bridges in National Highway and West Coast road, new class 70 R loadings should be adopted for design. For all other bridges 1. R. C class. A loading, shall be adopted.

5.6 Bearings

5.6.1 *Bearings.*-For spans upto 20' (6 m.) the free ends of girders should rest on a smooth, cement plastered surface of the bed block.

5.6.2. For, spans for 20' to 40' (6 m. to 12m.) sliding plate bearings shall be provided.

5.6.3. For spans from 10' to 50' (12 m. 15 M.) rocker plate bearings shall be provided and for spans above 50' (15 m.) seal or R. C. rocker and roller bearings shall be used.

5.6.4. For suspended spans in balanced cantilever type of bridges, steel roller bearings shall be provided.

5.7 Miscellaneous

5.7.1. *Miscellaneous.-Longitudinal camber.*-If a bridge is having longitudinal camber-this camber should consist of straights from both abutments junctioned by a cubical parabola in the centre, The upper flanges of supporting beams etc., shall follow this slopes so that the deck slab wearing coat parapets etc., shall all have uniform thickness and height and follow the camber as stated above.

5.7.2 Approach slabs should be provided on either *side* of the bridge for a length of at least 4 meters for the full width of the roadway.

5.7.3 In the case of bridges up to 15 m. span in Ghat roads the deck surface should be sloped to follow the gradient of the Ghat road. For spans above 15 m. if a level dock is adopted this should be smoothly joined with the road slopes on both sides avoiding kinks by the use of suitable vertical curves.

5.7.4. *Service Duct.*-In all bridges with footpaths, a service duct should be made under one or both footpaths to take water supply mains, electric, and telephone cables etc. The size and other requirement may be ascertained from the respective departments.

5.7.5 When footpaths are not provided, provision should be made for supporting a suspended service deck under the cross girder,. For this purpose suitable boot holes may be left in the cross girders which can later be used for fixing steel supports for a suspended rock.

5.7.7. *Lamp posts.*--Where the roads on either side leading to the bridge have street lighting the bridge also should have suitable lamp standards fixed in Pylons on the parapets.

5.7.7 Where there is no street light on the approach road, provision should be made for pedestals to support lamp standards later when required.

5.7.8 *Access to bearings.*- Provisions should be made in the design for access to all bearings so that same can be inspected and maintained.

5.7.9 *Expansion joints.*-These should be provided in the bridge floor at the free ends of the supporting system and at the abutments and at suitable place. Adequate clearances should be left at these places and copper seal provided to prevent rain water soaking through the gap. In addition the gap (or clearance) provided may be filled with bituministic filler.

5.8 Adoption of Type designs

5. 8.1 Wherever type designs are provided for the deck, parapet, pylons etc., these should normally be followed.

5.8.2 *Authority competent to sanction design.*-All permanent bridges costing Rs. 1 lakh and above should be designed in the Chief Engineer's office and approved by Chief Engineer.

5. 8.3 Designs of permanent bridges costing less than Rs. 1 lakh may be done in Superintending Engineer's office and approved by Superintending Engineer. The Superintending Engineer may if he finds it necessary refer to Chief Engineer cases of designs of such bridges also.

5.8.4 Permanent bridges costing Rs. 25,000 and below may be designed in the Executive Engineer's office adopting type designs to the extent possible.

5.8.5 *Code of practice to be followed for design.*-The design of the bridge should be done as per instructions contained in paras 103 to 116 of the Standard specifications and Code of Practice for road bridges in Section-1. (I. R. C. Code).

CHAPTER VI

INVESTIGATION AND DESIGN-BUILDINGS

6.1 Selection of site for the Buildings.

6.1.1 *Selection of site.*-The site selected should be such that it is most advantageous for the purpose for which it is put up. If the building is for another department, it is necessary that the selection is done by Executive Engineer in consultation with the District Officers of that department. In the case of office buildings, excluding those for Projects where the campus site has been fixed, the District Collector may also be consulted. For major buildings, costing above Rs. 2 lakhs the final selection may be done after inspection of the prospective sites by the Superintending Engineer or the Chief Engineer.

6.1.2 Wherever master plans for town or country development have been prepared or are under preparation the District Town Planner or the area development authority having jurisdiction over the area should also be consulted before finalising the selection of site.

6.1.3 In selecting a site the following desirable features should be kept in view.

(a) The neighbourhood must be suitable for the purpose for which the building is to be constructed.

(b) The site must be easily accessible from the main roads and important institutions.

(c) As far as possible the site should be such that the building constructed in it is not hidden by other buildings of no consequence in the locality.

(d) The site must be fairly level or gently undulating without steep slopes, rock out crops, abandoned laterite or rock quarry pits etc.

(e) The site must not be subjected to water-logging and should be capable of easy drainage.

(f) The subsoil should be hard enough to provide good foundation at reasonable depth.

(g) It should be possible to locate sources of drinking water for use of the occupants either at the site or within reasonable distance there from:

(h) The site should have good ventilation. At the same time it should not be exposed to heavy wind without any protection.

(i) The site should not contain places of worship, graveyards, monuments, or any other structure or feature of religious or sentimental value whose demolition may cause offence to any section of the population.

6. 1. 4 If more than one site is available, the relative merits of the several sites should be examined before a final choice is made.

6. 2 Investigation and field data to be furnished

6.2 Investigation and field data.--The following field data should be furnished in respect of proposals for new buildings.

(i) An index map showing the site in relation to the nearest public road, railway line and important institutions in the neighbourhood. The index plan may be a tracing from the village map or town map or a good sketch containing the information required.

(ii) A detailed site survey of the site showing the boundaries and ground features as well as structures if any, trees of more than one metre birth, abandoned laterite quarries, wells etc. It should also show portions of adjacent property, and structures if any, abutting or close the site. Spot levels should be taken throughout the site so that contours at 1/2 metre intervals can be plotted. The existing natural drainage courses within the property if any as well as outside should be marked. The approach road to the site upto where it joins any public road should also be surveyed and marked. A few cross sections should also be taken at convenient intervals. The survey may be done with a plane table or chain in small areas, and with theodolite triangulation in larger plots. A reference line should be established at a suitable place in the plot. It should be permanently fixed by means of concrete blocks at its extremities. One or two permanent B. Ms. should be established. The reference line and the B. Ms. should be marked in the site survey. The north point should also be marked. The site survey should be of a scale not smaller than 1 cm = 10 m.

(iii) A report containing information on the nature of soil and subsoil and the bearing capacity etc. should be submitted. For this purpose a series of trial pits are to be taken at suitable places within the site. Ordinarily trial pits need not go to more than 2 meters depth if hard soil capable of supporting the structure is obtained within that depth. In case good foundation is not available within 2 metres depth borings should be taken. The location of the trial pits and bore holes should be marked in the site survey. It is desirable that the Executive Engineer inspects sites where foundations are poor and indicates the number and location and minimum depth of bore holes to be taken. It is necessary that the samples of soil obtained from boreholes are taken and sent for examination. Where undisturbed samples are required, the Peechi Research Station or any other approved laboratory may be consulted.

Where necessary, load tests on foundation or soils should be carried out

iv Where pile foundations have to be adopted, it may sometime be necessary to drive in test piles so as to ascertain the bearing capacity of the piles. In such cases, test piles should be driven and the results sent along with the investigation data.

(v) The subsoil water level during rainy season and dry season should be observed and recorded.

(vi) Maximum flood level expected in the locality.

(vii) Direction of prevailing wind during different season.

(viii) Source of water supply for construction as well as for use when the building is occupied.

(ix) If there is electric supply in the vicinity, the distance of the nearest point from which power supply has to be tapped.

(x) The source from where the principal construction materials like stones, bricks, metal, lime etc. are to be procured.

6.3 Authority empowered to design buildings

6. 3. 1 *Design*.-The design of a building or group of buildings involves three processes.

(a) Designing the layout and orientation of the buildings.

(b) Architectural planning of the individual buildings which consist of preparation of plan, section and elevation showing the size of rooms their inter-relation, the communication spaces, architectural features, specification for finish for walls, floors doors and windows etc.

(c) Structural design of the foundation and individual components of the structure.

6. 3. 2 In respect of individual buildings or group of buildings, costing up to Rs. 5 lakhs (a) and (b) will be considered and finalised by the Senior Architect, directly in charge of the Architectural Wing under the Chief Engineer (General Buildings and Roads) and (c) by the Chief Engineer. In cases where the Chief Engineer considers that modifications are necessary, because of structural requirements or for economy, he will consult the Senior Architect and effect necessary changes. If there is any difference of opinion the matter will be referred to the Government for advice before taking final decision.

In case of Architectural Designs of buildings costing Rs. 5 lakhs and above, the procedure will be the same as above, with the modification that cases of disagreement between the Chief Engineer and the Senior Architect will be referred to the Government for decision. The Government will take a final decision in such matters after holding discussions with the Chief Engineer and the Senior Architect and after giving due consideration to their points of view. Where there are type designs approved for buildings forming part of a group of buildings the total cost of which exceeds Rs. 5 lakhs, reference to the Senior Architect need be made only with regard to item (a).

6. 3. 3 In respect of buildings or groups of buildings costing between Rs. 50,000 and Rs. 2 lakhs (a), (b) and (c) will be done by the Superintending Engineer. In respect of buildings or groups of buildings costing below Rs. 50,000 (a), (b) and (c) will be done by Executive Engineer.

6.3.4 Wherever type designs are available, they should be invariably adopted unless the site conditions, necessitate a change in which the case sanction of Chief Engineer should be sought for.

6.4 Layout and orientation

6.4.1 *Layout.*-In preparing the layout plan, the bye-laws of the Corporation, Municipality or the Local Body concerned or in cases where applicable, the relevant portions of the Town and Country Planning Act should be complied with as regards set back line, free space around the building etc. At the same time considering the heavy pressure of building land in Kerala, the layout should be such that if possible there is space left for expansion or construction of additional buildings later in the concerned site.

6.4.2 The Orientation of buildings have to be carefully determined with reference to the roads, direction of prevailing wind, the need for protection against hot sun on the west and south sides, the relative positions of the structure with reference to adjacent buildings etc.

6.5 Number of stories

6.5.1 In urban areas it is preferable to go in for 2 or 3 storied construction wherever the nature of the buildings will admit of such construction.

6.5.2 In Corporation of Ernakulam and Calicut, multi storied buildings should be adopted wherever possible.

6.6 Restriction in height near Aerodrome

6.6.1 In the case of buildings to be put up within 5 KM of an existing aerodrome, the height of the buildings should be restricted as given in Appendix VI (a).

6.6.2 It is also necessary that the sanction of the Civil Aviation Department be obtained on the plans in the case of all buildings located within 1800 metres of aerodrome.

6.7 Residential buildings

6.7.1 *Residential buildings standards for.*-The standards of space and specifications to be followed in respect of residential buildings for Government officers are given in Appendix VI (b). These are based on type design approved by Government and are for single storey buildings. Where residential buildings are built as flats the same floor area may be provided and in addition enough area to provide for stair cases and passages. Where any one residence is built as double storied structure the minimum space required for a staircase room may also be added to the plinth area fixed for that class of building.

6.7.2 The pay scales referred to in the table are those which prevailed prior to the revision effected with effect from July 1968. The revised pay scale corresponding to these pay scales noted in the table should be followed for determining the type of building to which an officer is eligible.

6.7.3 No relaxation in regard to the area or specifications noted above should be done without special orders of Government.

6.8 Office Buildings

6.8.1 *Office buildings standards for.*-The provision of space in designing office buildings should be worked out based on Appendix VI (c). No relaxation on this should be made without orders of Government.

6.8.2 In respect of schools, hospitals, hostels etc., the standards given in Appendix VI (d) may generally be followed.

6.8.3 Where buildings have to be constructed to house machinery, the design of the buildings must be suitable for the machinery to be installed. It is desirable that, the manufacturer's suggestions in this regard are obtained before finalising the designs.

6.9. Water Supply Installation

6.9.1 *Water supply installation.*-Water is an essential requirement for residential buildings and provision must be made for the supply of water to such buildings. In case there is a public water supply system available in the locality, the requirement of water may be drawn from such system after obtaining sanction of the authority controlling it. When there is no Public Water Supply System in the locality, special arrangements must be made to meet the water requirement of the occupants of the buildings. If there is a group of buildings in the form of a colony it may be necessary to design a small Water Supply Scheme to meet the needs of these buildings. In the case of isolated buildings or small groups of buildings, less than ten, it may be

uneconomical to go in for a separate water supply system involving pumps etc. Instead of individual or common wells may have to be provided to meet the requirements of water supply.

6.9.2 In the case of non-residential buildings also water supply will be required but on a much smaller scale than for residential buildings. Here also if there is a Public Water Supply System in the neighbourhood, this can be availed of for supply subject to getting permission from the authority controlling such system. If no such system exists, the question as to whether a separate water supply scheme had to be worked out for the building or buildings should be carefully examined and decided. In deciding this issue the following factors should be considered.

(a) Whether the requirement can be met from wells in adjacent public buildings.

(b) If the above is not possible whether the requirement can be met from other wells in the neighbourhood and if so, what is the financial implication would be.

(c) Whether supply can be ensured by sinking a well in the compound to be used as a draw well.

(d) If none of the above will be suitable what will be the capital and operating cost of a separate water supply scheme for the building or buildings in question. Before taking a decision on this matter, the views of the department for whose purpose the building is put up should also be obtained. The concerned department should also be informed that if a separate water supply system is to be provided solely for the building for that department the capital cost as well as the recurring operating cost will have to be borne by that department.

6.9.3 *Inside installations.*-Where piped water supply is intended to be provided proposals for inside installation should be finalised along with the design so that detailed estimate can be framed when the estimate for the building is prepared. In the case of non-residential buildings, the occupying department may be consulted before finalising the inside installations.

6.10 Sanitary installation

6.10.1 *Sanitary Installations.*-Where water closets are provided, there should be proper arrangements for disposal of the sewage. If there is a public sewage system in the locality the sewerage must be led to the nearest sewer in the manner approved by the authority controlling such system. In other cases suitable septic tanks should be designed and constructed. The question as to whether individual septic tanks are to be provided for different buildings or a common septic tank for group should be decided based on comparative cost and convenience. It should be ensured that the outlet from the septic tanks is at such level that there is free dispersion into the soil and whatever is not so absorbed drains into the nearest open drain.

6.10.2 Where only urinals are provided and the number of users is not large, it may be enough to provide suitable soak, pits instead of septic tanks.

6.10.3 If flushing tanks are provided for flushing there should be an overhead cistern interposed between the flushing tank and the water supply main.

6.11 Internal Roads within colonies

6.11.1 *Roads within colonies.*-When making lay out for a group of buildings in an area, the location of approach roads within the campus should be properly marked. Roads should be formed along such alignments charged to the estimate for the building project. The width and nature of surfacing to be provided for the service roads will vary depending upon the importance of the road, the traffic needs etc. Normally service roads need have only have the standards of village roads. Wherever possible trees should be planted along such service roads.

6.11.2 The road system should have proper drainage. Open drains cut along side the road would normally suffice. Masonry drains should be provided only in special cases where due to restriction of width or slope adequate drainage cannot be provided through earth drains. The outlet should be led into the nearest valley or to the drain in the nearest public road.

6.12 Fencing compound walls etc.

6.12.1 *Compound walls.*-Provision of compound wall will generally involve considerable cost and should not be considered as automatically necessary for every building. It is difficult to lay down hard and fast rules regarding this but the following principles may be kept in view while taking a decision on this.

(a) Where there is a group of public buildings in one site, fencing or compound wall should be thought of for the site as a whole and not for individual buildings or groups of buildings unless security reasons necessitate separate enclosure for any particular building or set of buildings.

(b) As far as possible fencing should be chosen in preference to compound wall as this is cheaper and will be sufficient for demarcating the boundary and for preventing trespass.

(c) Compound wall may be built along side the boundary abutting a public road for appearance and for privacy. Compound walls need not be more than 1.5 metres high unless for security or other reasons they have to be made higher.

(d) Compound walls should be made as cheap as possible consistent with the requirements.

(e) In case of residential buildings where space admits live fencing (hedges) may be provided.

6.13 Electrification:

6.13.1 *Electrification.*-If Electricity distribution is available at the site where Government buildings are put up and the buildings are of such nature as to require Electrification, this should be provided for in the design of the building concerned. In such cases the finalised plans should be forwarded to the Assistant Engineer, Electrical Wing who has jurisdiction over the area where the building is being put up for designing and preparing the detailed Electrification estimate. This design and estimate should form part of the estimate for the building work.

6.13.2. Standard to be followed.

(i) *Lights*.- (a) Each room in a building should have one or more lights so as to provide the requisite illumination. Generally speaking one light may be required for every 20 sq. m. of floor area for residences and for general lighting in public buildings. Where more intense light is required the spacing should be suitably modified. The following code of practice may be followed.

<i>Location of lighting</i>	<i>Intensity of illumination</i>	<i>Proposed fittings</i>
1.General office & office rooms	30 ft. candles	100 W-Incandescent lamps at 3 to 10ft. height and 6 ft. spacing. or 4 ft.40W Fluorescent lamp at 6 ft. spacing.
2. <i>Hospital Buildings</i> , (a) Wards general fittings Beds	10 ft. candles 15 ft. candles	40 W 1. L. or 20 W F. L fittings 60 W 1. L. or 20 W F. L fittings
(b) Operation Theatre General . *Over table	30 ft Coles	100 W 1. L. or 40 W F. L

*Special lighting as supplied through Medical department.

(h) In the case of residential buildings, the light point may be of the pendant or bracket type according to layout of the, concerned rooms. Normally only plain fittings should be adopted for lights in residential buildings and if in any case special fittings are to be adopted, sanction of the Chief Engineer should be obtained. One tube light (40W-4') may be provided in residential buildings. Types 1 to 4. For types 5 and above, 3 tube lights may be provided. In rooms where tube lights are installed one ordinary light point may also be provided to serve as stand by. One light with bulk head fittings may also be provided for external lights in each residential buildings.

(ii) *Fans*.-Provision of fans should be based on the standards prescribed by Government vide G.O. (MS) 51/65/PW dated 2-3-1965 vide Appendix VI (E) attached.

(iii) *Power wiring*.-Two power plugs may be provided in residential buildings types 6 and above.

In respect of non-residential buildings, the requirement of power plug should be specially assessed in consultation with the occupying department and provided according to necessity.

(iv) *Ordinary plug points*. - For residential buildings types 1 to 4 two plug points may be provided. For types 5 and above 4 plug points may be provided.

(v) *Street lights*. - In any campus consisting of a number of buildings street lights may be provided at suitable places along side service roads within the campuses. It should be so arranged that the energy for the streetlights is metred along with any other common services for the campus.

APPENDIX VI (a)

GOVERNMENT OF KFRALA

No. BI-40872/63/PW

Public Works (Buildings) Department

Trivandrum, Dated, 18-7-1963.

MEMORANDUM

Sub.-Buildings-Construction of buildings and other structures in the vicinity of Civil Aerodrome, Trivandrum-Instructions issued.

Instances have come to the notice of Government where certain Departments of Government have taken up the construction of buildings in the vicinity of the Civil Aerodrome, Trivandrum, without prior consultation with the Civil Aviation Department. According to the present instructions of the Government of India no building should be put up within a radius of 15,000 feet of the Aerodromes without prior consultation with the Civil Aviation authorities. The Chief Engineer, Buildings and Roads, the Commissioner, Trivandrum Corporation and all Heads of Departments are therefore requested to see that the instructions in this regard are strictly adhered to in future. Copy of letter No. VB-3 (188) /58 dated 10-8-1961 from the Deputy Secretary to the Government of India, Ministry of Transport and Communications with its enclosures is also enclosed herewith for reference.

(Sd.)

Deputy Secretary.

To

The Chief Engineer, (B & R.)

Copy of letter No. VB-3 (188) /58 dated 10th August, 1961/19th Sravana 1883/8 from the Deputy Secretary to the Government of India, Ministry of Transport and Communications (Departments of Communications' and Civil Aviation), New Delhi, to the Chief Secretary to the Government of Kerala

Sub:-Construction of buildings and other structures in the vicinity of Civil Aerodromes.

I am directed to say that cases occur not infrequently when an aircraft crashes on a building situated in the vicinity of an aerodrome resulting in the death of persons not only on board the aircraft but also in the building. In order to obviate such instances in future, which result in the loss of valuable human lives as well as damage to property, the Government of India deem it advisable that high buildings and other tall structures should not be constructed in the vicinity of Aerodromes either by the Government of etc., or by private persons as would constitute hazards to air navigation. The existing Municipal laws in force in the State ofetc.,, presumably contain provision prohibiting the erection of buildings, without previous sanction and except in accordance with, the bye-laws made there under in relation, to the erection of buildings. The Government of India therefore request the state Government to instruct the local municipalities District. Boards etc., to avail of those provisions with a view to preventing, danger to human life, property, etc. in the vicinity of aerodromes. These local bodies may also be requested to incorporate suitable provisions in their bye.-laws with a view to prohibiting the construction of buildings, installations and structures, the height of which is beyond a certain limit in the vicinity of Civil Aerodromes and indicated in Annexure I to this letter. The construction of any building, structure or installation exceeding the height indicated in Annexe I may be permitted only after prior consultation with the local Aerodrome authority. Similarly, the bye-laws should prohibit construction of smoking chimneys in the vicinity of aerodromes without consultation with local civil aerodrome authorities as the drifting smoke from the chimneys may cause poor visibility at or near the aerodromes. If such bye-laws are made it would empower the local authorities to withhold approval of plans for buildings, installations and structures violating the above two requirements.

ANNEXURE I

Annexure 1 to Government of India, Ministry of Transport and Communications (Depts. of Communications & Civil Aviation) Letter No. 3-VB9 (188)/58 dated the 10th August 1961

VICINITY OF AERODROME, - DEFINITION OF

From the Civil Aviation point of view, the term Vicinity of an aerodrome is defined below.. -

I. International Civil Airports and their alternates..-The elevation of the top (which is also called the reduced level of the top) of buildings structures and installations proposed to be constructed in the neighbourhood of International Airports and their alternates should be within the limits indicated in the table below.

Sl No	Limits of distance from the aerodrome reference point measured horizon tally of buildings structures or installations.	Difference between elevation of the top of the buildings, structures or Installations and the elevation of the aerodrome (Aerodrome Reference point).	Remarks
(1)	(2)	(3)	(4)
1	Between 28,000' and 12 Nautical miles	Less than 500'	
2	" 24,000' and 28,000'	" 400'	
3	" 20,000' and 24,000'	" 300'	
4	" 16,000' and 20,000'	" 200'	
5	" 14,000' and 16,000'	" 150'	
6	" 12,000' and 14,000'	" 120'	
7	" 10,000'and 12,000'	" 80'	
8	" 8,000' and 10,000'	" 40'	
9	" 8,000' and less	Nil except with the prior concurrence of the local Aerodrome authorities.	

II. Other Civil Airports and Civil Aerodromes

(1)	(2)	(3)	(4)
1	Between 26,000' and 12 Nautical miles	Less than 500'	
2	" 22,000' and 26,000'	" 400'	
3	" 18,000' and 22,000'	" 300'	
4	" 14,000' and 18,000'	" 200'	
5	" 12,000' and 14,000'	" 150'	

6	" 10,000' and 12,000'	" 120'	
7	" 8,000' and 10,000'	" 80'	
8	" 6,000' and 8,000'	" 40'	
9	" 6,000' and less	Nil except with the prior concurrence of the local aerodrome authorities.	

*Note:-*1. For serial Nos, 7, 8 and 9 no trees should be planted within the limits of the distance indicated thereto.

2. Irrespective of their distance from the aerodrome, (that is beyond 12 N. M. of the aerodrome-aerodrome reference point), no radio masts or such similar type of installations exceeding 500 ft. in height should be erected with out prior permission of the DGCA.
3. No building, structure or installation exceeding the heights indicated in Tables 1 and 11 above should be permitted, without prior consultation with the local aerodrome authority.

(Sd.)

Superintendent

Appendix VI (b)

STANDARDS FOLLOWED FOR RESIDENTIAL BUILDINGS FOR GOVERNMENT EMPLOYEES

Type	Minimum space requirements	Wood Work Doors windows & Ventillators	Shelves, wardrobe etc	Sanitation	Finishing work	Other amenities	Remarks
Type 1 (a) Single storied Plinth area per unit 37.42 m ²	1 living and kitchen 1 bed room 1 drawing room 1 veranda 1 WC	Doors: Flush door single shutter commercial ply on both sides Doors (ii) A.C.	1 Shelf in living room 1 ward robe in bed room	1 WC without flushing tank and with a water tap 1 shower	All floors are finished with cement plaster	One external tap with washing platform Smokeless oven in the	Ward robes and lofts have to be provided wherever they have

(b) Flats: Plinth area 38 m ² Scale of pay Rs. 70-115 to 85-175	1 bath	panelled Windows: Fully glazed Ventillators: Fully glazed or with glass louvers		and 1 ordinary tap		case of single storied building for flat type quarters Kerosene or gas stoves shall be used. AC pipe to be provided for flats for collecting refuse.	not been provided. For flats the plinth area noted is excluding stair case.
Type II (a) Single storied Plinth area 57.71 m ² (b) Flats: Plinth area 57.50 m ² Scale of pay Rs. 90-190 to 225-450	1 drawing room 1 dining room 2 bed room kitchen 1 WC 1 bath front and back platforms	Doors: (i) Flush door single shutter commercial ply on both sides (ii) A.C. panelled door single shutter Windows: Fully glazed ground glass Ventillators: Glazed with staggered glass	1 Shelf each for drawing, dining and kitchen 1 ward robe each for bed rooms.	1 WC without flushing tank and a water tap 1 shower and 1 ordinary tap for bath, kitchen sink and tap 1 wash basin	Do	external tap with washing platform chute for flats Smokeless oven in the case of single storied building For flats Kerosene or gas stoves shall be issued.	Do
Type III (a) Single storied Plinth area 84.10 m ² (b) Flats: Plinth area 84.40 m ²	1 drawing room 1 study 2 bed rooms 1 dining kitchen 1 WC 1 bath Work area	Doors: Flush door single shutter commercial ply on both sides A.C. panelled door single shutter Windows: Fully glazed ground glass	1 Shelf each for drawing, dining and kitchen 1 ward robe each for bed rooms.	Toilets will have WC with flushing tank and one ordinary tap 1 wash basin in dining 1 shower	All floors are finished with cement plaster	1 external tap with washing platform Hearth (Smokeless oven) for single storied building and Kerosene or gas stoves for that shall be used chute	Ward robes and lofts have to be provided wherever they have not been provided. For flats the plinth

Scale of pay Rs. 250-525 to 400-900	and store	Ventillators: Glazed with staggered glass		in bath and 1 ordinary tap kitchen sink and tap		for flats.	area noted is excluding stair case.
Type IV (a) Single storied Plinth area 109.43 m ² (b) Flats: Plinth area 109.00 m ² Scale of pay Rs. 515-900 to 600-900	1 drawing room 1 study verandah 2 bed rooms 1 dining kitchen store Work area 1 bed room to have attached toilet 1 common toilet	Do	1 Shelf each for drawing, dining and kitchen 1 ward robe each for bed room	Toilets will have WC with flushing tank and one ordinary tap 1 wash basin in dining 1 shower in each toilet 1 wash basin with mirror 1 kitchen sink and tap	Mosaic flooring for verandah, drawing, dining and toilets Red oxide finishing in bed rooms and study Black oxide finishing in kitchen All other floors are finished with cement plaster	Garage has to be provided with an additional cost of Rs. 4500. 1 external tap with washing platform Hearth (Smokeless oven) for single storied building and Kerosene or gas stoves for that shall be used chute for flats.	Do
Type V (a) Single storied Plinth area 142.12m ² (b) Flats: Plinth area 142.35	1 Verandah 1 drawing 1 study 2 bed rooms (one bed room to have attached toilet, kitchen with separate	Do	Do	Do	Mosaic flooring for verandah, drawing, dining and toilets Red oxide finishing in bed rooms	Do	Do

m ² Scale of pay Rs. 600-1000 to 900-1200	store, Pantry, work area and servant's room 1 common toilet 1 toilet for servants				and study Black oxide finishing in kitchen All other floors are finished with cement plaster		
Type VI Double storied Plinth area 19.19 m ² (man) 23.17 m ² (stair) 20.65 m ² (garage) Total: 233.01 m ² Scale of pay Rs. 1000-1300 to 1300-1700	1 Verandah 1 Office room 1 drawing room 1 dining room 3 bed rooms (Two bed rooms to have attached toilet and dressing one bed room to have attached toilet) kitchen with separate store, Pantry, work area and servant's room 1 toilet for servants 1 WC attached to with office room	Doors: Flush door single shutter commercial ply on both sides A.C. panelled door single shutter Windows: Fully glazed ground glass Ventilators: Glazed with staggered glass	1 Shelf each for drawing, dining and kitchen 1 ward robe each for bed room.	Toilets will have WC with flushing tank and one ordinary tap 1 wash basin in dining 1 shower in each toilet 1 wash basin with mirror 1 kitchen sink and tap	Mosaic flooring for verandah, drawing, dining and toilets except for servant Floors of bed rooms, study and pantry area are to be finished with Red oxide Black oxide finishing in kitchen All other floors are finished with cement plaster	1 external tap with washing platform Hearth (Smokeless oven)	Ward robes and lofts have to be provided wherever they have not been provided.

Note: The scale of pay and area are fixed as per GO (MS) No. 83/73/PW dated 27-4-1973

[Vide G. O. (P) 46174/PW dated 3-4-1974]

APPENDIX VI (c)

GOVERNMENT OF TRAVANCORE-COCHIN

Public Works Department (Buildings)

PROCEEDINGS

Dated, Trivandrum, 19-10-1956.

Sub.-Standard Scale of buildings to House-Public Offices.

Read:-1. Letter No. D. A. XII. First. 3-2812 dated -2-1954 and subsequent correspondence resting with Letter No. HA2-d 72156-571525 dated 18-8-1956 from the Comptroller.

2. Letter No. B2-2273154 dated 16-3-1952 from the Chief Engineer.

ORDER R. Dis. 8977/56/PWD

The Comptroller has informed Government that the standard scale laid down by Government of India for Office accommodation for various classes of Government Servants is as below:

1. Gazetted officers (below the rank of an Accountant General or Comptroller). 160 sq. ft.
2. Non-Gazetted Staff (Clerks and Supts.) 40 sq. ft.
3. Records 10 per cent of item (2) above

1. He has suggested that this Government may also fix such a scale and insist on all departmental authorities to take on rent only such buildings as would provide for the minimum floor area required for each office.

2. The Chief Engineer has stated that the procedure suggested by the Comptroller can easily be applied in the case of Government buildings specially designed for housing offices where the maximum floor area could be made use of for the purpose. But he had pointed out that in the case of private buildings taken on rent it may not always be possible to utilise the whole floor area of the buildings for housing offices. He has, however, agreed that the standard scale referred to above may be accepted as the criterion for making use of the maximum area of such building.

3. Government accept the views of the Chief Engineer, P. W. D. All Heads of departments are requested to keep in view the standard mentioned above while hiring buildings to accommodate Public Offices.

(By order of His Highness the
Rajpramukh)

(Sd.)

Assistant Secretary

APPENDIX VI (d)

Standards of Space Allotment for Various Types of Buildings

PUBLIC BUILDINGS

(i) School Buildings. Primary Schools

Classroom area	10 Sft/Student.
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Secondary

Schools Class

room area	10 Sft/ Student.
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(ii) Arts and Science

Colleges

Lectures Halls	10 Sft/ Student.
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Lab6aratories	25 Sft/Student.
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Other requirements for Professional Colleges will be suggested by the authorities concerned.

STUDENT HOSTELS

Single seated Rms.	90 Sft-100 sq. ft./Student.
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Double seated Rms.	80 Sft/ "
--------------------	---------------

Girls W. C. 1 for every 4 students or part thereof

Bath 1 " 8 " "

Wash Basins 1 " 12 " "

(iii) HOSPITALS

Males W. C. 1 for every 8 beds or part thereof

Bath 1 " 10 " "

Urinals 1 " 20 " "

Wash Basins 1 " 12 " "

Female W. C. 1 " 6 " "

Bath 1 " 10 " "

Wash Basins 1 " 12 " "

(iv) PUBLIC OFFICES

Males W. C. 1 for first 40 & 1 for every 100 and part thereof

Urinals 1 for first 50 or part thereof

Wash Basins 1 for first 50 or part thereof

Females W. C. 1 for first 20 and 1 for every 50 and part thereof

Wash Basins 1 for every 50 or part thereof

STAIR CASES

Width. All Public buildings should have a staircase with not less than 4'-0" including handrails (120 cm.) preferably 5'-0" (150 cm.)

APPENDIX VI (e)

GOVERNMENT OF KERALA

Abstract

GOVERNMENT BUILDINGS---PUBLIC WORKS DEPARTMENT-PROVISION OF FANS-GENERAL RULES TO DETERMINE ELIGIBILITY-ORDERS ISSUED

PUBLIC WORKS (BUILDINGS) DEPARTMENT

G.O. (MS) 51/65/PW.

Trivandrum, Dated, 2nd March 1965.

*Read:-*1. Correspondence resting with letter No.ELI-16729162 dated 21-12-1964 from the Chief Engineer Buildings and Roads.

2. Letter No. 4782/AD1/64 dated 8-10-1964 from the Chief Town Planner and Consulting Architect to Government.

ORDER

The Chief Engineer (Buildings & Roads) is in his letter read above has reported that at present estimate's for electrification of buildings including the provision of ceiling fans are prepared and finalised in consultation with the heads of Debarments occupying the buildings concerned who are having differing views on the subject. He had therefore stated that it is desirable to fix certain standards in regard to provision of fans in Government Buildings including residential quarters. The Chief Engineer (Buildings & Roads) has forwarded certain proposals in this regard, after consulting the major beads of Departments.

After considering, these proposals Government prescribe the following standards for the provision of fans in Government Buildings in future.

1. As a general rule, one fan Sweep may be provided.

of 48' for every 20 sq. metres.

2. (a) All Gazetted Officers. 1 fan 48' sweep or higher size according to the size of the room.

(b) All Heads of Offices do.

(c) Inspection Bungalows, 1 ceiling fan in each bed room and 1 Rest Houses and or more
in Tourist houses. each dining and drawing room according to the size of the room.

(d) *Courts:*

(i) Dais 1 fan.

(ii) Bar Table One 48' fan for every four persons the fans being provided not less than 8' c ft.

(iii) Retiring room of 1 fan of 48

Presiding Officer

In the case of large court rooms fans will be provided according to size of rooms as per standard in Rule 1.

(e) *Police Stations.*

For the Inspector or 1 ceiling fan.

Sub Inspector or Head

Constable in charge of

the Station.

(f) *High Schools.*

(i) Headmaster 1 ceiling fan.

(ii) Common room 1 or more fans according to size of the
(for teachers). room as per the standard in Rule 1

(g) *Colleges.*

(i) Professors; Assistant 1 ceiling fan each.

Professors

(ii) Other Officers who 1 ceiling fan.

are allotted a single room

(iii) Lecture rooms One ceiling fan for the dais and for the rest fans as per standards in Rule (1) above.

(iv) Common rooms and library Fans as per Rule (1) above

(v) For workshops etc. As per the recommendation of Principal concerned.

(vi) *Polytechnics etc:*

Superintendents of Junior Technical

Schools and Principals of Polytechnics. 1 Fan.

For Lecture rooms

common rooms, As in item (ii) to (iv) above.

library and workshops

(h) *Mofussil Hospitals and Dispensaries*

(i) Wards One 56" fan for a bed.

(ii) Nurses' duty room 1 fan according to the size of room.

(iii) Single bed operation room Two exhaust fans of 19" sweep and 2 ceiling fans 48'.

(iv) X-ray room and dark room One exhaust and one ceiling fan (size based on the floor area).

(v) Blood Bank, Ophthalmic, ENT. etc One ceiling fan each according to the size of room.

(vi) Dining halls, dressing As per General standards in Rule (1) above.
rooms, pay wards etc

(vii) Compounding room 1 fan.

(viii) Each Doctor having a single room 1 fan.

(j) *Veterinary Hospitals:*

(i) Doctor's room 1 fan.

(ii) Examination rooms 1 fan each.

laboratory and dispensary
and surgery room

Officers.-No fans should be allowed for any single head ministerial Officer if he is not of the grade of pay of a Gazetted Officer.

All District Officers may be given a ceiling fan in their office rooms and a table fan in their retiring room. Fans if any to be provided for individual non-gazetted Officers should be table fans for which separate sanction may be obtained from the competent authority. In offices with one or two Clerks or where only one or two Clerks occupy a room fans need not be provided

except for special reasons. Any additional fans provided may be table fans as per sanction from competent authority.

(k) Others:

- | | |
|--|--------|
| (i) Quarters for Officers on Rs. 500-800 | 3 fans |
| (ii) Quarters for Officers on Rs. 250-400 | 2 fans |
| (iii) Quarters for Officers on Rs. 150-250 | 1 fan |

3. Wherever the term ceiling fan is used without indicating its size, the size 48' sweep shall be accepted.

4. Relaxation to the above standards shall be made in special cases and only with the sanction of Government.

5. Requirements not covered by the above standards shall be examined and accepted or rejected according to the merit of each case.

By order of the Governor,

R. RAVI VARMA,

Assistant Secretary to Government.

To

The Chief Engineer, Buildings & Roads.

CHAPTER VII

INVESTIGATION AND DESIGN-WATER SUPPLY TO COLONIES

7. 1. General

7. 1. 1. *General.* The responsibility for water supply to town and rural areas is vested with the Public Health Engineering Department. The P. W. D. however has to undertake water supply installations to colonies or group of buildings constructed by the Department. The operation of any water supply installation will involve a good amount of recurring cost and hence the question as to whether such an installation should be provided for a particular group of buildings or whether it would be enough if one or more draw wells are constructed to provide drinking water is a matter to be carefully considered and decided on merits. If it is decided to go in for a protected water supply system distributed through pipes, investigation has to be carried

out regarding source, location of pump house, alignment of pumping mains, location of storage tanks, layout of distribution systems etc.

7. 2 Requirements of Water

7. 2. 1. Before investigating for source of water, the requirement must be properly assessed. The requirement may be estimated on the following basis:-

7. 2. 2. *Domestic.* Where family type residential houses are involved, five members may be allowed for each house. In the case of bachelor type residences and dormitories the population may be estimated at 1 1/2 times the number of persons for whom such accommodation is given. The requirements may be worked out at 135 litres per head of population per day. If there is a chance of the colony being expanded within the next 30 years an estimate of the additional population to be created for should be made so that the further requirement may also be kept in view when designing the system.

7. 2. 3. In respect of hostels, the estimate of requirements may be made as in the case of dormitories.

7. 2. 4. For rest houses, tourist bungalows and hostels 120 litres per day for 2 times the number of beds provided may be taken as the requirement. In addition the requirement of the staff of the Rest House residing in the compound may be taken into account.

7. 2. 5. For offices, schools and colleges (excluding laboratory requirements) 25 litres per head may be provided.

7. 2. 6. For Hospitals 120 litres for thrice the number of beds provided may be assumed as the requirement.

7.2.7. *Non-domestic:* For Industrial establishments where water is required for processing or washing or cooling, the requirement should be assessed on the basis of the actual need.

7.2. 3 For other industrial establishments 50 litres per worker employed may be estimated as the requirement.

7.2.9 For laboratories the actual requirement should be ascertained. 7.2. 10 For gardens 7000 litres per acre per day may be estimates as the requirement.

7.3 Source

7.3.1. *Location of source.*-Having ascertained the requirements the source must be located.

7.3.2 Wherever there is a public water supply system within 2 Km. of the colony, and this system can supply quantity required, then the supply from such public water supply system should be made use of. Even in cases where the nearest main of the public water supply system is over 2 Km. distant it may some times be more economical to take supplies from such a system instead of from an independent source provided of course the public water supply system can

supply the required water. The relative economics of tapping from the public water supply main and obtaining water from a nearer but independent source should be examined.

7.3.3. Another possible source is from rivers or streams in the neighbourhood. It should be examined whether there is adequate flow in the stream to meet the requirement and whether the water is reasonably free from contamination and brackishness. By the term "responsibly free from contamination" it is meant that the quality must be such that the water can be made fit for human consumption after the usual treatment by filtration followed by chlorination. The advice of the water analyst attached to the Public Health Laboratory may be sought regarding suitability of the water available. The adequacy must be judged by gauging or otherwise ascertaining the minimum flow during the dry months.

7.3.4 In rivers with sandy beds extending over a considerable depth, even where the surface run off is poor, a good amount of flow can be tapped through infiltration galleries suitably located. The possibility of providing such infiltration galleries should also be examined in such cases.

7. 3. 5 It may often happen that a stream capable of supplying the required water for the colony or group of buildings is too far away or is at considerably lower elevation than the building site. In such cases the capital and or operating cost will make this source uneconomical to be used. Other possible source viz. shallow wells or tube wells may be considered. The possibility of striking water in a shallow well is a matter to be carefully studied after examination of wells in the neighbourhood, topographical and geological features etc. If there is fair prospect of striking water, further investigation should be done by driving a bore hole in the possible site and examining whether water bearing strata is met with at reasonable depth or not. The driving of the test hole may be done using earth auger or such other tool as may be found suitable. Casing pipes may be used where there is a chance of the sides slipping in. If water bearing strata is met, the drilling may be continued with a casing pipe for about 2 metres in that strata and a rough test of the yield made by depressing water level in the test of hole and watching the, rate of recuperation. This may help in fixing the diameter and depth of wells to be constructed. In addition to rate of recuperation, the following factors also should be taken note of in determining the size of the well.

(a) *The normal water table*.-This is the level at which water stands in a well which has not been pumped for 24 hours. This varies throughout the year; and.

(b) *The critical velocity of flow*.-The critical velocity of inflow is the maximum velocity of water passing through a sub-soil without disturbing the arrangement of the finer particles of the sub-soil. In average sub-soils, this velocity is between 750 mm (2-112') and 1200 mm (4') per hour and is obtained with a head of 2 metres (7') to 3 metres (10') under average conditions of sub-soil.

The quantity of water that can be safely pumped from open wells is limited by the critical velocity and for practical purposes this may be calculated by multiplying the critical velocity by the area of the floor of the well.

7.3.6 Where deep tube wells have to be thought of the advice of the Public Health Engineering Department and the Geological Department may be sought as to the feasibility of getting water from this source at the site concerned. The work of constructing a deep tube well may also be entrusted to the Public Health Engineering Department with the sanction of the Chief Engineer.

7. 3. 7 Sometimes the yield obtainable from any of the sources above mentioned may fall short of the requirement. Before discarding an otherwise suitable source on this account it should be examined whether the extra cost by resorting to a distant but more assured source is worth spending or whether restricted supply may be made using the source available.

7.4 Intake works

7.4.1 *Intake works.*-In the case of supply from public water supply systems no special intake works may be necessary. However, where the mains pressure is insufficient or where the supply in the main is intermittent or where the supply main cannot cater for peak load requirements, then it may be necessary to have a storage tank to receive the supplies from the mains. Where the main supply is intermittent the storage tank may have a size equal to the daily requirement. Where the main supply is continuous the storage tank need only hold 213 the daily requirement.

7. 4. 2 Where the source is from a stream it is advisable to have a well type of intake constructed close to one bank with sufficient openings at suitable levels to let in water. The side steining should be carried to a level above the M. F. L. and the pump house may be located on top of the well above M. F. L. The section pipe should be taken to the bottom of the well and protected by suitable screens all around to prevent choking with debris.

7. 4. 3. In case of supply from shallow wells the intake work will consist of the well and a pump house. The pump house may be located adjacent to the well or on top of the well itself according to convenience. It has to be ensured that the pump motor is kept above M. W. L.

7. 4. 4 The depth and diameter of the well should be designed based on the requirement, the lowest rate of recuperation, critical velocity etc. The sides of the well should be properly protected by masonry, concrete or R. C. steining which should be designed to stand the stresses involved under the most adverse condition when the well is pumped- dry and the surrounding soil is saturated with water.

7. 4. 5. In hard soils the well can probably be excavated and the lining constructed thereafter. In loose soils and wet soils, where the sides are likely to collapse, well steining should be constructed in sections over a proper kerb and the well sunk to required depth. In such cases, steining rods should be put in the steining to take the stresses while sinking. Where the steining is constructed after open excavation backfilling should be done very carefully. The bottom portion should be back filled with metal and the top with good impervious earth. It is essential that at least 3 meter length of steining immediately below the ground level is provided with water tight masonry to avoid surface water seeping through.

7. 4. 6 The steining masonry should be carried up above ground level for height of about a metre to serve as a protective parapet. A masonry platform 112 metre wide with lead off drain should be constructed at ground level around the well so as to facilitate surface drainage.

7. 4. 7 In deep tube wells a pump house should be constructed over the tube well and the pump motor located in the pump house.

7. 5. Pumps and Pumping Mains

7. 5. 1 *Pumps and Pumping Mains*.-Pumps may be designed for supplying the daily requirement at a rate not exceeding the safe pumping rate in the well. There should be one stand by pump. Where electric supply is available the pump should be electrically operated, otherwise diesel operated pumps should be used. The type of pump has to be decided taking into account the duties to be performed the fluctuation of water level in source etc. The Motor has to be located at a level higher than the highest flood level. So if the lowest water level is 5 metres or below the motor platform level, it is advisable to go in for vertical type of pumps the pump being submerged at the lowest level and driven by a vertical shaft by the motor.

7. 5. 2 *Pump installation*.-In the installation of a pump, the following points should be attended to:-

(a) the foundation, which must be heavy and rigid to prevent vibration and to hold shafts firmly in line;

(b) the section lift, which should be made as low as possible the greatest section-lift that may be expected at sea level is about 6 metres (20 feet).

(c) the suction pipe which should be air tight, laid with as few bends as possible and equipped with a foot valve;

(d) non-return valve on the discharge pipe, supplemented by a sluice-valve which shall not be closed while the pump is running.

(e) proper sheds for the pump.

7. 5. 3. Pumping mains should be designed for the maximum pressure they have to stand up to 75 mm diameter G.I. pipes capable of standing the required pressure including water hammer pressure) can be adopted. Above that size, cast iron or steel pipes may be used. No distribution should be made directly from the pumping main.

7. 6. Storage Tanks

7. 6. 1 *Storage Tanks*.-Except where the supply is from a public water supply system, there is no need for a low level storage tank. One or mote high level storage tanks will however be necessary to serve as balancing reservoir. The level of the high level tank or tanks should be fixed so that there is enough pressure to convey the water through the distribution system with a terminal pressure not less than 2.5 metres head. The size of the storage tank should be such as

to supply the peak demand even if the pump happens to be idle during that period. As a practical measure, it is advisable to provide **for** 24 hours storage. To facilitate cleaning, the storage tank may be in 2 compartments with suitable inter connections.

7. 7. Purification

7. 7. 1 Purification.-Except where the source is from public water supply schemes, samples of water to be used from any other source should be got examined by the water analyst and his advice sought regarding treatment to be given. Normally in the case of wells and tube wells, it may not be necessary to do anything more than chlorinating the water supply. Simple and automatic chlorinating units are available in the market and a suitable equipment for the quantity to be purified should be provided for in the design. The chlorination may be done either through the use of liquid chlorine or bleaching powder. In case supply is drawn from rivers, tanks or other sources it may be necessary to filter the water also in addition to chlorination. In such cases, for small colonies it is advisable to go in for pressure filters. Convenient handy units are available in the market for this purpose. The purification plant is most conveniently located near the source of water.

7. 8. Distribution system.

7. 8. 1 *Distribution*.-The distribution mains should be designed so that there is an exist pressure of at least 2. 5 metres at the last tap.

7. 3. 2 Normally G.I. pipes will be sufficient for distribution in small colonies. Class II or Class III quality pipes should be used for the purpose.

7. 9. Metering

7. 9. 1 *Metering*. Where the supply is from a public water supply system, the water will have to be paid for and the quantity will be measured either at one point or at the different consuming units through metres. If the quantity is measured at one point, the question as to whether the P. W. D. should install sub metres at the different consuming units or not should be decided on merits of **each** case. It has to be noted that reading of the sub meters and the maintenance of the same will involve a recurring cost some- times out of proportion to the Revenue realised on account of water charges. The alternative to providing meters will be fixed a flat rate for each building as a percentage of the rent.

7. 9. 2 Where the supply is from other sources, though water is not paid for, the operating cost has to be met by the Department in administrative charge of the colony. Here also the question as to whether meters should be installed or a flat rate is to be charged should be decided on merits.

CHAPTER VIII

INVESTIGATION AND DESIGN OF WORKS - MAJOR IRRIGATION WORKS

8. 1. General.

8. 1. 1 Every Irrigation structure has to be designed with reference to two aspects, namely, the hydraulic aspect and the structural aspect. The investigation required is therefore to collect field data for these two aspects of design.

8.1.2. The field data required for designing each type of structure varies but there are certain items which are essential for all designs and these are detailed below.

(i) Every estimate should be accompanied by a location map and where necessary a catchment area map from the G. T. 8. map.

(ii) There should also be a detailed site survey to a scale of 1 cm = 10 metres or 1 mml = 5 metres) showing all the proposals with spot levels. If the various component parts of the scheme are distributed to such an extent that they cannot all be shown in a single survey, as in the case of a long channel with structures all along its course, different site surveys should be given for each component part.

The site surveys should show the north point, the scale of plotting, a few permanent marks, the location and value of the B. M. adopted and also the location of trial pits or probing points adopted for exploring the foundation detail. The trial pits should be serially numbered and the strata details given in one corner of the sheet. As far as possible the trial pits should be taken down to hard rock or safe bearing strata, but in no case should they be less than 2 metres below ground level or 1 metre below the scour level expected at the site. The position of the water table should also be shown as far as possible either from the trial pits or from observation of neighbouring wells. All the Bench Marks should be connected to M. S. L. For this purpose, each Executive Engineer should keep a register of survey of India Bench Marks fixed by the Survey of India, within his jurisdiction and should extend them as far into the interior areas as possible and add them on in to the register under a regular programme.

The site survey of a particular structure should show all the physical features of the country clearly for a radius of at least 50 metres in the case of small structures and 150 metres in the case of major structures. If there are existing structures like bridges or culverts within this range their hydraulic particulars should also be given.

(iii) L. S. and G. S. at intervals of 30 metres for a distance of 100 metres upstream and downstream of any structure proposed should be taken. In the sections, the M. F. L. and O. F. L. and L. W. L. should invariably be shown; The cross sections should extend at least 15 metres on either side beyond the extremity of the Proposed structure.

Every drawing should show the name of the main work, the village and the taluk where the work is located in addition to the name of the particular structure to which the drawing relates.

The concerned Junior Engineer himself should take site surveys and level sections, and all trial pits and foundation probings should be got done in his presence. Overseers or Work Superintendents should be used only to assist him in these works.

The site surveys and level sections should contain a certificate that these were taken by the junior Engineer (the name of the Junior Engineer and number of the field book where such data are recorded should be noted in the survey and drawings).

Wherever new canals are proposed, the alignments should be peg marked on the ground and the site survey should be so made that points on the line are connected to permanent points or compass traverse taken so that there would be no difficulty to set out the alignment during execution even if the pegs are lost.

8.1.3. The hydraulic data required varies with the type of work under consideration but in general the following particulars should be collected:

(a) In the case of any structure on or across a river or natural valley

(i) The area of catchment draining into the river up to the site of the structure together with information regarding rainfall stations in the catchment and the available rainfall statistics in such stations.

(ii) The pattern of flow in the river or stream during different periods of the year. This should be ascertained through gauging or by study of available discharge information at other sites in the stream such as at weirs, barrages etc. or by computation of discharges from cross sections and surface of scope. The information collected should be included also maximum flood discharge, low water discharge and the M. F. L. O.F.L. and L.W.L.

(b) In the case of canals and tanks etc.

(i) The ayacut area sought to be served, the pattern of cultivation and usage of water by the ayacut at present.

(ii) Information regarding rainfall in the catchment during cultivation seasons.

(iii) Full hydraulic particulars of all cross drainage courses viz.- maximum flood discharge M. F. L. and the type and extent of silt carried by the drainage stream.

8. 2 Storage Schemes

3.2.1 *Preliminary section-* Before undertaking the detailed investigation and design of a storage scheme, a reconnaissance survey and a preliminary study of the basin with the aid of all available maps, rainfall statistics statements of discharges at existing works in the river should be made. Based on such study a few possible sites for construction of a storage dam suitable for the purpose in view should be marked out on the G.T. S map and these site should be inspected and their relative merits studies. The selection of a site for a dam should be done with great forethought and imagination. The following are some of the favourable features for a good dam site:

(a) The width of the river at the site should be as narrow as possible;

(b) The flanks should be rising;

(c) Rocky bed if available should be preferred;

(d) Upstream of the dam site, the valley should widen out and the bed slope should be flat so that there is good storage even for moderate height of dam;

(e) There should be no low gaps in the ridge along the watershed line. Such gaps will require subsidiary dams and would add to the cost of the work.

(f) The area likely to be submerged should not contain valuable occupied lands.

A preliminary geological examination should also be made through a Geologist to ascertain the general suitability of the sites constructing a storage dam and the special difficulties if any in the different sites. Sites, which from the geological point of view are unsuitable should normally be rejected.

A few sites where the conditions stated above appear satisfactory should be selected and a few trial borings taken along the proposed centre line of the dam at these places. Based on the foundation data as ascertained through trial borings the approximate cost of a dam for different heights at the possible alternative sites should be estimated. Concurrently the storage available upstream of the dam in the different sites for various dam lengths should be worked out on the basis of G. T. S. map. From this the relative economy of the different sites can be roughly studied for the storage required. Unless there are other considerations the most economical site should be chosen.

8.2.2. Estimation of yield.-The best method of estimating yield from a catchment is by taking actual measurements of discharges at a convenient point in the stream or river draining the catchment. If weirs or barrages, exist in the stream then measurements of discharges, can be made at these places. If no such weirs, barrages etc.; exist, discharges may be computed through gauging at a convenient reach in the river. From the measured discharge at weirs or discharge as ascertained through gauging the discharge at the dam site may be estimated proportional to the catchment areas intercepted making suitable allowances for variation in the characteristic of the catchments. The gauging should normally cover a cycle of at least 3 or 4 years and the discharges should be correlated to the rainfall of a representative station in the catchment. This correlation will enable the discharge of bad years, average years and good years being estimated from the gauging data available.

8.2.3. Another method of estimating, the yield is to work out the discharge on the basis of rainfall records in the catchment area. Each rain gauge station should be plotted in a map of the catchment area and its area of influence marked out. This may be done on the basis of Thiessen's polygons making allowance for important topographical features. The yield from the area of influence of each rainfall station may be worked out using Strangest run off tables or similar tables. From this the total yield over the catchment may be found out.

8 2.4. An estimate of run-off based on even the most systematic and accurate records of rainfall is however liable to great error and it should be clearly borne in mind that even an

approximate gauging of actual discharge, wherever possible, is preferable to estimates wholly based on rainfall data. In the case of most Irrigation Projects, the information required is the run-off from the catchment in an average or bad year and the actual gauged quantities of the daily flow for one or two seasons including a bad or below average year correlated to the daily rainfall records for those seasons, will often help to derive a reasonable forecast of the run-off in other years for which only rainfall figures are available

8.3 The maximum discharge in a river maybe determined by any one of the following methods:-

(a) The gauge readings if any maintained at sites of anicuts or masonry works, across the stream either upstream or down stream of the dam site should be obtained and discharges calculated and corrections applied to the catchment area between such masonry works and the dam site.

(b) From local enquiry the maximum flood level at the site may be ascertained and the discharge calculated by Kutter's formula by taking the cross-sections of the stream at the site and assuming a suitable value for the Kutter's constant.

(c) The maximum flood discharge maybe estimated by using an empirical formula like Ryve's formula.

8.4. *Quality of water for irrigation.*-In cases where the river water is suspected to contain salts, which may be detrimental to the growth of crops particularly sodium and calcium salts samples of water should be taken at different times and stages of river flow and sent to the water analyst for analysis noting the date on which the sample was collected, the locality from which it was taken, and the stage of river flow.

8.5.1 *Detailed investigation.*- Based on the data collected above and site inspections the site for dam and its height must be finalised and detailed investigation undertaken. This will consist mainly of surveys, borings and geological examination of foundation, collection of further hydrological data, location of quarries, campsites, approach roads, laboratory test of principal construction materials etc.

8.5.2. *Detailed Surveys.* -Contour surveys should be taken of the dam site (including saddle dams if any) site of surplus works and all such areas are needed for a proper design of the dam. It is advisable to use the triangulation method, with theodolite for this survey. Levels should be connected to the nearest M.L.S. Bench Mark and permanent Bench marks established in a number of places within the working area. There should also be a permanent reference line roughly along or parallel to the axis of the dam.

8.5.3 Survey of the water spread area upstream of the dam up to a level 10 metres above F.R.L. should be taken and this survey should show contours at 3 metre intervals. Where large areas are involved or where the area is a heavy jungle, this survey may, if possible, be done by aerial photography through the Survey of India with the sanction of Government. In other cases theodolite triangulation method may be adopted. This survey should be connected to the site

survey of the dam site. Bench marks should be established at suitable places in the water spread area at or slightly above F. R. L.

8.5.4 In case the dam is to be of masonry or concrete, the quarry or quarries for supply of stone and sand should be selected and detailed surveys of the quarry and also approach roads or railway tracks thereto should be taken.

8. 5. 5 If the dam is to be of earth or of composite structure, quarries for earth for the body of the dam should be selected and survey of the area or areas and approach roads taken.

8.5.6 Sites for the construction of offices, stores, workshops as well as for residences of the construction staff, workmen etc., should be selected and the areas should be surveyed. Similarly surveys necessary for water supply arrangements to the various sites should also be carried out. Surveys should also be done of the approach road or roads to the site from the nearest public road and also of the internal system of roads and tramway tracks in the working area and colony.

8. 5. 7 In addition to the above' in particular cases, other surveys may be necessary. The nature of the surveys required must be specified by the Engineer in charge of the Project.

8.6 Borings

8. 6. 1 A careful study of the foundation conditions in the site of the dam and all appurtenant structures has to be made. For this purpose trial pits or trial trenches or a series of bore holes should be put in at suitable locations as decided by the Engineer in charge of the Project. All the trial pits, trial trenches and bore holes must be marked on plan and the longitudinal distance along the line of the dam at which each is located must be correctly noted in the longitudinal section. A logbook showing progress of boring work in each hole, description of the strata available at different depths and other relevant details must be systematically maintained day after day and produced before the inspecting officers for check. Samples of materials or cores obtained in the case of calyx drills and diamond drilling must be retained in suitable core boxes indicating the depth at which particular samples were obtained. In many cases the final depth to which drill holes should be taken can be determined only after the drilling proceeds and the samples are examined. The general intention is that after sound rock level is established, the drill hole should extend into the sound rock for a distance of 6m or more depending on the height of the dam. After each borehole is completed, it should be plugged and its number and L. S. distance as noted in the chart should be noted in black paint over the top of plug so that the borehole can be identified later during construction. If any bore hole discloses the presence of faults, fissures, dykes, additional bore holes will have to be taken to get a clear picture of such fault, fissure, dyke etc.

Trial pits, trenches and drilling will also be necessary at the sites of the quarry to establish the suitability of the quarry and depth of overburden. The area where such drilling should be done and the depth of the same should be indicated by the Engineer in charge.

8.7.1 *Geological survey.*- In important works, particularly where difficult foundation conditions exist, it is necessary to have a thorough geological examination of the site. The data

obtained during borings should be made available to the Geologist employed for this purpose. Additional data through drill holes etc., as desired by him should also be collected and made available.

8.7.2 Hydrological data.- The main hydrological data concerning the reservoir would already have been collected during the preliminary phase of investigation. Further details should be collected during the course of detailed investigation and this also should be taken into account when the data are finally processed.

8.7.3 Laboratory tests.-As early as possible, even during the final investigation stage, a field laboratory should be set up so that tests on the foundations as well as materials to be used for construction can be carried out and the necessary data regarding this for design obtained. During the construction stage the laboratory can be used for the quality control of the materials and work.

8.8 Distribution system

8.8.1 The distribution system of irrigation canals starts either directly from a storage reservoir or from a diversion work. The system will generally consist of a main canal branch canals and distributaries. The main canal will be in the upper reaches of the distribution system and will generally be aligned in contour above the highest level of land to be irrigated. Where the irrigated area is small and in one compact block, distributaries can take off directly from the main canal. Where the area to be irrigated is large and are located in different pockets branch canals may also be necessary before distributaries are taken. The distributaries are generally aligned along watersheds so that they can supply water to lands on both sides.

8.8.2 The investigation and design of irrigation canals and their alignment requires a combination of both field work and office work. To start with, the alignment of the main canal is first roughly marked out on a contour plan of the irrigated area in a manner to enable water being supplied to as much of the commanded area as possible. The alignment is continued so as to connect up with the source along one or more alternative routes and a rough paper study of the cost of the canal along the different routes so aligned made. The alignment, which promises to be most economical and not likely be beset with difficulties regarding acquisition etc., is then chosen and the same roughly marked on ground. The alignment should then be inspected and such changes as are necessary to effect economy and to avoid construction or other difficulties should be made. Based on this preliminary alignment the design of the channel should be made and further ground inspection carried out to examine its feasibility and if changes are necessary they should be effected before finalising the alignment.

8.8.3. Detailed general instruction for investigating and preparation of estimate for distribution system of canals are contained in Circular of Chief Engineer (Irrigation) given in Appendix VIII.

8.8.4. It is the duty of the ryots to provide field channels from the sluices in the distributaries. Government canals and sluices should be so provided that water is made available to each block of about 25 acres in extent.

APPENDIX VIII

(Referred to in para 8. 8.3.)

General instructions for investigations and preparation of detailed estimate for the distribution system of canals

PART I-INVESTIGATION

1. Preliminary Investigation.

Generally the main canal and the important branches would have been investigated and marked on the ground during the preliminary investigation and these details will be available when the detailed investigation commences. The alignments of the main canal and major branches would also have been marked on G. T. 8 maps. The ayacut blocks also will be indicated in these maps.

As regards the capacity of the various reaches of the canals, although detailed location of the ayacut may not have been done, the area of the commendable lands may be commuted from the contours of the G. T. S. maps and about 70% of the area assumed as cultivable area. A maximum duty of 64 acres per cusecs in the field will normally give the required channel capacity at the tail end of each reach. To this has to be added the transmission and other losses in the field channels, @distributaries and branches worked out from the tail of each to the head and added on until the main canal head is reached. Each canal is then divided into convenient reaches and their respective capacities are fixed. The channel section and the bed fall are then designed based on approved procedures.

The bed levels and F.S. levels of each reach of each channel are then worked out from tail upwards making provisions for head necessary at head sluices and also losses in structures, flumes, curves, etc., liberal provision should be made for all possible losses. When this is done systematically, the B. L. and F. S. L. of the various points in the distribution system can be determined right up to the head of the main canal.

If in the preliminary investigation only the main canal and a few major breaches have been taken up, all the remaining channels should be investigated during the, detailed investigation as investigation of a new canal.

Investigation of new channels.-This will be dealt with briefly.

(1) Mark out tentative alignments and ayacut blocks in the G. T. S. map in which the main canal and major channels are marked.

(2) Establish M. Bs. along the tentative alignment at the rate of 1 B. M. per Kilometre.

(3) Determine the level of the highest field to be commanded. The tail F. S. L. should be half a foot higher than the level of the highest field and the H. S. L. (Half Supply Level) of the parent channel at the sluice should be 1/2 ft. higher than the F. S. L. of the branch at the head

and the channel capacity should provide for all transmission losses from the head sluice to the field.

Fix the F. S. L. of the various distributaries and their parent channel in this way systematically from the tail upwards.

(4) Design the channel sections for the various reaches and the bed fall.

(5) Check the original tentative alignment on the G. T. S. map contours with respect to the bed levels and adjust the lines if necessary.

(6) *Locating the canal on the ground.*-As a general rule, main canal and branches should have their F. S. L. entirely below ground level wherever the ground levels make it possible. In the case of distributaries, the half supply level may be kept at ground level.

But where the country is very undulating and the canal has to be taken across valleys frequently, it may be more advantageous to increase the depth of cutting so as to make available cut soil for forming embankments. In such cases, a differential mass diagram may also be drawn showing the algebraic summation of excess or deficiency of excavated material in each cross section after deducting a suitable percentage for soil unsuitable for bank formation. Within reasonable lengths this summation should be kept zero to avoid extra borrow areas as far as possible.

11. Field work.

(i) Pegs driven along the alignment of the main canal will generally be available for the commencement of the detailed investigation work. This alignment may be examined in detail and if no major changes are required, detailed investigation works can be started.

(ii) If this is not available the alignment will have to be marked on the ground with the help of the survey of India Map. This may in some cases be done with the help of L. S. details available or by a reconnaissance survey. While pegging out the new alignment the permanent Bench Marks established during preliminary investigation should be touched invariably and the correctness of ground levels in L. S. verified.

(iii) Following facts should be taken into consideration while fixing the line of the canal.

1. Ridges have to be crossed in cutting generally, unless the depth of excavation is too great. Wherever the maximum depth of cutting exceeds 25 ft. alternative alignment should be examined including tunnels.
2. Valleys have to be crossed in reasonable embankments unless soil available at site is quite unfit for formation of high embankments. Test sub soils in every case where the bed filling is more than 10 ft. Soil samples should be taken upto depths equal to the maximum height of banks above G. I. and tested. Where the sub-soil is incapable of supporting the band masonry structures should replace high embankments.

(3) Torrents with very large catchment areas must be crossed on the square as far as possible.

(4) As far as possible acquisition of costly properties and interference with monuments of religious or sentimental significance should be avoided.

(iv) The advantages of the line so fixed can then be examined as also other alternative alignment. Economy should be the main consideration in the final selection of any alignment. Among lines of equal economy that which gives least nuisance to public should be adopted.

(v) The next step is to transfer the alignment to the R. S. V. map. This is done in general by noting the survey numbers through which the line passes and also noting known check points and places where it crosses road, or channels, or its proximity to important structures etc. The alignment will normally consist of straight reaches. The distances are measured continuously from the centre of the head sluice gate.

The angle at inter-section points need not be measured by compass or theodolite. Instead a length of 50 ft. is measured on each line from the intersection point and the cross lengths between these two Points also measured as shown in the sketch. Normally the angle will be an obtuse angle and hence usually the external angle is used for constructing the isosceles triangle.

The external angle is thus determined and the alignment correctly marked in the R.S.V. If any glaring mistakes are observed in the map, the alignment as well as the map may be re-examined and the differences reconciled.

(vi) Now the ayacut area has to be determined with greater accuracy to find out the capacities of branches, distributaries and reaches of canals. For this spot levels are to be taken all over the ayacut in order to fix the boundary contour below, which the canal will command. These contours and spot levels are then marked in the R. S. V map. The area of the various sub-blocks are then determined by squaring or planimetre.

(vii) This work will also help in fixing tentatively the off take points of minors. The capacities of the various reaches are then fixed from tail upwards. Any change in the capacity at the head by this detailed ayacut location, from the original assumption should be looked into and adjusted either by slight changes in the alignment or by separating certain blocks and proposing a new distributory.

(viii) Having thus finalised the alignment both on the ground and in the R. S. V. map, the detailed survey begins.

B. DETAILED INVESTIGATION WORKS

I. Preliminary

(i) First and the foremost work to be attended for the detailed investigation is the establishment of pertinent B. Ms. along the alignment of the canal. This item may be carried out even during preliminary investigation stage.

11. Establishing B. Ms.

(i) Permanent Benchmark stones in granite 0.70M x 0.25M x 0.25M neatly dressed to size on all sides with a neat level depression of 0.10M x 0.10M on the top for holding the leveling staff should be fixed in concrete base 0.50M x 0.50M x 0.35M at interval of about 1000M along the line of the canal. The stones should have letters "B. M" cut on one face and the name of the project by letters (K.I.P.) on the other face. As far as possible these may be planted at points approximately 2M to 3M beyond the outer toe or top of cutting of the proposed canal on its lower contour side.

(ii) The B. M. stones must be serially numbered, Levels of these stones should be connected with two instruments and one staff by two Junior Engineers. The Assistant Engineer should check the values and enter them in the Register of B. Ms. position and the values of these B.M. should be noted also in the R. S. V. map.

(iii) If possible these stones may be given two coats of white paint and the curved letters engraved neatly in black enamel paint. B. Ms. for each reach or branch or distributory may be serially numbered and its values entered in a register.

This register should be submitted to the Division Office for approval.

III. Setting out the alignment

Next step for the detailed investigation work is to mark the straight reaches of the final line of the canal in the village map on to the ground, by centre line stones. These stones may be either granite or cement ground without any concrete foundation. These also should have project letters on one face.

(ii) Now the curves if any connecting these straight reaches are to be set out on the ground. As a general rule the radius of the curve 'R' may be fixed as far as possible as 20 times bed width (see also item X of canal standards in part II)

AB -- T- the tangent distance

R Cot ABC (see fig. No. 1)

BD = Secant distance. S is obtained from the relationship $S^2 + 25R - T^2 = 0$

The tangent points A & C can then be marked and also the Secant point D by marking the distance S on the bisector of the angle ABC obtained by joining the intersection point B to the centre of the line. AC joining the tangent points. Two more points F and H on the curves, on either side of the Secant point D can then be fixed. IAF is the middle point of the arc DC and G the point of the chord DC. Then FG is perpendicular to DC.

If $FG = Y$ and $DG = Z$,
 then $Y - R = -Z$ (see fig. No. 2)

Fig. (1)

.ell

] Fig. (2)

z G z C

It will be sufficient to fix 5 points on the curve on the ground. The tangent points should be carefully marked on the R. S. V. map also and the curve drawn. Straight reaches between tangent points may then be finally set out by means of centre line stones at 25 metres interval.

After pegging out the final line of canal it is desirable to examine same again and satisfy that the crossing of the major drainage courses with the centre line are made on the square and not on the skew. A slight adjustment of the line at the course may easily lead to a square crossing.

IV. Taking L. S. and C.S.

(i) Having thus correctly marked out the final line at 25 M intervals in the straight and curved reaches, the next step is to take longitudinal and cross-sectional levels correctly at close intervals. Longitudinal levels may be taken at every 25 M peg point, tangent point of curves, road crossings stream crossings, and where features of the country change sharply. Cross sectional levels may also be taken at every 50 M. intervals if the country is very rugged or at 100 M intervals if the variation in L.S. levels is very small. Cross section may also be taken at intermediate points if found necessary. Levels in cross section may be taken at points not exceeding 5 M intervals. This may be decided at site according to the lie of the ground. Permanent bench marks established during the course of preliminary investigation should also be touched while taking L. S. and C. S. of the final line.

(ii) After completing the alignment work of the main canal, a Preliminary report of the project giving salient features; and a statement of the villages affected by the project, and the approximate area that is likely to come under irrigation in each village, together with a tracing of the R. S. V. map with village boundaries and the names of village shown therein and the main canal line marked in red ink thick line and the approximate lines of branches and important distributaries marked in them dotted red ink line, may be prepared. A detailed ayacut register showing the source of irrigation for each field viz. number of the sluice name of the minor distributaries or branch, has to be prepared for the full ayacut area of the project by the P. W. D. and Revenue staff jointly.

V. Trial pits

(i) Trial pits should ordinarily be dug along the centre line of the canal at intervals not exceeding 100 M. This may be taken at closer intervals if found necessary. They should be excavated to the proposed bed level of the canal or at least to the level of the hard rock requiring blasting. Auger borings may be adopted when convenient.

(ii) Trial pits should also be dug in borrow area to depths not exceeding 2 M.

(iii) Location of all cross masonry works should be noted during field survey. The special field data to be collected for such type of work such as bridges, syphons, super passages etc. are determined separately.

VI. Office work

(i) On the R.S. V. map the canal alignment should be marked in red ink showing curves and straights, the tangent points with radial lines, radii of curves, Kilometer-war-points in the canal measured from the head changes of the crossing of road, stream etc. should also be shown in the map. The total distance from head to each tangent point should be marked. The angles of intersection between straight reaches should also be shown. All these details should be in red ink.

(ii) The location of trial pits must be shown in the form of small squares with 3 mm. sides in black ink at relevant place in the alignment. Its number in the serial order should be noted across the alignment line and on one side of it.

(iii) The position and value of benchmark should be noted on each survey map in red ink.

(iv) The reduced level of the canal bed may be indicated in red ink at intervals of 250 M across the alignment line.

VII Land Acquisition

(i) The profiles of canal formation including bed width slopes of cuttings, berms, slopes of bank, top width of banks, margins outside banks and extra land required for side drain formation on the higher contour side of the canal should be marked in all cross sections. When width of land to be acquired on either side of the canal can be neatly marked in each cross

section care should be taken to see that at no point there be any shortage of land including land for dumping spoil. The acquisition limits may be thus marked on the relevant points on the R. S. V. tracing and the points then marked on the ground with proper boundary stones. Gross section should be plotted as far as possible to a scale of 1/10 natural.

(ii) Proposal for acquisition of borrow area if any should also be marked in the R. S. V. map with average depth of soil and the quantity of earth available in red ink inside a small circle. All R. S. V. tracings should be serially numbered for each canal. This must be shown on the top right hand corner. North point should be marked in each survey sheet.

VIII. Plotting L. S. and C. S.

After having plotted the line of canal in the R. S. V. map the longitudinal section of the canal may be plotted on section paper. The horizontal scale of the longitudinal may be 1/100 (1 cm = 100 m) and the vertical scale 1/10 (1 cm = 10 m). The following horizontal columns (from top to bottom) may be adopted in plotting the longitudinal section (1) Datum (2) Hydraulic particulars (3) Top level of bank (4) reduced level of F. S. L. (5) depth of cutting (6) reduced level of bed (7) reduced level of ground (8) distance in KM (9) total distance in K.M. All these items may be entered in red ink except F.S.L, which may be in blue or black ink. Lines of bed level O F. S. level should then be drawn in the L. S. Trial pits also should be marked in the drawing as two vertical lines, 3 mm apart with soil classification on one side and reduced level on the other. The bottom of the two lines should terminate at the bed level. Every stream, road, cart track crossing with levels of crossing should find a place in the longitudinal section.

(ii) While plotting the cross section the spoil bank side of excess earth or unsuitable earth should be clearly marked in each section before hand so as to avoid land acquisition difficulties during execution. The area of spoil bank may be completed using 20% more than the excess quantity actually available from cutting, to make provision for bulkage. All canal banks should have dowel banks 0.20 m x 0.15 m size on either side.

(iii) The certificate of initial levels and check levels with reference to the I. F. Books numbers and pages should be furnished by the junior Engineer and the Assistant Engineer in each survey sheet. The forms of the certificate are.

"Levels were taken by Sri junior Engineer and recorded on pages
of level Field Book No"

(5d.)

Junior Engineer.

"Levels have been checked by Sri. Assistant Engineer and the check
levels are recorded on page of the level Field Book No"

(Sd.)

Assistant Engineer.

- (iv) The reference number and value of the bench marks should be shown in the L. S.
- (v) The L. S. sheet and the C. S. sheets should all be serially numbered at the top right hand corner with the name of the canal shown on the bottom right hand corner.
- (vi) As soon as the main canal is thus tackled, similar procedure for all branches and distributories may be followed.

IX. General.

(i) The- other items of work to be attended to after completion of the works detailed above may be in the following order:

1. Work out the earthwork estimates of the canal.
2. Prepare a neat drainage map of the area for the canal. This is actually the area drained by each drainage course upto its crossing of the canal line. The map may be prepared in R. S. V. tracing. The catchment areas of the drainage-s may be numbered serially from head of the canal. The name of the cross drainage works-aqueducts, under tunnels, syphon aqueducts, super passages, syphon inlet etc. with chainage of their crossing with the canal may be noted in it.
3. Prepare a list of works under each head for the canal. C. Works. D. Regulators, E. Falls, F.C.D. Works, G. Bridges, H. Escapes, K. Buildings, 1. Earth work, O. Miscellaneous etc.
4. Prepare necessary tabular statements in the prescribed form (statements 1 to 6) for each set of work% sluices, Railway bridges, Class A bridge, Class B bridge, foot bridge, Regulators G. D. works and drop.
5. Prepare detailed plans and estimates for all works for which details have been furnished above.
6. Prepare detailed data sheet for all items of work adopting suitable common leads for materials for convenient reaches of canal or for the full length.
7. Work out classified abstract for the canal.

These details may be worked out for main canal first and then for the branches and distributories one by one.

STATEMENT 1
Grading and velocities in main canal

STATEMENT 4

Particulars connected with drop in main canal

Position in distributor y		Description	Upstream side					Downstream side					Soil in foundations
KM	M		Bed width	F.S.D.	Discharge	Bed level	F.S.L	Bed width	F.S.D.	Discharge	Bed level	F.S.L	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)

STATEMENT 5

Particulars connected with C.D. works in canals

Canal														
Reduced distance	Description	Subsoil in foundation	Required discharge	Bed width	Depth	Velocity	Calculated discharge	Bed level	F.S.L.	Top of bank level	Mean velocity in masonry	Head of afflux allowed	Waterway provided	Calculated discharge
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
))))))

Stream										
Catchment area	Maximum flood discharge	Bed level	Maximum flood level	Normal velocity	Velocity allowed in masonry	Calculated head of afflux	Waterway provided	No of vents; depth of vents	Calculated discharge	Remarks
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)

STATEMENT 6

Statement of particulars connected with Bridges in Canal

Serial Number	Reduced distance	Description of bridge	Required discharge	Bed width	Depth	Velocity	Canal						Bridge								Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	Ventway allowed								
													Subsoil in foundation	No of vents	Width of vents						
17	18	19	20	21	22																

Cheek slip for verifying the longitudinal section and Survey sheet of the alignment of Main Canal Branches and Distributories

After the longitudinal section is drawn in accordance with the procedure given above its completeness may be checked with the help of the following questionnaire.

1. Is the final alignment line drawn thick in red ink?
2. Are the total distance from the head of the beginning of the section of canal or distributory noted at each tangent point at the starting and end of each village limit and at every road or cart track crossing of canal or distributory?
3. Are the radii of curves marked in dotted red ink and values noted in red ink?
4. Are the kilometer point of the canal noted in the survey?
5. Are the angles of intersection of the straight reaches and length of curves and tangent lengths furnished in, the survey in red ink?
6. Are the position of trial pits in the survey shown in the form of a small square with 3 mm. sides in black ink ie., the relevant places in the alignment?
7. If the certificate of initial levels and check levels, with reference to L. F. Books number and pages furnished in each survey sheet?
8. Are the positions and values of bench marks noted in each survey sheet in red ink neatly?
9. Are the final longitudinal section levels taken along the alignment noted in red ink at every 50 m. intervals and at all points where cross section levels for the final lines of canal were taken?
10. Are the survey sheets numbered?
11. Are all the levels taken along the final alignment of canal plotted in the longitudinal section sheet in black ink?
12. Are the position and values of bench mark noted in red ink in the longitudinal section at the relevant point?
13. Are the trial pits shown in the longitudinal section in black ink at the relevant places?
14. Is the certificate of levels furnished in each longitudinal section sheet?
15. Are the longitudinal section sheet serially numbered and the number noted at the right hand top corner?
16. Are the cross section numbers correctly noted in the L. S.?
17. Is the distance column completely filled up?

18. Is the datum furnished in each sheet?

PART II

Standards and main design factors for canals

1. Classification

- (a) *Main Canal*.-Canal taking its supply direct from the head works
- (b) *Branch Canal*.-Canal taking off from a main canal and having a head capacity of more than $10\text{m}^3/\text{Sec}$. (353 cusecs).
- (c) i. *Distributory*.-Capacity more than $1\text{ m}^3/\text{Sec}$. (35 cusecs) and equal to or less than $10\text{m}^3/\text{Sec}$. (353 cusecs).
 - ii. *Minor distributary* - Capacity of $1\text{ m}^3/\text{Sec}$. and under but above $50\text{ dm}^3/\text{Sec}$. (1.8 cusecs).
- (d) *Water courses or field Channels*-Small channels of capacity $59\text{ dm}^3/\text{Sec}$. and less.

2. Canal Standards

(i) All channels except water courses will have an inspection or service road on one bank. Normally the road will be located, in the case of a contour channel, on the service bank i. e. the bank on the lower side. In all other casts, on the left bank will be the inspection road. The top width of the inspection bank will be not less than 4.0. m. in the case of distributories and 4.5m. in the case of main canal and branches.

The other bank have a top width of 2 m for main canal, branches, the major distributories and 1.50 m in the case of minor distributories. The top width of banks on either side of a field channel will be 0.60 M.

(ii) *F. S. L.*- For all channels the F. S. L. should be suitable for the maximum irrigation demand for the ayacut commanded which will be explained later plus transmission losses. Half supply depth (H. S. D.) will be assumed as equal to $0.6 \times \text{F. S. L. depth}$.

(iii) *M. W. L.* -An M. W. L. will be fixed for all channels. The difference between M. W. L. and F. S. D. will be 0.30 M for distributories and 0.20 M for main canals and branches.

(iv) *Free Board*.-Free board above M. W. L. shall be –

for main canal, Branches and major distributories 1 m

for minor distributories	0.60 m
for water courses	0.30 M

(v) *Berm*.-In the case of canals in partial cutting to ensure that the centre lines of banks are parallel irrespective of depth of cutting, a minimum berm width of $X d/2$ shall be provided. Berms 60 cms wide will also be provided in all deep cuts which are equal to or more than 6 M in depth. The first berm in such cases shall be at F. S. L. and thereafter at 3 M. intervals.

(vi) *Saturation gradient*.-A 1:4 slope may be assumed for the saturation gradient. The earth cover over the gradient shall be

1.20 M for discharge $> 30 \text{ m}^3/\text{sec}$.

1.00 M for discharge $< 30 \text{ m}^3/\text{sec}$ and $> 10 \text{ m}^3/\text{sec}$.

0.30 M for distributories and field channels.

(vii) *Side slopes*

Cutting in rock $\frac{1}{4}:1$

Other laterite or gravelly soils 1:1

Filling average loam and gravelly soils $1 \frac{1}{2}:1$

Sandy soils 2 : 1

(viii) *Extra bank height*.-To provide for future settlement, wherever bank height over natural ground is more than 2 M, an extra height over the normal free board may be provided equal to $1/10$ of the height, by raising the top bank levels.

(ix) *Bed width to depth ratio*.-This may be fixed generally between 1 : 5 and 5.

(x) *Bends*.-Minimum radius of bends may be measured from the centre of the canal.

Radius of bends in canal having capacity of $1 \text{ m}^3/\text{sec}$. and more should be 15 times bed width and for smaller canal it may be reduced to 10 times bed width.

The suggestion contained in the U. S. B. R. specification is that a radius of 10 to 15 times water depth or 3 to 7 times the top water surface width, whichever is greater may be adopted, larger radius being adopted for bigger canals.

It should be borne in mind that there is no satisfactory hard and fast rule for determining the required radius of curvature since it depends on the canal capacity, velocity soil characteristic etc.

Where a sharper curve has to be introduced, either extra width at the curve or super elevation to the bed should be given to minimise the loss of head. The Height of outer bunds should be increased at curves.

(xi) *Coefficient of rugosity in Mannings' formula.*

Cement mortar surface	0.013
Cement concrete sides	0.014
Unplastered rubble masonry surface	0.025
Dry rubble surface	0.033
Rock cut-fagged and irregular	0.040

ordinary earth sides 0.025 for $Q < 8.4 \text{ m}^3/\text{sec}$.

0.0225 for Q between $0.4 \text{ m}^3/\text{sec}$ and $28 \text{ m}^3/\text{sec}$.

0.020 for $Q > 23 \text{ m}^3/\text{sec}$.

3. General instructions for the design of unlined channel

(i) The capacity of each distributory branch and main canal should be determined from the tail end of each channel upwards to the head.

The maximum duty at the field may be assumed as $0.59/\text{hectare}/\text{m}^3/\text{sec}/ (70 \text{ acres}/\text{cus.})$

(ii) In addition to the actual maximum demand in the field at any time provision should be made for transmission losses, which may be computed at the rate of $12 \frac{1}{2} \%$ for distributaries and field channels and at the rate of 8 cus. for one million square feet of wetted area for main canal and branches.

(iii) For computing ayacut for designing canal capacity at various reaches, the gross commendable area may be ascertained by planimeter or otherwise for each reach of the branch or distributory from a G. T. S. map enlarged preferably to a scale of 4 inches to a mile. The cultivable area may be assessed for design purposes at 70% of the gross commandable area.

(iv) To ensure that full demand of all land under a particular, reach of the canal will be possible even with half supply, the half supply level for the reach should be kept at 0.15 M above the highest field it should command. However when the land is at a considerable distance from the supply sluice, the additional loss of head involved should also be added.

(v) (1) After determining the capacity for each reach of canal the velocity, bed width and depth should be so determined as to ensure.

- (a) Regime conditions
- (b) Minimum percolation losses
- (c) Minimum land acquisition.

(2) For a general guidance in the preliminary design, assume the following relationship in the case of unlined canals.

$$\text{depth of flow} \quad d = 0.83 \sqrt[3]{Q}$$

$$\text{velocity of flow} \quad V = \sqrt{d}$$

Bed width

$$\text{depth} \quad m = (2V - 0.5) \text{ ft.}$$

$$\text{Bed slope} \quad S = \frac{(V + 0.87)^2}{K^2} - \frac{4}{3} \text{ where } K = 1.486$$

$$K^2 V^2 \quad n$$

In the above relationships.

Q = discharge in cusec.

n = Mannings coefficient of rugosity.

Note:-All dimensions are in the F. P. S. Units.

Adopt a value of 'd' to the nearest 0.5 ft. and a value of 'b' (base width) to the nearest foot (next higher) from the above value and check V & s if necessary. Final value may then be converted into metric units.

As a general rule bed slope of an unlined canal should be flatter at head reach and should get steeper towards the tail. The bed width to depth ratio should also get reduced from the head towards the tail of any single canal. As the bed width becomes narrower, the value of 'm' will eventually get less than 1.5 when it will be necessary to change the depth and give a more suitable high value of 'm'.

(4) Change in F. S. D. in a canal may be made at drops at regulators or at regulating notches. Where such structures are not available change in depth may be effected by allowing a flatter bed than the designed bed all. But this is not a satisfactory method.

Example. Discharge. 850 Cum (23.8m³/sec.)

$$d = 0.8 \sqrt[3]{850} = 7.6' \quad v = \sqrt[3]{d} = \sqrt[3]{7.6} = 2.76 \text{ ft./Sec.}$$

$$m = (2 \times 2.76 - 0.5) = 5$$

$$b = m \times d = 38'-0" \quad K = \frac{1.486}{0.0225} = 66$$

$$0.0225$$

$$S = \frac{(2.76 + 0.87)^{4.13}}{66^2 \times 2.76^2} = 0.00017$$

$$66^2 \times 2.76^2$$

Adopt a section 11.60 m x 2.50 m with a bed level of 0.00017.

4. Lined Canals.

Purpose (1) To reduce seepage losses.

(2) To increase discharge capacity by reducing the coefficient of rugosity.

(3) To give extra strength in weak sections against a breach or side slips.

(4) As a measure of economy by using smaller cross section, less acquisition and shorter C. D. works and less maintenance costs.

Cross Section Requirements.-Concrete linings will generally require from work for side slopes seepages than 1:1 slopes of 1:l are to be prepared. For all linings slopes steeper than stable slopes for the natural soil on sides will have to be designed for withstanding lateral pressures also.

For the greatest hydraulic efficiency the semicircular shape is the best but from practical consideration and from the fact that there is only a small decrease in hydraulic efficiency, the trapezoidal is generally followed. For a trapezoidal section of the maximum efficiency for a given area, side slopes and bed slope, the hydraulic radius is equal to half the depth of water. But for this section the required side slopes for maximum efficiency is about 0.6:1 which is rather too steep. Hence a shallower section with flatter slopes is generally followed. As a rule deep and narrow section requires relatively less lining material.

The bed widths and depths suggested by K. S. B. R. for lined canals are given below. Side slopes are generally 1 ¼ :1 or 1 ½ :1.

Discharges (Cusecs)	1400	1000	800	600	400	300	200	100
Bed width (Ft.)	12	10 ½	9 ½	8 ½	7	7	6 ½	5

Depth (Ft)	10	9	8 ½	7 ¾	7 ½	6 ½	5 ½	2 ½
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Location in Cross Section.-Due to increased initial cost of construction the length of lined canal should be *shorter than in unlined canal* and so alignments involving deeper excavation but shorter in length should also be examined. Wherever water tightness can be fully ensured by lining, the F. S. L. can be kept above the ground level, even in main canals and branches, keeping in view also the fact that the filling in the rear should be well compacted. So H. S. L. may be kept at G.I. even for main canals.

Radius of curvature.-Due to higher velocities permissible higher free board encroachment, in curves would be possible and so there is greater importance for the radius of curves for lined canals more than for unlined ones. The U. S. B. R rules is that a radius range between 10 and 12 times the water depth or 3 & 7 times the top water surface width whichever is greater may be kept, the lower ratio in either case being the minimum under ordinary condition.

Free Board.-The U. S. B. R- practice for height of lining above maximum water surface is given below.

Discharge (cusecs)	1400	1000	800	600	400	300	200	100
Free board ft	1.75	1.6	1.5	1.3	1.1	0.9	0.75	0.6
Height of bank	3.25	3.2	3.0	2.9	2.75	2.6	2.4	2.0

Velocity and rugosity coefficient.-Velocity upto 10 ft./Sec. can be adopted for C. G. lined Section with rugosity coefficient as given under the Section for unlined, canals. Where there is restriction in bed fall, lower velocities will have to be used. Higher velocities give reduced cross section and lower initial as well as maintenance costs. But where stone masonry or brick masonry is used with cement plastering, the maximum permissible velocity is limited to 5 ft./Sec.

Types of lining.

1. Concrete Lining- 3" thick cement concrete may be used for both bed and sides for sides slopes flatter than 1:1. For 1:1 side slopes the thickness should be 4" at the toe reduced to 3" at top. The mix for the bed may be 1.6:10 with 70% 1 ½ " metal and 30% of ¾ " metal. The mix for the sides may be 1:4:7 of the same metal grading. The surface has to be plastered with crude oil cement mortar 1: 4 for ½ " thickness crude oil is added at the rate of 5 % by weight of cement.

The concrete may be laid in panels of 15 ft. with 3" x 3" ribs at 7' 6" centres i.e. 2 for each panel cast monolithic with the slope and bed concrete. Hand tamping will generally be sufficient.

The expansion joints 1' wide and 3' deep are to be filled with bitumen. Dummy joints 114' wide and 314' deep from surface may also be given in addition in the middle of the panels at 15' centres.

Transverse drains of reverse filter 6" x 6" may be given at 60' centres connected to a longitudinal drain 18" wide and 12" deep having a reverse filter core of broken metal 10" wide and 8" deep enclosed in 4" thick sand. Pressure relief holes 3" dr. may be provided in the bed over the central drain at 30' centres. The holes will be plugged with clay when channel is running. Rectangular weep holes 4" x 1 ½ " are to be provided at 5' intervals above F.S.L. with reverse filter behind them.

Usually linings are not reinforced since the contraction joints at about 50 times the thickness will control cracks. But where no joints are given 0.5% longitudinal reinforcement will fully control cracks. Transverse reinforcement will be 0.2 to 0.25%. If ¾ " deep scores or cuts are made in concrete, the steel need be only for the uncut thickness.

A 9" wide berm at the top edge of the lining is generally given to prevent surface water going under the slab.

Precast unreinforced slabs of such dimensions as can be handled conveniently and which will be stable during handling with reinforcement joints will be numerous and should be filled with bitumen to ensure water tightness.

Preparation of base.-No special preparation of the base of the lining is necessary in cutting except that the slopes should be well trimmed and the extra cuts for the lugs and the berm at the top before laying concrete. But on embankments, to ensure sound compaction, the inner slope should be formed to an extra 2 ft. width and trimming done just before laying concrete.

Typical drawings are given showing the various construction details.

Stone masonry lining.-This is particularly useful in deep cuts and also in rock cuttings where side slopes can be as steep as 1 ¼ : 1. The lining for the sides need be only 9" thick at top and 18" at the toe and consist of R.R. Masonry in 1:6 cement mortar and plastered over ¾ " thick with 1:4 cement mortar. At the bed either 18" thick stone masonry or 3" thick C.C. using 1:4:7 of graded metal may be used. Where there is over break the space may be filled with dry rubble well packed. Weep holes should be left at 3 ft. centres and staggered right upto the natural rock surface. No construction joints are to be left in masonry but grooves left in the plaster at 15' centre.

Brick Masonry lining.-Where good quality bricks are available, 2 layers of brick laid on edge in cement mortar 1:6 may be used for a total thickness of 9" and plastered with cement mortar 1:4 and ½" thick.

CHAPTER IX

INVESTIGATION AND DESIGN OF WORKS- MINOR IRRIGATION

9. 1. General

9. 1. 1. Irrigation works costing less than Rs. 15 lakhs are classified as Minor Irrigation Works. The types of works carried out under Minor Irrigation include-

- (a) Construction or restoration of Irrigation Tanks.
- (b) Construction of diversion works from natural streams or repairs and restoration of such works.
- (c) Salt exclusion works. Construction or restoration.
- (d) Improvements and protective works in streams and channels serving the irrigation and or drainage requirements of any cultivated area.
- (e) Lift irrigation works (irrespective of total cost).
- (f) Reclamation of waste lands.

9 1. 2. Any irrigation work in an area already covered by a major irrigation work, should be treated as a development or extension of the Major Irrigation Work and not classified as Minor Irrigation even if the cost is under Rs. 15 lakhs.

9. 1. 3.' Land development works such as measures for anti soil erosion etc. in areas already under occupation should normally be classified under the head "Land Development" and not Minor Irrigation.

9. 2. Construction or restoration of tanks.

9. 2. 1. In view of the heavy rainfall in most parts of Kerala and the pattern of cultivation adopted utilising the rainfall to the maximum extent possible, existing Minor Irrigation tanks generally ensure only two or three wanderings during the crop period to make up for vagaries in the incidence of rainfall. When new tanks are constructed the storage should be at least enough to provide 15 cm. depth of water over the ayacut. Where conditions are such that more storage can be provided at economic cost, the storage may be increased suitably.

9. 2. 2. The investigation necessary for the construction of new storage tanks and the field data to be supplied will be somewhat on the lines similar to what is described under "investigation and design of storage reservoirs".

9. 2. 3. In the case of restoration of tanks, the main works required will be removal of silt from the bed of the tank, repairing and strengthening weak bunds, repairing and restoring damaged masonry works such as inlets sluices, surplus etc., improving and protecting the drainage stream, constructing cattle ramps etc. The data to be furnished after investigation in such cases should include.

(i) An index map or sketch showing the location of the tank and the ayacut lands with reference to nearest approach road or important village, market or other well known places.

(ii) A tracing from the revenue survey village map, showing the tank, the benefited area (ayacut) the drainage course feeding the tank and the drainage course draining the ayacut lands etc.

(iii) A site survey of the tank and the surrounding foreshore lands feeding channel, surplus channel, irrigation water courses from the tank etc., with spot levels (scale not smaller than 1 cm = 4 m).

(iv) Cross sections of the bed of the tank from where silt is to be removed.

(v) If silt is to be deposited in any place other than the tank bund the survey of such area and its location in relation to the tank.

(vi) Where tank bund is to be strengthened, the cross sections of the bund showing also M. W. L. and F. R. L. in the tank, and the level of the land immediately below the tank bund on the ayacut side.

(vii) Site survey and cross sections of the feeding channel for at least 50 metres upstream and down stream of the intake work, if this is not already included in the site survey of the tank. Where proposals to improve the intake works are involved, the survey and details of present intake works.

(viii) Site survey and cross section of the surplus works and the drainage course below it for a distance of 100 metres.

(ix) Cross sections and plan showing the existing sluices.

(x) Information regarding catchment area, average rainfall, pattern of cultivation on the ayacut lands.

(xi) Information on the availability and source of principal construction materials.

9. 3. Diversion from natural streams.

9. 3. 1. Diversion works across streams generally consist of a low weir across the river with removable plank shutters above the crest, which are inserted during cultivation season and removed during floods. The plank shutters are either operated from an overhead platform through the use of screw gears or manually inserted and removed plank by plank between groove stones set on the crest of the weir. Lead off channels from upstream of the weir are usually constructed by the ryots themselves. Where the benefited area is over 25 acres and where no irrigation channels exist from the diversion site, the main irrigation channels should also be investigated and the cost included in the estimate.

9. 3. 2. Investigation for a work of this nature will include: -

(a) Hydrology of the stream-viz. the flow during different seasons, the M. F. L., O. F. L., and L. W. L. the catchment area and average rain-fall in it.

(b) The benefited area, the pattern of cultivation followed, the distribution of rainfall over the area during cultivation seasons.

(c) An index map showing the proposed work, benefited area and the access to the site from the nearest public road.

(d) Site survey of the stream for a distance of at least 200 metres upstream and downstream of the proposed site with spot levels.

(e) L. S. of the stream for a distance of at least 200 metres upstream and downstream showing M. F. L., O. F. L., L. W. L. as well as levels of the banks on both sides.

(f) A few cross sections up and down streams of the proposed diversion site including one at the site proposed.

(g) Nature of the soil and sub-soil at the site of the diversion work proposed.

(h) Information regarding availability and source of principal construction materials.

9. 3. 3. After the field data is furnished and preliminary proposals are made in the design office, it may sometimes be necessary to collect additional data regarding foundations or other site conditions. These should be indicated by the officer designing the work.

9. 3. 4. In the case of repairs to existing diversion work, it should be carefully examined whether the structure, if restored to the condition existing prior to such damage, would be structurally and hydraulically suitable for the purpose in view. If so, the attempt should be to restore it to such condition. If the restoration to original condition will not be sufficient to meet the requirements, a fresh design should be made making use of as much of the undamaged portion of the old structure as can be fitted into the new work.

9. 4. Salt Exclusion Works.

9. 4. 1. These works are generally located in tidal reaches of streams and are intended to protect the marginal lands upstream of the structure from the effect of salinity brought up through tidal action. The nature of work is essentially similar to a river regulator except that the shutters in this case will be- subjected to pressure from both sides depending upon the tide level down- stream and the upstream water level. The design will usually consist of a low weir with suitable aprons acid cut off, surrounded by either removable or lifting shutters or by removable coffer boxes filled with clay. There should be one regulating vent with a screw gearing shutter to discharge flash floods during cultivation season. During flood season, all the coffer boxes or removable shutters are removed so that, the flood water has an easy passage with- out undue rise of flood level upstream.

9. 4. 2. While designing a structure for salt exclusion, the stability has to be examined under the worst conditions of water levels up and down streams resulting in maximum hydraulic thrust on either side. It is essential that the shutters are water tight and proper seals should be provided for this purpose. Even slight leakages may cause considerable increase in salinity upstream both by leakage of fresh water from upstream during low tide conditions and by ingress all of saline water during high tide. Coffor boxes with clay are generally satisfactory for the main body of the structure and are preferable to lifting, shutters. The regulating shutter should be water tight on both sides and it necessary the shutter may be duplicated, one in front and one in rear, so that one is water tight against upstream water pressure and the other against downstream tide pressure. The structure should have adequate bank connection taken to such level as will ensure that no outflanking take place. The effect of the weir and obstruction caused by the structure on the up- stream flood levels should be calculated and flood banks provided to the extent required. Ale aprons have to be designed against uplift and piping through creep.

9. 4. 3. The field data necessary for design are generally the same as provided for a diversion work (para 7. 3. 2.). In addition the H. T. L. and L. 'P. L. tide levels expected during the period of cultivation, and also the quantity of water stored upstream upto the top of the coffer boxes or shutters should also be ascertained. The designing officer should inspect the site, with the preliminary designs and if further data is necessary before finalising them, the nature of such data should be intimated.

9. 5. Lift Irrigation.

9 5. 1. Schemes for lift irrigation are generally undertaken where there is assured water supply for Irrigation but the water is at a level lower than the level of the area to be irrigated. Most of the lift irrigations schemes provide water from river sources. Before undertaking investigation for Lift Irrigation Schemes, the hydrology of the river or other source of water supply should be studied to ascertain whether water required for irrigation is available during the cultivation season when the scheme is in operation.

9. 5. 2. After having assured that the required water will be available, a suitable site for pumping should be selected. The following are some of the desirable features, which may be kept in view when selecting the site for pumping.

(a) In many rivers the flow during the dry weather is confined to a meandering channel, which occupies only a small fraction of the width of the river. The course of this dry weather channel should be studied and the pump location should be such that the suction well is either located in or is close to the dry weather channel.

(b) The location should not be at a place likely to get shored as on the concave side of a bend.

(c) The banks near the location should be stable so that the supports for the pumping main and the foundation of the forebay do not get undermined.

(d) The pumping site should be as close to the site to be irrigated as possible and preferably near the high level contours of the irrigated area.

A few alternative sites may be selected and their relative merits studied before finalising the location.

9. 5. 3. A site survey of the proposed area for irrigation should be taken and this should be connected upto the pumping site. This should show the existing drainage, courses and field channels. Contours of the irrigated area at $\frac{1}{2}$ metre intervals should also be taken.

9.5.4. Based on the above, one or more preliminary alignments of the main irrigation channel should be made on the site survey of the ayacut. The different alignments should be inspected at site and the most suitable are selected. Detailed survey and L. S. and C. S. of the channel alignment as finalised should then be taken for design purposes.

9 5. 5. The irrigation channel should be taken to such limit that the entire ayacut can be served with water. Where the area is large, or where the configuration and contours require it, branch channels may be taken to serve different areas. Field channels from sluices in the main channel may not be necessary in most cases.

9. 6. The channel should be designed for the discharge necessary during that crop season which requires maximum water. In the case of rice crop the average duty may be taken as 40 acres per cusec supplied during the crop period. Generally pumps are not worked for full 24 hours but only for 12 hours or 16 hours. The capacity of the pumps and the channels should be designed taking into account the fact that the pump works only for a part of the day.

9. 7. The channel may have to be carried in embankment in certain reaches. The relative economy between a flume and an earthen channel must be studied before making a choice when taking the canal in such reaches.

9. 3. Pumped water is costly and wherever the nature of soil is such that large wastage through percolation and absorption is to be expected, the channel should be lined to minimise wastage. Lining also reduces head loss and therefore the pumping head.

9.9. Sluices must be located in convenient places along the canal so that a sluice commands about 20 acres of land. It is the duty of ryots to distribute the water from the sluice to their respective fields.

9. 10. Pumps should be designed for the supply of the maximum quantity of water required under the most unfavourable conditions of water level in the river or other source. Where large quantities are involved, it is advisable to go in for a series of pumps located in the pump house for meeting the requirement. It is also advisable to have one standby pump or at

least all the facilities for erecting a stand by pump when any one of the other pumps fails. The pumps should preferably be self priming or there should be separate arrangements for priming. They should be so arranged that the motor is not subjected to inundation during floods.

9.11. The discharge from pumps should be led into a masonry forebay from which the channel should take off.

CHAPTER X

ESTIMATE

10.1 Kinds of Estimates

All proposals for expenditure on works and on Tools and Plant in the P.W.D. should be presented in the form of one or other of the following estimates, for scrutiny by the authority competent to sanction the same.

- (a) Preliminary Estimate.
- (b) Detailed Estimate.
- (c) Project Estimate.
- (d) Working Estimate.
- (c) Recast Estimate
- (f) Supplementary Estimate.
- (g) Revised Estimate.

10.2 Preliminary Estimate.

This is prepared in order to enable the authority competent to accord administrative approval to form a reasonably accurate idea of the probable expenditure and also the essential features of the proposal. Preliminary estimates avoid the expense and delay of preparing estimates for works in detail at a stage where the necessity or the general desirability of the works proposed has not been decided upon by the competent authority. The preliminary estimate should contain a brief report giving information on the essential features of the work, and specifications, and justification for the work. It should also show the cost subdivided under main heads or sub heads or specific items, the purpose being to present a correct idea of the work and the probable expenditure involved. The cost of the several sub heads or items should be based on the prevailing market rates or on the best judgment of the officer preparing the estimate. For instance, in the case of buildings, the cost may be worked out on plinth area basis.

Sketch drawings indicating the proposals should also accompany the preliminary estimates. A model preliminary estimate in respect of a road, bridge and building work as detailed in Appendix X (g) is enclosed.

10.3 Detailed Estimate.

10.3.1 This is prepared on the basis of detailed designs and specifications for the work, study of site conditions, source of supply and cost of different materials, cost of labour, the hire charges of tools and plant, if and etc. Proper care should be bestowed on the preparation of a detailed estimate so that it reflects as faithfully as possible the cost of work as can be foreseen at that time.

The detailed estimate for a work consists of five parts, viz. -

(i) A report containing the following particulars:-

(a) The justification for the work.

(b) The location of the work or works concerned and the available approaches to the same.

(c) Salient features of the proposal.

(d) The total cost.

(e) If, after completion any operating cost is likely to be involved, the approximate cost of operation.

(f) The extent of land acquisition and problems if any connected with such acquisition.

(g) The approximate time required for completion.

(h) Any special problems regarding execution of the work.

In the case of Irrigation works the following additional particulars should be furnished.

(i) The nature of the problem sought to be solved by the work and essential hydraulic data.

(j) The economic aspects of the scheme, i.e., the cost as compared with benefits derived.

(k) A detailed realistic programme chart for execution.

(ii) Details of quantities of different items of work involved based on the design and drawings.

Normally every item included in the estimate should conform to the standard specification for that class of work and the specification number of the MDSS or (KSS) or I.S.S. must be quoted against the description of the item. Where items, which are not covered by standard specification, are involved the description of the item should be full and clear.

(iii) A data sheet showing the 'estimated unit rate for the different items of work. This should be based on the current schedule of rates for the locality making allowance for conveyance and leads and lifts involved for the materials. It should also take into account any special features which may affect the cost of execution of any particular item of work. If the work is to be done through contract agency, the data should make a provision for contractor's profit at 10% of the net cost of the items less cost of departmental materials, if any, supplied. If items not included in the departmental schedule of rates are included in an estimate, the data for unit rate should be worked out based on the market rate for the item or its components. The market rate should be ascertained by making local enquiries in the most suitable manner found expedient. The data should indicate the source from which the rate for the items of work is derived. A certificate should be added to the data sheet that the conveyance and leads and lifts provided have been verified and are the minimum necessary for procuring required quantities of the materials. This certificate should be signed by an officer not below the rank of an Assistant Engineer.

(iv) An abstract giving the description of the different items involved and the total quantities, the unit rate and the cost of each item. To the total of the several items as per this abstract 21% is added to cover the cost of contingencies.

This abstract should also give the total quantities of materials to be arranged for as departmental supply. It should also contain a list of special Tools and Plant which may become necessary.

(v) A docket sheet covering the estimates containing the following information: -

- (a) The division, subdivision and section concerned.
- (b) The name of work.
- (c) Source of fund for the work.
- (d) The head of classification as per budget viz. Major head, Minor head, Departmental head and Service head.
- (e) The name of the officer who framed the estimate.
- (f) A certificate in the following form.

"The estimate has been personally verified by me at site and the provisions made therein are adequate." This certificate should be signed by the Assistant Engineer For estimates up to and including Rs. 1 lakh; by the Executive Engineer for estimates above Rs. 1 lakh; and up to and including Rs. 5 lakhs; by the Superintending Engineer for estimates costing over Rs. 5 lakhs.

10.3.2 As far as possible lump sums should be avoided in a detailed estimate except for petty items the total of which will not exceed 5% of the estimate. L. S. provision is also permissible in case of items whose details cannot be foreseen at the time of preparation of the detailed estimate or where it is proposed to work out the details later on. In such cases working estimates should be prepared against these lump sum provisions as soon as the details can be known, before the L. S. are operated on. Such working estimates will be treated as part of the detailed estimate.

10.4 Project Estimate

10.4.1 In the case of major projects (generally costing Rs. 15 lakhs and above) it is usual to prepare a project estimate after full investigation and after finalising the major designs.

10.4.2 Although the main designs will be completed, since a large number of works are involved the preparation of a detailed estimate on the lines indicated above would take considerable time. Hence in a Project Estimate, the work is divided into convenient sub heads and detailed estimate are prepared in respect of such sub heads where detailed designs are completed and quantities can be abstracted from, such design. In respect of other sub heads approximate costs somewhat on the basis of preliminary estimates are provided. For instance, in the case of a sub head dealing with buildings, the cost may be worked out on the basis of the numbers of the different types of buildings and the approximate cost of each type of building. Similarly in a sub head dealing with roads the estimate may be framed on the basis of the length and approximate cost per mile. As far as possible the sub heads dealing with the principal items of work should be estimated in detail to avoid large variations later.

10.4.3 In addition to cost of works, the project estimate should include also the cost of establishment, special tools and plant required for the execution and the indirect charge debitable to the project.

10.4.4 It is usual to prescribe standard sub heads under which project estimates should be prepared for different types of project.

10.5 Working Estimate

10.5.1 A working estimate is intended to give the details of the works and the cost thereof, which are to be carried out against a L. S. provision made in an estimate. Normally therefore, the working estimate should not exceed the amount of L. S. provision in the estimate for the main work. If however, it is not possible to limit the cost of the works included in the working estimate to the L. S. provision, care should be taken when sanctioning the working estimate, that the overall excess is within the powers of the authority sanctioning the working estimate.

10.5.2 Working estimates should be prepared with the same care as in the case of detailed estimate. It should be as realistic as possible. If the works as per the working estimate are to be entrusted to the contractor for the main work then the rates to be included in the working estimate should be his quoted rates for agreed-items and rates worked out as per his agreement for allied and extra items. In cases where a different agency can be entrusted with the works as per the working estimate, the rates to be adopted should be based on the schedule of rates

prevalent at the time of preparation of the working estimate and on the market rates where there is not schedule item.

10. 1. 6 Recast Estimate

10. 1.6. 1 It may sometimes happen that after the estimate for a work has been technically sanctioned but before it is taken up for execution some changes are found necessary in the estimate for the work. In such cases a fresh estimate may be prepared and got sanctioned in cancellation of the originally sanctioned estimate. This fresh estimate is called a recast estimate and is dealt with as if it is an original estimate. If however, before a recast estimate is prepared some expenditure has been incurred in an originally sanctioned estimate, then this procedure cannot be followed and instead a revised estimate should be prepared and got sanctioned.

10. 1. 7 Supplementary Estimate

10. 1. 7. 1 Any development or extension of a work thought necessary while the work is in progress which is not fairly contingent on the work as first sanctioned must be covered by a supplementary estimate. In effect this supplementary estimate is an original estimate for the additional works consequent on the development or extension of a project or work under execution. Administrative sanction should therefore be obtained for the supplementary estimate from the same authority, which sanctioned the original estimate even if the cost can be met from savings in the original estimate. The competent authority in this case is the authority who is empowered to accord administrative sanction to the work as a whole, i.e, including original and supplementary estimates.

10.1.7.2. The following particulars should be invariably furnished when submitting supplementary estimates for sanction.

- (a) A full report of the circumstances rendering the need for the supplementary estimate.
- (b) The amount of the original estimate and the amount of supplementary estimates already sanctioned, if any, and the amount of the supplementary estimate for which sanction is sought.

Each supplementary estimate to any original estimate should be numbered consecutively as first supplementary estimate, second supplementary estimate and so on for easy identification.

- (c) The supplementary estimate should be prepared in the same manner as an original work and all details and drawings furnished.

10.1.7.3. When a supplementary estimate is sanctioned the original estimate amount stands enhanced to the extent of the amount of the supplementary estimate.

10.1.8. Revised Estimate

10. 1. 8. 1. A revised estimate must be prepared and got sanctioned.

- (a) When there are deletions, additions or alterations to the scope of the work as originally sanctioned needing revised administrative sanction.
- (b) When there are major structural alterations from the design as originally sanctioned.
- (c) When the estimate as sanctioned is likely to be exceeded by more than 5%.

10.1.8.2. The revised estimate should not be kept waiting till the work is completed or reaches an advanced stage of completion but should be prepared and got sanctioned as soon as any of the above three conditions are anticipated during, the course of execution of work. If after one revised estimate is sanctioned the conditions mentioned above arise again, then fresh revised estimates must be prepared and got sanctioned.

10.1.8.3. A revised estimate will consist of-

- (i) A deviation statement in form No. Appendix X (a) indicating briefly the nature and reasons for the main variation and the financial effect of the variations.
- (ii) A comparative statement (in Form No. D. B. 4)-Appendix X (b) giving the quantities, rates and amount of the items as per original estimate and as per the revised estimate with the reasons for the variation of each item. It is not necessary that the comparative statement should repeat such items of the original estimate which are not affected by the revision but these items should be grouped together under the several heads as per the estimate and noted as unaffected. The affected items should be shown in detail in the comparative statement.

10.2. Sanctions Required.

10.2. 1. The estimate for an original work requires the following sanctions before it is taken up for execution.

- (a) Administrative sanction
- (b) Technical sanction
- (c) Financial sanction.

10.2.2. Administrative Sanction

10.2.2. 1. This is the sanction accorded by the Administrative Department concerned or Government authorising the P. W. D. to take up a particular work at a particular cost and in a particular location. Before this sanction is accorded, the Administrative Department concerned or Government may call upon the P. W. D. to prepare a preliminary estimate with plans for the work in the manner described in para 10.2. To enable the P. W. D. to prepare the preliminary estimate, all the data regarding the requirements of the work and the location must be made available to the P. W. D. by the concerned Department.

10.2.2.2. On receipt of such a requisition, the site details must be collected by the Junior Engineer concerned and a sketch plan for the work concerned should be prepared to suit the site. The preparation of the sketch plan should be taken up by the officer in the P. W. D. competent to accord technical sanction for the work. In the case of office buildings the District Collector may also be consulted. Where the help of the Architect is necessary he may be approached through the Chief Engineer. The preliminary estimate should then be prepared and the sketch plan and preliminary estimate sent to the head of concerned department by the P. W. D. Officer competent to issue technical sanction for that work.

10.2.2.3. In respect of works costing more than Rs. 5,000 instead of the preliminary estimate and sketch plan, detailed estimate may be prepared and sent in the first instance itself.

10.2.2.4. After the preliminary estimate and sketch plans are received, the concerned department or government will decide whether further steps should be taken to execute the work and if so, the appropriate authority vested with power of Administrative Sanction will issue the Administrative sanction.

10.2.2.5. In some cases provisions for certain works required by other departments of the State are made in the P.W.D. budget even before formal Administrative Sanction has been accorded. The Executive Engineer in whose jurisdiction the work is located should then take the initiative in contacting the District Officer of the concerned department for the necessary information regarding requirements, location etc. The Executive Engineer should then arrange for sketch plans and preliminary estimate for the work being prepared. If the amount as per preliminary estimate is beyond his power of according technical sanction he should send the papers to the higher officers of the P.W.D. for obtaining Administrative Sanction from the concerned Department or Government. In case, the work costs less than Rs. 5,000 the detailed estimate may straightaway be prepared and utilized both for Administrative and Technical Sanction.

10.2.2.6. Where the work concerned is a project, Administrative Sanction is to be accorded on the basis of the project report and project estimate and; not on the basis of preliminary estimate and sketch plan. To enable the project estimate being prepared an investigation estimate is usually sanctioned at first and the expenditure incurred on investigation etc. charged to this estimate. When the project estimate is prepared this should include the cost of investigation also.

10.2.2.7. If a work for which Administrative Sanction is given is not taken up within 5 years' then this sanction lapses. Even during the period of currency of the Administrative Sanction viz. 5 years, if at the time detailed estimate is prepared the cost is found to exceed the amount of Administrative Sanction by more than 15% then fresh Administrative Sanction should be obtained.

10.2.2.8. Administrative Sanction is not required in respect of the following estimates.

- (a) Estimates for repairs and maintenance work subject to such restrictions as Government may from time to time prescribe.

(b) Working Estimates.

(c) Investigation Estimate.

(d) Revised estimates in cases where the excess involved is within the powers of sanction of the P. W. D. Officers.

10.2.3 Technical Sanction.

10.2.3.1 This is accorded by the competent authority in the P.'W.D. on the basis of drawings, designs, specification and detailed estimate. It implies that the competent technical authority is satisfied about the suitability of the work to meet the requirement, its structural soundness and about the quantities, specifications and rates of the different items of work which will be involved in completing the work.

10.2.3.2. Before according Technical Sanction to a work relating to another Department, the plans should be got countersigned by the head of the concerned department or such Officer who may be delegated with power for this purpose. In respect of minor works costing Rs. 25,000 and less such countersignature is not necessary, provided the sketch plan has been approved along with the Administrative Sanction and no substantial variation has been made from the sketch plan.

10.2.3.3. Technical Sanction should be issued only based On the Administrative Sanction for the work and the amount of Technical Sanction for any work should not exceed the amount of Administrative Sanction by more than 15%.

10.2.3.4. In some cases an Administrative Sanction may cover a large number of works, as in the case of Project Estimates. It is permissible to issue separate Technical Sanction for the works in convenient groups provided the sum total of the amounts as per the different Technical Sanction so issued does not exceed the amount of Administrative Sanction by more than 15%.

10.2.3.5. Before Technical Sanction is issued there should be funds available for execution of the work either through budget provision or through diversion from other works under the prescribed rules for such diversion or by deposit in the case of deposit works. However in the case of estimates awaiting Sanction towards the close of a financial year, Technical Sanction can be accorded without budget provision for the then current **year** provided there is reasonable prospect of funds being made available in the next year's budget.

10.2.3.6. Technical Sanction for an estimate is issued in the form of a docket covering the detailed estimate (See Appendix X (c). This docket should contain.-

(a) The Register No. and date of the estimate

(b) The name of work

(c) Reference to Administrative Sanction

(d) The amount of estimate as per Technical Sanction

(e) The source of funds

(f) The Division which should execute the work.

10.2.3.7. Register of Estimates Sanctioned

In every officer where technical sanctions are issued for estimates register of such technical sanction should be maintained in the form given in Appendix X (d). Each estimate sanctioned in a financial year should be numbered consecutively and entered in the register.

Technical sanctions given to working estimates need only be noted against the sanction given for the main work originally and need not be given a separate number and noted in the register.

When technical sanction is issued for a revised estimate and a fresh number is given for this estimate then the fact that the original estimates stands cancelled should be noted against the original sanction. Correspondingly, there should be one entry in revised sanction quoting the original estimate.

When the supplementary estimate is sanctioned, the original technical sanction should be cancelled and fresh technical sanction issued including the supplementary estimate.

10.2.4. Financial sanction

10.2.4. 1. An estimate can become operative for execution by P.W.D. only when funds are available. Generally even when Technical Sanction is issued the availability of funds will be examined and the source of funds noted in the sanctions

10.2.4.2. The following are the usual sources of funds for execution of works.

(a) By a specific provision for the work in the Bud-et for the year.

(b) By diversion of savings in the budget allotments for other work- subject **to** the rules regarding such diversion. (See paras 82-86 of the Budget Manual.)

(c) By obtaining a supplementary grant for the work.

(d) By withdrawal of the required amount from the contingency fund

with the sanction of Government to the later regularised through Supplementary Grant.

(e) By funds being placed at the disposal of the P.W.D. for the specific work from out of budget allotments of another departs merit. (.....)

- (f) By obtaining deposits from the parties or authorities on whose behalf the work is to be done by the P.W.D. (Applicable to Deposit works).

10.3. Powers of Officers to accord Sanction

10.3.1. All heads of major departments are authorised by Government to issue Administrative Sanction for original works relating to their department subject to a maximum of Rs. 1 lakh for any work. Heads of minor department are competent to exercise similar powers upto Rs. 50,000 for any work.

10.3.2. The powers of P.W.D. Officers regarding Administrative and Technical Sanction are given in Chapter 11.

10.3.3. Special conditions regarding sanction to certain classes of work.

10. 3.3. 1. National highways are the responsibility of the Government of India and the State P.W.D. Acts as the agent of the Government of India for investigation, construction and maintenance of National Highways. For this purpose agency charges at 71% of the estimate amount has to be added in each estimate to cover the cost of establishment, overheads etc. The estimate for original works chargeable, to National Highways should be got approved by the Ministry of Transport (Roads Wing) of the Government of India before technical sanctions are issued by the State P.W.D. Before estimates are prepared for such works, the designs should be sent to the Government of India, Ministry of Transport (Roads Wing), for technical scrutiny and comments. After it is cleared technically the estimate should be prepared and sent through State Government to obtain sanction of Government of India. Formal technical sanction may be issued after approved by the Government of India. As an exception to the general rule above, Government of India have approved State P.W.D. taking up certain classes of works up to a monetary grant of Rs. 25,000 without referring the estimates to them. These types of works are given in letter NH-1-40(20)68/10-4-1969 from the Ministry of Shipping and Transport-Roads Wing to all State Governments (copies in Appendix X (c).

10.3.3.2 When estimates need revision and the amount of the revised estimate is beyond the power delegated to P.W.D. Officers of the State sanction of Government of India should be obtained for the revised estimate.

10.3.3.3 Regarding estimates for maintenance of National Highways it is necessary to give particulars of the year's Requirements under this head to the Ministry of Transport, Government of India, before the commencement of every financial year. This should be sent in Form given in Appendix X (f), which gives details of the types of works prepared to be carried out in various sections of the National Highway. On receipt of sanction from the Ministry of Transport, Government of India, detailed estimates for individual portions of works as approved by Government of India may be prepared and sanctioned by the officer of P.W.D. subject to the limits of their Technical Sanction powers and subject also to such individual items not exceeding the amount allotted for this purpose.

10.3.3.4 Original works chargeable to Central Road Fund, State Roads of economic Importance, Interstate Road, and West Coast Road are financed partly or wholly through

Government of India. Estimate for original works in these cases require prior approval of the Ministry of Transport. Government of India before they are accorded. Technical Sanction by State P.W.D. Officers. It is enough if the abstract of estimates with the estimate report are sent in these cases. No centage is to be charged on these estimates. Here also in the case of works costing above Rs. 5 lakhs for bridge work and Rs. 25 lakhs for road works technical, clearance from the Director General of Roads, Ministry of Transport should first be obtained before the estimates are sent to Government of India for approval.

10.3 3.5 Major Irrigation works are generally part of the Plan schemes of the State and as such require the concurrence of the Planning Commission and the Government of India. Before such concurrence is obtained, the project report together with the designs and project estimate for schemes costing Rs. 15 lakhs and above should be sent to the Central Water and Power Commission for technical scrutiny and approval. Schemes costing less than Rs. 15 lakhs may be technically dealt with by the State P. W. D. itself. These also will require Planning Commission's approval, and allotment of funds before technical sanction are given by the State P. W. D. Officers. Since a project work may probably extend for a few years it is desirable that in such cases technical sanctions for the different sub heads be accorded in the sequence in which they will be taken up so that funds available in an year are judiciously distributed.

10.3.3.6 Minor Irrigation.

Minor Irrigation works are also plan schemes but since each individual scheme costs Rs. 15 lakhs less technical clearance from Government of India is not necessary. Planning Commission's approval is however necessary for the broad groupings of works under minor irrigation included in any year's budget, such as Tanks, Channels, Lift Irrigation scheme etc.

P. W. D. Officers should before sanctioning such schemes examine the cost benefit aspect and should sanction schemes only when the cost benefit ratio is below the economic standard fixed in respect of each type of work. Where the cost benefit ratio exceeds the economic standard, sanction of Government should be obtained.

10.3.3.7. Deposit Works

In the case of deposit works for private parties before plans and estimates are prepared and made available to the party, centage at 2 ½ % should be, got deposited. To start with an approximate figure of cost may be assumed for the estimate and the 2 ½ % centage realised based on this approximate figure subject to adjustments after estimate is prepared. In case the work is carried out by the P. W. D., the estimate should include a total centage of 16% including the 21% for preparation of plan and estimate. Technical Sanction, for the estimate may be given by the officers of the P. W. D. subject to the limit of their powers after.

- (a) The party accepts the Estimate
- (b) Deposits the estimate amount (including centage)
- (c) Undertakes to make additional deposit to the extent necessary in the case the estimate amount is exceeded during actual execution.

10.3.3.8 In the case of works undertaken for local bodies and quasi Government Organisation and Government of India works it is not necessary to insist on 21 % centage prior to preparation of estimate provided the concerned local body or quasi Government Organisation agree to pay the centage after the estimate is finalised. It is, however, necessary to insist on fulfilment of conditions (a), (b), (c) of para 3. 3. 7 above before the estimate is technically sanctioned and work arranged except in the case of Panchayats where no centage is leviable for the preparation of estimates by the P. W. D.

10.3.3.9 Normally all civil works for every Department of Government should be carried out by the P. W. D. but this requires provision of funds for the concerned work in the P. W. D. budget. It may, sometimes, happen however, that another department of Government requires the P. W. D. to carry out some works provided in that Department's budget. Such works when carried out by P. W. D. are to **be** treated as deposit works and centage at 13% should be added to the estimate. The estimate should then be sent to the concerned department for administrative sanction. No deposit need be insisted in such casts, the administrative sanction, with the indication the willingness to accept debit raised by the P. W. D. for the concerned works.

The centage rate will be 15% in respect of Forest and other commercial departments of the State.

10.4. Schedule of Rates

10. 4. 1 As stated in earlier paragraphs, detailed estimates have to be framed based on the schedule of rates. This schedule will also have to be referred to for working out rates for extra items etc. in contracts. It is very important that the schedule of rates reflects the current markets as faith- fully as possible. It should also be revised once in an year so that fluctuations in market rates are taken note of.

10.4.2 The schedule of rates consists of three parts viz. Part I- The schedule of basic rates for labour and materials. Part II-The data book derailing the quantities of materials and labour required for different items of work and the process of working out rates for works from basic rates and Part III-Schedules of rates for various items of work. Part II viz. the data book will remain unchanged by fluctuation in market rates while Parts I and III are subject to such changes. Regarding rates for finished work to be included in Part III, these may be worked out from basic rates in Part I in the manner prescribed in Part II (data book).

APPENDIX X (a)

(Vide Para 10. 1.8.3.)

KERALA DEPARTMENT

Deviation statement in the course of actual construction of works

Name of work	Sub-heads in which departure occurs	Name of departure		Reason for the deviation	Results anticipated	Orders of the Engineer
		Original or sanctioned arrangement	Arrangements proposed to be carried out			

APPENDIX X (b)

(Vide Para 10. 1.8.3.)

FORM No. D.B.4-COMPARATIVE STATEMENT (LARGE)

Abstract of original and revised estimates with explanations for difference in quantities and rates

[illegible]

APPENDIX X (c)

(Vide Para 10. 2. 3. 6.)

KERALA DEPARTMENT

..... -..Division Subdivision 1 1.Name
of work

2. Amount of estimate Rs

3. Reference to administrative sanction.

4. Register No. and date of estimate

5. Source of funds

6. The duration which should execute the work.

The estimate enclosed as briefly described above is sanctioned as Register No dated
.....

(Sd.)

Engineer.

APPENDIX X (d)

(Vide Para 10. 2. 3. 7.)

G. W. D. 156

Register of sanction to estimates for.. ..

Technical Sanction No.	Name of work	Amount of estimate	Reference to Administrative sanction			Source of funds
			Authority	No.	Date	

APPENDIX X (e)

(Vide Para 10. 3. 3. I.)

Copy of letter No. NHI-40 (2) 68 dated 10-4-1969 from the Under Secretary to the Government of India, Ministry of Shipping and Transport, Roads Wing, New Delhi.

Sub:-Monetary limits upto which expenditure on petty and miscellaneous items of works pertaining to National Highways ordinarily called as new works can be charged to repairs.

"I am directed to invite a reference to Memorandum No. B. 30 (9) 49 dated the 14th June 1949 from the Consulting Engineer (Roads) Government of India to all Provincial Chief Engineers etc. and this Ministry's Circular letter No. WI-43 (13)/60 dated the 5th May 1961 to all State Governments etc. and to say that the monetary limit of Rs. 20,000 under the 'execution' below para 27 (4) of Appendix No. 2 to the Central Public Works Account Code which was fixed in 1961 needs further upward revision in view of general rise in the cost of materials and labour. The Government of India have reviewed the position and decided that present limit of Rs. 20,000 under the exception below para 27 (4) of Appendix No. 2 to the Central Public Works Account Code should be raised to Rs. 25,000. The revised instructions are reproduced below in a consolidated form for information and guidance.

1. Works that can be financed from maintenance and repairs grant.

(a) The following petty and miscellaneous items of work (which ordinarily should be classed as 'New works') upto the prescribed limit of Rs. 25,000 in any one case, provided that the works in question do not, in the opinion of the Superintending Engineer concerned, form part of any comprehensive scheme or project covered by the works estimate.

(i) Super elevation at curves.

(ii) Cutting back a hillside to improve vision at curves

(iii) Improvements of alignment or gradients or changes of grade at Irish bridges, or dips, carried out at the time of renewing a surface.

(iv) Improvements to or reconstruction of the surface of a road in Rome different material where it is desirable to carry out such improvements or reconstruction at the time of renewing a surface.

(v) The construction or reconstruction of road surfaces in different materials for the purposes of experiment

(vi) The construction or remodeling of bridges, cause-ways, embankments, ferry approach, protective or draining works in connection with a road.

Note.-Item (vi) includes replacement of boats and other apparatus connected with ferries.

(b) Petty works of the following nature [which are considered to be covered by the spirit of the exception to para 27 (4) of the Central Public Works Account Code] up to the prescribed limit of Rs. 25,000 in any one case, with the prior approval of the Government of India.

(i) Petty survey work, including survey required to complete records relating to land widths, encroachments etc.

(ii) Demarcation of road boundaries.

(iii) Traffic surveys for planning of road development.

(c) Ordinary repairs and maintenance, including surface painting and the necessary addition of stone chips, gravel or sand.

(d) Widening the formation or carriageway of a road including a drain or culvert and reconstruction of a drain or culvert.

(c) Special repairs and periodical renewals.

2. Original works taken up for the first time that cannot be financed from maintenance and repairs grant.

(a) Work involving land acquisition which may otherwise come under items (1) (a) (ii) and (iii) above.

(b) Provision of asphaltic or bituminous concrete, premix asphalt or bituminous, macadam, bituminous grout bituminous semi-grout, mix-in-place, cement concrete or cement macadam surface."

(Sd-)

Under Secretary to the Government of India.

APPENDIX X (e)

(Vide Para 10. 3. 3. I.)

STATE

M.T.(R.O) 3 Revised

ABSTRACT PARTICULARS OF ESTIMATE FOR MAINTENANCE & REPAIRS

YEAR

Name or Number of Highway.....Name of PWD Circle.....

Section (Place) To () Name of PWD Division.....
 From (Mile) To ()

BASIC ALLOWANCE & INCREMENT

(See explanation on reverse)

1. Basic allowance.....(X)

2. Present demand.....(Y)

3. Increase (Y minus X).....(I)

4. Percentage (I x 100/X.....

Particulars	Length and width by types of pavement							(Total Miles)
Length x width (Miles) x (Feet)	Earth	Moorum or Gravel	Kankar	Brick	W.B.M.	Black top	Cement Concrete	

I. RENEWALS PROGRAMME

Treatment proposed (Use symbols as explained on the reverse)	Width (ft)	Mile Nos to which this treatment has to be applied	Total No of miles of each treatment	Rate of each treatment per mile of 12 ft width Rs	Estimated cost of each treatment <u>col.2xcol 4x col</u> 5 12 Rs	Remarks
1	2	3	4	5	6	7
				Total =	(A)	

II- ORDINARY MAINTENANCE REPAIRS

II A. ROAD		Rs.	II B. STRUCTURES		Rs.
1. Road gangs			1. Buildings		
2. Materials for patch repairs etc			2. Minor bridges, Culverts and Drains		
3. Heavy berm repairs			3. Major bridges		
4. Arboriculture			4. Retaining walls, parapets, Drains etc		
5. Original works treated as repairs			5.		
Total =	(B)		Total =	(C)	
III. MISCELLANEOUS RECURRING CHARGES			IV. SPECIAL REPAIRS OUT OF CE (RD)'S RESERVE		
1. Ferry services			(To be entered by CE (RD)'s office when he approves detailed estimates)		
2. Payment of rents					
3. Seasonal road construction in river beds			1		
4. Pontoon bridges			2		
5			3		
Total =	(D)				

A+B+C+D =

Add 10% overhead charges =

Total of M&R Demand =

Rate per mile =

ENEWAL SPECIFICATION SYMBOLS

R (x") W. B. M. renewal: quantity of new metal being equivalent to x" thickness.

S₁ Light surface dressing, FIRST COAT on W. B. M. Surface.

S₂ Light surface dressing, SECOND COAT add also SUBSEQUENT resurfacing coats

P (x") Premix Carpet, x" thick.

G. (x") Semi-grout x' inches being the metal thickness.

F. G. (x") Built-up rout x inches thick.

G. (x") Spreading gravel or moorum x inches thick on gravelled or moorumed roads.

Notes: 1. If any specification, not included above, is proposed, it should be described in the first column under RENEWALS.

2. The most common specifications have been given appropriate symbols above. In some cases the treatment suggested would be a simple one describable by one single symbol from the above list: same proposed treatment however might consist of two or more, specifications. These latter will be stated as under:

Example- 1. 1 ½ inch premix carpet on 2 ½ inch thick W. B. M. renewal
course = R (2 ½ ") + P (1 ½ ")

2. Two surface dressing coats on 3' thick W.B.M. renewal
course = R(3") + S₁ + S₂

GENERAL EXPLANATIONS

1. M. & R. ESTIMATES.

Separate estimates will be sanctioned for each N. H. SECTION (Length lying, within a P. W. D. Division). Expenditure against each estimate will be booked under the heads I to III on reverse.

2. BASIC ALLOWANCE

The basic allowance will be fixed from time to time by the Ministry of Transport. Until it is fixed, enter against this head in the space provided on the reverse the actual average expenditure of the 5-year April 1947 to March 1952.

3. PRESENT DEMAND.

The demand of any year in the current quinquennium will consist of (i) the Basic Allowance of the previous quinquennium plus, if necessary a percentage allowance for growth of traffic, etc. Alternatively, if the surface is upgraded, the actual demand should be less than the Basic Allowance.

4. STATE C. E. 'S. DISCRETION.

Funds will be allotted to the State Govt. against the demands presented under the heads I to III on the reverse of this form, without any detailed estimates being called for. Out of these funds, the portion representing the excess over the BASIC ALLOWANCE of each road will be held by the State C. E., the rest being passed on (through S. Es. E to Es. Against his reserve, the State C. E. will approve repair works, which cannot be financed from within the BASIC ALLOWANCE, already passed on to the E. Es.

5. C. E. (RD)'S RESERVE.

For extraordinary repair works arising out of flood or earthquake damage or required for extraordinary renewals and black top- ping programmes, the CE (RD) will have a reserve --out of which he will allot funds against detailed estimates of works submitted to him. Entries under the head "IV SPECIAL REPAIRS out of CE (RD)'S Reserve" will be made in the C. E. (RD)'S office when he approves such estimates.

6. GENERAL

Estimated cost B+C (OVERLEAF) should not ordinarily exceed 50% of A. Where it does exceed, full reasons for the excess should be furnished. Otherwise the demand is likely to be suitably cut down.

APPENDIX X (g)

(Vide para 10. 2)

1 Model Preliminary estimate for Road Works

(To assess rough cost)

Part I. Acquisition of site.

- (a) Land acquisition.
- (h) Acquisition of structures.
- (c) _ shifting of electrical lines, Telephone/Telegraph lines, Pipe lines etc.

Part II. General improvements.

- (a) Felling trees.
- (b) Earthwork-widening, raising and/or forming embankments.
- (c) Blasting rock.

(d) Conveyance of materials.

Part III. Masonry works.

(a) Retaining walls.

(b) Construction of culverts.

(c) Construction of small bridges.

Part IV. Surfacing.

(a) Gravelling or soling and/or metalling.

(i) Supply of materials.

(ii) Spreading & consolidation of materials to form the road.

(iii) Forming the sides.

(b) Remetalling.

(i) Supply of materials.

(ii) Spreading and consolidation of mate materials to form the road surface.

(iii) Forming the sides.

Part V. Blacktopping.

(i) Supply of materials (a) metal (b) sand (c) bitumen.

(ii) Mixing, spreading and consolidating the materials.

(iii) Forming sides.

Part VI. Miscellaneous and Protective Items.

(a) Turfing slopes of embankments.

(b) Cutting side drains and slope drains.

(c) Providing guard stones.

(d) Providing Km stones.

(c) Providing signboards.

Part VII. Tools and plant.

Part VIII. Value of departmental materials such as rubble credited, if any

Part IX. Contingency charges.

Part X. Time schedule for the completion of the work.

II Model Preliminary Estimate for Bridge Works

(To assess rough cost)

Part I. Acquisition of site,

(a) Land Acquisition.

(b) Acquisition of structures.

(c) Shifting of electrical lines, Telephone lines, Telegraph lines, Pipe lines etc.

(d) Felling trees.

Part 11. Construction of temporary site office and working yard when necessary.

Part III Foundation.

Part IV. Sub-structure.

Part V. Super-structure.

Part VI. Approaches.

(a) Earth work filling/Cutting including conveyance if any.

(b) Blasting rock.

(c) Masonry works.

(i) Retaining walls.

(ii) culverts.

(d) Soling and/or metalling.

(i) Supply of materials.

(ii) Spreading & consolidating the materials for forming the road surface.

(c) Black top surfacing.

(i) Supply of materials (a) metal (b) sand (c) bitumen.

(ii) Mixing, spreading & consolidation for forming the surface of the road.

(iii) Forming the sides of roads.

Part VII. Miscellaneous items.

(a) Providing guard stones & Km. stones.

(b) Name and sign boards.

(c) Turfing slopes of embankments.

(d) Cutting side drains and/or slope drains.

Part VIII. Tools & Plant.

Part IX. Contingency charges.

Part X. Time schedule for the completion of the work.

III. Model Preliminary Estimate for Building Works

Part I. Acquisition of site-. .

(a) Land acquisition.

(b) Acquisition of structures, if any.

(c) Shifting of Electrical lines/ telephone/Telegraph lines and Drainage Sewer Pipe lines.

Part II. Preparation of site.

(a) Clearing and levelling site.

(b) Demolishing existing structures, felling trees etc., if any.

Part III. Earth work.

(a) Earth work for foundation.

(b) Filling basement.

Part IV. Sub-structure and super-structure.

(a) Foundation.

(b) Basement.

(c) Superstructure.

(d) Wood work for doors and windows etc.

(e) Roof timber/trusses.

(f) M. P. tiled/A. C. sheet/RCC/Roof.

Part V. Finishing items.

(a) Flooring.

(b) Ceiling.

(c) Plastering.

(d) Painting etc.

Part VI. Service connection.

(a) Water supply both internal and external / well with pumping arrangement and overhead tank.

(b) Sanitary installation both internal and external.

(c) Electrical installation both internal and external.

Part VII.

(a) Compound wall/Enclosures.

(b) Approach roads.

Part VIII. Tools and Plant.

Part IX. Other items.

(a) Contingency.

(b) Difference in value between recovery rate and issue rate of materials etc.

Part X. Time schedule for the completion of work.

Note to accompany model preliminary estimates for road, bridge and building works

(1) An estimate report explaining the location, length of roads and other salient features of the works proposed, and a site plan should be furnished.

(2) All the items indicated in the model estimates may not be required in all cases. Where an item is not required, it may be indicated as 'Nil'.

(3) The standard specification laid down for different classification of roads and bridges and standing circular orders should invariably be followed while proposing the works under various sub heads in the model estimates.

(4) *Under 'Land Acquisition'* the area of land, plinth area, or other relevant details of the structures to be acquired and approximate costs for shifting lines should be furnished.

(5) *'Under General Improvements'* the quantity of earthwork, and lock blasting (Approximate) should be furnished.

(6) In the case of retaining walls, the section proposed, height and the type of construction i.e. D. R. or Masonry, the length etc., should be indicated.

(7) In the case of culverts, the span, or the size of the culverts should be furnished.

(8) In the case of small bridge works, which form part of a road work, the span, width of roadway etc., should be noted.

(9) For *"Surfacing"* the formation width of the roadway, width of soling and/or metalling/gravelling, width and type of blacktopping, and the length should be furnished.

(10) In the model estimate for bridges, in addition to the points mentioned above the following points should also be noted.

(a) Under 'Foundation', the type of foundation i.e. open, Pile or well, size and, No. of piles and/or wells should be furnished.

(b) *Sub-structure.* Type and size of piers and abutments have to be noted.

(c) *Superstructure.* Type of decking, width of roadway, span etc., should be noted.

(11) With regard to buildings, in addition to the general instructions mentioned above, the following points should also be noted.

- (a) If the estimate provides for residential quarters for Government employees, the pay scales of the officers for whom the quarters are intended, should be furnished.
- (b) In the case of buildings for accommodating officers, the number of offices, details of staff and other requirements should be indicated.
- (c) In the case of other buildings also, like hospitals, hostels etc., full details of requirements should be given.
- (d) The possibility of getting adequate supply, of potable water should be investigated, where there is no protected water supply system.

CHAPTER XI

LAND ACQUISITION

11.1 General.

11.1.1 General.- Government have in their memorandum No.43583/BI/64/RD dated 11th, November 1964 issued instructions showing the role of the Department in the matter of Land Acquisition. A copy of this Government Memorandum is, given in Appendix XI (a).

11.1.2 The instructions given in this Chapter are supplemental to the above and are particularly applicable to the PWD.

11.2 Who should initiate acquisition.

11. 2. 1. *Initiation of acquisition.*-For all Land Acquisition needed for the P. W. D. the initiative for acquisition should be taken by the Executive Engineer who has jurisdiction over the concerned work, or institutions requiring the land.

11.2.2. The P. W. D. undertakes works for other departments of the State also. In case any such work requires land to be acquired the move for acquisition should be made by the concerned department, even if funds for meeting the cost of Land Acquisition are made in the P. W. D. Budgets. The Executive Engineer who had jurisdiction over such work should assist the concerned department in selecting the site and also make available the funds (if provided in the P. W D. budget) for meeting the cost of acquisition at the appropriate time. The intention is that the concerned department should pursue the matter regarding land required for a work of the department and make available the land to the P. W. D. for executing the work.

11.2.3 In the case of works undertaken on behalf of other Governments Local Bodies, Quasi Government Organization and Private bodies etc., it is the duty of the concerned sponsoring authority to process land acquisition.

1 1.2.4. As an exception to the above, land acquisition required for construction, improvement or any other work in connection with the rational Highway should be moved and processed by the Executive Engineer, B&R, having jurisdiction over the work, after sanction of

the Union Government in the Ministry of Transport (Roads Wing) is obtained for the proposal and the estimate, and after funds are allotted.

11.2.5. It may sometimes be necessary to rehabilitate persons who are living in areas acquired for the P. W. D. or in Government Land to be used, for works for the P. W. D. If land has to be acquired for such rehabilitation, the move for acquisition should be made by the Revenue Department, which has to deal with the rehabilitation problem, but the cost of such acquisition may be paid from the provision for acquisition in the concerned work in the P. W. D. Budget.

11.3. Conditions to be satisfied before Land Acquisition is moved

11.3.1. The work requiring the land to be acquired should have been administratively sanctioned and funds for the work must have been provided in the concerned year's budget. In urgent cases with the sanction of Government it is permissible to move for land acquisition even if funds are not available in the current year's budget provided it is possible to find funds by diversion or otherwise to meet land acquisition cost.

11. 3.2. It should be ensured that the land to be acquired is suitable and necessary for the work.

11.3.3. With regard to ascertaining the, suitability it may be necessary to conduct some preliminary examinations, inspections or tests at site. These should be done with the consent of the owner if he is willing before moving for acquisition. The help of the Revenue Department Officers may be sought in this regard. If, however, there is objection to these preliminary works being done, and if prima facie, the site appears suitable and necessary, the Executive Engineer may move for land acquisition. In such cases, as soon as the notification under section 3 (i) is published, the necessary surveys and tests should be done.

11.3.4. Any such survey or test carried out by an Officer generally or specially authorised by the Collector is legally permissible, under Section 3 (2) of the Act. However, there is a proviso that "no person shall enter into any building or upon any enclosed court or garden attached to any dwelling house (unless with the consent of the owner thereof) without previously giving such occupier at least 7 days notice in writing of his intention to do so.

11.3.5. Any damages caused to the property by such surveys, tests etc. should be assessed and paid to the owner by the Executive Engineer in accordance with Section (4) of the Act and the fact intimated to the Collector. The expenditure should be debited to the cost of investigation for the work or general investigation charges for the divisions.

11.3.6. If after such tests, the site proposed for acquisition is found unsuitable then the Collector must be informed and requested to withdraw the notice of acquisition. When a fresh site is chosen the entire procedure for acquisition should be started de-novo.

11.3.7. With regard to necessity, all the possible alternative should have been examined from various angles, so that during the Collector's enquiry if any objection is raised against the acquisitions there must be sufficient ground to over rule the objection and justify the acquisition.

11.3.8. A survey of the land should be made and a plan of the area to be acquired should be made. This survey plan should be connected to available points in the cadastral survey of the area if possible. The survey plan should clearly indicate the land marks by which the land can be easily identified.

11. 3.9. Where there is objection from the owner to take such surveys at least a good sketch of the land should be furnished in such a manner that the land proposed for acquisition is identifiable.

11.4. When the urgency clause is to be applied.

11.4.1. *Application of urgency clause.*-The general principles regarding the application of the urgency clause to particular casts of Land Acquisition are given in para 10 of Government Memorandum No. 43583/B1/64/RD dated 11th November 1964 vide Appendix XI (a).

11.4.2. As far as possible the provision for acquisition under the urgency clause should be used sparingly and only in cases where there are justifiable reasons.

11. 4. 3. It is necessary that in cases where land has to be taken possession of in advance of the award the requisitioning officer should have gone through para 1 (iv) of Chapter 1 of the Kerala Land Acquisition Manual and should be satisfied about the need to take advance possession. For easy reference para 1 (iv) of Chapter 1 of the Kerala Land Acquisition Manual is extracted below:-

“Ordinarily, land should not be entered upon or taken possession of otherwise than in accordance with the provisions of the Act. It should be remembered that no subsequent proceedings under the Act will have retrospective effect or validate any action previously taken. If, in order to save life or property or for the purposes named in Section 3 (2) of the Act or in other urgent cases it is necessary to take possession of the land before the provisions of Act have been complied with, the officer taking action should previously obtain the consent in writing of the owner of land. Detailed particulars regarding the nature of the land, the improvements thereon, particulars necessary for valuation of the improvement which might be removed or demolished or destroyed after taking possession but before passing of the award, the date from which interest on the award amount will have to be paid and other details necessary for the completion of land acquisition proceedings, should be clearly mentioned in the consents to be obtained in writing. If the owner of the land claims interest from the date of taking possession of the land, the officer desiring possession of the land earlier should decide whether it would be advantageous to Government or the Company or the Local Body concerned to take possession of the land before the completion of the proceedings only if it is materially advantageous to Government to do so. In such cases, it should be ensured that the land acquisition proceedings are completed with the least possible delay as otherwise interest would accrue unduly on the amount of compensation to be awarded. The Officer taking possession of the land should contact the District Collector concerned and see that the land acquisition proceedings are initiated at once and completed within a maximum period of six months. If due to the neglect of any officer, the Government are put to any avoidable loss, the officer concerned will be personally held responsible for it and disciplinary action taken against him. The District

Collectors should pay particular attention to such case during their reviews of land acquisition work in the District". .

11.5. Joint Inspection by Land Acquisition Officer and Departmental Officer.

11.5.1.If a joint inspection is considered necessary by the Land Acquisition Officer, then an officer not lower in rank than a Junior Engineer and having jurisdiction over the work should be deputed for the purpose. He should be fully briefed regarding the suitability of the land and the necessity for the acquisition and also identify the land.

11. 6. Collector's enquiry under Section 5 (i)

11.6.1. If objections to the acquisition are received, the Collector usually notifies the department also about the date and time when enquiry into the objection will be held. The Department should depute a suitable officer to be present at the enquiry and explain its view point so that the Collector can take a decision on the objection.

11. 7. Valuation of Building

11.7.1 *Valuation of Buildings*.-Valuation of the property is the responsibility of the Land Acquisition Officer. However, in case of buildings or other structures the P. W. D. may be called upon to work out and estimate the present value of the structure or building. This should be worked out on the following basis.

11.7.2 First a detailed plan and specifications of the items of work in the structure should be prepared. It is likely that certain details like mortar proportions or quantity of steel used in R. C. work cannot be found out by usual observation. In such cases assumption may be made that the mortar or concrete of the type used contains the minimum proportion of cement material, which will be required for the stability of the concerned portion of the structure. Similarly in R. C. work, in the absence of any other data, the minimum of steel necessary for the particular item may be assumed as having been used. With regard to foundations a few examination pits should be taken to find out depth and nature of foundations.

11.7.3 An estimate then should be prepared for the construction of the structure using the current schedule of rates. Where non-standard items of work are done, special data for the same should be worked out on the basis of prevailing market rates. In case the building is electrified, the estimated cost of electrification should be worked out in consultation with the Assistant Engineer, Electrical Wing in the concerned circle. For leveling site, only the minimum quantity necessary for construction of a building of the size should be assumed unless there is evidence at site that extra quantity of work was involved and it is possible to measure such extra quantity. Leads and lifts for materials should be worked out as if the structure is being constructed by the department at that site. If any item of work done is sub- standard as compared to the same item as per P. W. D. specifications, suitable percentage reduction may be made for the same. Similarly, if any item of work is of specially superior standard as compared with the corresponding item of P. W D, specification, a suitable extra per cent on the rate of the concerned item due to such superior work may be allowed.

11.7.4. From the estimated cost of the building worked out on the above basis, depreciation should be deducted for the period which had elapsed after the building was constructed. The age of the building should be ascertained by local enquiries including enquiries from local bodies like Municipalities, etc., having jurisdiction over the area. The facts ascertained through such local enquiries should also be verified by examination of the condition of the building and its component parts.

11.7.5 The rate of depreciation to be allowed for the building should be on the basis given in the standard data book (Metric System) of the P.W.D. The rate of depreciation to be allowed for the electrical and water supply and sanitary installations should be on the following basis.

Electrical Installations	6%
Water Supply & Sanitary Installations	41%

11.7.6 In addition to normal depreciation, deductions should be made for damages in any point of the structure. When allowing normal depreciation rates, it is expected that the structure is maintained properly. Hence depreciation does not cover special damages such as cracked walls, damaged roof, rotten state of wood work etc. A reasonable amount which may be more or less equal to the cost of rectification should be deducted from the depreciated value of the building to arrive at the final cost to be intimated to the revenue authorities.

11.7.7 Government have delegated certain powers, to officers of the P.W.D. regarding valuation of buildings for acquisition. These are detailed in the table below, which also shows the maximum time that can be allowed for completing such valuation.

Name of officer	Cost of building to be valued	Time limit for completing the valuation
Assistant Engineers	Above Rs. 5,000 & up to Rs. 15,000	Two months
Executive Engineers	Above Rs. 15,000 & up to Rs. 1 lakhs	Three months
Superintending Engineers	Above Rs. 1 lakh & below Rs. 5 lakhs	Four months

11.7.8. In all cases of valuation of buildings, the preparation of the plan and specifications should be made by the junior Engineer concerned and the estimate should be framed by the Assistant Engineer. Where the valuation has to be approved by officers higher in rank than Assistant Engineer sufficient time (at least one month for each office which has to scrutinise the valuation) should be allowed from out of the maximum permitted by Government. Before the valuation is approved it is imperative that the officer who is competent to approve the valuation

should inspect the structure with the plan and estimate and satisfy himself about the various provisions made therein.

11.8 Acquisition of part of building to be avoided

11.8.1 It is not permissible to (acquire only a part of a building if the owner objects to such part acquisition. In fixing the limits of the area to be acquired this fact should be kept in mind, and if such acquisition cannot be avoided, the department has to reckon on the possibility of the whole building being acquired and paid for. The advice of the Collector should be sought before finalising the limits of acquisition in such cases.

11.9 Acquisition for Projects

11.9.1 Under the Act, if sanction to a project is notified in the gazette the value payable for the land to be acquired will be the value prevailing on the date of such notification or that prevailing on the date of section 3 (i) notification whichever is less. This safeguard is provided in order that Government do not have to pay for increase in land value which generally results when a project is taken up in any area. There is however one limitation and that is that section 3 (1), notification for the areas to be acquired should be published within 3 years of the date of publication of sanction for the project in the gazette. Officers-in-charge of projects should keep this in view and

(a) Move Government for the publication of sanction of the project, as soon as it is sanctioned, and

(b) As far as possible see that all the lands required for the project are notified for acquisition under Section 3 (i) before the expiry of 3 years from the date of publication of sanction to the project.

11.10 Possession of land after award

11.10.1. The general instruction regarding taking possession of and after awards are conferred in Government Memorandum No. 43583/B1/64/RD dt. 11th Nov. 1964 [See Appendix XI (a)]. In addition, the following rules regarding demarcation of lands acquired for the P.W.D. should be followed.

(a) All lands acquired for the P.W.D. should have the boundaries marked by the demarcation stones, except where a wall runs along the boundary. The demarcation should be done by the acquisition officer, the demarcation stones being provided by the P.W.D.

(b) Demarcation stones should be made of cement concrete (with out reinforcement) except where it is cheaper to use granite or other durable stone.

(c) The prescribed dimensions are 2" x 6" x 6". The letter P. W. 4" high and coconut tree should be cut on one side of the stone. It should be dressed for a height of one foot only and embedded in the ground to a depth of one foot.

(d) Demarcation stones should be fixed at all angles along the boundary and at all intersections of survey field boundaries.

(e) Whenever two adjacent P. W. demarcation stones fixed under the above rules by the Land Acquisition Officer are more than one furlong apart, an extra P. W. demarcation stone or if necessary, more than one stone should subsequently be fixed by the P. W. D. on the boundary so as to reduce the interval between two adjacent demarcation stones to less than one furlong. The additional stones fixed in such cases should bear the letters P. W. but not the coconut tree (as they will not be 'survey marks' fixed by the Land Acquisition Officer).

(f) Provision will be made in all estimates for the above items.

(g) When survey fields are subdivided or resurveyed in consequence of the acquisition of lands for public purposes, at the cost of the P. W. D. such subdivisions or new survey fields should be demarcated by the Revenue Department.

11. 11. Temporary Occupation

11.11.1 *Temporary Occupation*.—When land is required only for temporary occupation by the department as for instance for a fabrication yard in a bridge construction or quarters for labour which may not be required after construction, formal acquisition need not be moved. Instead, the help of the District Collector may be sought in procuring the occupation, and use the land under Section 37 to 39 of the Kerala Land Acquisition Act. In such cases the compensation may be a *Land Acquisition* amount of periodical payments, which the department should arrange to pay as instructed by the Collector. At the end of the period of occupation, the land should be handed over back, to the owner through the District Collector.

11. 11. 2. If during the occupation of the land by the department the land has become permanently unfit for the purpose for which the land was used immediately before the department took over, then Government may have to proceed to acquire the land if the owner requires it. This aspect has to be kept in view by the officers arranging the temporary use of the land so that no permanent damage is done which will render the land unfit for use as before the occupation.

11. 12. Lands acquired but no longer required-disposal of

11. 12. 1. Whenever land already acquired and under the control of the P. W. D. are found no longer required, the Executive Engineer concerned with the approval of the Chief Engineer may inform the District Collector about the matter and request to arrange disposal. Until the disposal is effected the land should continue to remain in the possession of the department

Revenue (B) Department

MEMORANDUM

No. 43583/B1/64/RD.

Dated, Trivandrum, 11th November 1964.

Sub: -Land Acquisition (General)-Instructions showing the role of the Departments in the matter of acquisition of lands-Issued.

The Kerala Land Acquisition Manual inter alia lays down, the procedure to be adopted by the departmental officers when applying for acquisition of land. It has been suggested that consolidated instructions specifying the role of the departments as laid down in the Manual might be issued to enable departmental officers to understand their responsibilities correctly. Accordingly, the following instructions are issued for the guidance of departmental officers:-

1. When land to be acquired under the Act

Whenever land, which is not already the property of Government, is permanently required for public purposes it should invariably be taken up under the Land Acquisition Act 1961 (Act 21 of 1962), as acquisition under the Act confers an indefeasible title to the land. When the land is only temporarily required, the procedure laid down in -Part VI of the Land Acquisition Act should be followed.

2. Proceedings under the Act not to be retrospective.

Ordinarily, land should not be entered upon or taken possession or otherwise than in accordance with the provisions of the Act. If for any reason, it is proposed to take possession of the land before the provisions of the Act have been complied with, but without resorting to the urgency provisions of the Act the Officer taking action should previously obtain the consent in writing of the owner of the land. Detailed particulars regarding the nature of the land, the improvements thereon, particulars necessary for valuation of the improvement which might be removed or demolished or destroyed after taking possession but before passing of the award, the date from which interest on the award amount will have to be paid and other details necessary for the completion of land acquisition proceedings, should be clearly mentioned in the consent to be obtained in writing. If the owner of the land claims interest from the date of taking possession of the land, the officer desiring possession of the land earlier should decide whether it would be advantageous to Government or the company or the local body concerned to take possession of the land before the completion of the proceedings under the Land Acquisition Act and could take possession only if it is materially advantageous to do so. In such cases, it should be ensured that the land acquisition proceedings are completed with the least possible delay, as otherwise interest would accrue unduly on the amount of compensation to be awarded. The Officer taking possession of the land should contact the District Collector concerned and see that the land acquisition proceedings are initiated at once and completed in time.

3. When land to be acquired by private negotiation to acquire land by free gift or by private purchase not desirable.

It is not desirable that land required for Government purposes should be acquired by free gift or by private purchase. Formal proceedings should always be initiated under the Land Acquisition Act for the acquisition of land for a Government Department. There is no objection, however, to local officers negotiating with the owners of land about to be acquired for a public purpose with the object of coming to an amicable agreement with them as to the price to be paid previous to the initiation of proceedings under the Land Acquisition Act and with a view to guarding against subsequent exorbitant demands or awards; provided that this procedure will result in economy. Any settlement thus arrived at should be communicated to the Land Acquisition Officer, who though not bound to accept, in his award, the price agreed on before hand will, no doubt, do so in ordinary cases. The settlement must take the form of an agreement that the owner is willing to sell for a certain specified sum plus 15 per cent of that sum for compensation, the total of the two sums being the actual price agreed on. These instructions, do not, however, apply when land at the disposal of the Government is granted in exchange of the land acquired.

4. Procedure to accept free gift of land.

A free gift of land can be accepted under the Kerala Land Relinquishment Act, 1958. Under Section 4 (8) of that Act as amended by Act 8 of 1963, after the acceptance of relinquishment, the title and interest of the registered holder, or, as the case may be, of the registered holder, the cultivating tenant and the intermediaries, if any, on the land shall vest in Government free of all encumbrances and the land become Government land, with indefeasible title over them. Under Section 3 (1) of the Act, a registered holder may relinquish in favour of Government, the whole or any portion of land standing in his name provided that such land is in his possession and free of encumbrance'. Under Section 3 (2) of that Act, where any land is in the possession of cultivating tenant and the intermediaries, if any, of such land may jointly relinquish the same in favour of Government, provided that such land is free of encumbrances. In cases of free gifts of lands, which satisfy Section 3 of the Act, relinquishment proceedings can be initiated by the District Collector under Section 4 of the Act and the Rules there under, instead of acquiring them under the Land Acquisition Act.

The above procedure will reduce the number of cases for acquisition of land offered as gifts. However, when such lands are encumbered or where surrenders are conditional or partial they should be acquired under the Land Acquisition Act as provided for in the following paragraph.

5. Acquisition on nominal compensation.

In cases where the land owners voluntarily surrender their land for any public purpose, free of cost, the Department to which the land is so surrendered should initiate, action for the acquisition of land under the provisions of the Land Acquisition Act on payment of nominal compensation, the object being to secure an indefeasible title to the land. In such cases the Collector will, on receipt of application from the requisitioning department, proceed with the acquisition of land on the basis of an agreement under Section 16 of the Land Acquisition Act.

6. Local Authorities obtaining land by private purchase or by deed of gift.

There is no objection to local authorities or Municipalities obtaining land required for their purposes by private purchase or by a deed of gift provided that the conditions prescribed in rule 3 of the Kerala Panchayats (Acquisition and Transfer of Immovable Properties) Rule's 1962 or Rule 2 of the Kerala Municipalities Acquisition and Transfer of Immovable Properties Rules 1962, Section 72 of the Calicut City Municipal Act, 1961 or Section 68 of the Trivandrum City Municipal Act, 1116 as the case may be are, satisfied. It will be left to the local body concerned to decide in each case whether it will acquire the land required by private ne6r6tiation or whether it will approach the Government for its acquisition under the provisions of the Land Acquisition Act.

7. Selection of site for acquisition.

The Officer who selects the land on behalf of the requiring department is bound to see that the interests of Government, of the public and private individuals are duly considered and that sites and alignments are chosen so as to cause the minimum of expenditure, annoyance and loss compatible with the object for which he land is required. Where the land to be acquired is for the construction of an irrigation canal or for a similar work, technical scrutiny of the site should be completed before the land to be acquired is fixed up. There is a case where the Public Accounts Committee has pointed out an infructuous expenditure of about Rs. 6,000 on account of the acquisition of land for construction of a canal. In that case, it was found at the time of commencement of the work that the land was unfit for the work because of the presence of rock underground very close to the earth's crust, in the major portion of' the area of the land acquired. Similarly, before a particular land is fixed up for the construction of a building, the size and estimate of the building should be fixed up before hand and the land proposed to be acquired for that building should be technically scrutinised before land acquisition proposals are placed before the Collector. Whenever it is proposed to acquire a site for a building, attention should also be paid, among other things, to architectural conditions. Thus, if there is a choice of site between a prominent corner plot which is not occupied by any suitable building and a more ordinary site in which the Government building in contemplation would be hidden away by other buildings of no consequence, the site, the construction of' buildings on which will improve the amenities of the locality, should be preferred. The arrangements, if any, between the Officers of the Department requiring the land and those of the Revenue Department in regard to the selection of the land to be taken up should, where practicable, be made without divulging the intentions of the Government in order to prevent prices being pushed up.

8. Employment of special staff for acquisition

In all cases of acquisition of land for companies and local authorities the cost of special establishment employed and the incidental charges incurred will be debited to the acquiring body concerned as laid down in Section 55 (1) of the Land Acquisition Act. When lands art acquired for the Central Government, the cost of acquisition (including the incidental charges and the cost of the special staff, if any, employed) should be debited to Central Government. When a special officer is appointed for the acquisition of land for any department of the Government, the expenditure on account of his pay, allowances, establishment contingencies, etc. is chargeable to that department as part of the cost of land. When the acquisition proceedings is taken up by any officer, not specially appointed for the work, his pay and allowances and the charges of his ordinary establishment aria contingencies will be debited to

the Revenue Department but any special charges incurred in connection with the acquisition of the land in question, on establishment contingencies etc. should be borne by the department for which the land is acquired.

9. How to apply for acquisition of land for Government Depart' meats other than the Revenue Department.

(a) Application in all cases in which land is required by a department of Government other than the Revenue Department should be sent by the Departmental Officer authorised in this behalf in the prescribed form (vide Appendix A) to the District Collector or to the Special Land Acquisition Officer, if any, appointed for the purpose. In the application it should be specifically stated whether the sanction of the competent authority exists for the work for which the land is required and for the acquisition of the land, and whether necessary funds have been provided in the budget for meeting the cost of acquisition.

(b) Applications from associations or private institutions, other than educational institutions, should be sent in the prescribed form to tile District Collector. When land is required by a private education institution the manager of the institution should send an application in the prescribed form to the District Educational Officer concerned who will forward it to the District Collector with a certificate from the departmental officer authorised in this behalf, to the effect that the acquisition is necessary as the land is required for a public purpose and that the private educational agency has agreed to meet the expenditure.

(c) A Panchayat that requires land to be acquired for public purpose has to send its requisition to the District Panchayat Officer who will forward it to the Special Land Acquisition officer, if any appointed for the purpose or to the District Collector after appending a certificate to the effect that the acquisition proposal satisfied to the conditions prescribed in Rule 3 of the Kerala Panchayats (Acquisition and Transfer of Immovable Properties) Rules, 1963.

(d) Requisition in the prescribed form from Municipalities and Corporations, will be forwarded to the District Collector, direct with a certificate from the Commissioner to the effect that the acquisition proposal satisfied the conditions prescribed in Rule 2 of the Kerala Municipalities (Acquisition and Transfer of Immovable Properties) Rules 1962, Section 68 of the Trivandrum City Municipal Act or Section 72 of the Calicut City Municipal Act as the case may be. If a Special Land Acquisition Officer has been appointed, the requisitions can be sent direct to him with a copy to the District Collector.

Note:- In exceptional cases in which the requisitions are forwarded to the Special Land Acquisition Officer direct to avoid delay, copies should be sent to the District Collectors concerned. Normally however the requisition ought to be sent only to the District Collector concerned.

10. When urgency provision is applied

Applications for lands, which are to be acquired by invoking the urgency provision of Section 19 of the Kerala, Land Acquisition Act, should contain necessary details to enable the District Collector or the Government, to decide whether it is a fit case to be proceeded under

Section 19 (4) of the Act. It should also be stated in the application whether there is any necessity to take possession of the land in advance and whether interest charges on the compensation amount may be paid while passing the award. All the requisitioning departments should understand that in cases of requisition under the urgency clause, the Government or the District Collector has under Section 19 of the Act, to direct that the land needed urgently for a public purpose and they have also to record the reasons the therefore in writing. They have also to direct that the provisions of Section 5 of the Act shall not apply. Section 5 gives 30 days time to a person affected or interested to file his objections to the acquisition proposed. In A I.R. 1954 Mad. 481, 1956, 11 MLJ-279, it has been held that when it is decided to dispense with the provisions of Section 5 of the Act, the authority doing so must be fully aware that a very valuable right statutorily conferred on a citizen, to object to the acquisition proposed is, taken away. Therefore, any urgency that demands a dispensation with procedure under Section 5 must necessarily be an urgency, which will not brook a delay of 30 days and must be real and well founded.

11. Acquisition of land other than for Government purpose

The application received by the Government or the District Collector will be forwarded to the Land Acquisition Officer concerned for initiating land acquisition proceedings, if it is decided that the lands applied for should be acquired under the Act. When the acquisition for a private institution or an association, the Government or the District Collector before forwarding the requisition to the Land Acquisition Officer will determine the conditions subject to which the lands will be alienated to it after acquisitions and communicate them to him with instructions to add such and other special conditions as are deemed necessary according to the local conditions and to obtain the consent of the party to them. The declaration under Section 6 will not be issued until the party agrees. When the conditions of acquisition are to be fixed subsequent to the institution of the acquisition proceedings, the Collector should obtain an undertaking from the institution or association while making the application for acquisition that in case it refuses to agree to the conditions that may be imposed by the Government it will pay such compensation for damages as may be determined by the Government under Section 52 of the Land Acquisition Act.

Note:- -he certificates required in the application should be supplied and if for any reason, any of them cannot be supplied, the reasons therefore should be clearly explained.

12. Acquisition of land for the Revenue Department.

When land is required for the Revenue Department, the District Collector himself will institute proceedings either of his own motion or under the orders of the Board of Revenue or Government. The District Collector shall inform the Collector whether necessary funds have been provided for the acquisition.

13. Acquisition of land for Local Authorities.

When land is required on behalf of local authorities a resolution of the local body should be, obtained undertaking

(a) to use land for the purpose for which it is to be acquired and for no other purpose without the sanction of the Government.

(b) to carry out that purpose within a specified period, and

(c) to restore the land to the Government, if they so direct, on payment of the compensation awarded less 15 per cent awarded for compulsory acquisition or of the value of the land at the time of restoration which- ever may be less, in the event of local body not carrying out the purpose for which the land is acquired within the specified period or using the land without sanction of the Government or using the land without the sanction of the Government at any time, for any purpose other than that for which it is acquired. The Collector should before publishing the notification under Section 3 (1), ascertain by careful enquiry that the local body is willing to carry out this undertaking and is financially in a position to do so.

(d) To meet the additional compensation awarded by any Appellate Court within a fortnight of receipt of such intimation from the Collector.

14. General points to be specified in the application.

(a) The application for land should show clearly the purpose for which the land is required. The limits of the land and such other particulars as may be necessary for the identification of the land should also be specified. To facilitate joint inspection, it is necessary to mention the name and designation of the Officer who can identify the land required and who has authority to decide himself or subject to confirmation by a superior officer any doubtful points that are likely to arise during such inspection.

(b) A plan of the site should accompany the application. This plan should, wherever possible, be based on and connected with the cadastral survey. In the case of land required for railways or other large projects, the department concerned should furnish a separate sketch map for each district affected by the project showing the exact course of the centre line of the land to be taken up and containing references to villages and towns. This map should be drawn to a scale of 1 inch to the mile or 1 C. M. to the Kilometre and should show village boundaries wherever they have been surveyed. This distance should also be marked upon it, and the average width of the strip to be taken up should be stated. For land near towns, or which for other reasons is likely to have especially high value a map on a sufficiently large scale should be prepared showing the approximate boundaries of the land likely to be required with a note of any valuable trees, buildings or other property for which compensation will have to be paid in addition to the price of the land itself.

15. When application for acquisition is to take effect.

Until and unless the requisitioning department furnishes all the information possible on all points mention in the requisition form, no application will be entertained and till such a properly filled up form is received by the Land Acquisition Officer, correspondence between him and the requisitioning department should be closed at convenient stages. It will not be considered that there was a regular application for acquisition of land and the responsibility for the delay and consequential loss or damage, will be solely that of the departmental officer.

Hence the departmental officer should take care to send in the requisition for acquisition in the proper manner as indicated in the preceding paragraphs, and resolve any doubts by discussion with the concerned Land Acquisition Officer at the earliest to ensure that acquisition proceedings are initiated without delay.

16 joint inspection by the Land Acquisition Officer and the Departmental Officer.

The Land Acquisition Officer will either personally or through a sub-ordinate Officer not below the rank of a Revenue Inspector inspect the locality and will be accompanied when necessary by an Officer of the department or local body requiring the land. Cases will frequently occur when the presence of the departmental Officer may not be required for identifying the land to be acquired, as for example when a whole survey field or a plot about which there is no doubt or dispute as to the boundary is to be acquired or when the application is accompanied by a plan correctly prepared from the survey records in which case there is no possibility of inaccuracy. But his presence may still be necessary, c. g. when there are objections to the acquisition or the price appears prohibitive, to decide whether some alteration in the boundaries or change in the site would not serve the purpose equally well. It will be for the Revenue Officer to decide in what cases the departmental officer should attend and in what cases his presence is not necessary. In cases where he considers joint inspection is necessary, he should fix a date and give notice to the department concerned, which will then depute to attend on that date an officer who can identify the land required and who has authority to decide himself, or subject to confirmation by a superior officer, any doubtful points that are likely to arise. The Inspecting Officers should make known their visit in advance so that the parties interested may be present at the time of their visit.

Note: Where the acquisition is made on behalf of a local body or company, the local body or company, should either arrange to demarcate the land with stones of proper size or within three weeks after the publication of the notification under Section 3(1) of the Act, deposit with the Collector the necessary funds to meet the demarcation charges.

17. At the time of the inspection, the land should be identified and staked out. If the plan received from the department applying for the land is not sufficiently detailed to allow of the preparation of the preliminary valuation statement, such further measurements should be taken during the inspection as are found necessary to enable the statement to be prepared. All that is necessary is to take sufficient measurements to enable the land to be properly identified in the cadastral village and field maps to obtain the approximate areas of portions of fields to be acquired.

13. Provision or surrender of funds for award.

Under section 36 of the Act, interest at 4 per cent per annum is payable on the amount of compensation for the interval between the date of taking possession of the land and the date of payment or deposit. The Collector will not be passing the award unless he has funds at his disposal for tendering payment of compensation to the awards at once. Therefore, if lands ordered to be acquired in a particular year are not acquired and paid for during that year itself, the Collector will, before passing the award and taking Possession of the land, be ascertaining from the Department concerned whether there are funds for payment of compensation that

year and pass the award and take possession of the land only if there is such provision. In cases where the Collector expects lapse of funds through inability to pass awards within the year in which the acquisition was ordered, he will be giving information to the department concerned of the amounts lapsing sufficiently yearly in the year, to enable that department to provide for the required funds in the following year's budget estimate. The department should make the necessary provisions in the succeeding year's budget and communicate the fact to the Collector after the budget is sanctioned by Government, so that the latter Officer may proceed to pass the award, take possession of the land and make the payment immediately. The budget provision for the payment of compensation should be placed at the disposal of the L. A. Officer by the Controlling Officer. The L. A. Officer shall thereafter directly draw the amount when the same is actually required for payment when it is required for deposit in court and render accounts to the Accountant General.

19. Possession of land after passing the award.

When an award has been made, possession of the land (if not already taken under Section 19 of the Act) can be taken at once. Neither the fact that the amount of the compensation has not actually been paid nor the pendency of award proceedings in the Civil Court is a bar to taking possession. Where, however, the claim for compensation is largely in excess of the award, possession should not be taken without a reference to the authority, which has applied for the acquisition. After taking possession the land should be handed over to the department on whose behalf, it has been acquired. An intimation for this purpose will be sent to the departmental Officer in the Form in Appendix B. If the acquired property is not taken charge of on the date specified for the purpose watchers will be appointed wherever necessary to look after the property at the cost of the Department for which the land was acquired; and that department will take steps to recover from those responsible for the delay in taking over possession of the land the amount of loss caused to the Government by way of remuneration to watchers. Therefore, the departments for which the land was acquired should be prompt in taking possession of the land acquired.

20. After possession has been taken in accordance with any provisions of the Act the land vests absolutely in the Government free from all encumbrances including easements over it and it is then impossible for the Government to withdraw from the acquisition. Possession in accordance with the provisions of the Act cannot be taken in anticipation of the proper proceedings being taken to acquire the land. Possession under such circumstances can be secured only in one way viz., by private arrangement, i.e. if the owners of the land agree in writing to permit the Departmental Officer concerned to take possession in consideration of the fact that formal acquisition proceedings are pending. Such possession by private arrangement is not possession in accordance with the provisions of the Act and does not prevent the Government from withdrawing from the acquisition. It is, however, seldom desirable to take possession of land in this way, for, the action of take possession of land in this way, for action of the departmental Officer is so taking possession is likely to lead to difficulties should be the Government eventually decide not to acquire the land under the Act and may possibly lead to complications and claims to damages should be reputed owners from whom written consent was taken to prove not to be the true owners or all the true owners, of the land.

21. In cases of urgency possession may be taken under the Act before the award has been passed, but in such case the following conditions must be fulfilled..-

(1) A specific order of the Government, or the District Collector permitting the Collector to take possession before the award has been passed must have been received.

(2) The declaration under Section 6 must have been published.

(3) The notice under Section 9 and the notice under Section 10 (i) necessary must have been issued.

(4) Fifteen days must have expired after the publication of the notice in accordance with section 9 (1).

(5) Before taking possession the Collector must have offered to the persons interested, compensation for standing crops and trees on the land and for any other damage sustained by them because of such sudden dispossession and not excepted in Section 26. Care should be taken that the money is not paid to a wrong person.

Note:-Under Section 19 (3), before taking possession the Collector may also pay to the persons interested, if the claim is not disputed, a sum not exceeding fifty per cent of the probable compensation, on their furnishing sufficient security.

In the case of a building at least three days notice of the Collector's intention to take possession must have been given to the occupier by the Collector.

22. In certain circumstances the taking of possession may have to be postponed.

If the claims have been made largely, in excess of the estimate, and the Collector, though not prepared to allow them, feels that there are reasonable grounds for thinking that the Court may largely enhance his award, the taking possession of the land may have to be postponed. If he does not accept them, he should either defer making his award or, if he has made his award and the time for making a reference has not expired, he should defer taking possession until he has consulted the department for which land is being acquired or his superior officers and has obtained their orders.

Conclusion: -

In the above instructions, the broad principles which should guide the departmental officers in applying to the Land Acquisition Officers for acquisition of land, have been mentioned obviously, all possible circumstances leading to or requiring acquisition of lands may not be covered by these instructions. In cases of doubt, the departmental officers, particularly the district officers, would do well to discuss matters with the District Collector concerned who is in overall charge of acquisition of lands within the district and finalise matters. It is emphasised that close liaison between the departmental and land acquisition authorities will enable proper and speedy completion of land acquisition proceedings. It should be the constant endeavour

of the District Collectors and the heads of Departments to establish such a liaison between the concerned authorities in the Districts.

R. GOPALASWAMY,

Revenue Secretary.

APPENDIX A

Form of requisition for acquisition of land under the Kerala Land Acquisition Act

1. Name of District, Taluk and Village.
2. Survey Number (s) -
- 3 . Extent of land to be acquired.
- 4 . Purpose for which it is to be acquired.
5. (a) Name and designation of the Departmental Officer if any , deputed for the joint inspection with the revenue officer.
- (b) Whether it is necessary to take possession of the land in advance by invoking the urgency clause under section 19 of the Land Acquisition Act.
- (c) If so the special reasons to be given in as detailed a manner as possible to enable the District Collector/Government to decide upon the question.
- (d) If the land is to be taken possession of in advance of the award whether the requisitioning officer has gone through paragraph 1 (iv) of Chapter 1 of the Land Acquisition Manual and satisfied himself about the need for doing so.
- (e) Whether interest charge on the compensation amount may be paid from the date of taking possession of land under the urgency clause.
6. Whether the resolution of the Panchayat or Municipal Council or Corporation undertaking to use the land for the specific purpose, etc., is attached.
7. If required on behalf of a Panchayat or a Municipal Council or Corporation whether the certificates regarding the suitability of the site are appended.
8. (a) Whether the sanction of the competent authority has been obtained.
 - (i) for the work for which the land is required
 - (ii) for the requisition of the land in question and

(iii) whether necessary budget provision exists for meeting the cost of acquisition.

Certificate

1. *Demarcation:* That the site was pegmarked on the ground and the demarcation approved by a responsible Officer.
2. *Plan..* That accurate measurement, are furnished in the plan attached.
3. *Objection:* That the objections of the owners have been duly consider- ed and that the selection of another suitable site less open to objection by the owners was found impossible.
4. *Sanction:* That sanction of the competent authority exists for work for which the land is required.
5. *Funds:* That provisions has actually been made in the budget for the cost of acquisition under the head of account ""
6. That the acquisition proposal satisfied the conditions prescribed in Rule 2 of the Kerala Municipalities (Acquisition and Transfer of Immovable Properties) Rules 1962. Section 68 of the Trivandrum City Municipal Act, 1116 or Section 72 of the Calicut City Municipal Act, 1961 (applicable to Municipal Councils and Corporation only).
7. That the acquisition proposal satisfied the conditions prescribed in Rule 3 of the Kerala Panchayats (Acquisition and Transfer of Immovable Properties) Rules 1963 (applicable to Panchayats only).
8. That the Panchayat, the Municipality or the Corporation has agreed to abide by the condition that may be imposed for alienation of the land after acquisition.
9. Agreed also to pay such compensation for damages as may be deter- mined under Section 52 of the Land Acquisition Act, if there has to be a withdrawal notification.

Signature and Designation of
the

Acquisitioning Authority.

APPENDIX B

Office

No

From

The Land Acquisition Officer

.....

.....

Reference: Acquisition of land for

Sir,

With reference to the correspondence ending with letter No I am to inform you acres cents of land have been acquired on behalf of your department. Please arrange to depute an Officer of your department to take possession of the land from the Revenue Inspector of : ... at on 19 if the property is not taken over on the appointed dates, watchers will be appointed to look after the property at the cost of your department.

Yours faithfully,

Land Acquisition Officer.

CHAPTER XII

STORES

12. 1. General.

12. 1. 1. A large majority of works in the P. W. D. are carried out through contract agencies and the selected contractor is expected to supply all the materials required for the complete work. However, the department reserves the right to supply certain materials which go in to the construction, and the contract conditions provide for the use of such materials and recovery of value at specified rates. These materials have to be procured, stored and made available for use when required.

12. 1. 2. The procurement and stocking of materials involve locking up of capital and also expenditure in storage watching, handling etc. Sometimes there may be loss on account of deterioration. Hence the number of articles and the quantities to be stocked should be limited

to the minimum consistent with the requirement for the progress of works. As a general rule, the items to be stocked and supplied should be those which,

- (a) have to be supplied by the department to ensure proper quality of material being used on work,
- (b) are scarce in the market and may not readily be available when required,
- (c) will require a long time interval between placement of order and receipt of supply,
- (d) may result in economy if bulk purchase is arranged even allowing for cost of storage.
- (e) will not perish easily or substantially get damaged due to storage proper protection and care being of course taken in storing the material.

The list of articles to be stocked in District Stores is given in Appendix XII (a). If other items have to be stocked in the stores, approval of the Chief Engineer should be obtained before ordering such materials for stocking in the Stores.

12.1.3. In respect of departmental works obviously all articles required will have to be procured and stocked. The limitation regarding items to be supplied for contract works vide para. 12. 1. 2, above will not apply to articles to be procured and stored for such works.

12.1.4. Work in projects may require a number of special items to be procured and stocked particularly Tools and Plant and their spares and accessories. In such cases, the list of items to be stocked should be prepared by the officer in charge of the project and the approval of the Chief Engineer obtained. The list may be modified or supplemented from time to time according to needs of the Project.

12. 2. District Stores and Project Stores.

12. 2. 1. Since the works in the State are spread over a large area, a district store is provided in each district where articles to be procured and supplied are stored and issued for all works done by the P. W. D. in that district. In addition, each important project will have its own store to cater for the projects requirement.

12. 2. 2. Where a P. W. Division's jurisdiction is coterminous with a Revenue district, the requirement of stock materials for the division should be obtained from the District Store in that district. Where a P.W. Division has jurisdiction in two or more Revenue districts, the requirement should be met, from the District Store of that District where the work is located.

12. 2. 3. In the case of Project with separate project store the stocking may be done in one or more stores as required with the Project jurisdiction. In such cases one store should be treated as the main store and the other stores should be treated as sub-stores.

12.3. Classification of Stores.

12. 3. 1. For easy identification, docketing and control each item to be stored should be suitably grouped /classified under different trade groups according to approved classification on the lines indicated in Appendix VII of the Stores Purchase Manual and given a permanent identifying number by the Executive Engineer (Store Purchase and Control). All the officers in charge of stores and all indenting officers should indicate the code identification number of the item also in all transactions concerning it.

12. 3. 2. The Executive Engineer (Stores Purchase and Control) should also fix the unit of measurement of each item and circularise to all officers of the department. All transactions concerning the item should be recorded in such units only. In some cases different units may be adopted by the supplier and his bills may have been made out accordingly. In respect of such items the quantity as actually received and measured in standard units prescribed should be entered in the store accounts. The variation, if any, between the quantity entered in the store accounts and the quantity computed from the suppliers bill should be adjusted in the account then and there. All indenting officers should take care to use only the standard units when indenting for their requirements.

12.4. Estimating requirements for purchase and stocking.

12- 4. 1. Among the items to be stocked, certain items like cement, steel, rods bitumen etc. may be considered as routine items which are required in large quantities every year. The Executive Engineer (Stores Purchase and Control) should identify and list out such "routine items". The annual requirement of the routine items may be assumed based on statistics of drawal of such items from the different district stores for general works in P. W. D. during the preceding year. To this must be added the estimated requirements of the routine items for the different projects, which should be obtained from the Executive Engineers in charge of projects.

12. 4. 2. Regarding "non-routine" or "special" items, the forecast of requirement must be obtained from the Executive Engineers and a summary of the same made out by the Executive Engineer (Stores Purchase and Control). Concurrently information about unutilised balances of any such item in the different stores should be obtained and the net quantities to be procured should be worked out after allowing for utilisation of the available balances.

12. 4. 3. Tools & Plant required for the general use of the department as a whole are classified as ordinary Tools & Plant. Tools and Plant held in the District Stores of the Public Works Department will be held as part of stock and will be accounted for as such, as they are intended for issues to other divisions of the department. The Superintending Engineer should every year review the stock of the ordinary Tools and Plant available in the Circle and if additional quantities or new items are required they should prepare and send an estimate for the requirement justifying the need for the same. When sanctioned by the Chief Engineer this will provide the basis for making purchase.

12. 4. 4. Tools and Plant required for projects from part of the project estimates and generally the broad details will be indicated therein. If details are not included therein, one or more working estimates should be prepared by the officer in charge of the project giving details of the type and number of different Tools and Plant required. The purchase of these should be suitably phased so that they are available when the project requires them without being stocked far

ahead of the need thereby unnecessarily locking up capital. In the same way if special Tools and Plant are required in any division (i.e. other than ordinary Tools and Plant) an estimate for the same should be got sanctioned. This will form the basis for procurement if funds are made available in the Budget for this estimate.

12. 5. General principles regarding procurement.

12. 5. 1. Where it is felt that inspection during manufacture is necessary to ensure proper quality of supply, it is advantageous to route the purchase through the D. G. S. & D. who has an inspection organisation. This may involve sometime and indents should therefore be placed sufficiently early.

If, due to urgency this procedure cannot be availed of, the department may arrange purchase directly without routing through D. G. S. & D. In such cases, the department should make arrangements for proper inspection and test during and/or after manufacture as the case may require.

12. 5. 2. Where the sale of articles is controlled by the State Government or the Government of India, the permits to acquire the article will generally indicate the party from whom the article should be procured and the price and terms of supply. There is no need for any tenders to be invited in such cases but steps should be taken to move the controlling authority for the required permits sufficiently early.

12. 5. 3. In some cases there is control only on price and consumers are at liberty to purchase from any manufacturer or stockist who is obliged to sell the article at the controlled price. Limited tenders may be invited from manufacturers and/or stockists and the supply arranged on the basis of such tenders.

12. 5. 4. Government may sometimes issue general or special orders to give preference to local manufacturers, Co-operative Societies etc., in respect of supply of certain articles. Such preference may be given either as price preference or quota allotment. Where it is a quota allotment, the quota must be reserved and distributed among those to whom the preference applies, based on limited tenders. Where there is price preference, open tenders may be invited for the article and in evaluating the tenders the price preference should be taken note of in respect of those to whom the preference is due.

To ensure that Government orders in this regard are duly followed in the offices of all purchasing, officers, a register should be maintained giving the essential details regarding the nature of preference and reference to the concerned G. O. This register should be always kept up-to-date and referred to before tenders or quotations are invited for such articles.

12. 5. 5. Spare parts form an important item of purchase particularly in projects- where large scale use of machinery is involved. A good deal of care and attention is needed in preparing the list of spares to be purchased. As far as possible, there should be no over-stocking and at the same time enough of spares must be available on hand to replace broken or worn out parts without much loss of time. It is advisable to get the manufacturer's suggestions in this regard but such suggestions should be also further scrutinized and corrected by an officer experienced

in the use of the particular type of machinery so that over stocking may be, minimised even if it cannot be completely avoided. As far as possible spares for keeping the machinery in running condition for one year need alone be purchased and stocked unless it is felt that there will be considerable delay in obtaining any particular item of spare part. In such cases the requirement of the concerned item should be estimated to cover such longer period as is felt necessary. Having got a proper list of spares, the items which can only be obtained from the manufacturer or his spare part stockist should be identified and the purchase arranged after inviting quotations from the manufacturer or his recognised stockist or stockists. Other item of spares (such as for instance, tyres, tubes, fan belts etc.,) may be dealt with in the normal course.

12.5.6. All store of standard types other than those required in small quantities only which are in common and regular demand and which are not subject to appreciable market fluctuations may be purchased on the basis of Rate or Running Contract whichever is most suited to the circumstances of the case. These contracts are entered into by D. G. S. & D) or by the Stores Department of the State Government. Wherever such contract has been entered into by State Government, the indenting, officer of the department should invariably make use of such contracts for the concerned article. In the case of D. G. S. & D. rate contracts also as far as possible purchasing officers of the department should make use of the same. However, if by reference to the supplier, it is found that supplies will be delayed or uncertain, then the officer may make purchase from the open market subject to Stores Purchase Rules. Every officer who is empowered to make purchases should keep up-to-date list of rate contracts entered into by the State Government and by D. G. S. & D. in respect of items which he may have to purchase. In cases of doubt about the details of the items covered by the D. G. S. & D. or State Rate Contract or about the procedure to be adopted on such purchase, the officer, concerned may address the Government in the Stores Purchase Department and seek necessary advice.

12.5.7. The Store Purchase Manual approved by Government gives the detailed procedure to be followed in making purchases and these should be adhered to.

Government have delegated certain powers of purchase to different officers of the Department. It must be understood that these powers are to be exercised only in accordance with the rules, and procedures prescribed in the Stores Purchase Manual.

12.5.3. The following points should also be noted by all purchasing officers of the Department when exercising their powers of purchase.

(a) Routine items (like cement, iron rods, asphalt, etc.) should be purchased only by the Chief Engineer.

(b) As regards other items (like concrete mixers, pumps, vibrators small tools, scientific instruments etc.) if they are required by more than one Division it is advisable to arrange the purchase through the Chief Engineer. For this purpose the Chief Engineer will from time to time circularise lists of articles likely to be required by more than one Division.

(c) All purchases should be against specific provision in sanctioned estimates (except in regard to routine items like cement, iron rods, etc.). If the estimate provision is a L.S., working estimates should be got sanctioned detailing individual items included in the L. S. before

purchase is arranged. As an exception to the above, spares may be purchased against L. S. provision without detailed working estimate provided the cost is within the L. S. provision.

12.6. Store accommodation

12.6. 1. The accommodation required for the store should be properly assessed based on the expected maximum quantities of materials to be stored at a time. The provision for storage should be on a generous scale to avoid deterioration and consequent loss due to inadequate storage accommodation.

12.6.2. Covered accommodation should be provided for all materials except bulky and unwieldy articles provided such articles will not deteriorate due to exposure to weather. Suitable Jacks and bins should be provided so as to obtain the maximum storage utilising the minimum building space. Cement from which a lot of dust will fly about, should be kept, separate from other materials. Similarly inflammable materials should be stored separately in compartments not likely to catch fire. Explosives should be stored only in magazines of approved design with sufficient safety margin all round. Such magazines generally being in isolated places may, be treated as sub store of a main district or project store.

12.6.3. The cement store should be properly planned so that supplies received on different dates or supplies against different orders can be stacked separately. It may be advantageous to divide the cement store into a few different compartments with separate doors so that receipt and issues may not be made from the same compartment at the same time, which may cause difficulty in tallying and, controlling. There should be moving space around stacks and it should be possible to issue out earlier supplies first and later supplies thereafter. Each compartment should have a board fixed on it in which the following information is noted.

Compartment No......

Receipt

----- Date of receipt Quantities received.

Order No. Total

Issue

----- Issue No. Quantities issued.

Date

Total

Balance as on

The noting may be done in loose sheets, which may be removed and kept in the office of the custodian of stores as soon as the compartment becomes empty.

Cement has a great avidity for water and will readily absorb moisture from the atmosphere or from damp material in contact with it. Cement exposed to the atmosphere becomes hydrated and loses strength. If the absorption exceeds 5 percent, the cement is for all ordinary purpose, ruined.

Cement in bags should be stored in a dry room on a raised wooden platform 15 to 22 cm. above the floor level and 30 cm away from walls. Bags should be stacked not more than 10 layers high to prevent bursting of the bags in bottom layers. The bags should be placed close together to reduce circulation of air and all openings in the room should also be well closed.

Cement stored for long periods, say exceeding 6 months should be got tested before being used on major works.

12.6.4. Steel materials may be stacked under cover if available. Otherwise they may be stacked in the open yard. In such cases the yard should be properly paved, preferably metalled and bitumen concreted and provided with good slope for adequate drainage. Stacking should be done on sleepers so that the steel materials do not come in contact with moist ground. There should be moving space between stacks so that individual pieces can be removed without disturbing neighbouring stacks.

12.6.5. It is advisable to set apart a separate room to serve as a transit store where articles on receipt from supplier are received, measured and checked before they are taken to the stores proper.

12.6.6. The store and the yard around it should be properly protected wall or high barbed wire fencing with only one gate, controlled by a gateman who should have a shelter put up near the gate.

12.7. Stores Organisation.

12.7.1. Each store (whether district store or project store or a sub-store working under them) will have a custodian (at present Junior Engineer) who will be responsible for the verification, receipt, custody and issue of the stock materials and maintenance of initial accounts of all store transactions. The administrative control over such custodians will be exercised by stores officers (at present Assistant Engineer) who will be stationed in suitable places. There may thus be one or more stores under such store officers depending upon the volume of transactions in stores and their location. The Stores Officer (designated as Divisional Officer, as per clause 22 of para 2. 1. 1. of the K.P.W.A. Code) controlling stores (treated as a Division with reference to clause 21 of para 2.1.1. of K.P.W.A. Code) should render compiled accounts to the Accountant General.

12.7.2. The officers in charge of the District Stores will for administrative purposes work directly under the Chief Engineer (dealing with stores). The officers in charge of project stores will work under the officer who is in charge of the project concerned.

12.7.3. The Stores officers and custodians of Stores will have adequate ministerial, and field staff to assist them in the discharge of their duties.

When the custodian goes on long leave, he should normally be relieved only after a substitute takes charge of the stores. But when the leave is for a short period it may be difficult and not practicable to arrange a complete verification and handing over of the stores before the custodian proceeds on leave. In such cases, each store under the custodian should be provided with an additional lock, the keys of which will be retained by the Stores Officer. The custodian will hand over the keys in his charge to the Senior Assistant working under him who will temporarily function as custodian. All transactions during such period of temporary absence of the custodian should be carried out in the presence of the Stores Officer who should also attest the entries in the basic initial records, viz. Goods Received, Sheet, Stores Indent and Bin Card and also in the Day Book in the office of the custodian of the stores. This arrangement to meet the situation arising from the temporary absence of the custodian will not in any way absolve him of his responsibility for the articles entrusted to his care.

12.7.4. To assist the Chief Engineer (dealing with stores) in the matter of procurement, inventory control periodical verification etc. there will be an Executive Engineer (Stores Purchase and Control) and required staff working in the Chief Engineer's Office.

12.7.5. Periodical verification of stores is a matter of great importance and a regular systematic verification of all the stores has to be carried out at least once a year. Based on the number of stores to be examined and the time required for verification, one or more squads for stock verification should be appointed. These squads will work under the administrative control of the Chief Engineer (dealing with stores).

12.8. Receipt of materials

12.8.1. When materials are received in the stores, the custodian should verify the supply against the order both as regards quantity and quality and enter the accepted quantities in the Goods Received Sheet in K. P.W. Form 7A-vide Appendix XII (b). The measurements should be got checked by the Stores Officer, or such other officer as is nominated for this purpose, before the materials are taken and kept inside the store. For this purpose, it is better that they are kept in a transit shed until measurements and check measurements are complete.

12.8.2. In some cases the suppliers send the goods by train and the Railway Receipt is sent to the Stores Officer for taking delivery. The Stores Officer should then depute some responsible person without delay to take delivery of the goods from the Railway and check the same against the railway receipt. If any shortage is noticed, the same should be intimated to the railway authorities and concurrently to the supplier and further action taken. Transport from the Railway station may be arranged through a transport contractor or through departmental vehicles according to convenience. If a transport contractor is employed, he should take delivery of the goods at the Station, and convey and deliver the same at the Stores, the loading and unloading being done by him. Detailed verification and entry into the Goods Received Sheet may be done in the stores, as indicated in para 12.8.1. above. In all cases of supply of articles by Railway special care should be taken to avoid delay in taking delivery as this may entail

payment of demurrage charges. All persons concerned in this matter should be particularly vigilant.

12.8.3. As soon as measurements of supplies are entered in the Goods Received Sheet, the receipt should be noted in the Bin Card and the Day Book. Should any correction be effected during check-measurement on a subsequent date, such correction should be noted in the store records through a plus or minus entry indicating the reason for such entry in the remarks column.

12.8.4. It is necessary that supplies are got checked against specification before they are accepted. If it requires any tests being carried out such tests should be arranged and the articles should be accepted and taken into stock only after the tests prove satisfactory. The supplier should be kept informed of the action taken. The cost of such tests should be borne by the department unless the order specifies that the test will be at supplier's cost.

12.3.5. If the order specifies that supplies should be completed by a certain date, supplies made after that date should be accepted only after getting sanction from the authority who ordered supply.

12.8.6. The Goods Received Sheets will be printed in the form of booklets and will be machine-numbered. The booklets will be prepared in triplicate, if payments are made by the Divisional Officer and accounts maintained in the Divisional Office, by carbon process, the office copy in tact and others perforated. They will, however, be in quadruplicate if payments are effected by Sub-divisional Officer and accounts maintained in the Divisional Office. The words 'original', 'duplicate', 'triplicate', quadruplicate' will be printed on them. The office copy will be retained by the custodian of the stores. The other copies will be sent to the Stores Officer, out of which one copy will be passed on to the supplier and the remaining one(s) made use of for posting the Priced Stores Ledger and making payments.

Booklets will be serially numbered and the issue and the receipt back of the booklets will be watched through a Register of Goods Received Sheet in K. P. W. Form 11. A- See Appendix XII (c).

The used-up sheets should be arranged in chronological order and bound in volumes of convenient sizes and kept under the safe custody of the Stores Officer.

See also paras 7.2.6 to 7.2.8 of the Kerala Public Works Account Code.

12.9. Issues of articles.

12.9.1. Issues of articles from the stores should be made only as per issue orders passed by the Stores Officer. Each store should have a list of officers who are authorised to indent on the particular store and keep copy of the specimen signatures of these officers for reference. Issues should normally be made only against authorised indents from these officers. If other officers or other persons require articles from the stores they should obtain special order from the Chief Engineer. Any such order issued by the Chief Engineer should specify the name and/or

designation of the party, the items and quantities to be issued and the terms and conditions of such issue. For identification an authenticated specimen signature of the recipient and his messengers, if any, should also be incorporated in the order.

12.9.2 Officers who are authorised to obtain articles from any store should use an indent in K. P. W. Form 6 - Appendix XII (d). Books of such forms should be printed and bound suitably, each indent being machine numbered. The numbering should be continuous for each lot of books printed at one time with a letter as prefix to indicate the lot concerned. The numbering of the indent forms will then be more or less on the pattern followed for bank cheques. The distribution of the Indent books will be done by the different stores. Each District Store and each Project Store will keep a register of the Indent books, each book being identified as Book containing Nos A.... to A Such books will be authenticated by the seal of the District Store or Project Store concerned and issued to the indenting officer registered with the store. No. indents other than those made in the authenticated indent form should be complied with except in cases authorised by Chief Engineer, vide para 12. 9. 1.

12.9.3. Each indent will be in quintuplicate and bear the same serial No. The Indent books should be kept in safe custody by the Indenting Officer. If any Indent is damaged or cancelled, or lost, the fact should forthwith be intimated to the Stores Officer concerned who should ensure that the concerned Indent is not honoured if presented.

12.9 4. When any article required for use in a work, is to be obtained from the Stores, the junior Engineer in charge should prepare and submit a requisition for the same to the Executive Engineer (who is usually the indenting officer) through his official superior. This requisition should contain the name of the work, names of the articles, the code numbers, the unit of measurement,, quantities required for the whole work, quantities already obtained and quantities for which requisition is made. It is necessary to .cc that only articles required for use on the work are requisitioned and that the quantities are as actually required to avoid unnecessarily keeping back stock materials in a work which does not require it. This aspect should be particularly checked by the Assistant Engineer who passes the requisition. A requisition should not contain articles required for more than one work. In case the articles are to be obtained through a messenger, who is a departmental employee he should be asked to attend the indenting officer's office with the requisition and get his signature attested by the indenting officer in the indent. If the articles are to be issued to a contractor, a receipt should be obtained from the contractor in the following form.

"Received copies 1, 2, 3 and 4 of the indent No . . . for use on based on requisition No of the Junior Engineer

This indent will be produced and the articles received from the stores by my agent whose signature is authenticated herewith. The indent may be banded over to the above agent and his signature obtained in token of his having received the indent.

I shall be responsible to take the article-s on receipt from stores to the work site and hand over the gate pass issued by the custodian of stores to the Junior Engineer and also given an unstamped receipt to him for the articles received as per the Indent".

This certificate along with the requisition should be produced by the contractor's agent/ representative to the indenting officer who after verification may issue the Indent to him. Simultaneously the Junior Engineer /Assistant Engineer should be informed of the number and date of Indent issued against the requisition.

12.9.5 All the five copies of the store Indent marked 'original', duplicate', etc. should be filled in by indenting officer by carbon process. The description of the article in the indent should conform to the description and the permanent identifying number given in the vocabulary of stores. The quantity should be entered in standard units both in words and in figures. The column headed "Name of work/job" need be filled in only when the stores are required for works within the division and in such cases the full name of the work as given in the estimates should be entered as well as the name of the contractor from whom the value is recoverable. In the column 'Head of Account' besides entering the name of the account head to which the issue of stores is chargeable, full name of the division and offices to which the store is to be issued and of contractors, employees, other persons or local bodies to whom it is authorised to be sold should be added in all cases. The first four copies marked 'original' duplicate' etc. should be forwarded to the supplying division and the last copy retained as office copy of the indenting division.

The Stores Officer on receiving the indent will verify

- (a) whether the Indent is in a form issued to the particular officer by reference to its number.
- (b) whether the signature is as per specimen signature of the officer.
- (c) whether the serial number and date of the indent bear proper sequence.
- (d) whether the articles indented are available.

After such verification the stores officer will pass the indent in the copy marked triplicate' and sent the four copies to the custodian of the stores. The latter will enter the quantities issued in all the four copies and sign the indent in the space provided therefore. The acknowledgement of the person taking delivery of the mores should also be obtained in all the copies. The quantity issued should simultaneously be entered in the Bin Card and the 'original' copy of the indent retained as a voucher in support of the entry in the Bin Card. The 'duplicate' copy should he sent to the indenting officer. The triplicate and quadruplicate copies should be sent back to the stores officer. The triplicate' copy containing the pass order of the stores officer will be used for posting the Priced Stores Ledger and the 'quadruplicate' copy for claiming the value of the stores from the indent or in Form I-See Appendix XII (f). See also paras 7.2.10, 7.2.1 1. and 7.12.17 of the Kerala Public Works Account Code.

The custodian of the stores should prepare a gate pass-See Appendix XII (e) in triplicate, one copy being retained in the store and two copies being given to the messenger. The messenger's signature should be obtained in the office copy of the gate pass. The gate pass should give the date, the stores indent number, list of articles, quantities of each, the destination of the articles, the name of the messenger, lorry number etc. in cases where lorry issued for transport. One copy of the gate pass will be handed over to the gate-man, who should check the articles

allowed to be taken out of the gate. One copy of the gate pass will be handed over to the messenger who will produce it along with the articles to the indenting officer or his representative at destination. The articles may then be issued in full or part to the contractor after obtaining an Unstamped Receipt-See Appendix XII (i).

The indenting officer should effect monetary settlement of the claim from the supplying division within 10 days of receipt of Form 1 referred to above. The details of the claim should be checked with indents and should be entered in the 'Register of claims Received' in Form 3 [Appendix XII (g)]. The requisite cheque/bank draft with the distinct marking "Payment by book and adjustments only, should be sent along with a forwarding letter in Form 4 [Appendix XII (h)]. The detailed procedure of settlement of the transaction between the divisions is contained in Appendix 8 of the Kerala Public Works Account Code.

12.9.6 All articles issued should be counted, measured or weighed as the case may be before they are issued. There should be proper measuring and weighing apparatus in each store for this purpose. Wherever necessary the weighing or measuring apparatus should be tested and calibrated so that errors if any are corrected. The stores officer should make it a point to test these measuring and weighing apparatus occasionally at least once in 6 months.

12.9.7. The issue should be made in the standard units prescribed for each item.

Counting, measuring or weighing of articles particularly heavy articles may need the assistance of some labour. This should be legitimately charged to stock. If possible, this work may be arranged on piecework basis at specific rates for handling unit quantities of the main items involved. Small articles weighing less than 10 kgm. should be handled without extra cost by the stores staff themselves.

12. 9. 3. Loading of articles into lorry or other conveyance for removal from the store is the responsibility of the indenting officer. For this purpose the messenger who arrives with the Indent may be allowed to bring in his own labour to the stores and arrange the loading work.

12. 10. Bin Cards

A chronological record of receipt issues and the running balance of each articles of stock will be kept in the Bin Card K. P. W. Form 7 [Appendix XII (j) 1 which will be kept at the place where the materials are stored. These cards will be posted from the Goods Received Sheets and the Stores Indents by the custodian of the stores (Junior Engineer or Store Keeper as the case may be) in the order of occurrence and as and when the transaction takes place.

As Bin Cards constitute the basic quantity record of stock transactions adequate care should be taken for their proper maintenance and safe custody. All the Bin Cards should be serially numbered and a register of them should be maintained in the Divisional Office in K. P. W. Form 11B [Appendix XII (k)].

The Divisional Officer should arrange to have the balances as per Bin Cards verified periodically with those shown in the Priced Stores Ledger. This verification should in any case be conducted before any item is taken up for physical verification.

As soon as a Bin Card is completed, it should be returned to the Divisional Office after carrying over the balance to the new card. On receipt, the entries of the completed cards and the corresponding entries in Priced Stores Ledger should be checked in the Divisional Office and discrepancies if any, pointed out to the Junior Engineer or other officer concerned for further action. The Bin Cards should then be recorded in the Divisional Office after entering the date of return in column 7 of the register of Bin Cards.

12 11. Issue Rate

12. 11.1 The rate at which each, article will be priced on issue from stores is called the issue rate. The issue rate for each article is fixed to cover the actual cost of acquisition of the articles and includes cost price, transport and incidental charges until the article is brought to the stores and stack d. In the case of articles, which are regularly being purchased and issued, the issue rate should be fixed at the beginning of each year instead of after every purchase unless there is a violent fluctuation in purchase price exceeding 20% of its value. If such violent fluctuation takes place a fresh issue rate must be prepared and the rate so fixed will be operative even on balance remaining in stock from out of previous purchases. This is to avoid having different issue rates for the same article at the same time.

12.11.2. Issue rates once fixed will generally operate until the next revision takes place. This particularly applies to articles, which are regularly purchased and stocked. In respect of articles purchased now and then the issue rate once fixed will continue to operate until the article is exhausted or until a fresh issue rate is fixed based on fresh purchases whichever is earlier. It is necessary that in the case of articles purchased now and then issue rate is revised after each purchase. The Chief Engineer will decide which articles are to be considered as regular purchases where the issue rates are fixed every year and which articles are to be considered needing fixation of issue rate after each purchase.

12.11.3. The incidental and transport charges which are to be taken into account in fixing issue rates need not await accurate assessment until all contracts are fixed and may be fixed based on best judgment approximately.

12.11.4. Issue rates should be worked out to the nearest multiple of five paise, fractions of 2.5 paise and below being ignored and fractions of more than 2.5 paise taken as five paise.

12.11.5. The issue rate should be fixed by the Stores Officer or the Executive Engineer (CSPC) in charge of the Stores. As soon as issue rates are fixed for any articles in a store the same should be communicated to all departmental officers having regular dealings with the particular store and to the Chief Engineer.

12.12. Storage Charges, Supervision Charges, etc.

12.12.1. *Storage Charge*.-A storage rate is fixed annually for each division on the basis of the actual storage charges incurred in the year preceding the year for which the rate is calculated so that, the total estimated annual expenditure may as far as possible be recovered from the issues likely to be made during the year. Storage Charges calculated at the rate fixed for each year will be added on a percentage basis so as to form part of the issue rate.

Handling Charges. A suitable percentage based on carriage and other incidental charges of the previous year, which are incurred simultaneously in connection with several articles of stock and cannot therefore be allocated to the various articles, should be fixed annually on the principal enunciated in the previous paragraph and added to the issue rate.

12.12.2. Where the issue is to other departments of the State there will be a further addition of 20% of the issue rate as supervision charges. This addition may, however, be waived by the officer who is empowered to authorise sale in the case of surplus stock which will otherwise be unsaleable.

12.12.3. Where the issue is made to quasi-government organisation, local bodies and private individuals, sales tax at the appropriate rate should be realised over and above the storage and supervision charges given in para 12.12. 1 and 12.12.2 respectively. This tax is to be worked out on the issue rate of the article excluding storage and supervision charges.

12.12.4. In the case of transfer of articles from store to store, the value of articles need be claimed at issue rate excluding storage charges. Issues may also be made at a rate higher than the issue rate-vide para 7.2.21. (b) Kerala Public Works Account Code. Supervision charges should also be claimed in addition to the above rate [vide para 7.2.24. (c) of Kerala Public Works Account Code].

12.13. Unserviceable Articles

12.13. 1. No unserviceable article should be accepted in the store for storage and disposal. Where an article has become unserviceable by use in a work, it is the responsibility of the officer in charge of the work to deal with the unserviceable article until it is finally disposed of. It may sometimes happen that along with serviceable articles, some unserviceable or partly damaged articles are also received from suppliers through Railway or other modes of transport. In such cases only the serviceable articles should be accepted and the unserviceable articles either returned to supplier or temporarily kept in the transit shed till it is disposed of in the manner as settled between the department and the supplier.

12.13.2. Some articles may deteriorate or become unserviceable due to long storage. All care should be exercised to prevent or minimise deterioration by proper care in storage and by timely issues. The stores officer should take frequent inspection of the stores and identify such articles likely to get deteriorated, provide them with proper protection if it is lacking, and also make enquiries from other stores officers whether these articles are required for use. If no such demand is forthcoming and if the Stores Officer feels that further storage will cause deterioration, he should report the matter to Chief Engineer and with his approval arrange for open sale of the article before it actually gets deteriorated or unserviceable.

If during inspection the Stores Officer finds that an article has already become unserviceable, the same must be removed from the stores to a suitable place where these unserviceable articles can be retained till disposal. The Stores Officer should conduct necessary enquiries as to the reason for the article having become unserviceable and obtain sanction to dispose of the unserviceable articles through a survey report giving a clear history of the matter.

After such sanction is received, the articles should be disposed of in the manner specified in the sanction.

12.14. Tools and Plant

12.14. 1. All articles retained in the stores should remain charged to stock, even if in some instances the final debit head is easily identifiable. Thus it may be some articles of Tools and Plant or scientific instruments or stationery are kept in the stores, for being issued to various indenting officers. Even in such cases, these should be initially debited to stock and finally debited to the appropriate head when they are issued from the stores.

12.15. Transfer between stores

It may sometimes be necessary to transfer articles from one store to another store in the interest of the department. Such transfer should be arranged only on the orders of Chief Engineer, and it is the duty of the Stores Officer at the receiving and to arrange transport from the issuing stores. He should send a pre-acknowledged receipt for the articles to be delivered duly endorsed in favour of the transport contractor or his messenger whose signature should be authenticated. On receipt of such a receipt, issues may be done as in the case of other indenting officers. The transactions between the division should be settled in cash immediately in accordance with the procedure laid down in para 7.2.17 of the Kerala Public Works Account Code.

12.16. Priced stores ledger.

As account shall be maintained in the Accounts Branch of the Divisional Office to record day by day the transactions relating to each item of stock. This account should be maintained in K.P.W. Form 11 [Appendix XII (1)] Priced Stores Ledger which will be duly machine-numbered and will have different sections or sets of pages for different articles of stock with columns for receipts, issues and balance for both quantities and values. Separate ledgers will be maintained for articles falling under each sub-head of stock. Each ledger should be provided with an index, which should be kept up to date.

All items of receipts and issues will be entered in the ledger from the copies of the Goods Received Sheets and the indents, which are, received daily from the junior-Engineer or other officer concerned. At the end of the day's postings, the balances under each article should be worked out in respect of quantities as well as values.

The ledger should be closed for both quantities and values at the end of each month. A few pages should be reserved at the end of each ledger for abstracting the transactions (value only) pertaining to each article of stock. The monthly total of receipts, issues and balance should then be worked out for each sub-head and a consolidated abstract prepared for all the sub-heads which should agree with the summary of stock receipts and the summary of Indent3, K.P.W. Form 8 and, K.P.W. form 9 [Appendix XII (m) and Appendix XII (n)] posted daily in the Divisional Office from the Goods Received Sheets and the Stores Indents.

12.17. Stock Verification

It has already been mentioned that periodical verification of stores is absolutely essential. This periodical verification should cover not only the verification of physical balances but also the postings and accounts of all transactions, which have taken place since the last verification.

When once the verification of the physical balance of any item is taken up in a store it should be ensured that there is no transaction of that article (either receipt or issue) until the physical verification of that article is completed. This is to avoid any confusion in regard to the account balance of the article at the actual time of physical verification. The physical balance should be compared against the account balance after providing for corrections against erroneous entries, if any. Immediate steps should be taken to deal with excess and shortage as prescribed in the P.W.D. Code.

Concurrently appropriate disciplinary action should be initiated regarding erroneous postings and other irregularities if any detected during verification.

12.18 Dismantled Materials

Dismantled materials remaining undisposed should be physically verified at least once in a year and the result of verification recorded in the remarks column in the register prescribed for keeping the record of dismantled materials [vide Appendix XII (o)]. This register should be submitted by the Subdivision Officer regularly each month along with the monthly accounts for scrutiny in the Division Office. In case where the section officers are stationed at places other than the place of Headquarters of the subdivision separate registers should be maintained for such section and monthly extracts should be furnished to the Division Officer for incorporation in the register maintained by him, before submission to the Division Officer. After the transactions have been checked by the Divisional Accountant the register should be laid before Division Officer for monthly review.

List of Appendices

XII (a) List of Articles to be stocked in District Stores

(b) Goods Received Sheet

(c) Register of Goods Received Sheet

(d) Stores Indent

(e) Gate Pass

(f) Form 1

(g) Form 3

(h) Form 4

- (i) Unstamped Receipt
- (j) Bin Card
- (k) Register of Bin Cards
- (1) Priced Stores Ledger
- (m) Summary of Receipts
- (n) Summary of Indents
- (o) Register of Dismantled materials
- (p) Annexure-Procedure of stock verification

APPENDIX XII (a)

(Referred to in para 12.1.2)

List of Articles to be stocked in District Stores

1. Cement
2. M.S. rods and structurals
3. Drawing and Blue Printing materials
4. G. 1. sheets, plain and corrugated
5. A. C. sheets and accessories
6. M. T. tyres and batteries
7. Mathematical and scientific instruments
8. G. 1. Pipe and specials

APPENDIX XII (b)

(Referred to in para 12.8.1)

Goods Received Sheet

Division

Subdivision

Section

Name of supplier.....

SI No	Date	Invoice/ R.R.No	Purchase/Supply order		Description of materials	Stores code No	Quantity		Unit	Rate	Amo
			No	Date			Received	On check measurement			
1	2	3	4		5	6	7A	7B	8	9	10

APPENDIX XII (b)(Concl'd)

Incidental charges	Amount including incidental charges	Bin card No	Stores Ledger Folio No	Reference to payment voucher or adjustment to debit		Remarks including result of test check by superior officers
				No	Date	
11	12	13	14	15A	15B	16

Dated signature and Designation of
the Officer entering measurements

1. A separate GRS should be prepared in respect of goods purchased from one supplier.
2. The articles falling under each sub-head of stock should be grouped together or entered on separate sheets.
3. The details of measurements, check measurements, incidental charges and immediate payments will be recorded on the reverse.

4. If GR sheets are prepared for part supplies reference will be made to previous G.R.S also in column 4.
5. Column 11 – Extra items as are payable to the supplier or as deductible towards expenses incurred by the department on the supplier's account on the basis of the conditions of the supply order or contract is intended to be included in this column.

APPENDIX XII (c)

FORM 11-A

Register of goods received sheet

Division.....Subdivision.....

Date of issue	Serial No of Booklet	Name and designation of the officer to whom issued	Signature of the officer to whom issued	Date of receipt in the Division	Remarks
1	2	3	4	5	6

APPENDIX XII (d)

(Referred to in para 12.9.2)

FORM 6

Stores indent

(Referred to in para 7.2.9)

No.....Stores indent onDivision

Date.....Name of work/job.....

Division.....Name of contractor from whom value recoverable.....

Subdivision.....

Head of Account.....

SL N o	Description of article	Cod e No	Quantity indented		Quantity issued		Unit	Rat e	Valu e	Remar ks
			In figures	In words	In figur es	In words				
1	2	3	4(a)	4(b)	5(a)	5(b)	6	7	8	9

Received the articles as per column 5 (b). Please deliver the articles to the person whose specimen signature is given below.

<p>Name and address of the person to whom the article are to be delivered</p> <p>.....</p> <p>(Specimen Signature of the above person)</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>Signature (with date) of the Indentor</p> <p>(Designation).....</p> <p>.....</p>
--	--

Passed for issue (furnish details of the items and quantities not passed as per column 4)

Signature of Divisional /
Sub divisional Officer

Issued on.....	Received the quantity as per column 5 (b)	Ledger folio No.....
----------------	--	----------------------

and entered in Bin Card No..... Gate pass No & Date Signature of <u>Junior Engineer</u> Store Keeper Signature (with date) of the authorised person	SI No of item Initials of Ledger Keeper Divisional Accountant
---	--	--

APPENDIX XII (e)

(Referred to in para 12.9.5)

Gate Pass

(Original)

SI No	Code No	Particulars of items	Quantity received from store		Lorry No
			In figures	In words	
1	2	3	4		5

Checked at the gate and passed

Signature of Custodian of Stores

Time

(Seal)

Date

Signature of gateman

Gate Pass

(Duplicate)

SI No	Code No	Particulars of items	Quantity received from store	Lorry No

			In figures	In words	
1	2	3	4		5

Checked at the gate and passed

Signature of Custodian of Stores

Time

(Seal)

Date

Signature of gateman

Gate Pass

(Triplicate)

Sl No	Code No	Particulars of items	Quantity received from store		Lorry No
			In figures	In words	
1	2	3	4		5

Checked at the gate and passed

Signature of Custodian of Stores

Time

(Seal)

Date

Signature of gateman

APPENDIX XII (f)

(Referred to in para 12.9.5)

FORM I

[Referred to in Rule I (1) – Appendix 8 to K.P.W.A. Code]

**Division-wise register of transactions adjusted under the head
“cash settlement suspense account”**

PART I – DETAILS

Name of Division.....

Month.....

Sl No	Reference to stock Account, Voucher or Transfer Entry Order	Particulars of transaction	Value of stores issued or services rendered	Remarks (including the indication of vouchers sent in support of the debits)
1	2	3	4	5

Rs. Ps.

Balance B.F.

Total

@Less credits during the month

Closing Balance

No..... Date.....

Copy along withvouchers forwarded to the Executive Engineer, Division. A sum of Rs.(as detailed above) is due from him on account of stores issued or services rendered to his division during and to end of19..... He is requested to send within 10 days of the receipt of this claim, a cheque / bank draft for the total amount, drawn in favour of the undersigned.

Executive Engineer

.....Division

Encl:-

@ Here give reference to the No. and date of cheque/ draft received

APPENDIX XII (g)

(Referred to in para 12.9.5)

FORM 3

Register of claims received

Division..... Month

Number and date of letter with which the claim was received	Amount of claim	Number and date of cheque/Bank draft issued	Initials of Divisional Accountant	Remarks
(1)	(2)	(3)	(4)	(5)

APPENDIX XII (g)

(Referred to in para 12.9.5)

FORM 4

[Referred to in Rule I (2)]

Office of the Executive Engineer,

..... Division.

Dated the19....

As requested in letter No.dated.....a cheque / bank draft No.....dated
for Rs. (Rupees.....) is sent herewith in
settlement of his account for month of

2. The receipt of this letter may please be acknowledged.

Encl:

Executive Engineer,

.....Division

To

The Executive Engineer,

.....Division

.....

APPENDIX XII (i)	APPENDIX XII (i)	APPENDIX XII (i)
Unstamped Receipt for Materials Issued to Contractors	Unstamped Receipt for Materials Issued to Contractors	Unstamped Receipt for Materials Issued to Contractors
	Copy for Executive Engineer	
	..... Division	
Office copy	..... Subdivision	Copy to be returned to original office by Executive Engineer
..... Division	Book No Receipt No .....	..... Division
..... Subdivision	Subdivision.....Date .....	..... Subdivision
Book No Receipt No	I hereby acknowledge receipt from .....of the materials noted on the reverse for the work of as per agreement No and bind myself not to use the same for any other purposes and the same shall remain the property of Government until used for the said work.	Book No Receipt No
Subdivision.....Date	I shall also accept such corrections in rates noted overleaf as are found necessary,	The receipt has been posted in .....Contractor's ledger Vol.....Folio..... with alterations noted overleaf
Name of contractor.....		no alterations
Name of work		
Agreement No		
Stores Indent No Date		

Executive Engineer

.....Division

APPENDIX XII (j)

(Referred to in para 12.10)

FORM 7

BIN CARD

Article.....

Maximum stock.....

Code No.....

Minimum stock.....

Unit.....

Issue Rate.....

Bin card No.....

From.....

From.....

Signature of Issuing Officer

[illegible]

APPENDIX XII (k)

(Referred to in para 12.10)

FORM 11-B

Register of Bin Cards

Division.....

Subdivision.....

Date of issue	Bin card No	Name of article	Code No	Name and Designation of the Divisional Officer/to whom issued	Signature of the Officer to whom issued	Date of return	Remarks
1	2	3	4	5	6	7	8

APPENDIX XII (l)

(Referred to in para 12.16)

FORM 11

Priced stores Ledger

Article.....

Maximum.....

Minimum.....

Ordering level

Division.....

Code No.....

Subdivision.....

Unit.....

Issue Rate..... from

SI N o	Dat e	From whom received / to whom issued	GRS/ Inden t No.	Receipts					Issue	
				Quantit y	Rat e	Valu e	Incidental s	Tota l	Quantit y	Valu e
1	2	3	4	5A	5B	5C	5D	5E	6A	6B

Balance		Reference to payment or adjustment of debit		Initials of poster	Initials of Divisional Accounta nt	Remarks including reference to Serial No. of item to which excess / short amount paid, if any, relates
Quanti ty	Valu e	Voucher/ TEO No	Date			
7A	7B	8A	8B	9	10	11

APPENDIX XII (m)

(Referred to in para 12.16)

FORM 8

Summary of Stock Receipts

Division.....

Name of subhead

Month.....

SI No	Date	Goods received Sheet No.	Value debitale to stock	Remarks including reference to voucher in the case of items paid for during the month
1	2	3	4	5

Total =

Note: A separate summary should be prepared for each subhead of stock and the value of all the subheads abstracted on another sheet.

APPENDIX XII (n)

(Referred to in para 12.16)

FORM 9

Summary of Stock Indents

Division..... Name of subhead Month.....

Sl No	Date	Indent No.	Value creditable to stock	Name of Division / work to which the amount is debitable
1	2	3	4	5

Total =

Note: A separate summary should be prepared for each subhead of stock and the value of all the subheads abstracted on another sheet.

APPENDIX XII (o)

(Referred to in para 12.9.5)

Register of dismantled materials

Division.....

Subdivision.....

Sl No	Date of receipt	Reference to No and page No of measurement book	Full particulars of materials giving size etc if any	Opening balance	Quantity received	Total	Reference to its disposal whether by write off or transfer to other works
1	2	3	4	5	6	7	8

Quantity issued or disposed off	Closing balance	Dated initials of the Assistant Engineer	Date of verification of balances and by whom verified	Remarks
9	10	11	12	13

ANNEXURE

(Vide para 12-17)

Procedure of Stock Verification

1. The object of verification of stock by the stock verifiers is not only to ensure that the book balances and the balances actually in the stores agree but also to see that all the stores accounts prescribed in the Public Works Department and Account Codes and Manuals are maintained, strictly in accordance with rules.

2. Before verification of stock articles as actually in the Stores the Stock Verifiers will make a test check of the accounts maintained and satisfy themselves that the book balances are arrived at correctly. This should be done with reference to the relevant Bin Cards and Ledger and whenever necessary with reference to Goods Received Sheets and Indents.

3. (a) They will select at random any material for physical check and count all the materials. They will so arrange their programme of physical check of the store materials is to cover up all the important articles and record the result of such verification in the progress reports to be submitted to the Chief Engineer. Each article counted should be carefully examined and its condition should be noted in the progress report.

(b) All verification of stock must be made in the presence of the concerned custodian of stores who will be required to sign the stock sheets or inventories as a token of the acceptance of the correctness of entries. The Stock Verifiers should open Stock Ledgers as in the enclosed form, showing the names of articles, opening balance and abstract entries for each month of receipts, and issues and closing balances as per the prized Stores Ledger. Whenever stock is counted with reference to book balance in the middle of a month, the book balances have to be entered with reference to daily receipts, and issues and differences between book balance and actual stock listed out and reported to the Chief Engineer dealing with Stores. Stock Ledgers should be kept in the District Stores for future verification and ex- tracts of this Register submitted to the Office of the Chief Engineer dealing with Stores.

(c) The Stock Verifiers should record the following certificate in the District Stock Registers:-

"Certified that the actual Stocks on hand are verified by me on the date noted against each and found to be correct".

4. If the physical balance as per the findings of the stock verifier agrees with the ledger balance, the Stock Verifier will affix his dated initials in the Ledger and the Bin Card; otherwise, the actual balance in words and figures will be noted in the Ledger and the Bin Card on the next line with the dated initials of the Stock Verifier, Custodian of Stores and the Gazetted Officer in charge of the Stores, i.e. Assistant Engineer.

The actual counted figures agreed upon by the Custodian of Stores and the Gazetted Officer, will be the basis for regulating future balances, the differences being taken up separately through the Chief Engineer. Wherever differences are observed between the ledger balances and the counted balances, the postings should be checked, the cause for the differences investigated and instructions recorded in the ledger maintained by the Stock Verifier. The ledgers must be handed over to the Assistant Engineers for record in the District Stores.

6. The Stock Verifiers will also verify the correctness of the average rates of articles and see whether the issue rates are being averaged from time to time and revised wherever necessary.

7. They will also verify and point out delays in the settlement Of transactions of stores with a view to see that materials received and issued are not kept out of account.

8. In the course of his stock verification he will bring to the notice Of the Chief Engineer, cases of materials which have not been operated upon for more than one year.

9. The Stock Verifiers will also see that orders of the Chief Engineer passed on the different statements are given effect to promptly and action is taken to adjust all shortages and surpluses in balances.

10. They should verify whether list of surplus, obsolete and unserviceable stores in the District Stores are promptly submitted and disposed of.

11. They should also verify whether the value of stock articles does not exceed the stock reserve limit.

12. In order to ensure that the Stock Verifier verifies that the account prescribed in the Public Works Department and Account Codes and Manuals are maintained he should furnish a certificate to that effect in the progress reports.

13. The progress report to be submitted by the Stock Verifier will be in the enclosed form and will be prepared in triplicate, original copy thereof, will be submitted to the Stores Officer (Assistant Engineer) who will record his remarks and submit it to the Chief Engineer in charge of Store through the Executive Engineer, (Stores Purchase and Control) and the duplicate copy, the Stock Verifier will submit direct to the Chief Engineer. The Stock Verifier will retain the triplicate copy for his reference.

14. The Stock Verifier should also furnish his remarks in the progress reports about the adequacy of arrangements made for the custody of stock materials.

15. A Watch Register will be maintained in the Chief Engineer's Office to watch the receipt and disposal of progress reports and will also indicate the final action taken.

16. The Stock Verifier has also to verify whether the stock and tools and plant returns are sent from the District Stores to the Executive Engineer (Stores Purchase and Control) on the prescribed dates.

17. He should also see that the advices of transfer and acceptances thereof pertaining to the District Stores are promptly attended to.

18. The suspense transactions relating to the District Stores should also be reviewed by him and steps taken to see that they are properly accounted for in the monthly stock accounts etc. submitted to the Executive Engineer (Stores Purchase & Control.)

CHAPTER XIII

TOOLS AND PLANT

13. 1. General

13.1.1. Under this head is included all appliances, Tools, Equipment Plant and Machinery which are necessary for carrying out the various works of the department but which are not consumed in the course of execution of the concerned works. Appliances, which are of such perishable nature that they get fully worn out in the course of the work even though they are not consumed as such, should not be classed as Tools and Plant.

Example: Bamboos, coir, small baskets etc.

13. 1. 2. Tools and plant are classified into ordinary Tools and Plant and special Tools and Plant. The former represents Tools and Plant required for the general use of various works of the department while the latter represents Tools and Plant acquired and put to use for a specific project or work. Since the cost of the special Tools and Plant is charged to the, project or work concerned for which it is acquired, when such Plant is taken for use to another work after completion of the project, credit for its depreciated value should be given to the project or work concerned where its cost was originally debited. If such special Tools and Plant is temporarily taken out from the project or work where its cost is borne for use in some other work, then hire charges for such use in the latter work should be realised and credited to the project or work for which this special Tools and Plant was acquired. On the other hand no such adjustment cost or hire charges is necessary if an item of ordinary Tools and Plant is transferred from one work to another in the department.

13. 1. 3. Tools and Plant should be grouped under the following heads prescribed in the list of Major and Minor heads of account with sub-groups wherever necessary.

(a) Scientific and drawing materials

(b) Tools, Plant and Machinery

b-1. Generator

b-2. Compressor

b-3. Drilling equipment

b-4. Earthmoving equipment

b-5. Concreting equipment

b-6. Handling and lifting equipment

b-7, Pumping equipment.

b-8. Road surfacing equipment.

b-9. Pile driving equipment

b-10. Road transport vehicles

b-11. Other Plant etc.

(c) Tools and

(d) Navigation Plant

13. 2. Tools and Plant Registers

13. 2. 1. In addition to the Tools and Plant Received Sheet, Tools and Plant indent and Tools and Plant Ledger id K. P. W. Form 12 13 and 14 prescribed in the Kerala Public Works Account Code a Register of Tools And Plant in the Form given in Appendix XIII (a) shall also be maintained in each Divisional Office.

Every item of Tools and Plant acquired by purchase, transfer or through any other way should be included in the appropriate groups in the register of Tools and Plant kept in the concerned Division Office. Similarly every item of Tools and Plant, which is disposed of finally by transfer to other divisions or by sale or in any other manner should be noted in the appropriate register. The intention is that each division will have an up to date register of all the assets in the form of Scientific Instrument and Tools and Plant available in the division and its subordinate offices grouped under proper heads as above.

13. 2. 2. To ensure that all acquisitions and final disposals of Tools, and plant are posted in the Tools and Plant register, the vouchers dealing with the acquisition or final disposal should contain a certificate from the Accountant in charge of Tools and Plant work in the division that the transactions have been posted in the Tools and Plant Register giving also the page and item number of the entry. The certificate should be checked and initialled by the Divisional Accountant after verifying the concerned Tools and Plant register.

13. 2. 3. Cases may arise where the transactions regarding acquisitions or final disposal of some Tools and Plant are dealt in the subdivision office. Before the concerned vouchers or other documents dealing with these are finally accepted, the same should be got prechecked and passed by the Executive Engineer so that appropriate entries are made in the Tools and Plant register of the division.

13. 2. 4. Except in the case of small tools like hammocks, pickaxes, chisels etc. and minor items of scientific and mathematical instruments, each item of Tools and plant, Scientific and Mathematical Instruments and furniture should be given an identification number when first received in the division and this number should be quoted in all transactions relating to the same. The identification number will be preceded by an initial representing the name of the Division and followed by initials representing the group and sub group to which the item belongs. The number itself will be based on the serial number of the item in its subgroup or groups in the concerned register.

13. 2. 5. Spares for Tools and Plant should not be brought in as separate items of Plant in the Tools and Plant register. These are to be treated as stock items and when used for replacement or in repairs should be shown as issue on the concerned repair estimate. Accessories however stand on a different footing. These are additional equipments to be inserted or attached to a

plant to enable it to perform different functions or to improve its performance. If these are not fitted in the main plant and are kept separate, then these should be numbered and accounted in the Tools and Plant register. If fitted, the accessory need not be separately accounted but the descriptions of the plant should indicate the fact of the accessory being fitted in it.

Example:-A battery for a motor car is an item of spare used for replacing a worn out one. This is to be accounted under stock until used on the car.

A sun visor for a car is an accessory. If it is kept separate this should be accounted under Tools and Plant. If, however, it is fitted to a particular, car, the description of the car should indicate the fact of the sun visor being fitted.

Similarly a chuck for a lathe is an accessory and should be separately accounted under Tools and Plant unless it is permanently fitted to any lathe.

13. 2. 6. All movements of Tools and Plant, Scientific instruments etc., which are given separate identification numbers should be watched through a movement register so that at any time the location of any item is easily known. The form in which movements should be recorded is given in Appendix XIII (b). To enable the movement register kept in the Division Office being posted up-to-date, all movements of such Tools and Plant should be accompanied by a transfer note in form [vide Appendix XIII (c)] a copy of which should be sent to the Division Office.

13. 3. Estimating the Requirements

13. 3. 1. *Scientific Instruments*:- (a) The requirement varies with the nature of work of the section, subdivision or division and with the number of parties engaged in survey or setting out work at a time. The following table may be taken as a guide in estimating the requirement of Survey instruments for a Division (other than Projects) engaged in both investigation and execution of works.

	Section	Subdivision	Division
1. Levelling instruments	2	1	..
2. Levelling staves	As many as there are levelling instruments	As many as there are levelling instruments	..
3. Theodolite	Nil	1	..
4. Compass (Prismatic)	2	1	..
5. Plain tables and accessories	1	..	..
6. Chains and arrows	6 sets	..	..

7. Ranging rods	To suit above	..	..
8. Cross staff	Do	..	..
9. Tape (Steel)	2	1	1
10. Tape (Metallic)	One for each Work Superintendent, Overseer and Junior Engineer	One for Assistant Engineer, one set extra in the office	One for Executive Engineer, one set extra in the Division office
11. Foot rule with spirit level	4	Do	Do
12. Sounding rods	2	..	..
13. Ghat racer	In hilly areas for road work and investigation		

In special cases additional instruments or additional numbers of the listed instruments may be provided with the sanction of Superintending Engineer. In the case of special sections, subdivision and divisions etc. engaged in investigation work or in project work the requirement may be modified based on the number of survey parties and design and the nature of work to be done.

(b) In the case of Divisions, Subdivisions and Sections already existing, the annual requirement must be prepared by the Superintending Engineer based on the overall shortage of each item listed as against the norms required. Such shortage may arise either from inadequate supply originally or from some of the available instruments being in disorder. In the latter case, before arranging for fresh supplies in lieu of instruments in disorder, an examination must be made whether the same can be repaired at reasonable cost. The advice of the Government Instrument Workshop may be sought in this connection.

(c) Regarding, Mathematical and Drawing instruments each Draftsman, Overseer, Surveyor and Junior Engineer should have one set of drawing instruments consisting of-

- (a) One Mathematical Instrument Box
- (b) One tee square
- (c) Two set squares
- (d) One parallel ruler
- (e) Box of scales including plotting scales and architectural scales.

In addition in each Division Office there should be one set of french curves, Pantograph and Planimeter. If in any Division, Subdivision, or Section the normal standard as specified above are found inadequate then additional instruments and/or additional quantities of the listed items may be sanctioned by Superintending Engineer or Chief Engineer according to necessity.

13. 3. 2. *Tools and Plant.*-(a) Hand tools like Mammatties, Pickaxes, shovels etc. are to be procured for the use of departmental labour and are not intended to be hired out to any contractor. So the requirement must be based upon the maximum number of departmental labour to be employed at a time and the class of work to be performed by the departmental labour. After making a proper assessment as above 10% more of each class of Tools may be procured in addition to meet emergencies and to replace worn out or broken tools.

(b) In the case of Sections, Subdivisions etc. where departmental labour has been working for long periods end where there is no likelihood of substantial variation in labour strength the requirement will be worked out on the basis of the worn out or broken tools needing replacement. This may be estimated on the experience of the previous year.

(c) In regard to machinery, all machinery required for departmental execution of works should obviously be purchased by the department- as for instance, machinery for investigation work, machinery for a servicing work- shop etc. The requirement should be carefully estimated based on the programme of work, but before making arrangements for purchase, the availability of such machinery, which may be spared from other divisions, should be ascertained and only the balance arranged. For this purpose, each Superintending Engineer should keep himself informed of the tools and plant which can be spared in each of the divisions under his charge and make them available as and when required by other divisions needing them.

(d) Machinery required for works done on contract basis should as a general rule be provided by the contractor himself. However, in cases where specialised and costly equipments are involved, (such as earthmoving equipment) there may not be sufficient contractors to compete f it is insisted that the equipments should be provided by, them. Hence a careful balancing of the advantages and disadvantages of departmental procurement of such plant should be made and a decision taken after such consideration. This particularly applies to projects where large scale construction works requiring the use of costly and special plant are involved. Only such equipments as are not to be provided by the contractor for the execution of work should he procured and hired by the department.

(c) As an exception to the general rule it is the usual practice in the department to hire road rollers, bitumen rollers asphalt hot mix plant, sprayers and accessories of the above for road surfacing work to contractors. Every year each division having these equipments must make an assessment of the adequacy of the same based on the programme of work expected and estimate the additional requirement. Here again, before steps are taken to procure the additional requirement, the availability of surplus plant in other Divisions should be taken into account.

13. 3. 3. *Departmental Vehicles*.- (a) Departmental vehicles may broadly be divided into goods vehicles and vehicles for inspection. Normally contractors are expected to provide the goods vehicles necessary for all transport of goods in connection with the execution of the contract and hence Departmental goods vehicles are primarily intended for use in Departmental works including investigation work. The number of such goods vehicles for any Division should be decided based on the quantum of work to be done. As a general rule not more than one lorry need be kept in a Division. If more than one lorry is found necessary it should be examined whether the additional need cannot be met by hiring lorries as and when the need arises. If the need for additional lorry is very frequent, then sanction of the Chief Engineer should be obtained for providing more than one lorry in the concerned Division.

(b) For inspection work officers are expected to use their own conveyances for which they are entitled to get T. A. as per rules. However, it is necessary that some Departmental vehicles are also available for general use for inspection and for use as a staff car. It is necessary to keep the number of vehicles so employed to the minimum, which would meet the needs. The following may be considered as a general guide in this respect. Each Division which has 3 subdivisions or less under it may have one jeep. Those Divisions which have more than 3 subdivisions and upto 6 subdivisions may have one jeep in addition. Those with more than 6 subdivisions may have one more jeep or 3 in all.

(c) In special cases where the number of jeeps as per norms provided above are found inadequate, sanction of Government should be obtained for the additional vehicles.

(d) Wherever vans are available and are in use in any division this may be considered against the provision for jeep.

(e) In addition to the above there will be one van or one car under each Chief Engineer to serve as staff car.

(f) In some cases as in projects, it may be necessary to provide special facilities by way of school bus, ambulance etc. These should be considered as special requirements and should be provided only with sanction of Government.

13.4. Procurement of Tools and Plant.

13.4. 1. Small tools, accessories and furniture may be procured by the Executive Engineers in charge of the concerned divisions on the basis of sanctioned estimates subject to store rules.

13.4.2. Scientific and Mathematical instruments, Plant and Machinery, Spare parts etc. should be procured by the Centralised Purchasing Agency in the Chief Engineer's office. For this purpose annual indents of requirements should be sent up to the Chief Engineer before the end of January every year. In regard to the above items chargeable to special Tools and Plant, adhoc indents should be sent as and when necessary. When giving specifications of machinery or scientific instruments care should be taken to avoid mentioning any particular make as this will rule out possibility of competition. At the same time the performance requirement and the type of equipment required as well as specifications either relating to the whole equipment or any

particularly important part or parts should be clearly indicated in inviting tenders for the equipment invited.

13.4.3. The procedure to be followed for inviting tenders and arranging purchases will be as detailed in para 5-7 of the chapter on stores. The place of delivery of the Tools and Plant should be normally at the office of the Executive Engineer for whose division the Tools and Plant is being ordered. Spare parts being treated as stock item until used on work, may be arranged to be delivered to the District Stores or Project Stores concerned. On receipt of the Tools and Plant items by the Executive Engineers and spares by the Store Officer, proper inspection and where necessary test of the equipment and articles received should be conducted. Where the recipient officers feel necessary, the help of the officer in charge of the nearest Regional Engineering or Project Workshops may be availed for conducting necessary tests and in inspecting the plant, spares and accessories.

13. 5. Custody and protection of Tools and Plant

13.5. 1. Scientific and Mathematical instruments allotted to an office should be under the custody of the senior most technical officer working in that office provided such technical officer working in that office is not below the rank of a first Grade Overseer/Draftsman. This is subject to the overall control of the Head of the office. In cases where the senior most technical officer in the office is below the rank of First Grade Overseer the custody of the Scientific and Mathematical Instruments should be with the Head of the office. As an exception to the above, Mathematical instruments, and articles like tapes, foot rules etc. may be entrusted to the officers using the above instruments regularly on their personal receipts, subject to the over-all control of the Head of the office.

13.5.2. Small tools like Mammatties, Pickaxes etc. in use will be under the custody of the Work Superintendents controlling the Departmental labour. Such tools, which are not in use, should be kept in the section office concerned under the custody of the junior Engineer in charge of the Section.

13.5.3. Plant and Machinery in use will be under the custody of the officer to whom they are issued. Where operators or drivers are employed the operator or driver will be in direct charge of the plant during the period it is in operation subject to the control of the officer having custody of it. During the period when the plant is not being operated or where there is no operator for the plant, the custodian should arrange for its protection including watch and ward where necessary. If the equipment is hired out to a contractor, the responsibility for protection, watch and ward etc. is that of the hirer but the custodian should see that the hirer makes suitable arrangements for these.

13.5.4. When it becomes apparent to an officer to whom a plant or equipment is issued that the same is not likely to be required for the next 3 months or more, he should report the fact to the Executive Engineer through his official superiors. The Executive Engineer should then order such plant to be taken to any other place where it is likely to be used within a reasonable time or order it to be returned to the Division Office. In the Executive Engineer's Office compound there should be a proper yard and store building for keeping custody of plant and equipment not in use. Equipment likely to be damaged by exposure to weather should be kept

under cover. There should be a custodian for the plant and equipment in the Division office who should be a technical hand with Mechanical Engineering and/or Electrical Engineering qualification.

13.5.5. If any plant or equipment needs repairs, the custodian should report the fact to the Executive Engineer through his official superior. The Executive Engineer should then arrange a competent mechanic or Engineer to inspect the plant and report on the nature of repairs to be done, the time required and the probable cost. If the plant is beyond the stage of economical repair this fact also should be reported by the inspecting mechanic or Engineer. For this purpose the Executive Engineer may seek the help of the Regional Engineering (or project) Workshop if he has not got suitable person qualified for, or capable of such examination and advice. If the repairs can be arranged without the plant having to be moved out then it may continue to remain under the custody of the officer under whom it was when it fell into disorder. Otherwise the Plant may be transferred to the Division Office or to the Regional Engineering /or Project Workshop wherever the repairs are intended to be carried out. If it is proposed to dispose of the plant the Executive Engineer will decide whether the plant is to be disposed at the place where it is or whether and to which place it should be transferred. The plant will continue to be in the custody of the officer with whom it was when the question of repairs was taken up until it is transferred under orders of the Executive Engineer.

13.6 Use and operation of Tools and Plant

13.6.1 Scientific instruments like levels, theodolites etc., should be handled and used only by technical hands having the requisite training in the use of these instruments. When they are not in use, these instruments should be kept properly in their boxes or containers. Usually when these instruments are taken from one place to another, they should be in their boxes or containers and carried carefully by manual labour. If long distances are involved, the instruments may be transported by road vehicles or boats as the case may need, provided the boxes or containers are carefully supported in cushions without the chance of getting jolted during the journey.

13.6.2. Tapes and chains may get stretched by prolonged use. It is necessary that a standard chain length is marked permanently in a convenient place in each section office, subdivision office and division office and the measuring chains, tapes etc., are frequently checked against standard length and correction noted.

13.6.3. Operation of plant and machinery should be entrusted only to operators competent to handle them. For this purpose the required training should be given to persons selected to work as operators. Such- training may be given in the Regional or Project Workshops or in special training establishments wherever available or by a period of apprenticeship under a skilled operator. Wherever operating instructions are issued by the manufacturers of the equipment the same should be translated to local language and the operator asked to get fully conversant with it. A copy of such operating instructions should be kept along with the equipment and exhibited in such a manner that the operator can at all times refer to it easily. Where no operating instructions are issued by the manufacturers the Assistant Engineer in charge of the Regional or Project Workshops (where the equipment is likely to be serviced and maintained) should write out the important operating instructions for the guidance of operator.

13.6.4. Road vehicles as well as mechanically propelled Navigation plant require the operators and crew to have licences issued by certain statutory authorities. Operators who are posted to operate such equipments should possess the required licences, which should be periodically renewed and kept current at their own expense.

13.6.5. It may often happen that some of the equipments are only put to use for a portion of the year. It will be a waste of money if in such cases the full set of operating crew is retained and kept idle during the lay off period. To avoid this waste the following methods may be adopted.

(a) Where operators are available for occasional employment then their employment may be restricted to the period when the machinery is put to use including short breaks during the working season.

(b) As far as possible operators and skilled workmen should have training in operation of more than one equipment so that when one type of equipment is not in use they can be employed in another. Further they may also be trained as fitters to enable their services being utilised for repairs and maintenance of various equipment when they have no work on operation.

(c) It may not always be necessary to appoint an operator for each equipment. The total number to be appointed should be carefully studied based on the number of equipments likely to be in operation simultaneously, the possibility of more than one equipment being worked by one operator when these work side by side etc. Only the minimum number required should be appointed after such study.

13.6.6 All important items of equipment such as motor vehicles, road rollers, mechanically propelled navigation plant, pile driving plant, U compressors, mixers, Pumps etc., should have log books maintained for each such equipment. The log book should be written up by the operator-in-charge of the equipment and frequently checked by the Junior Engineer, Assistant Engineer and reviewed by Executive Engineer concerned.

13.6.7. In the case of plant consuming fuel, lubricants etc., the standard consumption of these per hour of operation or for a certain unit of work done should be prescribed after carefully watching the performance of each such plant. When reviewing the log book, a check should be made whether the actual consumption is reasonable as compared with the prescribed standard. If any abnormality is noticed, the plant performance should be tested and if necessary repairs or adjustments as are required should be carried out. The standard of consumption should be refixed once a year or as often as found necessary by the Executive Engineer.

The rules regulating the use of the staff maintained in Government offices are reproduced in Appendix XIII (d). These rules will apply *mutatis mutandis* to the operation of departmental inspection vehicles also.

13.7 Hiring of tools and plant.

13.7. 1. The general rules regarding hiring of Tools and Plant are contained in Article 316 of the K.P.W.D. Code. When Tools and Plant are hired out to contractors or others these general rules should be followed regarding conditions of hire and rates of hire. The hire charges do not include operating cost and also cost of conveyance of the plant to the required place and back. Both these charges are payable by hirer. Operating cost includes the pay and allowances etc., payable to the operating crew and also cost of fuel, lubricants and other consumable stores used, while the plant is so hired.

13.7.2. If the plant has an operating crew, then the crew should move with the plant and should be employed for its operation during the period of hire. If there is no such crew, then the hirer should be asked to employ crew having the qualifications experience and skill for the operation of the plant. The prior approval of the Executive Engineer should be obtained before such crew is employed. Such crew will work under the hirer who will pay their wages and allowances etc., directly. In case of accidents to the operating crew while the plant is hired out, the compensation under the Workmen's Compensation Act should be paid by the hirer irrespective of whether the crew belong to the Department or whether the crew were directly employed by the hirer. When Departmental crew are lent to the hirer with any equipment, their pay and allowance will be paid by the Department in the first instance based on attendance certificate of the hirer and later recovered from the hirer. In addition to such pay and allowances a further sum of 20% to represent leave and pension contribution should also be recovered from the hirer.

13. 7. 3. In regard to fuel, lubricants and other consumable stores, the hirer may be allowed to procure these at his cost and use them for operation. The Executive Engineer should inform the hirer the particular quality and type of fuel, lubricants and other consumable stores to be used on the equipment and the hirer should use only such quality and type as are so approved. In case the fuel, lubricants or other consumable stores are obtained from the Departmental Stores, these may be treated as sale and cost realised under the rules for sale of stock articles.

13 7.4. The cost of normal maintenance including replacement of worn out parts (i.e. parts worn out due to normal wear and tear) should be the responsibility of the Department even when the plant is hired out. Any repair necessitated while the plant has been hired out which is not attributable to normal wear and tear should be done at the cost of the hirer.

13.7.5. When a plant which has been hired out is returned back to the Department the custodian of Tools and Plant in the Division should examine the plant to find out whether it is in the same condition as it was when hired out excepting for normal wear and tear. In case there are any special damages these should be brought to the notice of the Executive Engineer so that action may be taken for necessary repair and realisation of cost thereof from the hirer. Any expenditure necessary to test the plant on its return should be met by the hirer.

13.7.6. The rates and conditions of hire in respect of the following Tools and Plant are slightly different from the general rules described in paras 10.1 to 10.5 above. Except to the

extent specifically modified below the general rules in paras 10.1 to 10.5 will however continue to apply.

1. Dredgers-Vide G. O. MS. No. 101168/PW dated 26-4-1968 reproduced in Appendix XIII (c).
2. Rates of hire of Departmental vehicles-Vide correction slip 1/69 to Art. 316 (3A) of K.P.W.D. Code- Issued under G.O.(P) 8/PW dated 10-1-1969 reproduced in Appendix XXX (f).
3. Rollers-Vide G. O. (P) No. 258/PW dated 13-12-1967 and Chief Engineer's Memo No. TB9-43235162 dated 19-10-1964 reproduced in Appendices XIII (g) and (h).

13.8 Repairs and Maintenance of Tools and Plant

13.8. 1. It is essential that Tools and Plant are properly maintained so that they can efficiently function when ever required. The maintenance work may be divided into three broad categories, viz.-

- (a) Preventive maintenance
- (b) Periodical overhauls
- (c) Special repairs.

13.8.2. Preventive maintenance consists of carrying out certain item of maintenance as a regular feature so as to reduce the wear and tear on the equipment. Regular lubrication, periodical cleaning of oil and fuel filters, tightening of loose joints, checking and correcting contracts in electrical system and works of a similar nature can be considered as preventive maintenance. Such preventive maintenance items should he properly listed out for each equipment and charts of the same written in Malayalam or the language known to the operator and kept with the equipment and displayed whenever it is in operation. The listing of preventive maintenance work, including the periodicity of different items to be done, should be made out by the Mechanical Assistant Engineer attached to the nearest Regional Work- shops or Project Workshops. The preventive maintenance works should normally be done by the operating crew when the equipment is in operation. When the equipment is laid off, certain preventive maintenance items may still have to be done occasionally. This should be arranged through such portion of operating crew as are retained during the lay off period. If no operating crew is so retained, this should be got done through any other suitable agency.

13.8.3. Periodical overhauls should be arranged at regular intervals for major items of Plant and Machinery. The interval may be once every 6 months or once every year or at such periods as decided by the Assistant Engineer, Mechanical in charge of the workshops concerned. The concerned Workshops for this purpose will be the Regional Workshops or such other Workshops, which has the responsibility of servicing the equipment. As far as possible the periodical overhaul should be arranged at a time when the plant is not likely to

be in great demand. The plant should then be taken to the Regional or Project Workshops and a thorough check up made. Worn out parts should be replaced, adjustments should be effected wherever necessary and painting of such portions as need paint should be done all as a part of periodical overhaul. The intention is that after every periodical overhaul the equipment is refitted to operate at the maximum efficiency possible consistent with its age and general condition. If any plant has become so old that replacement of worn out parts and refitting will be too costly and commensurate with the efficiency of its performance after the overhaul then it is better that the plant is disposed of as it is without attending to the repairs. This aspect should also be borne in mind when taking up periodical overhaul.

13. 8. 4. Special repairs are taken up as and when necessary mostly to repair unforeseen damages to any equipment. With proper 'preventive maintenance, careful operation, and regular periodical overhauls, the need for special repairs should arise only very occasionally perhaps due to accidents

13. 8. 5. The cost of preventive maintenance works should be included in the operating cost of the plant, in all cases where there is an estimate for operating cost for such plant. In other cases the Preventive maintenance may be included in one general maintenance estimate for the tools and plant of the division concerned.

13. 8. 6. The cost of periodical overhauls will depend on the cost of spares replaced, cost of other materials required, labour involved etc. and can therefore be properly estimated only after the condition of the plant is examined. So the estimate for such periodical overhaul should be prepared by the Assistant Engineer in charge of the workshops servicing the equipment after such examination. This estimate should then be sent to the Executive Engineer who has administrative control over the plant. The Executive Engineer will issue sanction or obtain the sanction to the estimate from the competent authority and communicate the sanction to the Assistant Engineer in charge of the workshops. On receipt of such sanction the work may be taken up by the Assistant Engineer. In urgent cases, the Executive Engineer in administrative control of the plant may request the Assistant Engineer workshops to arrange to take up the work in anticipation of sanction to the estimate provided he has necessary fund allotted in the budget for his Division to meet the cost.

13. 8. 7. Special repairs can be estimated only after a proper examination of the plant. This should be got done and the estimate obtained from the Assistant Engineer (Mechanical) in charge of the workshops servicing the plant. Work may be taken up after sanction is accorded for the estimate. Here also in urgent cases, the Executive Engineer in administrative control may request the Assistant Engineer (Workshops) to take up the work in anticipation of sanction provided funds are available with him to meet the cost.

13. 9. Servicing workshops.

13. 9. 1. For carrying out overhauls, repairs etc. to Plant and Machinery in use, department workshops are established at different places. At present the following are the servicing workshops for Divisions other than Project Divisions.

(1) Regional Engineering Workshop at Mavelikara.

- (2) Regional Engineering Workshop at Chalakudy.
- (3) Regional Engineering Workshop at Calicut.
- (4) Project Workshop at Malampuzha.
- (5) Irrigation Workshop at Alleppey.

13. 9. 2. Each Division of the P. W. D. other than a Project Division should make use of the nearest of the above servicing workshops for all repairs to, the Major Plant and equipment in that Division. Where the Executive Engineer in charge of a Division other than Project Division finds it more convenient to get servicing done through a Project workshops nearby, he may do so after obtaining concurrence of the officer in charge of the Project. He should also intimate this fact to the officer in charge of the regular servicing workshop which would normally have attended to the repairs but for this special change. The Superintending Engineer should also be informed of this. Each Division should know which workshop would be servicing equipments in that Division and per contra each servicing work shop should know the division whose equipments should be serviced by them. The servicing workshop should also have a list of Major equipments in the Division to be serviced by them and plan the work of the workshop so as to service all the equipments. Whenever any such equipment is permanently transferred from one Division to another or disposed by sale or transfer this fact should also be intimated to the officer in charge of the servicing workshop. This officer should, as already stated in some earlier paragraphs-

- (a) assist the Executive Engineer in checking new equipment and spares on receipt.
- (b) prepare a preventive maintenance chart of the various equipments and instruct the operations about this.
- (c) prepare a suitable timetable for periodical overhaul of various equipments and see that the repairs are carried out expeditiously. For this purpose, he may have to list out spares likely to be needed and move for the purchase and stocking of the same in the District or Project Stores.
- (d) arrange to carry out special repairs when necessary, and
- (e) give technical advice to the Executive Engineers on any matter concerning the selection, operation and maintenance of Tool and Plant required by them

13. 9. 3. In addition to servicing, the Regional Workshop and Project Workshop should also arrange small structural fabrication work on requisition from the Executive Engineers.

13.9.4. Major fabrication work such as roof trusses, small slice gates and manufacture of certain types of Engineering goods may be arranged through the General Engineering Workshop, Trivandrum after consultation with the Superintendent in charge of that workshop. The General Engineering Workshop is a Production Workshop and is not normally intended for servicing Tools and Plant. It can, however, manufacture certain parts

as for instance, Road Roller wheels, and as far as possible the help of the General Engineering Workshop should be availed for work of this nature.

13. 9. 5. It may sometimes happen that the servicing workshop is unable to undertake certain types of repairs or overhaul works either for want of requisite machinery or, for want of skilled technician for the purpose. In such cases, the officer In charge of the Regional or Project Workshop may arrange to get the work through a private workshop. Before this is done he has to make sure that-

(a) the concerned workshop is fully equipped for this work and has established a reputation for reliability;

b) that the rates charged are reasonable. For this purpose an estimate may be obtained and the reasonableness of the rates quoted examined before deciding to entrust the work to the Project workshops;

(c) that the work will be done expeditiously.

13.9.6. Since the cost of the work is to be met by the Executive Engineer in administrative charge of the equipment the officer in charge of the workshop should send the estimate from the private workshop with his remarks to the concerned Executive Engineer. The work may be arranged after obtaining sanction to the estimate and with funds.

13.10. Disposal of Tools and Plant.

13.10.1. It is unnecessary and costly to maintain old obsolete and unserviceable Tools and Plant. Every year the Executive Engineer in administrative charge of the Tools and Plant should review the Tools and Plant in his division and sort out such items which in his opinion fall within the above category and may be disposed. In respect of machinery items the advice of the officer in charge of workshop servicing the concerned division Tools and Plant may also be sought to identify such items. After finalising the list, sanction to dispose the Tools and Plant should be obtained. In seeking sanction the following points may be borne in mind.

(a) Unserviceable articles which if sold without being destroyed may surreptitiously find their way back to the department in place of serviceable articles should be destroyed beyond recognition.

(c) It may sometimes happen that although an equipment is unserviceable and uneconomical to repair, some portions of the equipment may be serviceable and could be used as spare for similar equipment in use in the department in such cases it may be advisable to remove and keep such parts as spares and dispose only the rest of equipment.

APPENDIX XIII (a)

(Referred to in para 13.2.1)

Register of Tools and Plant

Division:

Group head:

SI No	Description of the article	Identification No.	Date of receipt source and reference to voucher	Price of article	Number	Remarks
1	2	3	4	5	6	7

Note:- In column 4 quote the C.B.V. No. in case of purchases paid for in the division or transfer note if transferred from other divisions.

In column 5 note price if known. Where tools and plants are transferred for numerical accounting without value rate "transferred without value"

Where any item is finally disposed by transfer from the division, sale, destruction or through any other cause the fact should be noted in remarks column so that the concerned item is eliminated from the register.

APPENDIX XIII (b)

(Referred to in para 13.2.6)

Register of movements of Tools and Plant

SI No	Item No	Description	Date and reference to voucher No	Destination	Date	Movements			
						Division	Sub-division	Division	Sub-division
1	2	3	4	5	6	7			

APPENDIX XIII (c)

(Referred to in para 13.2.6)

(Original)

Tools & Plant Transfer Note No

.....Division

To

Dated.....

.....

.....

The following items of Tools & Plant are transferred to you. Please acknowledge.

SI No	Identification No	Description of articles	Number / quantity issued	Remarks
1	2	3	4	5

.....Engineer

(Duplicate)

Tools & Plant Transfer Note No

.....Division

To

Dated.....

.....

.....

The following items of Tools & Plant are transferred to you. Please acknowledge.

SI No	Identification No	Description of articles	Number / quantity issued	Remarks
1	2	3	4	5

.....Engineer

(Triplicate)

Tools & Plant Transfer Note No

.....Division

To

Dated.....

.....

.....

The following items of Tools & Plant are transferred to you. Please acknowledge.

SI No	Identification No	Description of articles	Number / quantity issued	Remarks
1	2	3	4	5

.....Engineer

APPENDIX XIII (d)

(Referred to in para 13.6.7)

GOVERNMENT OF KERALA

Abstract

RULES-STAFF CAR RULES –ISSUED

FINANCE (RULES) DEPARTMENT

G O . (P) 28165/Fin.

Dated, Trivandrum, 16-1-1965

Read.-Letters No. TMI/15-116/114 and 152 dated 27-6-1964 and 1-8-1964 from the
Accountant General Kerala.

ORDER

Government have been considering for some time past the question of prescribing standard rules for regulating the use of staff cars maintained in the Government offices and are now pleased to issue the rules, herewith appended, These rules will take effect from 1-2-1965 and apply *mutates mutandis* to all departments having staff cars, attached to their offices.

By order of the Governor,

(Sd.)

Finance Secretary

STAFF CAR RULES

1. Control of staff cars and responsibilities of controlling Officers

'The *staff car will be under the administrative control of an Officer not below the rank of an Assistant Secretary/Under Secretary who will act as a Controlling Officer in respect of the car.

*Staff car means a motor vehicle, provided as such, under the orders of Government for the common use of an office/establishment.

2. The Controlling Officer will be responsible for the proper use, care and maintenance of the car and for regulating its journeys generally in accordance with these rules.

3. He shall maintain-

(a) a log book in the form enclosed (Annexure 1);

(b) a record of repairs and replacements indicating the cost and the dates on which carried out and of spare parts;

(c) a register showing cost of petrol etc. consumed and -all incidental receipts and expenditure;

(d) an inventory of the equipments.

4. The drawing and disbursing officer shall. re-cord the following certificates on the contingent bills in support of the expenditure on consumption of petrol-

(a) Certified that the quantity of petrol purchased has been entered in the log books of the respective staff cars.

(b) Certificate that the necessary recoveries under rule 26 have been made/or are being made from the parties concerned using the staff car for non-duty journeys.

5. He shall personally check the inventory of equipments every month and arrange to recover any loss arising out of negligence or fault from the persons concerned. He should also have the vehicle tested every six months for fitness, for journeys and place a report on record.

6. He should report half-yearly to his next senior officer the expenditure incurred on the maintenance of the car.

7. He will be personally responsible for the proper and prompt recovery of all charges recoverable for the use of staff cars and their credit to Government as "Miscellaneous receipts of the Department".

8. On transfer from his post he will hand over the vehicle to his successor, complete with all spare wheels, tyres, tools etc., and mention the fact in his charge report.

II. *Use of staff cars for official purposes.*

9. The staff cars may be engaged on *bona fide* official duty within headquarters, for example by Officers proceeding to places where official meetings are held.

Note:- (1) journeys performed in staff cars, on the following occasions should also be treated as official:

(i) Subject to availability of staff cars, journeys performed by officers, not below the rank of Deputy Secretary, for attending parties, receptions, etc., for which invitations have been extended to them by virtue of their office and which, in their discretion, they decide to attend.

(ii) Journeys performed by nonofficials who asked to attend an official meeting in public interest, and who, after the meeting is over, have to be dropped at their respective places of business/residence.

(iii) Journeys performed when officers have to be picked up from their residences or dropped back in cases, when they are required to attend meetings (a) during the normal working hours, if the meeting have been convened at places outside their normal places of work or (b) outside the normal working hours.

(iv) Journeys performed in cases of emergency, when an officer, on being suddenly taken ill or on meeting with an accident, is removed from his office either to a hospital or to his residence. The office concerned should place on record a certificate indicating the circumstances necessitating such journeys. If he is not a Grade 1 Officer, such a certificate should be countersigned by the Controlling Officer.

Note:- (2) Staff cars may be used by members of the non-gazetted staff also for *bona fide* official purposes with the prior approval of the Controlling Officer.

10. Staff cars should not be used for official journeys outside headquarters for which T. A. is admissible except on the written sanction of the Secretary of the Department.

(i) Where the Secretary himself takes the staff car outside headquarters for official journeys for which traveling allowance is admissible, a note signed by him to this effect should be placed on record.

(ii) The Secretary may delegate this lower to the Additional/Joint Secretary in charge of the Department.

11. A Government servant in receipt of conveyance allowance should not normally use a staff car for journeys within his local jurisdiction. If, however, he is permitted by a competent authority to use a staff car for journeys within his jurisdiction, recoveries should be made from the Officer at the rates laid down in rules (26) and (27) of these Rules. If the journey is beyond 16 kilometres from the usual place of duty the officer will be allowed daily allowance and/or mileage allowance admissible under the K. S. R. subject to the following deductions being made there from.

(i) Full charges for the use of staff car calculated under rules 26 and 27.

(ii) 1130th of the monthly rate of his conveyance allowance.

12. When cars are used for journeys on official duty exceeding 8 KMs. from Headquarters no charges will be made for their use, and the officers will be entitled to D. A., which should be calculated under Rule 10 Part 11 Kerala Service Rules.

13. In the case of journeys performed by Private Secretaries/Personal Staff of a Minister in staff cars from their residence or the residence of their Minister, etc. to the Railway Station or Air Port and back in order to receive or see off the Minister, etc. the journeys will be treated as official only if they are undertaken under the instructions of the Minister etc., and an entry to this effect is made in the log book.

14. A journey performed in a staff car by a member of the Personal Staff of a Minister, from his residence to the residence of the Minister and back, may be treated as official, if it is undertaken at the instance of the Minister in the interests of Public service. Similar other journeys performed in a staff car by a member of the personal staff of a Minister, at the instance of the Minister, in the 'interests of public service may also be treated as official.

In every such case, an entry should be made in the log book by the Private Secretary concerned to the effect that the journey was undertaken in the interests of public service and was authorised by the Minister.

III. Use of staff cars by Touring Officers.

15. Touring officers not under the administrative control Of the Government who come to Trivandrum (or any other place where Government has staff car) may be allowed its use for the limited purpose of journeys from Airport/Railway Station to residence, office etc. and vice versa.

Note:-The term 'touring officer' occurring in these rules denotes any officer on tour.

16. Officers of Quasi-Government Organisations on tour may, if they so desire, be allowed the use of Government staff cars Provided:

(i) the officer concerned is on tour in connection with some assignment of the office/department whose staff car he proposes to use; and

(ii) necessary payment is made by him towards hire charges calculated as for non-duty journeys.

17. A touring officer under the administrative control of the Government may also be allowed similar use of staff car; but the officers concerned should not be allowed to draw the mileage allowance; they should be required to give a certificate along with their T. A. Bill, as to whether or not the staff car was used by them.

18. The use of staff cars for journeys from residence/office to the Airport/ Railway Station and vice versa by touring officers in lieu of mileage allowance should be regarded as authorised.

19. Touring officers of the Government may be allowed at the halting station the free use of staff cars for official work within a radius of 8 K. ms or the municipal limits whichever is more distant, subject to the condition that the touring officers will not be entitled to exchange daily allowance for road mileage even if the distance travelled exceeds 32 K.Ms. As far as possible such touring officers will travel with officers serving at the station (as headquarters) where the staff car is available.

20. The use of staff car may also be permitted by touring officers of the Government at the halting stations for journeys between places of half/ residence and office within municipal limits, provided that,-

- (a) no increase in the number of staff cars is allowed on this account.
- (b) no staff car is exclusively placed at the disposal of the touring officers;
- (c) all journeys are properly logged.

Note.-Journeys undertaken by a touring officer between his places of halt/residence and office for non-duty purposes (eg. for lunch/ dinner, other than official lunch/dinner of the type mentioned in Note 1 (i) below rule (9) should be treated as non-duty journeys and charged for in accordance with rule 26.

IV. Use of staff cars for non-duty purposes.

21. The staff cars may be permitted to be used on non-duty journeys to a limited extent by Gazetted Officers (normally not below the rank of a Deputy Secretary) provided official requirements are not interfered with in any way.

22. The following classes of journeys on non-duty purposes are permissible:

- (a) Occasional journeys performed by officers from their residence to office and vice-versa;
- (b) Urgent visits to hospitals.

23. The use of staff cars is not permissible for journeys to places of entertainment, public amusements, parties and pleasure trips etc...

24. The Department of the Government may decide whether a particular journey should be treated as private or official.

25. Duty journeys shall have preference over non-duty journeys.

26. A rate of Re. 0.32 per kilometre will be charged for use of the staff cars on non-duty journeys. The charges at the said rate are recoverable for the distances covered by the car from the time it leaves office garage.

NOTE: -The charges recoverable will be for complete kilometres, fractions of a kilometre being rounded off to the next higher integer. The charges so calculated will be rounded off to the nearest multiple of five paise.

27. Officers should not normally use staff cars outside the normal hours of duty of the chauffeurs save on exceptional occasions, eg. when officers are required to be dropped at their residences after attending a meeting.

Detention charges at the rate of Re. 0.60 per hour will, however, be leviable if a staff car is detained for a non-duty purpose irrespective of the detention of the staff car being within or outside the normal working hours of the staff cars. The period of detention will be noted by the officer concerned in Col. 6 of the log book and detention charges will be recoverable on the basis thereof. Fraction of an hour will be charged on the basis of actual period. The detention charges recovered will be indicated separately in Col. 7 of the monthly summary (Annexure II) in addition to the charges recoverable on mileage basis.

28. Staff Cars should not be allowed to be used by officers on leave.

V. Pay and allowances of Staff Car Drivers

29. The chauffeurs of Staff cars will be treated as members of the regular establishment.

30. The normal working hours of the chauffeurs will be from 9.30 a. m. to 6.30 p.m. with a lunch break of half-an-hour from 1.30. to 2 p. m.

NOTE:-The Controlling Officer may, however so prescribe the working hours of the chauffeurs according to administrative convenience and requirements that the total number of hours of effective duty does not exceed 8 hours per day.

31. No special allowance is admissible to chauffeurs for cleaning and washing staff cars, as such service form a normal part of their duties. NO cleaner shall be separately appointed for keeping the staff cars clean and washed.

VI. Log Book.

32. Log Books shall be maintained in the prescribed form. See. Annexure 1.

33. Entries in logbooks should be made in ink or copying pencil, but preferably in ink.

34. Officers using the staff cars should note in the log book in their own hand writing the mileage at the start and at the completion of their trips after verifying the milometer and give sufficient particulars to indicate that the journeys were on official business.

35. In the case of officers of the rank of Additional/Joint Secretary and above the entries in the log book maybe made and signed by their Stenographer on behalf of officers. The officers will, however, be responsible for the certificate regarding the purpose of the journeys performed, which will be noted by the Stenographers in consultation with them.

36. It may be left to the discretion of the Minister to describe any particular journey performed by him as 'official' or 'private'. The private Secretaries may, where they deem necessary consult the Minister concerned before making entries in the Log Book.

37. Where it will not be in the public interest to give full details of the journeys in the logbooks the insertion of the word 'Secret' in the appropriate columns of the logbook would suffice. In order, however, to ensure that there is no misuse of Government vehicles in the guise of 'Secret' duties a separate logbook in the same form may be maintained for journeys of a secret nature. The secret logbook should however, remain in the custody of an officer not below the rank of Assistant/Under Secretary and need not be made available for check by Audit. On the basis of details in the secret logbook, corresponding entries in the original log book should be countersigned by an officer of the rank of Deputy Secretary in token of the fact that the journey was of a secret nature and was performed for official purpose. In case the countersigning authority is not satisfied that the journey was performed for official purpose he should endorse a remark to the effect 'non-duty' whereupon the office by whom the staff car was used should be billed treating the journey as having been performed for a private purpose.

38. A senior officer preferably of the rank of Additional/Joint Secretary in each department should scrutinise the logbook once a month to ensure that there is no misuse and that all officers who used the staff cars have made the necessary entries. A certificate to this effect should be recorded in the logbook by the officer so authorised.

39. The logbook in respect of each staff car should be closed at the end of the month and a summary prepared in the logbook showing details of duty and non-duty journeys performed during the month as in proforma enclosed (Annexure 11).

40. The log books may be preserved for a period of five years reckoned from the date of the last entry in them or one year after their examination in Local Audit whichever is earlier, provided, however, that no log book becoming due for destruction, after, the stipulated period, should be destroyed until the settlement of all audit objection relating to any entry therein.

VII. *Service and Repairs*

41. The general rules regarding servicing and repairing of Government Cars will apply in the case of staff cars also.

VIII. *Miscellaneous.*

42. Staff cars should carry prominently a plate in front and at the rear indicative of the fact that they are staff cars of a specified department.

43. (i) The purchase of the staff car will be made through the Director General of Supplies and Disposals only with the previous consent of the Finance Department.

(ii) Old and unserviceable staff cars will be disposed of to the best advantage of Government in accordance with the provisions of the Kerala Financial Code or any other relevant rules, for the time being in force, or which may be brought into force.

44. These rules will apply *mutatis mutandis* to the staff cars maintained by Heads of Departments and offices.

N.B.-If any of the provisions of these rules, in so far as they relate to Ministers are repugnant to any of the corresponding provisions of the 'Payment of Salaries and Allowances Act' the latter provisions will alone be applicable.

ANNEXURE I

(See Rule 32)

Log Book

Petrol Account

Department..... Staff Car No.....	Date	Milometer/ Kilometer reading	Petrol drawn (litres)	Initials of officer in charge of the car

Dat	Time	Milomete	Milomete	Period	Name	Places	Purpos	Signatu	Initials
-----	------	----------	----------	--------	------	--------	--------	---------	----------

e	From	To	r/ Kilometer reading	r/ Kilometer covered	of detentio n included in cols 2 & 3 (for nonduty journeys only)	and Desig natio n of the office r using staff car	visited	e of journe y if official full details	re of officer using car, his remark s if any	of officer in charge of vehicle his remarks , if any
1	2	3	4	5	6	7	8	9	10	11

ANNEXURE II

(See Rule 39)

Summary of Log Book

For the month of

Sl No	No of staf f	Miles/Km covered for		Tot al	Time spent on nondu ty journe ys	Amount due for nondut y journe ys includi ng detenti on charge s	Detail s of bills & amou nts realiz ed (by cash / chequ e	Partic ulars of credit to Govt accou nt (chala n No and date)	Total quanti ty of petrol consu med (litres)	Reading of milometer / kilometer		Avera ge miles/ KMs per Litre (Col 5, 10)	Rem arks
		Dut y	Nond uty							On 1st day	on last day		
1	2	3	4	5	6	7	8	9	10	11	12	13	14

APPENDIX XIII (e)

(Referred to in para 13.7.6.)

GOVERNMENT OF KERALA

Abstract

P. W. D.- DREDGERS-HIRE CHARGES-RATES REVISED)- ORDERS ISSUED

PUBLIC WORKS (BUILDINGS & COMMUNICATIONS I) DEPARTMENT

G. O. (MS) No. 101/68/PW.

Dated, Trivandrum 26th April 1968.

*Read:*1. Letter No. P2- 67535/66 dated 3-5-1967 from the Chief Engineer, General and Irrigation.

2. Letter No. WAD3/K.D5/1-1/121 dated 15-12-1967 from the Accountant General.

O R D E R

The question of revision of rates of hire charges of dredgers of the P. W. D. has been engaging the attention of Government for some time now. After examining the various factors relating to this matter, Govern- inert ate pleased to fix the following revised rates of hire charges for the dredgers in the P. W. D.

	For Govt. works	For non-Govt. works including those for private persons
(a) Small size dredgers	Rs. 675 per day fuel, labour charges and tugging charges as per actuals	Rs. 1015 per day plus dredgers plus fuel, labour charges and tugging charges as per actuals
(b) Bigger size	Rs. 800 per day plus dredgers plus fuel, labour charges and tugging charges as per actuals	Rs. 1200 per day plus dredgers plus fuel, labour charges and tugging charges as per actuals

The above revised rates of higher charges will come into effect from 1-4-1968.

By order of the Governor,

(Sd.)

Joint Secretary to Government.

APPENDIX XIII (f)

(Referred to in para 13.7.6.)

GOVERNMENT OF KERALA

Abstract

P.W.D-FIXING OF HIRE CHARGES FOR DEPARTMENTAL VEHICLES-AMENDMENTS TO THE KERALA P.W.D. CODE- ORDPRS – ISSUED

PUBLIC WORKS DEPARTMENT (GENERAL AND PLANNING)

G. O. (P) No. 8/PW.

Dated, Trivandrum 10th January 1969.

*Read:--*1. G.O. MS. No. 222/PW dated 28-10-1968.

2. Letter No. M3-68821/68 dated 9- 12.1961 from the Chief Engineer, Irrigation.

ORDER

The Chief Engineer, Irrigation has proposed amendments to para 316 of the Kerala P.W.D. Code based on the orders issued in the G.O. read as first paper above fixing the rates for the hire charges to be levied for departmental vehicles Government have examined the proposals and are pleased to issue the following amendment to sub para 3 para 316, Kerala P.W.D. Code. (1961 Edition).

AMENDMENT

(Correction Slip No. 1169)

(vide G. O.MS. 222/PW Dated 28-10-1968)

In the said Code,

1. After sub para 3 of para 316 the following sub para shall be inserted, namely--

3A. The hire charges in respect of departmental vehicles shall be recovered at the rates given in Appendix 111 A. In addition to the above rates, 15% shall be charged if the vehicles are hired out for works in high- ranges".

2. After appendix 111 of the Kerala P.W.D. Code, the following shall be added as appendix 111 A, namely:-

APPENDIX IIIA

[Vide rule 316 (3A)]

RATE OF HIRE-CHARGES FOR DEPARTMENTAL VEHICLES

Sl No	Description of the vehicle	Rates in kilometers	Minimum charges per day	Detention per day	Detention charges if due to repairs
1	Station Waggon	0.50	40.00	20.00	10.00
2	Pick up van	0.46	20.00	10.00	10.00
3	Heavy trucks over 14,500 lbs.	1.57	100.00	50.00	25.00
4	Lorries less than 14,500 lbs. capacity but over 4 tons	1.19	75.00	40.00	20.00
5	20 tons tractor	1.26	50.00	25.00	15.00
6	Jeeps	0.32	30.00	15.00	10.00
7	Water and oil tankers	0.60	50.00	25.00	15.00
8	Trailers upto 5 tons	0.63	40.00	20.00	10.00
9	Trailers from 5 tons to 10 tons	0.69	50.00	25.00	15.00
10	Trailers over 10 tons	0.79	60.00	30.00	15.00
11	Water carts	0.32	20.00	10.00	5.00
12	Lorries up to 3 tons	0.88	60.00	30.00	15.00
13	Lorries over 3 tons and up to 7 tons	1.19	75.00	40.00	20.00
14	50 tons tractor	4.38	150.00	80.00	40.00
15	Dampers (classic)	3.12	100.00	50.00	25.00
16	Dumpos	3.12	100.00	50.00	25.00
17	Departmental boat	3.42	50.00	25.00	15.00

NOTE:-The detention charges will be levied in cases where the vehicles hired out are detained for more than 24 hours.

By order of the Governor,

R. GOPALASWAMY,

Secretary

APPENDIX XIII (g)

(Referred to in para 13.7.6.)

GOVERNMENT OF KERALA

Abstract

P.W.D. -Hire-Charges of Power Rollers -Revision of-Amendment to the Code-Issued.

PUBLIC WORKS DEPARTMENT (GENERAL)

G.O. (P) No. 258/PW.

Dated, Trivandrum, 13th December 1967

Read. 1. G. O. (P) No. 57/PW. dated 8-3-1966.

2. Letters No. T B 6-,,249165124-6-1966 & 10-2-1967 from the Chief Engineer, B. & R.

3. Letter No. WMII/4-3167-681331 dated 25 -1967 from the Accountant General.

4. Letter No. BII/37646/67/7-11-1967 from the Chief Engineer General and B&R.

ORDER

Sanction is accorded for the levy of further charges for power rollers used in excess of 8 hours at the rate of Rs. 12.30 (Rupees Twelve and paise thirty only) extra per hour or part thereof when power rollers are hired out to the contractors, from the P W. D. The following amendment will be issued, to form 83-Notice inviting Tenders-Appendix 1-Kerala P. W. D. Code (1961 Edition):-

Amendment

(Accordance Slip No. 9167)

[Vide G. O. (P) 258/P.W. dated 13-12-1967]

Add the following as addition to the existing clause 28-Form 83- Notice Inviting Tenders-Appendix 1, Kerala P. W. D Code (1961 Edition) "When Power Rollers (which term includes steam and diesel rollers) are used in excess of 3 hours, a further charge at the rate of Rs. 12.30 (Rupees Twelve and, paise thirty only) will be levied extra per hour or part thereof".

Delete clause 29-Form 83-Notice Inviting Tenders Appendix I- Kerala P. W. D, Code (1961-Edition).

By order of the Governor.
(Sd.)

Public Works Secretary.

APPENDIX XIII (h)

(Referred to in para 13.7.6).

No. TB9-43235/62.

Office of the Chief Engineer, Buildings and
Roads,

Trivandrum, dated 19-10-1964.

MEMO

Sub:-Road Rollers - Hire-charges of

Ref--This office circular dt. 11-10-1962. Memo dated 7-11-1962.

It has come to the notice of the undersigned, that many of the Executive Engineers are not following the instructions regarding correction in the Tender Notice and incorporation of the revised rate of hire-charges of Road Rollers as per instructions contained in the Circular and the memo cited above.

For the sake of uniformity, it is suggested that clauses 28 and 29 of Tender Notice- Form No. 83- may be scored off and the following clause inserted "when road rollers are hired out to contractors, fuel required for the efficient working of the roller shall be supplied by the Contractor and in addition, recovery towards roller charges. (Oils and stores plus staff charges shall be effected from the contractor at the rate of Rs. 82 per day".

The specifications for the items of metalling work may also be modified, using the word 'Power Roller' instead of Steam Rollers, Diesel Rollers, Motor Rollers etc.

(Sd.)

For Chief Engineer.

CHAPTER XIV

BUDGETING AND CONTROL OF EXPENDITURE

14. 1. The department has to prepare and submit to Government every year at the appropriate time a detailed statement of receipts and expenditure under the different heads of account anticipated during the succeeding year. After the budget is sanctioned, the receipts and expenditure have to be watched and controlled and timely steps taken to regularise

unavoidable variations from budget provision through reappropriations, moving for supplemental grant, surrender of surplus funds etc. The method of preparation of the budget, the procedure to be followed in controlling the expenditure and correcting unavoidable variations are detailed in the Budget Manual. The following instructions should be considered supplemental to the instructions in the Budget Manual and applicable to the Public Works Department.

14. 2. Selection of new works

14. 2. 1. In the case of buildings for other Departments of State, the list of new building works to be carried out by the P. W. D. during the concerned budget year should be prepared and finalised by the Departments concerned. These should then be incorporated in their Part 11 proposals after consulting the concerned Executive Engineer of the P. W. D. regarding cost and other details. In the case of works where only investigation and preparation of preliminary estimate are completed, the amount as per preliminary estimate can be noted in the column 'estimate amount'. In other cases, where preliminary estimates are yet to be prepared, the District Officer of the Department concerned should furnish sufficiently in advance- the requirements site proposed etc. to the Executive Engineer concerned- who will assess the rough cost of the work on plinth area basis) and intimate the same to the concerned department for incorporation in the list of new works (vide also para 70 Kerala P. W.D. Code). The heads of Departments are required to send these proposals direct to the concerned Administrative Department of the Secretariat with copies of the proposals to the Chief Engineer, Buildings and Roads.

14. 2. 2. Regarding buildings under the Administrative control of the P. W. D. the list of new works to be taken up should be prepared each year by each Executive Engineer giving a short note about the need, the site where it is to be constructed, the probable cost, recurring cost if any etc. This list should be sent to Chief Engineer through the Superintending Engineer well ahead of the date when budget proposals are to be sent. The Chief Engineer after scrutiny should decide which works should be included in the Budget and inform the concerned Executive Engineer. The budget should be framed accordingly by the Executive Engineer concerned and sent to the Chief Engineer through the Superintending Engineer

14. 2. 3. In the case of new original works under National Highways, the selection of new works is drawn up by the Ministry of Transport (Roads wing) of the Government of India on the advice of the State Government. A list of works to be taken up in a year is then communicated by the Government of India to the State Government well in advance so that the State Government may conduct detailed investigation and forward estimates to Government of India in due course.

Roads and Bridges

14. 2. 4. The new works to be included under this head may be broadly divided in to-

- (i) Improvement, or upgrading of existing roads
- (ii) Strengthening or construction of existing bridges and culverts.

(iii) Construction of new roads

(iv) Construction of new bridges and culverts.

14. 2. 5. Works under (i) and (ii) should be taken up according to as phased programme. Such a phased programme covering a fairly long period should be prepared in each Buildings and Roads Division. After scrutiny by the Superintending Engineer and approval by the Chief Engineer works may be included in the budget according to the order of priority in the programme. In addition to the above, the budget may also include urgent works which were not foreseen when the phased programme was drawn up and which cannot be postponed.

14.2.6. Works to be included under (iii) and (iv) should as far as possible be those recommended by the D.D.C. or form part of a general scheme already approved by Government. Other works should be included only if so ordered of Government or the Chief Engineer.

14.2.7. Some road and bridge works are financed from the Central Road Fund under the classification 'Ordinary allocation' 'Ordinary Reserve' and 'Special Reserve'. The scheme of "Roads of Interstate, or Economic Importance" and "West Coast Roads" are also financed from the Central Road Fund. The rules regarding the operation of the Central Road Fund are given in appendix XIV (b) 1. Works to be included under the above schemes should qualify for inclusion in accordance with the rules, and such estimates should also have had the approval of the Government of India (Ministry of Transport, Roads wing) before they are included in the budget.

Irrigation Works

14. 2. 8. Major Irrigation Projects are plan schemes and normally no new projects should be included in the budget unless it has been investigated and the project report with estimate and plans are prepared and the scheme sanctioned by Government. During the investigation stage, the cost of investigation should be met from general allotment of funds for this purpose in respect of major irrigation projects.

14.2.9. In the case of projects already under execution, the programme of construction during each year should be decided upon by the Executive Engineer in consultation with the Superintending Engineer and Chief Engineer, and budget provision should be made for such works as are to be taken up in accordance with such a programme.

Minor, Medium and Lift Irrigation Works

14.2.10. Selection of new works under the above head should be based on the recommendation of the D. D. C. concerned or orders of Government. Before however including such works in the budget it is necessary that the works should, as far as possible, have been investigated and detailed estimate prepared. No work should be included in the budget without at least a preliminary investigation and ascertaining the approximate cost of the work and the extent of benefit derived. Further as these works form part of plan

schemes, the expenditure during the year has to be based on the plan provision for the particular year. The number of works to be elected should therefore be fixed keeping the above in view.

Inland Navigation

14.2.11. Original works under the head 'Inland Navigation' should have had the approval of Government before being included in the budget.

Flood Control and Anti Sea Erosion Works

14.2.12. Here also the works to be included in the budget should have been approved by Government.

Classification of Works-General

14.3.1. Original works are classified under the Major heads '50 Public Works, or 152 Capital Outlay on Public Works within the Revenue Account' or "103 Capital outlay on Public Works". The first two of the above major heads are intended to provide for works which are financed from the Revenue of the State and the third for works to be financed from borrowings etc. The criterion for classification between the above Major heads in respect of original works is generally the total cost of the work concerned. Original works costing Rs. 20,000 and below are classified under "50 Public Works", those costing above Rs. 2 000 and upto and including Rs. 1 lakh under "52 (Capital outlay on Public works within the Revenue Account" and those costing above Rs. 1 lakh under "103 Capital outlay on Public Works". As an exception to the above general rule, original works whose entire cost is met from outside sources including grants from the Central Government are included under 'Major head 50'.

14.3.2. After 1968 no new works are being classified under 'Major head 52' as per Finance Department Circular No. 49168120-7-1968. Hence all original works costing upto and including Rs. 1 lakh are included under 'Major head 50', and the 'Major head 52' only provides for incomplete works which had been previously included therein.

Buildings

14.3.3. Under each of the above Major heads, Minor head (a) provides for original works on buildings. Since the P. W. D. undertakes construction of buildings for various departments, the minor head (a) is subdivided into group heads (i), (ii) etc., representing building works for the different departments.

Communications

14.3.4. Original works pertaining to communications are also classified under the Major heads 50 or 52 or 103 in the manner described in paras 3-1 and 3-2 above. Minor head (b) under the above Major Head provides for original works under communications. Here also the Minor head is subdivided into sub heads and detailed beads of appropriation as under.

Roads

Special Road surfacing

V. R. D. Major

Bridges

Roads within Municipalities

Missing links

Missing bridges

New construction of Roads

Construction of by pass

Upgrading the surface of Roads

Widening carriage way to two lanes including and strengthening bridges and culverts

Strengthening carriage way

Level crossing to be replaced by over bridges strengthening and reconstruction of major bridges etc.

Roads of General Importance.

i. Roads leading to Tourist Centre (including supplementary grant of Rs. 100).

ii. Roads leading to Industrial Project.

iii. Roads intended for development of Fisheries.

iv. Roads providing communication facilities in Tribal areas.

v. Other Schemes.

Roads in sugar factory area

C. R. F. Roads (Ordinary allocation)

C. R. F. Bridges (Ordinary allocation)

C. R. F. Bridges and Roads (Ordinary Reserve).

Irrigation, Navigation and Embankment and Drainage Works

14.3.5. Major Irrigation works are classified as "Commercial" or "Non Commercial" by Government. In the case of the former, certain subsidiary and proforma accounts as required in Art. 347 of the K. F. Code are to be maintained. Major head 43 provides for expenditure on account of working expenses, extension and improvements, maintenance and repairs, establishment, Tools and Plant and interest charges in respect of Irrigation and Navigation works classified as commercial. Major head 44 provides for such expenditure (except interest charges) As detailed above in respect of Irrigation Navigation works classified as Non Commercial. These expenses are met from the Revenues of the State.

14.3.6. All Minor, Medium and Lift Irrigation works are normally classified as Non Commercial. All Navigation works are also at present classified as Non Commercial.

14.3.7. Irrigation, Navigation and embankment works chargeable to capital account are classified under Major heads, 99 or 100 according as to whether they fall under the category of Commercial or Non Commercial works. In the case of new projects other than those pertaining to Minor, Medium and Lift Irrigation and Navigation, orders of Government as to whether the project should be classified as commercial or non commercial should be obtained and the appropriate major budget head should be chosen to provide for expenditure on the same.

14.3.8. Major Irrigation projects are also classified as productive and unproductive. Productive Irrigation works are those, which after a certain period are expected to yield enough revenue to meet the interest charge on the capital and the cost of working expenses and maintenance. Major irrigation works whose revenue returns are not such as to meet interest charges on Capital and cost of working expenses and maintenance are classified as unproductive.

Miscellaneous

14. 3. 9. Miscellaneous works such as those pertaining to Anti Sea Erosion, Flood Control etc., are included under Minor head (c) of "Major head 50" or "Major head 103" according to principles of classification outlined in paras 3.1 and 3.2 above.

Repairs

14.3.10. Expenditure on repairs and maintenance of buildings, roads, bridges, and miscellaneous public improvements are to be classified under Minor head (d) of the Major head 50. Expenditure on repairs and maintenance of Irrigation and Navigation works should be included under appropriate sub head in Major head 43 or 44 depending upon whether the concerned Irrigation work is "Commercial" or "Non-Commercial" as described in para 3.5.

Provision of funds

14.4. 1. Funds for plan schemes included under the various major heads will have to be provided based on the annual plan allotment for the respective schemes. The annual plan

allotment for each of the plan schemes is fixed by the Planning Commission in consultation with the officers of the State Government.

14.4.2. In the case of non-plan expenditure such as expenditure under repairs and maintenance or on works which do not pertain to developmental activities, etc., the total allotment under various major, minor or group heads will be indicated by Government and the total provision under such major, minor or group heads should be kept within such allotment when framing budget proposals.

14.4.3. Having ascertained the total amount available under any major, minor or group head, the distribution of funds to various works should be made keeping the following principles in view.

(a) Sufficient amount should be provided for works already commenced to enable the same being completed as early as possible. Careful study of the progress which can be achieved during the year should be made after taking into account availability of land, materials, tools and plant, delays if any due to seasonal conditions or other reasons etc. and the budget provision to be made should be based on such study by the Executive Engineer.

(b) In respect of new works these should be listed in the order of priority and the provision of funds for each should be determined taking into account the progress which can be expected during the year after allowing for delays if any which may occur for getting possession of land, arranging contracts, making available required materials, tools and plant etc. If the total funds required for new works after making provision for each on the lines set out above is found to be more than the total amount available for distribution, then a few works with lesser priority should be eliminated. It is not advisable to provide for a large number of works within sufficient funds for each.

14.4.4. Provision of funds for repairs of the various categories of Public Works should be made based on the principles detailed in the respective chapters on maintenance as indicated below:

(a) Buildings Paras 9-1 and 9-2 of the chapter on maintenance of buildings.

(b) Roads and Bridges- Paras 16.1 to 16.7 of the chapter on maintenance of roads and bridges.

(c) Irrigation works-Paras 2-1, 2-2 for 'repairs and maintenance' and para 3 for 'extension and improvements' of the chapter on maintenance of irrigation works.

(d) Navigation works-Para 8 of the chapter on Inland Navigation.

(e) In other case according to needs based on past experience.

14.4.5. The method of working out funds required under establishment is detailed in Budget Manual. The system of charging the expenditure on work establishment to individual works has now been abolished and the work establishment personnel are also taken over into

regular establishment. Until the merger of the Work Establishment staff with regular establishment is completed a lump sum provision worked out on the basis of actuals should be provided in the budget under the appropriate major and minor head such as 50 (c) etc.. to cover the cost of such establishment.

14.4.6. The provision in the budget under Tools and Plant covers-

- (a) Purchase of New Tools and Plant, and
- (b) Repairs and carriage of existing Tools and Plant.

Provision for (a) is generally made on a L. S. basis for the items to be procured during the year as detailed in para 3 of the chapter on Tools and Plant. Provision for (b) is also made as a lump sum. Here again the amount should be worked out as detailed in paras - 10 and 11 of the Chapter on Tools and Plant.

14.4.7. Grants in aid given to Corporations, Municipalities, Panchayats and other local bodies for capital work and surfacing of roads etc., are to be provided under a separate Minor head (g) in the Major head 50. The amount is based on the estimates accepted by Government for this purpose.

14.4.8. There is a minor head (h) provided under Major head 50 to cover suspense transactions relating to purchases, stock, miscellaneous public works advances and workshop suspense. All transactions recorded under this head are ultimately removed either by payment or by recovery in cash or by adjustment to the works concerned. The transactions therefore consist of both debits and credits and the latter are adjusted as reduction of expenditure. Although the net financial effect of the transactions may be either zero or a small amount representing the difference between total expenditure and total credits, it is necessary for budget purposes to forecast the likely total expenditure to be incurred during the year without taking into account the credits and provide for the same under this head. This forecasting should be done based on previous year's experience allowing for necessary variations anticipated.

Preparation and Submission of Budget

14.5.1. The details to be furnished when submitting budget are given in the Budget Manual. All the information necessary should be furnished in the budget estimates submitted by the respective Executive Engineers and other Divisional Officers and these should be scrutinized by the Superintending Engineer and the Chief Engineer concerned. They should then be consolidated including establishment expenditure in the various offices. The Chief Engineer in charge of General branch of the P. W. D. is the Estimating Officer of the Department and he has to collect the budget estimates of all the different branches and submit them to Government in the Finance Department and the concerned Administrative Department and to Accountant General.

Preparation and Submission of Performance Budget

14.6.1. In addition to the Financial Budget referred to above it is also necessary to prepare and submit a performance budget in respect of the activities of the various branches of the Department. Performance Budgeting envisages establishment of programmes and activity classifications in conformity with the objectives for which a Government Department/ Organisation has been set up, This method of budgeting would enable a Department to set out in the budget document the objectives of the Department during a year, the programmes and activities by which these objectives are proposed to be realised, the expenditure to be incurred on each of these programmes and activities during the year, indicating the broad physical achievements that would be possible. This is a useful management tool both for the Legislature and the Departments in programming and evaluating the performance of the Departments. To start with, performance budgeting has been introduced in B & R branch, method of preparation of which has been detailed in Government Circular No. 88169/Fin. (FIW) dated 14-10-1969 vide appendix XIV (a).

Control of Expenditure

14.7.1. The Chief Engineer is the Chief Controlling Officer of the Major Budget heads solely operated by the P. W. D. Since there is more than one Chief Engineer for the P. W. D. each Chief Engineer will function as the Chief Controlling Officer for such of the Major Budget heads or portions of Major Budget heads with which his branch of the P. W. D. has to deal.

14.7.2. The Superintending Engineers in charge of Circles are subordinate controlling officers to control the expenditure under the Budget items dealt with by them.

14.7.3. Executive Engineers in charge of Divisions and other Divisional Officers of the P.W.D. are Disbursing Officers.

14.7.4. The Chief Controlling Officers, the subordinate Controlling Officers and Disbursing Officers have to exercise proper control over expenditure in the manner detailed in the Budget Manual. Expenditure has to be watched in terms of each unit of appropriation and steps taken to regularise unavoidable variations as soon as such variation is anticipated. The unit of appropriation so far as budget of the P. W. D. is concerned will be:

- (a) For works or items for which specific provisions are made in the budget-Each such work or item.
- (b) For works or groups of works for which L.S. provision is made- Each unit in to which the L.S. is distributed by the Chief or Subordinate Controlling Officer. Thus the budget provision for project involving several works may be a L. S. When this is distributed among various works pertaining to the project the expenditure has to be watched against the amount so distributed to each such work.
- (c) For repairs and maintenance when specific provision is made for a particular item or structure. -Each such item of maintenance.
- (d) For repairs and maintenance when the amount is provided as a L. S. -Each unit in to which the L. S. is divided by the Chief or Subordinate Controlling Officer.

(e) For Tools and Plant -Each unit in to which the Chief or Subordinate Controlling Officer distributes the L. S.

(f) T. A. contingencies and other expenses for which L. S. provision is made - Each unit in to which the L. S is divided by the Chief or Subordinate Controlling Officer.

(g) Suspense. The provision in the budget is to be treated as the unit of appropriation.

(h) Grant in aid--Each unit in to which the L. S. is distributed by Government.

14.7.5. In addition to watching and controlling expenditure against budget grant it is also necessary to watch whether the physical target arrived at for each work is being achieved, The performance budget is useful for effecting this check and Chief Engineer, Superintending Engineer and Executive, Engineers should periodically review the actual progress of each work against the physical targets fixed for the year in the performance budget. Even in cases where there is no performance budget prepared, during the periodical financial review by the Chief Engineer, Superintending Engineer and Executive Engineers the physical progress of each work should be reviewed and steps taken to remove difficulties in achieving the desired progress. The financial review will also bring to light cases where variations from budget grant are likely so that timely steps can be taken to regularise the same.

14.7.6. Variations are to be regularised through surrender of surplus funds reappropriations or supplemental grant. The procedure for the above are detailed in the budget manual.

DEPARTMENTAL REVENUES

14.8.1. The P.W.D. is responsible for the collection and accounting of certain items of Revenue. The main items of Revenue are given below:-

XXXVII Public Works

(a) Rents.-Rents for residential and non-residential buildings and quarters in charge of the P. W. D. including rents of furniture, amounts arising from lease of stalls, fees realised for the use of rooms in rest houses, etc. are credited to this minor head.

(b) *Receipts from P. W. D. Engineering Workshops.*

(i) *Sale of manufactured goods.*-Government Engineering Workshops undertake work orders on behalf of other Departments, quasi-public bodies and private individuals and the sale value of such manufactured goods form the revenue under this head.

(ii) *Others*-Other items of miscellaneous revenue, which are not connected with the manufacturing operations, are credited under this sub-head.

(c): *Recoveries of expenditure.*- Recoveries of on account of damage caused by occupants to buildings and furniture, tools and plant charges from contractors, refund of unspent balance of

grant, contribution from local bodies or private parties in respect of works, as specified in Article 428 (a) of the K.P.W.A. Code, sale proceeds of old tools and plant, etc. are creditable to this minor head.

(d) *Miscellaneous*. - The receipts credited to this minor head are lease rent and sale proceeds of avenue trees, wood, glass, fruits, vegetables rents from land etc.

Major Head XXXIV. Irrigation, Navigation, Embankment & Drainage Works (Commercial)

Receipts from completed Irrigation Schemes, namely, Peechi, Chalakudy, Malampuzha, Walayar, Mangalam, Cheerakuzhy, Bhoothathankettu and Meenkara are booked under this head. This includes water cess on old wet lands and dry lands converted into wet lands within the project areas, rent of buildings, sale proceeds of canal produce and other miscellaneous items of revenue in the project area. Betterment levy realised is also credited to this head. The collection of Revenue on account of water cess, betterment levy etc. is done by the Revenue Department Officers of the concerned division of the P. W. D. should keep in touch with the officers. of the Revenue Department and furnish that department with all necessary information and details regarding irrigated areas to enable realisation of cess, betterment levy etc.

Major Head XXXV, Irrigation, Navigation, Embankment & Drainage Works (Non Commercial)

I. DIRECT RECEIPTS

(a) *Wager Rates*. - Sale proceeds of water for Irrigation purposes are classified under this minor head. This also includes lease amount paid by the Tamil Nadu, towards use of Periyar River Water.

(b) *Water cess*. - The cess collected from parties on the water from Irrigation Projects (Non-commercial, used by them for irrigation purposes are classified under this head.

(c) *Water Power*. - This pertains to the Royalty payable by the Tamil Nadu Government towards the use of water from Periyar for generating Hydro-electric power on the basis of quantity of energy generated. The amount is adjusted through the Accountant Generals of the State.

(d) *Rents*. - Rents from occupants of buildings constructed charged to Irrigation Projects (non-commercial).

(e) *Recoveries of expenditure*. - Wherever the recovery is of an expenditure charged to a Major Irrigation Project (non-commercial) the same is included under this head.

(f) *Miscellaneous receipts*. - Hire charge of tools and plant etc. charged to a Major Irrigation Project (non-commercial) and other receipts of a Miscellaneous character pertaining to such Projects are included under this head.

II. INDIRECT RECEIPTS

(a) Portion of land revenue due to works.

(b) Betterment levy.

Navigation, Embankment and Drainage Works

I. Direct Receipts

(a) Navigation

(b) Plantation

(c) Rents

(d) Recoveries of expenditure

(c) Miscellaneous

Revenue collected by the P. W. D. from canals towards navigation such as fees for use of cranes, fees for registration and licensing of boats licensing of the crew of vessels etc. are credited under the head (a).

Sale proceeds of usufructs of trees belonging to Government alongside navigation routes or lease amounts thereof are credited under the head (b).

The sub-heads (c), (d) & (c) represent receipts under similar heads explained under Major Irrigation.

14.8.2. It is the duty of the Executive Engineers and Officers subordinate to them to arrange realisation of revenue to be collected by them in time and also take all necessary steps to prevent leakage of revenue.

14.8.3. General principles regarding collection of revenue and its accounting procedure are detailed in para 269 to 300 of Public Works Account Code.

14.9. *Construction and maintenance of National Highways.*

The procedure regarding Budgetting and Control of Expenditure for National Highways is given in Appendix XIV (c).

APPENDIX XIV (a)

(Referred to in para 14. 6. 1)

GOVERNMENT OF KERALA

Finance Inspection (Works) Wing,

No. 88/69/Fin. (FIW) .

14th October 1969. CIRCULAR

Sub:-Budget-Introduction of Performance Budget in the Public Works Department-Buildings and Roads Branch-Instructions issued.

Government have been examining the question of improving the financial management in the Departments of Government with a view to ensuring that the expenditure incurred is properly programmed and that the results are achieved efficiently and economically keeping in view the objectives set forth for the Departments. Many Governments have adopted the technique known as "Performance Budgeting" to achieve this objective. This method of budgeting would enable a Department of Government to set out in the budget document the objectives of the Department during a year, the programmes and activities by which these objectives are proposed to be realised, the expenditure to be incurred on each of these programmes and activities during the year, indicating the broad physical achievements that would be possible. This is a useful management tool both for the Legislature and the Departments in programming and evaluating the performance of the departments and will supplement the present form of budgeting which confines itself to the legality and accountability of a particular expenditure, and does not bring out in concrete terms the content of the expenditure.

2. Government consider that to start with an attempt should be made to introduce performance budgeting in the Public Works Department (Buildings and Roads Branch). The salient features of the proposals have already been explained at the Circle Conference of the Officers of the Buildings branch held recently at Calicut, Ernakulam and Trivandrum. In order to enable the preparation of the Performance Budget for this year and for next year, detailed proforma have been drawn up and are enclosed to this circular.

3. The objectives of the P.W.D. (B and R Branch) are to maintain and improve the road network and the public buildings within the State. These objectives are achieved by the inputs of the department in the various activities classified into sub-activities as shown in the proforma. Guidelines for filling up the proforma subactivity-wise and object-wise are given therein.

4. The Executive Engineers of the divisions in the Buildings and Roads branch, including the special divisions, are requested carefully to go through the pro forma, fill them up and submit them to the Secretary to Government, Finance Department by 1st December 1969. They are requested particularly to abide by the guidelines for filling up the pro forma given as foot- notes therein. As the details are to be furnished to the Legislature, they are requested to ensure that details are carefully scrutinised and up-to-date as far as possible on the date of submission of the pro forma.

5. The Chief Engineer (Gl., B and R) is also informed that as the Performance Budget for the B & R branch will be submitted for next year, the proposals for next year's budget should be submitted in this pro forma to the P.W.D. of the Secretariat. At the time of finalising the Budget, the Finance Department will consult the Chief Engineer about revising the Physical

achievements proposed in the proposals with reference to the final allocation that would be made in the Budget against each activity. The Chief Engineer (Gl. B & R) is requested to issue supplemental instructions, if necessary, on the above subject.

P. VELAYUDHAN NAIR,

Finance Secretary.

APPENDIX XIV (b)

(Referred to in para 14.2.7.)

Procedure for payments from the Central Road Fund

The resolution on road development adopted by the Constituent Assembly of India on 19.11. 1947 as amended by that Assembly on 8-12-1949 and by the Parliament of India on 14-4-1959 and the orders issued by the Government of India from time to time regarding the procedure for payments from the fund are reproduced below:-

1. *Central Road Fund Resolution.*-1. There shall continue to be levied on motor spirit an extra duty of customs and of excise of not less than 2 annas per gallon, and the proceeds thereof shall be applied for the purposes of road development.

2. (i) From the proceeds of such extra duty in any financial year there shall be deducted a sum as near as may be equivalent to the share in such proceeds arising from taxed motor spirit used in aviation during the calendar year concerned, and such sum shall be at the disposal of the Central Government for allotment as grants-in-aid civil aviation.

(ii) The balance of the proceeds shall be credited as a block grant to a separate Road Fund.

(iii) For the purpose of this resolution 'taxed motor spirit' shall mean motor spirit upon which the duty of customs or excise shall have been paid and in respect of which no rebate of such duty shall have been given.

3. (1) The Road Fund shall be allocated as follows.-

(a) a portion equal to twenty per cent, shall be retained by the Central Government as a central reserve, this percentage being applicable with effect from the allocation due for the financial year 1948-49.

(b) out of the remainder there shall be allocated by the Central Government a portion for expenditure in each State and Territory specified in the First Schedule to the Constitution as near as may be in the ratio which the consumption of taxed motor spirit other than motor spirit used in aviation in each area for which an allocation is to be made shall bear to the total consumption in the territory of India of taxed motor spirit, other than motor spirit used in aviation during the calendar year ending the financial year concerned.

(2) The portions allocated for expenditure in Part A States and Part B States shall be retained by the Central Government until they are actually required for expenditure in the manner hereinafter specified.

(3) If in the opinion of the Central Government, the Government of any Part A State or Part B State has at any time-

(a) failed to take such steps as the Central Government may recommend for the regulation and control of motor vehicles within the State, or

(b) delayed without reasonable cause the application of any portion of the Road Fund allocated or re-allocated as the case may be for expenditure within the State, the Central Government may resume the whole or part of any sums which it may at that time hold for expenditure in that State.

(4) All sums resumed by the Central Government from the account of any State Government as aforesaid shall be re-allocated between the credit accounts of State Governments and the reserve with the Central Government in the ratio of the main allocation for the financial year preceding the year in which the re-allocation is made provided that the sum so calculated as the share of the State from whose account the resumption has been made shall be credited to the reserve with the Central Government.

(5) Special additions to the Road Fund for financing particular projects may be accepted from sources other than that mentioned in para 2 (2) which shall be kept in a Special Reserve and utilised for such projects.

4. The balance to the credit of the Road Fund or of any allocation thereof shall not lapse at the end of the financial year.

5. No expenditure shall be incurred from any portion of the Road Fund save as 'hereinafter provided.

6. The Central reserve with the Central Government shall be applied first to defraying the cost of administering the Road Fund and thereafter upon such schemes for research and intelligence and upon such special enquiries connected with roads and upon special grants-in-aid for such objects connected with road as the Central Government may approve.

7. The sums allocated for expenditure in the States may, subject to the previous approval of the Central Government, to each proposal made, be expended upon any of the following objects, namely:-

(i) on the construction of new roads and bridges, of any sort;

(ii) on the reconstruction or substantial improvement of existing roads and bridges.

(iii) in special cases, on the maintenance of roads and bridges, constructed, reconstructed, or substantially improved from the Road Fund or from loans approved or sanctioned by the Central Government;

(iv) to meet charges, including the cost of establishment, connected with the preparation of schemes of road development or with the administration of State Roads of communications;

(v) to meet charges including the cost of establishment connected with control of motor transport, and

(vi) on the interest and amortization - of loans approved or sanctioned before the date of this resolution by the Central Government and spent, or to be spent on the construction, reconstruction or substantial improvement of roads and bridges.

8. In considering proposals for the construction, reconstruction or improvement of roads and bridges from the road fund the Central Government shall have regard to the present urgent need for improving the efficiency and reducing the cost of transport by road or agricultural produce to markets and railways.

9. (1) A Standing Committee for Roads shall be constituted consisting of:

(a) the Minister in charge of Transport who shall be ex-officio Chairman and the Minister of State for Transport who shall be ex-officio Vice-Chairman and the Minister of State for Parliamentary Affairs who shall be ex-Officio member.

(b) 15 members elected by the members of Parliament from amongst themselves, and

(c) the Chief Commissioner of Railways.

(2) In the absence of the Chairman and the Vice-Chairman the members present at any meeting may elect any among themselves to act as Chairman of the meeting.

(3) No approval to any proposal for expenditure from the Road Fund, shall be given by the Committee unless it is supported by a majority of the members present and voting.

(4) All proposals for expenditure from the Central reserve and all other proposals for expenditure from the Road Fund to be made in the State shall be referred by the Central Government to the Standing Committee before the proposals are approved:

Provided that the amounts in the Special Reserve shall be applied only to the purposes for which they are earmarked.

10. The functions of the Standing Committee shall be:-

(a) To consider the annual budget and accounts of the Road fund;

(b) To advise upon all proposals for expenditure from the Central Reserve;

(c) To advise upon the desirability of all other proposals involving expenditure from the road fund in the States;

(d) To advise upon proposals for the resumption of monies held by the Central Government as provided in sub paragraph (3) of paragraph 3 of this resolution, and

(e) To advise the Central Government generally on all questions relating to roads and road traffic which the Central Government may refer to the Committee.

Orders of the Government of India regarding the Procedure for payment from the fund

1. The money lying in the Fund exists in three different forms (i) Payments from Road Fund Allocations; (ii) The Central (Ordinary) Reserve and (iii) The Central Special Reserve.

Payments from Roads Fund Allocation of States

2. Under Paragraph 7 of the Road Fund Resolution, the sums allocated for expenditure in the States can be spent only on the objects specified in that paragraph and such expenditure requires the PREVIOUS APPROVAL of the Central Government. Before approving a proposal for expenditure from the Road Fund Allocations of a State, the Central Government are required to refer it the Standing Committee for Roads, vide para 9 (4) of the Resolution. It will, therefore, be necessary for the State concerned to obtain the previous approval of the Central Government to schemes, which they intended to finance wholly, or partly from the State's Road Fund Allocations. They must do this before incurring, any commitments on these schemes. They need not send the estimates to the Centre for approval of any works proposed to be financed from the Road Fund Allocations, though such estimates may be sent for technical advice to the Roads Organisation of the Ministry of Transport if the State wish to do so.

3. Quarterly allotments will be made by the Central Government from the allocations held by them to the credit of the State Government concerned for expenditure in specific schemes, which have been previously approved by the Central Government.

4. Audit is required to see that expenditure on any scheme met out of allocations from the Central Road Fund is within the programme approved by the Central Government with the advice of the Standing Committee for Roads. For this purpose the Government of the State concerned, upon the receipt of the approval of the Central Government, should intimate to them the name number and date of detailed estimate as (technically) sanctioned by the competent authority, the amount for which it is sanctioned the amount to be met from the State's Road Fund Allocations and a very brief description of the work which it comprises in those cases where the title of the estimate itself does not adequately convey its scope. This information will be passed on by the Government of India to audit with instructions that expenditure against the estimate in question may be adjusted against the State's Road Fund Allocations to the extent authorised.

5. The Accountant General or Comptroller concerned is authorised to pass an excess over the estimated cost of a scheme, as approved by the Central Government, upto a limit of 10% of the estimated cost. When the excess is more than 10%, the approval of the Central Government to the revised cost should be obtained by the State Government concerned. This limit of 10% applies to excess over the amounts approved by the Government of India whether at the preliminary stage, when approval to schemes is accorded after obtaining the advice of the Standing Committee for Roads, or at the later stage when the final costs of works as per detailed estimates are intimated to Audit.

Payments from the road fund Central (Ordinary) reserve

6. Under paragraph 6 of the Road Fund Resolution, the Central (ordinary) Reserve with the Government of India can be applied only for the purpose specified in that paragraph. Before approving a proposal for expenditure from the Central (Ordinary) Reserve the Central Government are required to refer it to the Standing Committee for Roads, vide, paragraph 9 (4) of the Resolution.

7. When an application is received by the Government of India for a grant from the Central (Ordinary) Reserve they will in the first instance satisfy themselves whether the proposed scheme is suitable and then refer it to the Standing Committee for Roads. If, in the light of the advice tendered by the Committee, the Government of India decide that a grant should be given from the Reserve to the State Government or other administration or authority concerned, the Government of India will inform them that they will be prepared to meet from the Reserve the whole or a stated percentage of the estimated cost of the work, subject to a maximum limit, if necessary.

8. The State Government or other administration or authority concerned should then submit detailed estimates, with plans etc. for each such scheme to the Government of India. After scrutiny of the estimates, the Government of India will communicate their technical approval and financial sanction to the State Government or other administration or authority concerned.

9. The competent authority will then accord (technical) sanction to the estimates, and the State Government or other administration or authority concerned should then intimate to the Government of India the number, date and other particulars of the detailed estimates so sanctioned as in paragraph above. The Government of India will at once pass on this information to Audit and inform them that a contribution will be made from the Central (Ordinary) Reserve towards the expenditure against the sanctioned estimate to the extent decided upon.

10. Actual payments will be made by the Accountant General, Central Revenues, to the State Government or other administration concerned on the basis of the monthly audited expenditure on the work as communicated to him by the State Accountant-General or Comptroller concerned.- subject to the limit of the contribution sanctioned by the Government of India.

11. Where the Accountant General, Central Revenue, is also the Audit Officer for a Chief Commissioner's State, he will make the necessary adjustments himself in his books, subject to the limit of the contribution sanctioned by the Government of India.

12. The State Accountant-General or Comptroller, or the Accountant General, Central Revenue, as the case may be, is empowered to pass any excess over a contribution from the Central (Ordinary) Reserve sanctioned by the Government of India up to a limit of Rs. 1,000 in any one case. When the excess is more than Rs. 1,000, an application may be made by the State Government or other administration or authority concerned for an extra grant from the Central (Ordinary) Reserve. In making such an application, the revised (detailed) estimates, if any, for the work should also be submitted to the Government of India for technical approval and financial sanction, with a report explaining in full the reasons for the excess.

13. Applications, if any, for extra grants from the Central (Ordinary) Reserve, will be considered by the Government of India on the merits of each case in the light of the financial position of reserve and other circumstances prevailing at the time, but no assurance can be given that the extra grant required will be forthcoming. Therefore, while sanctioning a grant from the Central (Ordinary) Reserve initially the Government of India may require an assurance from the State Government or other administration or authority concerned that they will provide the balance of the funds that may be needed to complete the project from their own resources.

14. The procedure described in paragraphs above has been in force for the Provinces (now Part A States) since the Road Fund was instituted 20 years ago. It is a simple procedure quickly understood by the P. W. D. of the States and give no trouble in all these years.

Payments from the Road fund Central (Special) reserve

15. The Special Reserve is intended for expenditure on specified objects, vide paragraphs 3 (5) and 9 (4) of the Resolution. The procedure for the sanction of grants, and adjustment of expenditure from the special Reserve is the same as that for grants from the Central (Ordinary) Reserve.

16. Strict instructions have been issued to Audit not to admit expenditure from any of the subdivisions of the Central Road Fund. ie. the Allocations, the Central (Ordinary) Reserve, and the Central (Special) Reserve, unless it has been authorised by the Central Government under the prescribed procedure described above. If, for any special reasons, it is described that expenditure should be permitted from the Fund in anticipation of sanction of the Central Government in accordance with the above described procedure, their orders should be obtained for the departure from the rules. Audit is not empowered to admit such expenditure from the Fund and will not do so unless authorised specifically by the Central Government.

APPENDIX XIV

(Referred to in para 14.9)

Procedure regarding Budgetting and Control of Expenditure for National Highways

Provision for works to be executed in a year is made in the Central Budget under "103 Capital Outlay on Public Works-National highway Original Works-Voted". Budget provision and work-war allotment for original works are then communicated to the State Government by the Ministry at the beginning of each year. Budget proposals showing revised Budget Estimates for the year and Budget Estimates for the next year are to be furnished to Government of India by the State Government by the 15th September every year. Revised allotment is sanctioned based on this.

The power to reappropriate/modify allotted funds vests with Government of India. The final requirements of funds are then furnished to Government of India by the end of February, based on which the final allotment is communicated by them. Expenditure on works are to be strictly limited to the final allotment. Reasons for variations have to be explained in the appropriation accounts furnished to Government of India at the beginning of the succeeding year.

In cases of L A. for National Highway works, the owners of the land may move the Courts for enhanced compensation. If and when the courts award higher compensation, the state Government, which acquires the land on behalf of Government of India becomes a party to the dispute and the excess expenditure incurred in satisfaction of Court decree is a "Charged items" as far as the State Government is concerned. The expenditure is therefore initially to be met by the State Government. Such amounts are ultimately reimbursed by the Central Government from their voted grant during the same year.

Government of India keeps regular control over expenditure on National Highway. To facilitate this, the monthly statements or expenditure are forwarded to Government of India by the State Government by the middle of each succeeding month. For maintenance and repairs of National Highways also, the Government of India prescribe norms and the State execute works of a agency basis as in the case of Original Works. Lump sum allotment for the various kinds of repairs, viz. normal maintenance and repair works, periodic renewals and special of flood damage repair works for each year are sanctioned by Government of India separately for each category. For normal maintenance and repairs and periodic renewals abstract estimates are forwarded to the Ministry of Transport on the first of April every) car and for special and flood damage repairs they are sent by first June and 15th October respectively. Maintenance and repairs works are done in the cyclic order of priority within the allotment sanctioned from time to time.

CHAPTER XV

Tenders and arrangement of contracts

15. 1. General.

Works in the Public Works Department are executed by any one of the following methods..-

(i) *Departmentally*. - by the employment of daily labour. This method is adopted in cases where no contractor is available or where, for other reasons it is found more suitable.

(iii) *By Piece-work contract*. -Under this method the Piece-worker merely agrees to execute specific items of work at specific rates without reference to total quantity or time.

(iii) *By Schedule contract*. -In this contract the total approximate quantities of the respective items of work and the time of completion are specified and the contractual obligations cover the rate the approximate quantities involved and the time of completion.

(iv) *Lump sum contract*. -Here the total cost of the completed works as per drawings and specifications and the time of completion form the essence of the contract. In adopting this contract the drawings and specifications must be full and complete in order to prevent claims arising for variations due to any ambiguity in these. Cases may, however, arise where some modifications to the designs or specifications are found necessary due to site conditions or other reasons. The contract should make provision for evaluating and adjusting the cost of such modifications.

(v) *Percentage rate contract*. -In this type of contract the departmental rates for the different items of work in an estimate are published and the contractor quotes his rate- at a percentage above, or below or at par the estimate rates so published. Only a single percentage applicable to all the items is quoted and this percentage rate is applicable to extra items also, if any, are found necessary during construction. Other conditions of contract are similar to those applicable to schedule contracts.

A modification of this type of contract is when, instead of estimate rates for a work, the schedule of rates is published and the contractor is asked to quote a percentage above, below or at par, the schedule of rates so published. Since neither the total quantity of work nor the time is specified, this modified form of percentage rate contract can be applied to piece-work contracts only.

The most appropriate form of contract should be decided upon in individual cases before inviting tenders. The authority competent to accord technical sanction to the estimate is the authority which will decide whether the work is done departmentally or through contract. In the latter case, the authority will also decide upon the form of contract.

15.2 Tenders.

15.2.1. When it is decided to arrange a work through contract agency the award of contract should normally be made through tenders.

The invitation of tenders is waived only when it is absolutely necessary for satisfactory reasons and the waiving should be done only by the authority competent to do so. Reference is invited to clause 139 of the P. W. D. Code in this context.

15.2.2. Before tenders are invited for a work, there should be-

(a) Administrative sanction for the work.

(b) Technical sanction for the work.

(c) Ample provision of funds for the work in the budget. If there is only a token provision in the budget, the work shall be put to tender only if additional funds can be found by diversion or otherwise.

(d) Lands for carrying out work should either have already been acquired or otherwise available or steps should have been taken for such acquisition and the proceedings should have reached a stage where there is reasonable prospect of land becoming available before the contractor starts the work. In no case should tenders be invited before making sure that the land required will be ready for being handed over to the contractor to start the work in time.

(e) If there is a time lag of 2 years or more between the date of preparation of an estimate and the date of its sanction, it is necessary that site conditions are examined again to verify whether any changes have occurred necessitating modifications. The inspection of the site should be done by the Assistant Engineer in charge or the work or the Executive Engineer and if major modifications are necessary, the estimate should be recast before it is put up for tender. If the modifications necessary are only minor, the officer competent to enter into contract may invite tenders on the basis of the sanctioned estimate so as to avoid the delay of getting a recast estimate sanctioned. Such inspections and verifications of site before tenders are invited may be done even in cases where the time lag between estimate preparation and the sanction is less than 2 years if the officer competent to enter into contract feels it necessary.

These conditions are important because the work will be delayed if detailed estimates have not been sanctioned or if funds are inadequate or if land is not available.

15.2.3. Contractors who are desirous of tendering for works in the P.W.D. should register themselves with the Department as per rules detailed in Appendix XV (a). Unless there are special reasons, tenders for works should be invited only from registered contractors eligible to tender for the work concerned.

15. 2. 4. When it is decided to carry out the work on schedule contract or lumpsum contract or percentage rate contract the notice inviting tenders should be published in the form given in Appendix XV (b). In this notice, among other details, the period during which tenders should be considered firm for acceptance has to be notified. This period should be reasonably fixed taking into account the time required for completing all formalities before settling the contract. Normally this period should be fixed at, 3 months from the date of opening of the tender. In special cases, however this may be increased up to a maximum of 6 months with the approval of the next higher authority.

15.2.5. In the case of a scheduled contract, the tender documents should contain the following:-

(a) A complete set of drawings.

(b) Complete specification of work to be done and the materials to be used or reference to item of the standard specification followed by the Department or I.S.I. in respect of each item of the tender schedule.

(c) A schedule of quantities of various items of the work.

(d) Time fixed for completion of work or parts thereof. The time for completion of work should be carefully assessed and fixed. This should take into account the seasonal variations, probable time required for procuring materials, the sequence of operations contemplated, and such other limiting factors as have a bearing on the progress of the work.

(e) List of materials proposed to be issued departmentally and the recovery rates.

(f) List of departmental Tools and Plant to be hired out and the hire rates.

(g) General conditions of contract current in P. W. D. and special conditions if any applicable to the particular case.

15.2.6. In the case of L. S. contract, the tender documents will be the same as above except that instead of rates for individual items of work in the schedule of quantities, rate will be called for the work as a whole or for individual units forming part of the whole work. A schedule of items of work likely to be involved for adjustment of variations should also be added and rates for these also called for.

15.2.7. The tender documents for a percentage rate contract will be same as a schedule contract, except that in the schedule of quantities, the estimate rates will be noted in words and in figures and the contractor called upon to quote his percentage above, or below or at par the estimate rates. As only a single percentage is to be quoted this need not be written against individual items but must be written at the bottom of the schedule.

15.2.8. In the case of piece-work contract, the tender notice may be of a simple form specifying the place of work, the facilities available the items of work to be done and the specifications to be followed. .

If the modified percentage rate contract is to be adopted for piece-work contract, the above notice should also contain the concerned schedule of departmental rates and the contractor should be called upon to quote his rate at a percentage above, below or at par the schedule of rates so notified.

15.2.9. Tenders should normally be invited by the officer competent to accept the contract concerned and these should be received and dealt with in his office.

In special circumstances, however, the officer concerned may delegate the power to receive the tenders to the head of the next subordinate office in whose jurisdiction the work is located.

15.2.10. Copies of tender documents shall be serially numbered 1, 2, 3, etc. and the pages and drawing of each document should also be serially numbered. These documents should be available in the office where sale is advertised. The sale of tender documents may take place in two or more offices as indicated below.

Tenders for contracts to be settled by Executive Engineers or by Assistant Engineers should be sold in the concerned Subdivision office and Division office.

Tenders for contracts to be settled by the Chief Engineer and Superintending Engineer should be sold in the Circle office and in the concerned Division Office. The sale amount in the different offices should be remitted into the Treasury and the original chalan sent to Division concerned for incorporation in the Divisional Accounts.

The unsold tender documents together with a statement containing the names of parties to whom tenders were sold and the particulars of remittance of sale price should be sent within one week from the last date of sale to the office from where the tender documents originated. In this a check should be effected to see whether the value of all tender documents sold has been remitted into the Treasury and whether all the unsold documents are available.

When a document is sold, the name and address of the person to whom it is sold should be entered in the front cover page under the dated initials of the junior Superintendent or other authorised persons in the office. Tender documents sold to one party are not transferable to another.

The sale of tender documents should be closed at 1.00 p.m. on the last date of receipt of tenders. If the last date of sale of tender documents is declared to be a holiday, the sale of tender documents should be extended up to one hour before tenders are opened.

Normally only one copy of the tender form need be issued. However, if any tenderer desires to have an additional copy, the same may be sold to him at half the prices noted above plus sales tax. The duplicate copy so issued should be marked 'duplicate' and should not be accepted in place of the original tender.

The tender forms shall be priced as per schedule given below:-

Probable amount of contract	<i>Cost of tender forms, schedule etc., of first copy (Rs)</i>	<i>Cost of additional copy of the tender forms, schedule etc.(Rs)</i>
Up to Rs. 5,000	5	2
Above Rs. 5,000 to 25,000	10	2
Above Rs. 25,000 to 50,000	15	2
Above Rs. 50,000 to 1,00,000	25	2
Above Rs. 1 lakh to 5 lakhs	50	5
Above Rs. 5 lakhs to 10 lakhs	100	10

Above Rs. 10 lakhs to 25 lakhs	150	10
Above Rs. 25 lakhs to 50 lakhs	250	25
Above Rs. 50 lakhs	350	50

[Vide G. O. (P) No. 82174/PW dated 27-5-1974.]

For all works Costing more than 5 lakhs, tender form should be sold.-

- (i) In all the subdivision offices of the Division where the work is situated.
- (ii) In all the divisional offices of the concerned Circle.
- (iii) In all other Circle offices of the respective branches (Buildings and Roads or Irrigation or Project or National Highways) subject to the condition that there is no undue wastage in preparation of copies of tender documents, especially those which contain drawings, special conditions and other enclosures.
- (iv) The concerned officers who issue the tender forms should intimate the tender accepting authority on the last date for receipt of tenders, the details of persons to whom the forms were sold, for the information of the tender accepting authority.

[Vide G. O. (P) 138176/PW dated 9-6-1976.]

The following is the procedure laid down for the accounting of tender forms:-

- (1) All tender forms should be priced and the price printed or hand- written on the form.
- (2) All tender forms should be kept in charge of the Junior Superintend in Divisional Offices and the Subdivisional Head Clerk in Subdivision Offices.
- (3) All the forms received in the Divisional or the Subdivisional Office should be entered in the register of valuables referred to in Article 353 (2) (v) of the Kerala Financial Code, Volume I together with the number and date of the advising despatch or invoice with which they are received.
- (4) The receipts and issue of the Forms for specific tenders should be recorded in the Register of sale of tender forms' vide Appendix XV (f) as a subsidiary Register to the Register of valuables.
- (5) The register of sale of tender forms should contain a chronological record of the issue of tender forms showing the name of the person to whom issued, the number of forms issued and the amount received.

15.2.11. **Advertisement of tenders**

The tenders should be advertised in the manner specified below:-

Authority	Monetary limit	Mature of Publication
1. G.O. (Ms) 51/PW dated 27-1-1960	Works costing Rs. 2,500 and below	Tender notices will be published in the Notice Boards of the Division, Sub-divisions and Section Offices.
2. G.O. (Ms) 526/PW dated 6.12-1962	Works costing above Rs. 2,500 and upto Rs. 10,000	Tender notices will be published in the Division, Subdivision and Section offices and also in the Notice Boards of allied offices of other Departments in the locality and Superintending Engineer's Office. The tender notice should also be published in one of the well circulated Malayalam dailies in the Circle and they should be sent to all Divisions in the Circle and Circle Offices.
3. G.O. (Ms) 51/PW dated 27-1-1960	Works costing above Rs. 10,000 and upto Rs. 25,000	Tender notice will be published in one of the well circulated Malayalam dailies and the Gazette and sent to all other Divisions in the Circle and Circle Offices for giving wide publicity.
4. G.O. (Ms) 455/PW dated 1-7-1959	Works costing above Rs. 25,000 and upto Rs. one lakh	Tender notice will be published in the prominent Malayalam dailies and the Gazette. The news papers published from towns in the District or Circle of the works or from the towns nearest to the works are preferred for publication of notices. Copies of notices will be sent to all other Divisions in the Circle and all Circles in the State.
5. G.O. (Ms.) 103/64/PW dated 20-3-1964	Works costing above Rs. one lakh and upto Rs. 5 lakhs	Tender notice for work of an ordinary nature costing below Rs. 5 lakhs will be published in the two prominent Malayalam dailies of the State and the Gazette. Copies of notices will be sent to all other Divisions in the, Circle and all Circles in the State.
6. G.O. Ms. 103/64/PW dated 20.3-1964	Works costing above Rs. five lakhs	The tender notice will be published in two English dailies in addition to the advertisement in Malayalam dailies.

Where the nature of work is such that it could be done through contractors within the State itself such as for instances, improvements to roads, construction of buildings etc., it would be enough if the tender notice is published in two of the local language dailies having wide circulation.

When sending matter for gazette publication sufficient time should be allowed for the publication to appear well ahead of the last date of sale of tender documents. The time table presented by the Superintendent of Government Presses regarding this should be followed. A post script may be added that if for any reason the publication is delayed beyond a particular date the matter may be returned for revision.

In the case of urgent works where there is insufficient time for gazette notification this notification may be waived provided there is sufficient advertisement otherwise. In such cases the approval of the next higher authority should be obtained.

15. 2. 12. The short tender notice to be advertised in the newspapers may be made in the form given below:

Tenders are invited from registered contractors for the following works..-

Name of work	Probable amount of contract	Period of completion	Earnest money	Cost of tender form & where available	Last date of sale of tender form	Date of receipt of tender	Office where tender should be submitted	Remarks

Designation

Place

Date

15.2.13. Time allowed to prospective tenderers.

The period allowed between the date of advertisement of a tender call and the last date fixed for the receipt of tenders should afford ample time and opportunity to the tenderers for full investigation and study before making offers. Normally the time allowed should not be less than the following:-

- | | |
|--|---------|
| (i) Works costing Rs. 10 lakhs and above | 6 weeks |
| (ii) Works costing Rs. 5 lakh and below Rs. 10 lakhs | 4 weeks |

- | | |
|---|---------|
| (iii) Works costing above Rs. 2 lakhs and below Rs. 5 lakhs | 3 weeks |
| (iv) Works costing above Rs. 1 lakh and below Rs. 2 lakhs | 2 weeks |
| (v) Works costing, above Rs. 25,000 and below Rs. 1 lakh | 10 days |

[Vide G. O. (P) 2041761 P.W dated 25- 8-1976]

15.2.14. The last date of receipt of tenders shall be suitably fixed and tenders received up to 4 p.m. on the specified date. The tender should be opened on the same date at 4.30 p.m or at such time as is specified in the tender notice. [Vide G. O. (P) 1381761 P W dated 9. 6. 1976.1

15.2.15. In the office where tenders are received, one clock or time-piece shall be kept in the room of the head of the office and this shall invariably be referred to in case there is any dispute as to the time up to which tenders shall be received. This clock or time-piece should be set as correctly as possible to the Indian Standard time on the day when tenders are expected to be received.

15.3. Tender Box

15.3. 1. In every office where tenders are normally received a locked box with a slit for depositing tenders shall be fixed in a suitable place preferably in the room occupied by the Divisional Accountant or the head of the Ministerial Section in the office. The key of this box shall be kept in the safe custody of the head of the office, and the box shall not be opened except at the time advertised for opening of any particular tender. Intending tenderer shall deposit their tender in this box in the presence of the Divisional Accountant or the head of the concerned Section of the office. The Divisional Accountant or the head of the Section in whose presence the tender is deposited in the box should keep a register of tenders so deposited indicating the date and time, name of work and name of tenderer. Earnest money in the form of cash should not be accepted except with the approval of the officer opening tenders. Where such cash is accepted this should not be enclosed with the tender but handed over to the officer who is authorised to receive the cash in the particular office and an official receipt obtained. This receipt may be attached to the tender.

15.3.2. Postal tenders may be received up to the time of opening of tenders. Those received prior to the time of opening may be entered in the register and deposited in the tender box then and there.

15.3.3. As soon as the time fixed for receipt of tender is over, the slit in the tender box should be closed and sealed and the box placed before the officer opening the tenders. Till the tender box is received back after the opening of tenders if tenders for other works are received they may be kept safe with the officer in whose room the tender box is normally kept. On receipt of the tender box back to this room, the tenders so received should be put into the box after entering in the register referred to in para 15.3. 1. above.

15.4. Opening of Tenders

15.4.1. Tenderers who are interested in witnessing the opening of tenders should be allowed to be present at the time of such opening of tenders. Only one representative should be allowed to attend on behalf of such tenderer. In case the tenderer himself cannot attend, but sends some one else to represent him, such party should produce an authorisation from the tenderer.

15.4.2. The tender box should be then opened in the presence of the tenderers or their representatives present at the time. The tender covers relating to the tender to be opened on the date should be sorted out and removed. The box should then be locked and sent back to its original location after breaking the seal covering the slit. The sorted out covers should be serially numbered in the order occurring in the tender register. The covers should then be opened in the serial order and each tender examined whether it is complete with all necessary documents and earnest money. This work may be got done with the help of an experienced member of the technical establishment. The officer opening the tender should then scrutinise the tender for any corrections, irregularities etc. and read out the salient points viz. the total tendered amount either for the whole work, or for each section, and any additional conditions which a tenderer may have specified in his tender. The rates for the individual items need not be normally read out on this occasion.

15.4.3. The officer opening the tenders (including all documents) should invariably date and initial not only the corrections in each tender, but also should initial all pages of the tender irrespective of whether they contain or do not contain corrections, overwritings, etc.

15.4.4. The officer concerned should mark all corrections and over- writings and number them and attest them in red ink. In case of a number of corrections in any rate, either in words or in figures or in both, the number of corrections marked should indicate, the corrections serially, that is to say, in case of any three corrections in rates of any one item, each of these three corrections should be allotted independent numbers serially and not one number to represent all the three corrections. In case of more correction or where the correction is not legible, the rate should be written afresh in the hand of officer opening the tenders. When there is no correction on a page, instead of attesting mere initials, the note 'no correction' shall also be inserted.

(i) The number of such corrections and overwritings must be clearly mentioned at the end of each page of tender and the sum total in the last page and properly attested with date. Any omission observed should also be brought out clearly on each page of the tender.

(ii) The corrections and overwritings should be allotted separate numbers, ie., corrections should start from 1, 2, 3 etc. and overwritings should similarly start separately from 1, 2, 3, etc.

(iii) Any ambiguity in units or rates quoted by the tenderers must be clearly indicated on the concerned pages of the tender. For instance sometimes the rate is quoted without indicating whether the quoted amount is in rupees or paise either in the column for rate in words or in the column rate in figures or in both. Such ambiguities should be noted.

(iv) In cases where the contract has quoted rate in rupees and no paise is mentioned, the word 'only' should invariably be added after the words 'Rupees' and the correction should be initialled and dated with suitable remarks at the end.

(v) Where the contractors have omitted to quote the rates in figures or in words, the omission should be recorded by the officer opening the tender on the concerned pages of the tenders at the time of opening of tenders.

15.4.5. After all the tenders are thus dealt with, the tenderers present should be asked to sign in the proper columns of the register in token of their having been present at the time of opening the tenders and allowed to disperse.

15.4.6. It is essential that the tenders should be opened punctually on the appointed date and time. If the officer who is to open the tender is on leave or tour or otherwise engaged or not available, there should be a standing arrangement by which a senior subordinate is named to open the tender on his behalf at the appointed time and place. In case the opening date is declared a holiday, the tenders should be opened on the next working day at the same hour and place as specified in the original notification.

15.5. Earnest Money

15.5.1 Every tender is to be accompanied by an Earnest Money Deposit equivalent to 20% of the value of the contract where the value of the contract does not exceed Rs. 5 lakhs; and 1 % subject to a minimum of Rs. 10,000 and maximum of Rs. 50,000 where the value is above Rs. 5 lakhs. Earnest money should be rounded to the nearest Rs. 50. The actual amount of earnest money will be specified in the notice inviting tenders. The forms in which Earnest Money can be deposited are given to Appendix XV (c).

15.5.2. Contractors who have deposited permanent earnest money and have secured exemption from individual payments need not furnish separate earnest money with each tender except when special earnest money is asked to be deposited.

Note.-The Kerala State Construction Corporation Limited will be exempted from payment of earnest money deposit and security deposit in respect of works to be executed by the Corporation for the State Govt. Departments [Vide G.O. (P) 218176/P.W. dated, 24-9-1976].

15.6. Withdrawal of Tenders

15.6. 1. A tenderer cannot withdrawn his tender or make any modifications not acceptable to the Department once the tender has been deposited in the tender box. Any contravention of the above rule will entail forfeiture of the earnest money.

15.6.2. If the Department for any reason fails to issue Selection Notice to a tenderer before the expiry of the firm period, or extended firm period mutually agreed to, his tender will stand nullified automatically unless revived by mutual consent.

NOTE:-A Selection notice will be valid if it is sent by registered post on or before the date of expiry of the firm period or extended firm period.

15.7. Consideration of Tenders

15.7.1. Each tender should be examined whether it is complete with all the required documents and clear without any ambiguity. If any tender is defective in this respect, this fact should be noted and the orders of the officer opening tenders should be obtained whether the particular tender should be tabulated. The officer may condone minor defects, if any, and allow the tender to be included for tabulation. Such minor defects included:-

(a) Omission to sign or include all or any of the plans with the tender.

(b) Failure to produce the original chalan for remittance of Earnest money, provided in its place the temporary receipt given in the treasury is produced.

(c) Omission to total the different Appendices.

(d) Failure to initial all or any of the pages provided he has signed in the pages containing the rates and in the page in which the tender offer is made.

15.7.2. The tender accepted for tabulation will be compared on the basis of the sum of the products of the items of work listed and the contract unit price, offered. In case of discrepancy between the gross sum shown in the tender and that obtained by adding products of the quantities of work and unit price, the unit price shall govern and any errors found in the said products shall be corrected.

15.7.3. If there are discrepancies between unit rates quoted in words and the same given in figures, rates, quoted in words should be accepted and the discrepant rate noted in figures should be ignored.

15.7.4. Normally tenders with additional conditions attached should be rejected. However, before doing so the officer considering the tender may examine the conditions to find out whether these are capable of being properly evaluated. If so, the monetary value arrived at after such evaluation should also be added to the particular tender to work out the total cost of that tender. Whenever the conditions are vague indefinite or would land the department in indefinite commitment or would cause other difficulties in fulfillment such conditional tenders should be rejected out-right.

15.7.5. The technical section should carefully examine each tender at the time of tabulation to see that there are no corrections other than those attested at the time of opening of tenders. Any such corrections noticed should be ignored in tabulation and the fact that these corrections have been noticed should be brought to the notice of the head of the office immediately. The head of the office should then order a thorough investigation into the matter and take further action in the light of the result of such investigation.

15.7.6. The tabulation statement prepared as above together with note on the merits of individual tenders should be prepared in the Technical Section of the office and scrutinised by the head of the Technical Section. It should also be checked by the Divisional Accountant in the case of Division offices and put then upto the head of the office for orders.

15.7.7. It is likely that in some tenders, unworkable rates are quoted for a few items. It is undesirable to accept tenders with such unworkable rates unless the total value of the item or items concerned is negligible, when compared with the total amount of contract (50, or below). In all other cases, if unworkable rates are quoted, the tender should not be accepted. For this purpose, a rate may be considered as unworkable when it is one-fourth of the estimate rate for the item or less. Similarly exorbitant rates for individual items may also cause difficulties to the Department later. In case a tender contains exorbitant rates for any item or items the total cost of which is more than 5% of value of contract, the tender should not be accepted. However, in case the lowest tender as per the tabulation statement contains exorbitant rates, the tenderer may be asked whether he is prepared to reduce the rates to reasonable level. This opportunity for reducing his tender should be given only to the lowest tenderer. A rate may be considered as exorbitant when it is more than double the estimate rates.

15.7.8. It may sometimes happen that the same item of work finds a place in different appendices or parts of the tender schedule. In scrutinising the tenders, care should be taken to see that there is no discrepancy between rates for the same item occurring in different appendices or parts if the leads, lifts, and nature of work are identical. In case such a discrepancy is noticed, the lowest rate should be accepted.

15. 7. 9. To avoid any complication due to dispute, as far as possible wherever the same items or similar items occur in different appendices of a tender, they may be clubbed together or alternatively it should be made clear in the tender itself what items in the different appendices will be treated as similar for which only one rate will apply.

15.7. 10. The practice of providing alternative specifications for an item in the tender and calling for rates for the different alternatives should be avoided as far as possible. The departmental officer should decide on the alternative to be followed before the tenders are invited. However, in some cases it may be necessary to call for rates for different alternatives, as for instance when scarce materials are involved. In such cases, the choice should be based on, the alternative most advantageous to the department taking into consideration the rates disclosed in the tender and the relative merits of the alternatives. Once the choice is made and the contract awarded on, this basis the rate quoted by the selected contractor for the alternative specification which has not been adopted should be deemed to have lapsed and should not be made use of for working out rates later during the course of the contract.

15.7. 11. When the officer opening the tender feels that any clarification is necessary from a tender, he may seek such clarification making it clear from the latter, that this does not in any way bind the department in regard to acceptance or rejection of any tender. Any clarification so obtained should not be a direct or indirect means of enhancing or modifying the rates already quoted in the tenderer. Letters sent by contractors after opening of

tenders except in response to queries by the department should be ignored as this may help in an indirect way to their modifying the tender.

15.7.12. *Negotiation after opening of tenders*:-Normally there should be no negotiation after tenders are opened. However, it is permissible to negotiate with the lowest tenderer so as to get high rates if any, reduced to reasonable levels. In all other cases where the officer opening the tender feels that negotiation with one or more tenderers will be advantageous, he must get concurrence of the next higher authority before entering into such negotiations. As a rule no negotiation should be carried on which will be contrary to the principles of tendering by which unfair advantage is gained by a tenderer after opening of tenders, through such negotiation.

15.7.13. The consideration of tenders and decision thereon should be completed well before the date of expiry of the firm period noted in the tender so that the selection notice is sent on or before the expiry of the firm period. If delays are anticipated, the officer who is then dealing with tenders should instruct the officer who opened the tenders to get the consent of the lowest three tenders for extending the firm period by one month or more as required. In case lowest, or any tenderer refuses to extend the firm period, the tender cannot be considered. All concerned with the consideration of tenders should deal with them expeditiously to settle the contract before the expiry of the firm date. The following timetable may be adhered to regarding the disposal of tenders: -

(i) The officer receiving tenders, if he is not competent to settle the contract, should send the tender with his recommendation and tabulation statement to the next higher officer within 1/3 of the time fixed as firm period. For example, if the firm period is 3 months, the officer receiving tenders should submit the tender documents to his superior within 1 month.

(ii) The balance 2/3 of the time may be divided equally between the various offices which have to deal with the tender. If special orders of Government are also necessary at least one month's time should be provided for consideration by Government and only balance period distributed between the concerned officers.

15.7.14. The decision on the tender should be taken by authority who is competent to enter into a contract for the amount involved. If the officer opening the tender is not the competent authority to settle the contract, he should forward tenders, tabulation statement, notes etc. together with his own recommendations to the competent authority for orders. This should be done well before the date of expiry of period of validity of the tender. Normally the lowest tender should be accepted. If the lowest tender discloses considerable excess over the estimated P. A. C., the officer dealing with the tender should satisfy himself about the following aspects before acceptance or recommending acceptance to a higher authority.

(a) That wide publicity was given.

(b) That sufficient time was given for submission of tenders.

(c) That there is sufficient justifications (item-wise) for the large variation between the quoted P. A. G. and the estimated P. A. C.

Further if the variations are on account of the unworkable rates or defects in the preparation of the estimates, such defects have to be got rectified and the estimates revised and fresh tenders invited. However if the work concerned is so urgent that the delay involved in following the above procedure has to be avoided, the officer concerned may take a decision on the tenders received after recording reasons for not following the above procedure. If the authority competent to accept tenders feels that it is in the interest of Government to reject the lowest tender or all tenders he may decide accordingly after recording the reasons for his decision. All such cases where the lowest tender is disregarded or all tenders are rejected, should be reported to the next higher authority.

15.7.15. *Splitting of tenders.*- Sometimes it may be more expedient to split and award a work to different contractors with a view to expeditious completion as well as on grounds of economy. In such cases, the office competent to enter into contract should decide on the manner in which the work may be split up and indicate this clearly in the tender notice. In evaluating the tenders, the alternatives of splitting the work among different contractors or awarding more than one split up item to the same contractor should be examined taking into consideration the speed of completion, and the cost. The tender notification should also specify that the department reserves the right to split the contract in the manner given in the schedule and call for time of completion of individual parts as well as for the whole work. In all other cases, splitting should not be resorted to after tenders are invited. This does not however prevent deletion of a few minor items from an otherwise acceptable tender if the officer who is competent to deal with the tender feels that it is in the interest of Government to do so, and the tenderer is agreeable to these deletions. The reason for such deletion should be recorded by the officer.

15.7.16. If all tenders received in response to a notification disclose very high rates or are otherwise unsatisfactory, the competent authority should examine whether fresh tenders may be invited for the work and if so proceed accordingly. If he feels that fresh tenders may not have a better response, or that the time available will not permit fresh tenders being invited, he may allot the work to a contractor selected by him with the sanction of the immediate superior authority at rates not exceeding his powers of acceptance in regard to excess over estimates (P. W. D. Code, Article 139-Note 2). The same procedure may be adopted in case no tenders are received for a work.

15. 8. Waiving of tender calls

15.8.1. Normally all works to be awarded on contract should be settled on the basis of tenders. However in appropriate cases powers have been given to the various officers to waive tender calls as indicated in the general delegation of powers. These powers do not admit a major work being split up into parts with a view to each part being given out on contract without calling for tenders. In case it is decided not to call for tenders, the work may be got done either departmentally or through negotiation with a contractor provided the rates offered are not in excess over the estimate rates. If, however, rates higher than estimate rates have to be given the reasons should be properly explained and sanction of the next higher authority obtained.

15. 9. Issue of selection notice

15.9. 1. After the decision on the contract is made, the selection notice should be sent by the officer who is competent to enter into the particular contract in Form given in Appendix XV (d) by registered post. This notice should be sent before the expiry of period of validity of the tender to the address given by the tenderer in his tender. "Copy of the selection notice should also be sent to the subordinate officer in charge of the works as well as the District Employment Officer in whose jurisdiction the work falls" [vide G.O. (MS) 105/75/PW dated 15-5-1975].

15.9 2. The selected contractor has to deposit the required security in the approved form within the period specified in the selection notice. In respect of contracts entered into by a Superintending Engineer the security deposit should be made in the office of the concerned Executive Engineer as specified in the selection notice. For contracts entered into by the Executive Engineer the deposit should be made in his office. Security deposit for contracts entered into by Subdivision Officers should be made in the Subdivision office or if the Subdivision Officer so specifies in the selection notice, the deposit may be made in the Executive Engineer's office.

Note:-The Kerala State Construction Corporation Limited will be exempted from payment of earnest money deposit and Security deposit in respect of works to be executed by the Corporation for the State Govt. Department [vide G.O. (P) 213/76/PW dated 24-9-1976].

15.9.3. In the case of contracts awarded by Superintending Engineer the Executive Engineer in whose office the security deposit is to be made should make arrangements to see whether the deposit is made in time or not. In the event of failure of a contractor to do so the Executive Engineer should initiate proceedings under the provisions of the penal clauses of the agreement unless the officer who awarded the contract gives extra time for such deposit. The Superintending Engineer should also be kept informed.

In contracts awarded by the Executive Engineer or the Subdivision Officer the Officer awarding the contract must similarly arrange for watching whether security deposit is made in time. If there is lapse in this regard appropriate action under the penal provisions of the contract should be initiated unless the officer feels that circumstances justify grant of extra time for such deposit.

15.9.4. All forms of security contemplated in Article 304 Kerala Financial Code Volume 1 would be accepted.

15.9.5. As soon as the selection notice is sent to the contractor, the formal agreement should be drawn up in the office of the authority accepting the tender and the selected contractor should be asked to attend the office to sign the agreement within the period specified in the selection notice. The contractor should bear the cost of the stamped paper required for this purpose. He should also produce proof of having deposited the security with the officer specified in the selection notice at the time of signing the agreement. Every page should also contain the name of the work in full. After the agreement is signed, it should be entered in the Agreement register vide Appendix XV (c). In the case of agreements entered into by the Superintending Engineer or Chief Engineer the original agreement should be sent for safe

custody and reference to the Executive Engineer in whose office payments are made. Original agreements entered in to by the Executive Engineer or Subdivision Officers will be retained in their own offices if payments are made from these offices. Copies of the agreement should be sent to all the subordinate officers who will be controlling the execution of the work. In the case of contracts exceeding Rs. 2 lakhs copies of the agreement should also be sent to the Accountant General.

The following should be the contract documents for a work

(1) Agreement form with all accompaniments like schedule, conditions of contract both general and special etc.

(2) Original tender and all accompaniments there of.

(3) Attested copies of interim correspondence between the department and tenderer, which have a bearing on the tender.

(4) Select on notice.

(5) The MDSS or KSS should also be considered as part of the documents of every contract even though individual copies are not attached to such contracts. For this purpose the Divisional or Subdivisional copy of the MDSS or KSS must be got signed by the contractors in token of his acceptance of the applicability of these specifications to the contracts tendered by him.

(6) An index showing the documents forming part of the contract.

15.9.6. If after the selection notice is issued, the selected contractor fails to deposit the required security and or fails to sign the contract agreement, then action should be taken against the contract as provided for in the tender notice and in the rules regarding registration of contractors.

15.9.7. In cases as outlined above when the selected contractor fails to deposit security and/or execute agreement, a registered notice should be sent to him indicating the penalties to be inflicted and the award of the contract withdrawn. The officer competent to decide the contract may then negotiate with the next two lowest tenderers whose Earnest money have been retained whether any of them is willing to take up the work on the same terms and conditions and rates are given by the Lowest tenderer. If any of them agrees, the contract may be awarded to that tenderer after getting a formal letter from him accepting the terms and conditions and rates as given by the lowest tenderer. If both the tenderers agree, the contract should be concluded with the second lowest on the above terms. If neither of the two tenderers agree to accept the terms and conditions and rates of the lowest tender, the work should be retendered.

APPENDIX XV (a)

(Referred to in Para 15. 2. 3.)

GOVERNMENT OF KERALA

Abstract

P.W.D. CLASSIFICATION OF CONTRACTORS - REVISED ORDERS ISSUED

PUBLIC WORKS DEPARTMENT (GENERAL & PLANNING)

G.O. (P) No. 47/PW.

Dated, Trivandrum, 4th February 1971

Read 1. G.O. (P) No. 69/PW dated 26-4-1969.

2. Letter No. WMII/151(423)/109 dated 4-5-1969 from the Accountant General.
3. Letter No. RG5-4177/69 dated 24-7-1969 from the Chief Engineer, General and Buildings and Roads.
4. Letter No. PHM-9103/69 dated 15-1-1970 from the Chief Engineer, P.H.E.D.
5. Letter No. WMII/15-423/215 dated 23-1-1970 from the Account- ant General.
6. Letters No. RG5-4177/69 dated 5-3-1970 and 10-3-1970 from the Chief Engineer, General and Buildings and Roads.

ORDER

Government have reviewed the orders issued in G.O. (P) No. 69/PW dated 26-4-1969 in the light of the suggestions received from the Accountant General, Chief Engineer, General and Buildings and Roads and Chief Engineer, P.H.E.D. and are pleased to issue revised orders relating to the Rules for registration of Contractors in the Kerala P.W.D as appended hereto.

2. The rules issued in the, G.O. read as first paper above will stand superseded by the Revised Rules now issued in this G.O.

3. These revised rules will come into force from 1-4-1971 onwards.

By order of the Governor,

R. GOPALASWAMY,

Secretary.

To

The Chief Engineer, General and Buildings and Roads/P.H.E.D. The Chief Engineer,
Irrigation/Projects/National Highways.

The Accountant General. (This order issues with the concurrence of the F.D.)

The Finance Department-Vide No. 6224/Ind. & PWIBI/Fin.170. dated 27-11-1970.

All Heads of Departments and Offices.

All Departments and Sections in the Secretariat (including Law, Legislature and
Finance).

The Private Secretary to Minister (Works and Tourism)

* Published in gazette dated 16th March 1971.

APPENDIX I

Rules for Registration of contractors executing works other than Electrical in the Kerala Public Works Department

1. (a) Only persons who have registered themselves as contractor under these rules are entitled to submit tenders for works.

The term 'works' includes (i) civil works and (ii) water supply and sanitary installation works.

(b) Civil Works & Water Supply & Sanitary Installation Works- A contractor who is in the register of any circle in the Kerala P.W.D., can tender for these works in all the circles in the State. A contractor who is in the register of any Division in a particular circle other than the Minor Irrigation Circle, which has jurisdiction throughout the State, can tender for these works in all the Divisions including Subdivisions under that Circle and one in the register of a Subdivision can tender in all the Sub- divisions of that Division. A contractor who is in the register of any Minor Irrigation Division, can tender for works in that Division. Temporary special Divisions or Special Subdivisions are not authorised to register contracts or renew their registration.

2. For the purpose of registration, the contractors will be classified into four separate categories on the basis of their financial resources, professional experience and records, as follows:-

(i) *A Category*. - Those who are entitled to tender for all works in a Circle irrespective of the estimated P.A.C. of the works.

(ii) *B Category*. - Those who are entitled to tender for all works in a circle the estimated P.A.C. of which is not more than Rs. 5 lakhs each.

(iii) *C Category*. - Those who are entitled to tender for works in a Division the estimated P.A.C. of which is not more than Rs. 2 lakhs each.

(iv) *D Category*. - Those who are entitled to tender for works in a Sub-division, the estimated P.A.C. of which is not more than Rs. 20,000.

NOTE.-The Chief Engineer, P.H.E.D. will have the discretion to entrust works like erection of machinery, equipments etc., the contractors who are the supplier of such machinery or equipment, even without registration as contractor of the P. H. E. D. if it becomes necessary and if it is advantageous to Government.

3 (a) Civil Works & Water Supply & Sanitary Installation Works- Applications for A & B categories Registration will be made to the Superintending Engineer of the Circle, for C category to the Executive Engineer of the Division and D category to the respective Sub division offices.

(b) The application for registration as contractor should be supported by a solvency certificate issued by the Revenue Department or a Bank guarantee by a bank approved by Government (a Scheduled bank) under the Bank Guarantee Scheme as follows-

<i>Category</i>	<i>Rupees</i>
(i) A	50,000
(ii) B	25,000
(iii) C	7,500
(iv) D	No solvency certificate and Bank Guarantee.

.Note:-The guarantee of the banks approved by Government (Scheduled Banks) under the Bank Guarantee Scheme will be accepted.

(c) Application for registration as a contractor should be supported by details about his financial stability and also his previous experience in works. Contractors for Water Supply and Sanitary Installation works should produce the plumbing licence issued by the competent authority along with the application for registration.

4 (a) The Registering authority will then scrutinise the applications for registration. He will then satisfy himself as to the financial capacity of the applicant and also his ability to take up and carry out the works in a particular category. He can if so needed, direct the contractor to produce before him satisfactory evidence towards this. If he is satisfied that the applicant can be

registered as a contractor, he will be intimated of the fact and will be asked to remit a registration fee at the following rates (in Form II):

	Category	Fees
		Rs.
A		200
B		150
C		100
D		50

The applicant will be registered as a contractor after remittance of this fee. The registration fee is not refundable. If for any reason, the contractor is not found fit for being registered, he will be intimated so. But this must only be a bare intimation of the fact that he is not being included in the list of registered contractors.

(b) If any application for registration as a contractor is rejected, the registering authority should register in writing his reasons for denying registration. He should also intimate confidentially his reasons for denial to any application for registration to his next superior authority.

(c) No appeal will lie against this decision.

5. After registration of a person as contractor a registration card will be issued to him under the seal and signature of the registering officer in Form III. This card should be referred to in all the tenders submitted by him and be produced by the contractor, if and when called for by any officer of the P. W. D. If the original registration card is lost the authority competent to issue the original registration card may, on request made by the Contractor, after enquiring the bonafides and after obtaining an indemnity bond executed from the contractor, issue a duplicate registration card after levying a fine of Rs. 25 from the contractor along with the application for the duplicate card.

6. (a) The registration issued is valid only for one financial year. Registration cards are to be renewed every year. Application for renewal are to be submitted before 1st January every year except in the case of renewals of existing registration wherein the last date for such applications for renewal for 1971-72 will be 31st March, 1971, together with bank guarantee solvency certificate. This may, however, be extended up to 31st January, after realising a fine of Rs. 5 for such late application.

(b) A non-refundable fee of Rs. 10 is payable for renewal. The registering authority can renew the registration or refuse to do so at his discretion following directions for registration as in para 4. He may refuse renewal for the following reasons:

- (i) Not being satisfied of the financial stability of the applicant.
 - (ii) Failure to execute satisfactorily a previous contract.
 - (iii) Poor quality of works executed.
 - (iv) Failure to put up schedule of progress of works or works taken up by the applicant previously.
 - (v) Or any other matter which, in the opinion of the registering authority, is undesirable.
7. A contractor who fails to get his registration renewed for an year can apply afresh the next year for registration only as a new contractor.
8. The registering authority shall, before 1st March, issue the renewal card or intimate the fact of having refused the request for renewal.
9. A list of applications for registration and renewal shall be maintained by each registering authority in Form VII. The reasons for refusal should be clearly specified in the register. The register will be confidential record in the custody of the registering authority. But it will be open to inspection by his superior officer and by Audit.
10. In case a contractor desires to be enlisted simultaneously as a registered contractor for executing non-electrical works also he may make the required deposit in the appropriate category either for electrical work or non-electrical works where the deposit is the highest.
11. *Application of the Rules.*-(a) These rules will not apply for the registration of L.C.C. Societies, B.S.S. and other workers' bodies which are governed by separate Government Orders and also in respect of works which are executed under the famine relief and flood relief rules.
- (b) These rules will apply to the contracts taken up in the P.H.E.D. also but will not apply to contractors for the supply of materials, machinery etc., in that Department.
- (c) The contractors who have registered during 1969-70 need not renew their registration for the year 1970-71. For the subsequent financial year, the rule 6 (a) above will strictly apply.

APPENDIX II

RULES FOR REGISTRATION OF ELECTRICAL CONTRACTORS IN THE KERALA P. W. D.

1. For the purpose of registration, the electrical contractors will be classified into four separate categories on the basis of their financial resources, professional experience and record as follows:-
- (i) A Category-Those who are qualified to tender for works upto any amount.

(ii) B Category-Those who are qualified to tender for works upto Rs. 50,000.

(iii) C Category-Those who are qualified to tender for works upto Rs. 25,000.

(iv) D Category-Those who are qualified to tender for works upto Rs. 5,000.

2. Enlistment of electrical contractors of all categories will be made by the Superintending Engineer of the concerned B & R Circle. Application for registration will be made in the prescribed form and should be supported by a solvency certificate by the Revenue Department or a Bank Guarantee by a bank approved by Government except in the case of electrical contractors coming under the 'D' Category. The amounts upto which such certificate or Bank Guarantee should be insisted will be as follows:-

A Category- Rs. 50,000

B Category - Rs. 25,000

C Category – Rs.12,000

D Category-No solvency Certificate or Bank Guarantee.

Note.-The guarantee of the banks approved by Government (Scheduled Banks) under the Guarantee Scheme will be accepted.

3. In the case of 'D' Category of contractors, the cost of Works for which they can tender can be fixed as the financial powers vested with the Assistant Engineers of the Electrical Wing as this category of contractor need not produce any solvency certificate. The last sub para of Rule 4 (a) (b), Rule 5, Rule 6 (a) and (b), Rule 7, 8 & 9 under Appendix 1 will apply in respect of registration as electrical contractors in the P. W. D.

4. The contractors should possess a valid contractor's licence issued by the competent authority, viz., the Licensing Board under the Chief Electrical Inspector as per the Indian Electricity Rules.

5. The Registration fee for different categories of contractors is prescribed as follows:

A Category-Rs. 200

B Category-Rs. 150

C Category-Rs. 100

D Category-Rs. 50

6. The Electrical contractors taking up works under A Category under these rules should have an office capable of submitting bills regularly or works done provided for in the contractor. This office should have sufficient technical personnel for submitting tenders in an intelligent manner and for supervision of works.

7. The contractor desiring enlistment in the 'A' category should have executed at least 5 works individually costing more than Rs. 25,000 satisfactorily. Those who desire to enlist as contractors in the 'B' category, should have executed at least five works individually costing more than Rs. 10,000 satisfactorily and those enlisting in 'C' category at least five works individually costing more than Rs. 2,500.

8. Any contractor who desires to be enlisted simultaneously in any category in electrical works also may make the required deposit in the appropriate category either for non-electrical works or for electrical works where the deposit is highest.

ANNEXURE

APPLICATION FOR REGISTRATION AS CONTRACTORS OF ALL CATEGORIES

FORM I

1. Name of applicant (in Block letters)
2. Full address
3. Officer to whom application is made
5. In the case of individuals, who are partners of

Regd. Firms or in the case of firms of contractors,
the following details should be furnished:

(i) Whether the firm is a private/public limited concern or undivided Hindu Family individual or a regd. partnership firm (attested copies of Deeds Articles of Association be enclosed)

(ii) Names of partners with their liabilities

(iii) Name of person holding power of attorney

(iv) Place of business

Category to which registration is sought

6. Details of financial capacity (enclose solvency
certificate or Bank guarantee)

7. Particulars of experience on works labour
command, equipment and other facilities on

hand and technical assistance available etc.

8. State whether he is registered contractor in

any other office in the P. W. D.

9. State whether the applicant was penalised in

connection with any contract with Government if so give details

10. State whether any of his previous applications
for registration in any of the Officers in

Kerala P. W. D. has been rejected

11. State whether the applicant or any of his

partners or shareholders is/are dismissed

Government Servant (s)

12. State whether the applicant has under his

employment, a dismissed Government servants

13. State whether the applicant has produced

Plumbing/Electrical Licence from competent

authority. (Only in the case of contractors

executing the specific type of works)

I have read and understood the rules regarding the registration of contractors published in G. O.
(P) 69/PW dated 26-4-1969 and amended from time to time.

Station:

Date:

Signature of applicant.

CONDITIONS GOVERNING THE REGISTRATION

The rule for registrar on of contractors in the Kerala P. W. D. appended and Published in G. O.
(P) shall form part of the conditions governing the Registration.

2. Demotion to Lower Class.

(a) The Registering Authority may, by order demote a contractor to a lower class if he:

(i) fails to execute a contract or executes it unsatisfactorily or is proved to be responsible for constructional defects revealed even after the expiry of the prescribed maintenance period, or;

(ii) has no longer the adequate equipment, technical personnel or financial resources. or

(iii) violates any important conditions of contract; or

(iv) is responsible for any other matter which would justify his demotion to a lower class taking into account the merits of the case.

3. Suspension of business:

Suspension of business may be ordered for an indefinite period, where pending full enquiry into, the allegations, the competent authority is of the view that it is not desirable that business with the contractor should continue. Such an order may be passed if the competent authority is prima- facie of the view that the contractor, is guilty of an offence involving moral turpitude in relation to business dealings in which, if established, would result in his removal /blacklisting.

4. Removal from the approved list.

(a) The Registering Authority may remove, the name of a contractor from the approved list if the contractor-

(i) fails to execute a contract or execute it unsatisfactorily or is proved to be responsible for constructional defects revealed even after the expiry of the prescribed maintenance period; or

(ii) has no longer the adequate equipment, technical personnel or financial resources; or

(iii) violates any important condition of contract; or

(iv) fails to furnish the required income-tax clearance certificate; or

(v) fails to abide by the conditions of Registration or is found to have given false particulars at the time of registration, or

(vi) is declared or is in the process of being declared bankrupt, insolvent, wound up, dissolved or partitioned; or

(vii) persistently violates the provisions of Labour Regulations and Rules.

5. Black Listing.

A contractor may be black listed for the following reasons:

- (i) where there is sufficient and strong justification for believing that the contractor or his employee has been guilty of malpractices such as bribery, corruption, fraud including substitution of or interpolation in tenders, pilfering or unauthorised use or disposal of Government materials issued for specific works etc., or
- (ii) where the contract or contumaciously refused to pay Government dues without sufficient reasons and where the Registering Authority is satisfied that no reasonable dispute attracting reference to arbitration or court of law exists for the contractor's action; or
- (iii) where a contractor or his partner or his representative has been convicted by a court of law for offences involving moral turpitude in relation to business dealings; or,
- (iv) where security considerations including suspected disloyalty to the State or warrant; or
- (v) where a contractor or his, partner or his agent is found to have abetted or induced: public servants, to indulge, in corrupt practices.
- (vi) A show cause notice should be issued before inflicting the punishment of black listing". [vide., G.O (P) 24 /76/PW.dated 30-1-76]

6. Restoration.

The question of upgrading a (demoted) contractor lifting the ban on business, restoring the registration, withdrawal of blacklisting etc., may be considered at the appropriate time on the merits of each case by the authority who passed the original orders. Copies of orders revoking black- listing orders shall also be furnished to the Government in the concerned Administrative Department for communicating the orders to the Government of India.

Note. 1. This registration will be valid only for one financial year ending 31st March, 19...

2. The Registration card is to be renewed every year.

3. Renewal application is to be submitted before 1st January every year together with an up-to-date Income-tax Clearance Certificate and a fee of Rs. 10 (not refundable).

4. While tendering for works the No. of the Registration Card shall invariably be referred to and produced when called for.

INTIMATION MEMO

Office of the

Station

Date

With reference to application dated for registration as a contractor, Shri/Messrs is/are hereby informed that he/they can be registered as Category contractor subject to the rules governing registration of contractors. He/they will remit a sum of Rs (according to category) only to this office towards registration fee.

To

(Sd.)

Shri/Messrs

Officer.

.....

Form III

CONTRACTOR'S REGISTRATION CARD

No

Date

Shri/Messrs (Name and full address)

..... is/are registered as a Category Contractor(s), the Register No. being of
19

Signature & Designation of the

(Seal of the Registering Officer)

Registering Officer Identification:

Photograph-Pass-port size of

Registered Contractor. Must be

perforated and signed by Registering

Authority.

FORM IV

APPLICATION FOR RENEWAL OF REGISTRATION AS CONTRACTOR

1. Name of applicant (in Block letters)
2. Full address
3. Officer to whom application for renewal is made
4. Category of Registration
5. Previous Registration No. and the year from
which he continues to be on the rolls
6. Details of financial capacity (enclose solvency
certificate or Bank Guarantee if the period of Bank
guarantee already produced in previous year has elapsed)
7. Particulars of experience on works, labour
command, equipment and other facilities on
hand and technical assistance available -
8. State whether the applicant was penalised in connection
with any contract with Government. If so, give details
9. Whether the applicant under his employment,
a dismissed Government Servant.

Station:

Date:

Signature of the applicant

FORM V

INTIMATION MEMO FOR RENEWAL OF REGISTRATION

Office of the

Station

Dated

With reference to your application dated for renewal of registration as contractor, Shri/Messrs is/are hereby informed that his/their registration can be renewed for the financial year ending March He/They will remit a sum of Rs. 10 only towards fee for renewal. The fee should be remitted under the head "4 Remittances-P.W.III-Other remittances in favour of the Executive Engineer"

Officer.

To

.....

FORM VI

CONTRACTOR'S RENEWAL REGISTRATION CARD

No

Shri/Messrs (name and full address) is/are informed that his/their registration card has been renewed for the financial year ending

Signature & Designation of

the Registering Officer.

(Seal of the Registering Officer)

FORM VII

REGISTER OF CONTRACTORS FOR THE YEAR

Class

Sl No	Date of application	Name & address of contractor	Whether application is for fresh registration or renewal	If renewal, No. of previous application and year from which he	Details of fees remitted	Whether application is accepted or rejected If rejected state reasons in	No of card issued	Signature of officer	If applica is rejec whethe the contra has bee
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				continues to be rolls		detail			intima or not
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

GOVERNMENT OF KERALA

Abstract

P.W.D. – CLASSIFICATION OF CONTRACTORS - REGISTRATION OF ELECTRICAL
CONTRACTORS IN P. W. D. - AMENDMENT- ORDERS ISSUED

PUBLIC WORKS (GENERAL & PLANNING) DEPARTMENT

G. O. (P) 87/72/PW. Dated, Trivandrum, 28th April 1972.

Read.-1. G.O. (P) 47/PW dated 4-2-1971.

2. G.O. (P) 96/PW dated 23-3-1971.

3. Representation dated 10-8-1971 from Kerala Electrical Contractors Association.

4. Letter No. RG5/75560/71, dated 15-11-1971 from the Chief Engineer (GBR).

ORDER

The Kerala Electrical Contractor's Association Trivandrum have requested to exempt the Electrical Contractors from the production of solvency certificate or bank guarantee for registration as contractors since no materials are supplied to them from Government Department. They have also requested that the rules governing the registration of contractors stipulated in the G. O. cited first, so far as it relates to the Electrical Contractors may be stayed till orders are passed in the matter.

2. The Chief Engineer has reported that the insistence of production of solvency certificate for comparatively high amount as has been now included in the G. O. cited first above has caused difficulties in the actual receipt of competitive tenders for electrical works, as many of the contractors have not come forward to register themselves as contractors under the above rules, and conditions. Most of the electrical works tendered in the P. W. D. are within the P. A. C. of Rs. 25,000 and it is mostly the smaller contractors who tender for the above works. The imposition of the conditions of production of solvency certificate for comparatively higher amounts has discouraged them from registering themselves as contractors to make them

eligible to tender for electrical works and hence there is no competition in the receipt of tender for electrical works.

3. Government have examined the question carefully and are pleased to substitute the following are appendix II of the G. O. cited first.

Appendix II to G.O. (P) 47/PW dated 4-2-1971

(1) For the purpose of registration, the Electrical Contractors will be classified in to three separate categories on the basis of their financial resources, professional experience and record as follows.,

(i) A Category-those who are qualified to tender for works up to any amount.

(ii) B Category-those who are qualified to tender for works up to Rs. 50,000.

(iii) G Category-those who are qualified to tender for works up to Rs. 20,000.

(2) The enlistment of Electrical Contractors A and B categories will be made by the Superintending Engineer of the concerned B&R circle and category G will be done by the E. E. of the concerned division. The application for registration will be made in the prescribed form and should be supported by a solvency certificate by the Revenue Department or a bank guarantee by a bank approved by the Government except in the case of C category Electrical Contractors. The amounts up to which such certificates or bank guarantee should be insisted on will be as follows:

A Category - Rs. 25,000.

B 5,000

C No solvency certificate or bank guarantee required

*Note:-*The guarantee of the bank approved by the Government (Scheduled Banks under the bank guarantee scheme) will be accepted.

(3) The registration fee for different categories of contractors is prescribed as follows.

A Category-Rs. 200.

B Category-Rs. 100.

A Category-Rs. 50.

(4) Rule 4 (a), 4(b), 4(c), 5, 6 (a), 6(b), 7, 8 and 9 under appendix 1 of G. O. cited first as amended in G.O. cited second above will *mutatis mutantis* apply in respect of registration as electrical contractors in the P. W. D.

(5) The contractors should possess a valid contractor's licence issued by a competent authority viz. Licensing Board under the Chief Electrical Inspector as per India Electricity Rules.

(6) The Electrical Contractors taking up works under A category under these rules should have an office capable of submitting bills regularly for works done provided for in the contract. This office should have sufficient technical personnel for submitting tenders in an intelligent manner and for supervision of works.

(7) The categorisation of A, B and C depending upon the experience will be decided by the registering authority.

(8) Any contractor who desires to be enlisted simultaneously in any category in electrical works also may make the required deposit in the appropriate category either for non-electrical works or for electrical works where the deposit is highest.

By order of the Governor,

R. Gopalaswamy,

Secretary.

To

The Chief Engineer (B & R)

The A. G., Kerala (This order issued with the concurrence of the Finance Department)

The Finance Department (Vide 351/Ind. & PWIBI/72/Fin. dated 25-2-1972.)

The Chief Engineer, Projects/Irrigation/National Highway

All Heads of Departments and Offices

All Departments and Sections in the Secretariat (including Law Legislature and Finance Department).

(Vide G. O. (P) No. 24/76/PW dated 30-1-1976)

APPENDIX XV (b)

(Referred to in para 15.2.4)

NOTICE INVITING TENDERS FOR WORKS

KERALA DEPARTMENT

Form No. 83

NOTICE INVITING TENDERS FOR WORKS

Name of work

Locality

Last date of tender

KERALA DEPARTMENT

NOTICE INVITING TENDERS FOR WORK

Form No. 83

Scaled tenders are invited for and on behalf of the Governor of Kerala from registered contractors of P. W. D. Class for the work of

2. The items and sub-heads of works to be done are enumerated in the subjoined schedule. Unless otherwise specified the tender must be for the whole or any individual work and part tenders are liable to rejection. A Contractor may tender for more than one work with the earnest money deposit specified in each case, but shall not tender for any part of a work only, unless specifically so required.

3. All works shall be done in conformity with the specifications and conditions of contracts in force in the P. W. D. Tenderers must quote their own rates specifically for each item, without reference to the departmental estimates or the current schedule of rates. The rates quoted shall be inclusive ones, covering all the operations contemplated in the specifications and tender schedules and all incidental work necessary for such operations such as shoring, bailing, form work, scaffolding, etc. "The rates quoted shall be inclusive of sales tax".

4. Tender scaled and endorsed as such with the name of the work clearly written thereon, should be delivered at the office of the Division Officer Superintending Engineer Chief Engineer

before

a. m. /p. m. on or before 19 They will be opened at the office of delivery by or such Officer as may be authorised in this behalf in the presence of such of those tenderers or their authorised agents as may be present. The total amount of each tender will be read out, the tender and all correction in the tender will be attested by the Tender

Opening Officer with dates and initials and by the tenderer, if present. A list of corrections which remain unattested by the tenderer will be made out and pasted to each tender. Details of individual rates will be treated as confidential and will not be read out. Each tender should be accompanied by a receipt for and earnest money deposit of Rs The Earnest Money may be produced in one or other of the following forms:-

(a) Chalan receipt from a Government Treasury. The Chalan will be countersigned by an authorised departmental officer in the office from where tender form is purchased.

(b) Draft on a scheduled bank made payable to the officer who has invited tenders.

(c) Deposit-at-call on a scheduled bank assigned in the favour of the Governor of Kerala.

(d) Cash remittance is not normally accepted. The officer receiving the tenders may, if he considers necessary relax this rule and permit cash being received in special cases.

Tenders not accompanied by such deposit, for receipt will not be considered. Contractors, who have deposited permanent earnest money and have secured exemption from individual payments, need not do this, except when special earnest money is asked to be deposited.

5. Selected contractor will be required to produce income tax and sales-tax clearance certificates before final payment is made for the work, and before security deposits released.

6. The Contractors submitting tender should produce copies of solvency certificates clearly indicating to what extent they are solvent from the Tahsildar of the Taluk where they reside along with their tenders.

7. Each tenderer must also send a certificate of income-tax verification from the appropriate income-tax authority in the form prescribed therefore.

In the case of proprietary or partnership firm it will be necessary to produce the certificate aforementioned for the proprietor or proprietors and for each of the partners as the case may be.

If a certificate had already been produced by the tenderer during the calendar year in which the tender is made in respect of previous tender it will be sufficient if particulars regarding the previous occasion on which the certificate was produced are given.

All tenders received without a certificate as aforementioned will be summarily rejected.

8. The tenderer shall examine closely the Madras Detailed Standard Specifications, and also the Standard Preliminary Specification contained therein, and sign the Divisional Office copy of the Madras Detailed Standard Specifications and its addenda volume in token of such study before submitting his tender unit rates which shall be for finished work in site. He shall also carefully study the drawings and additional specifications and all the documents, which form part of the agreement to be entered into by the accepted tenderer. The Madras Detailed Standard Specifications and other documents connected with the contract such as specifications

plans descriptive specification sheet regarding materials, etc. can be seen at any time during office hours on office days in the Office of the Executive Engineer/Assistant Engineer Division/Subdivision.

A copy of the set of contract documents can also be had on payment of Rs for each set.

9. The tenderer's attention is directed to the requirements for materials under the clause "Materials and Workmanship" in the "Preliminary Specification". Materials conforming to the Indian Standard Specification shall be used on the work, and the tenderer shall quote his rate accordingly.

10. Every tenderer is expected before quoting his rates, to inspect the site of the proposed work. He should also inspect the quarries and satisfy himself about the quality and availability of materials. The names of quarries, kilns, etc. where-from certain materials are to be obtained will be given in the Descriptive Specification Sheet. The best class of materials to be obtained from the quarries or other sources defined shall be used on the work. In every case, the materials must comply with the relevant standard specification. Samples of materials as called for in the standard specification, or in this tender notice, or as required by the Executive Engineer in any case, shall be submitted for the Executive Engineer's approval before the supply to site of work is begun. If the Contractor after examination of the source of materials defined in the Descriptive Specification Sheet, is of opinion that materials complying with standard or other specifications of the contract cannot be obtained in quality or sufficient quantity from the source defined in the Descriptive Specification Sheet, he shall so state clearly in his tender and state wherefrom he intends to obtain the materials subject to the approval of the Executive Engineer.

The Government will not, however after acceptance of a contract rate pay any extra charges for lead or for any other reasons, in case the contractor is found later on to have misjudged the materials available. Attention of the contractor is directed to the Standard "Preliminary Specification" regarding payment of seigniorage, tolls etc.

11. The tenderer's particular attention is drawn to the Sections and Clauses in the Standard "Preliminary Specification" dealing with:-

- 1 . Test, inspection and rejection of defective materials and work.
2. Carriage.
- 3 . Construction Plant.
4. Water and Lighting.
5. Cleaning up during progress and for delivery.
6. Accidents.

7. Delays.

8. Particulars of Payment.

The contractor should closely peruse all the specification clauses, which govern the rates, which he is tendering.

12. In consideration of the tenderer being allowed to quote for the work, he should keep the tender firm for a period of months from the date of opening the tender during which period or till the tenders are decided whichever is earlier, he will not be free to withdraw the tender. Any such withdrawal will entail forfeiture of the earnest money deposited for the work.

Due to departmental or administrative reasons it is found necessary to keep tender open for a further period, prior consent of the tenderer shall be obtained in writing for every further period of one month.

13. Before commencing work or within a week after the date when the acceptance of tender has been intimated to him, the tenderer shall deposit a sum sufficient to make up the balance of 4 per cent of the probable value of contract which together with the amount of earnest money deposited shall be treated as security for the proper fulfilment of the same and shall execute an agreement for the work in the P. W. Schedule form. If he fails to do this or in the case of P. W. contracts maintain a specified rate of progress (to be specified in each case in the tender schedule) the earnest money and security deposit shall be forfeited to Government and fresh tenders shall be called for or the matter otherwise disposed off. If as a result of such measures due to the default of the tenderer to pay the requisite deposit, sign contracts or take possession of the work, any loss to Government results, the same will be recovered as arrears of Revenue, but should it be a saving to Government, the original Contractor shall have no claim whatever to the difference. Recoveries on this or any other account will be made from the sum that may be due to the Contractor on this or any other subsisting contracts or under the Revenue Recovery Act, or otherwise the Government may decide.

Note:-If the amount of contract doesnot exceed Rs. 5 lakhs the amount of security will be 4 per cent. If the amount of contract exceeds Rs. 5 lakhs the amount of security will be 2 per cent, subject to a minimum of Rs. 20000.

14. The acceptance of the tender rests with the..... who does not undertake to accept the lowest or any particular tender.

15. The right to carry out the work either in conformity with or in a manner entirely different from the terms of this invitation that may be considered most suitable before or subsequent to the receipt of tenders due to exigencies of work, is reserved with the Department.

16. Drawings, Schedule of quantities specifications of work to be done and conditions of contract to be entered into can be seen at the office of the undersigned and/or of the :..... Engineer on any working day during office hours or purchased from the Executive Engineer's Office on payment of a cost of Rs..... per set.

It shall be definitely understood that the Government does not accept any responsibility for the correctness or completeness of the schedule, that the schedule is liable to alteration by omission, deduction or addition at the discretion of the competent departmental Officer or as set forth in the conditions of contract. The tenderer will however base this tender amount in the case of lump sum tender, on the basis of those quantities etc.

17. Printed Departmental forms of tender and general specifications can be obtained from the office of the undersigned at a cost ofRs.,.....each. Tenders not submitted in such printed forms, or submitted incomplete in any respect whatever, such as unattested errors and corrections in rates, quantities, units or amounts (figures not expressed in words) totals of contract not entered etc, shall be liable to summary rejection.

18. The Earnest Money Deposit of the unsuccessful tenderers will be refunded immediately after tabulating the tenders, keeping only the earnest money of the first 3 lowest tenders.

The Earnest Money Deposit of the remaining unsuccessful tenderers will also be refunded within a week from the date of acceptance of the tender

19. Solicitors' fee, if any, to be paid to the Law Officers of Government for scrutinising or drawing up of agreements will be paid and the same recovered from the successful tenderer.

20. Tenderers must also state in their tenders if they are prepared to carry out at their tendered rates such portion or portions of the work as may finally be allotted to them by the Officer deciding tenders.

21. Any further information necessary can be obtained at the Office of the undersigned on all working days during office hours.

22. The work should be completed in all respects in months from the date the order to start work is issued and in any case not later than 19 ...

23. *Payment on lump sum basis or by final measurement at unit prices.*-(a) Final measurements need not be taken unless either the contractor or the Executive Engineer claims extras to, or deductions from, the quantities of Schedule A.

(b) In case final measurements are claimed, they shall be taken only for those items for which either the contractor or the Executive Engineer claims final measurements and the quantities of the remaining items in Schedule A shall be accepted as correct. The lump sum amount mentioned in the agreement will then be varied by addition there to or deducting there from as the case may be the difference (if any), between the amounts mentioned in Schedule A for such items and the amounts arrived at by calculation at contract rates based on the revised quantities For the same, obtained by the final measurements aforesaid.

(c) It shall be accepted as a condition of the contract that the payment of the final bill to the contractor less the withheld amount and his acceptance thereof shall constitute a full and absolute release of Government from all further claims by the Contractor under the contract.

(d) Payment for additions and deductions for omissions. No authorised variation shall vitiate the contract, but additions and omissions shall be measured up and dealt with in accordance with Clause 23 (b).

(e) *No payment for unsanctioned extras.*-It shall be distinctly understood that no payment whatever will be made to the contractor for variations by way of extras, in cases where such variations have been made without the written sanction of the Executive Engineer.

24. Arbitration.- In case of any dispute or difference between the parties to the contract either during the progress or after the completion of the works or after the determination abandonment, or breach of the contract as to the interpretation of the contract, or as to any matter or thing arising there under except as to the matters left to the sole discretion of the Executive Engineer under clauses 20, 27 (c), 29, 36, 37 and 40 of the preliminary Specification, or as to the withholding by the Executive Engineer of payment of any bill to which the contractor, may claim to be entitled; then either Party shall forthwith give to the other notice of such dispute or difference and such dispute or difference shall be and is hereby referred to the arbitration of the Government Arbitrator, appointed in G. O. Ms 78/P.W. dated 12-7-1970 mentioned in the 1 Articles of Agreement" (hereinafter called the "arbitrator") and the award of such arbitrator shall be final and binding on the parties. Provided however that in cases where the Executive Engineer has entered into the contract on behalf of the Governor, the dispute or difference shall, in the first instance, be referred by or through the Executive Engineer to the Superintending Engineer of the Circle, in which the work lies and his decision thereon obtained before referring such dispute or difference to arbitration under this clause. Progress of the work shall not be suspended or delayed on account of the reference of any dispute or difference to the Superintending Engineer of the Circle in which the work lies or to arbitration under this Clause. The decision of the Executive Engineer or the Superintending Engineer of the Circle in which the work lies, as the case may be, on such dispute or difference shall be conclusive until reversed by the Superintending Engineer or the arbitrator. Either party may within a period, which shall be fixed by the arbitrator, file before the arbitrator a statement of the case and also all the documents relating to or having a bearing on the case. The arbitrator shall see that the award is passed, if reasonably possible within a period of four months from the date of his entering upon the reference, but if any extension of that period is considered by him to be necessary, either suo moto or on the application of either party to the reference the parties hereby agree and consent to such extension as the arbitrator may from time to time consider reasonably necessary, and any such extension shall forthwith be communicated by him in writing to each of the parties hereto. The arbitrator shall not be bound to observe the ordinary rules of procedure applicable to trials before judicial tribunals nor to hear or receive formal evidence but may pass an award on the documents or statements of the case filed by both the parties and/or on personal inspection. The arbitrator shall have power to view the subject matter of the dispute with or without the parties or their agents. The arbitrator shall also have power to open up review and revise any certificate, opinion, decision requisition or notice, save in regard to the matters expressly excepted and to determine all matters in dispute which shall be submitted to him and of which notice shall have been given as aforesaid, in the same manner as if no such certificate, opinion decision, requisition or notice had been given. Upon every and any such reference the costs of and incidental to the reference and award respectively shall be in the discretion of the arbitrator, subject to the condition that the amount of such cost to be awarded to either party shall not in respect of a monetary claim exceed the percentage set out below of

any such award irrespective of the actual fees, costs and expense incurred by either party provided that where a monetary claim is disallowed in full, the said percentage shall be calculated on the amount of the claim. The arbitrator may determine the amount of the cost to be awarded or direct the same to be taxed as between solicitor and client or as party and party and shall direct by whom and to whom and in what manner the same shall be borne and paid.

The percentage above referred to in this claims are 5 per cent on any such monetary award which does not exceed Rs. 10,000, 3 per cent on the next Rs. 40,000 or any part thereof, 2 per cent on the next Rs. 50,000 or any part thereof, and 1 per cent on any excess over Rs. 1,00,000:

Provided that Government shall not be liable to any claim in respect of any such dispute or difference until the liability and the amount thereof shall have been referred to and decided by the arbitrator.

25. The contractor shall not without the previous sanction in writing of the authority accepting the tender, execute any power of attorney in respect of any matter, touching this contract, and any such power of attorney executed without such sanction shall not be recognised by or be binding upon Government or their Officers. It shall be entirely within the discretion of the authority accepting the tender either to grant such sanction or to refuse it or to revoke a sanction once given.

26. No part of the contract shall be sublet without written permission of the Executive Engineer nor shall transfer be made by power of attorney authorising other to receive payment on the contractor's behalf.

27. The Executive Engineer or other sanctioning authority reserves the right to reject any tender or all the tenders without assigning any reason therefore.

28. Cement and M. S rods required for the work will be supplied departmentally from the District Stores and their value recovered at Rs per bag of 59 Kg. of cement and Rs per/Kg. of M. S. rods. Cement and rods as well as other materials so issued shall remain the property of Government though in contractor's custody and shall not be removed from the stores at work site except under written authorisation by a competent authority not less than the rank of a junior Engineer.

29. Any other materials available in Departmental stores if issued to the contractor will be recorded at book value or issue rate plus 20% supervision charges or market value or data rate whichever is higher. The fixing of market rate will be governed as per clause 33.

30. The contractor will be exempted from payment of seigniorage for rubble and metal quarried from P.W.D. quarries exclusively for P. W. D. work. If the P. W. D. quarries are not situated within a convenient distance from the site of the work, the contractor's quoted rates shall be inclusive of seigniorage, ground rent etc., that may be payable to the owners of private quarries.

31. In making payment the total amount of the bill will be rounded off correct to the nearest rupee if the amount is above Rs. 25 and to the nearest paise if the amount is below Rs. 25.

32 (a) When power rollers (which term includes Steam and Diesel Rollers), are hired out to contractors, hire charges for the rollers (which include cost of lubricating oils, grease, small stores and establishment charges, but exclude cost of fuel), shall be recovered at the rate of Rs - per day of eight hours for the full period the roller is hired out to the contractor, including non-working days except for authenticated periods of breakdown of the roller for the full working hour's of a day; that is 8 hours from 8 a.m. to 5 p. m. (including one hour's interval for lunch) and for Sundays and other public holidays, if there is no work on these days.

The daily rate of hire fixed by the Chief Engineer shall be for a day of 8 hours or part thereof, between 8 a. m. and 5 p. m. with one hour's interval for lunch.

(b) If there is work on Sundays and other public holidays, the hire charges for the rollers, shall be recovered at the rate of 1.20 times the rate for normal working, days.

(c) When power rollers are worked on any day in excess of eight hours (that is outside the normal working day between 8 a. m. and 5 p. M.) hire at the rate of 1.20 times the hourly rate applicable for that day (based on the rate for 8 hours) shall be levied for every extra hour or part thereof.

The average out-turn expected from a power roller for a day of 8 hours shall be fixed by the Chief Engineer (Buildings & Roads) for the various items of road work. A variation of plus or minus 12% may be allowed to this average. If the daily out-turn from the roller falls outside the permissible variations, the contractor shall be charged at one and a half times the rate of normal hire for the day, specified for the roller concerned.

However, this clause shall not be applicable in cases where the variation is due to authenticated periods of break-down of the roller or inclement weather.

32-A. In addition to the hire charges, necessary water, split firewood, diesel oil (fuel oil) or powerine, as the case may be, required for the efficient working of the power roller, shall be supplied by the contractor at his cost.

33. Value of quantities of the departmental materials issued for the work either allowed to deteriorate or unaccounted for, amounting as it does to an excess supply over the sanction requirements, shall be recovered at book value or issue rate plus 20% supervision charges or market rates whichever is higher with sales tax and in addition, specific penalty rate stipulated by the Department Market value will be the retail selling price of the materials in the locality of the work or the nearest market town current on the day of issue, or recovery which is more. - The Executive Engineer shall obtain the information and record within 7 days of such issue, sending a copy to the Contractor. The decision of the Chief Engineer regarding the current market rates shall be binding on the contractor,.

34. Tenderers should declare they are not related to any Government servant, who is in charge of or having control of the work. Relationship in this will be restricted to father, mother, son, daughter, brother, sister, direct uncle, nephew, father-in-law, brother-in-law, mother-in-law, sister-in-law, and first cousin of the officer concerned. If the above condition is found to

have been contravened, when they tender the earnest money security deposit of the tenderer /tender will be forfeited and the contract entered into will stand cancelled.

35. The contractor will provide his own tools and plant, store sheds to store his own materials as well as those supplied by the Department and will be entirely responsible for proper use and safe custody of the latter and also for any loss, damage, theft, mishandling, weathering or any cause what so ever.

36. If different rates quoted for the same specification of work at the same site/in different appendices of the schedule, and the lowest quoted rate will be accepted for the items in all the appendices.

37. The contractor shall be responsible for the safety of the labour employed by him and he shall be liable to pay the necessary compensation in case of accidents, as per the Workmen's Compensation Act.

The contractor will also be liable to abide by the fair wage clause condition attached separately.

38. Empty bags, of cement used on the work need not be returned to the departmental stores. Value of empty cement bags will be recovered at rates fixed by the Department from time to time.

39. If the department undertakes to supply particular materials no claim for extra payment on account of delay in the supply of these materials will be entertained.

40. In the case of construction of steining to wells, excessive tilts if any occurring to the extent which is more than the percentage allowed as per rules will have to be rectified by the contractor at his own cost and if the contractor fails to attend to the same it will be got attended to by other agency and the cost thereof recovered from the original contractor.

41. The contractor should take a licence under the current explosive rules to enable him to manufacture and possess the quantity of gun powder required by him for blasting, if necessary.

42. The contractor shall employ engineering personnel as detailed below for a period of one to two years according to the tenure of the contract paying Rs. 250 p.m. and Rs. 150 p.m. to the Engineering Graduates and Engineering Diploma holders respectively.

Cost of work executed	No. of personnel to be employed
For works costing from Rs. 2 lakhs upto Rs. 5 lakhs	One Engineering diploma holder
For works costing from Rs. 5 lakhs upto Rs. 10 lakhs.	One Engineering Graduate and one

	Engineering diploma holder
For works costing over Rs. 10 lakhs.	One Engineering Graduate and two Engineering diploma holders

43. Tenders which are not in conformity with this tender notice are liable to rejection.

44. This tender notice with the conditions stated herein will form part of the contract documents.

..... *Engineer or*

Division I Subdivision Officer.

For and on behalf of the Governor of Kerala.

KERALA PUBLIC WORKS DEPARTMENT

Forma of Tender

Division

Subdivision

Name of work

Date of issue

Address of Tender

Price 25 P.

KERALA P.W.D.

Specification

PART I-General

The rates tendered by a Contractor for the work shall include the cost of-

(a) All labour and supervision thereof, all materials, tools implements and plant of every description, ladders, cordage, tackle, etc., as well as the provision of safe and substantial

scaffolding required for the proper execution of the work in conformity with the specifications for the various items of work;

(b) Supplying the requisite agency with necessary equipments, to set out the work as well as to afford facilities for such examination of the work, as the Departmental Officers may, at any time consider desirable, as also to count, weigh and assist in the measurement, or check measurement of the work or materials;

(c) Providing and maintaining all temporary fences, shelters, lights, watchmen and danger signals and such other precautions as are necessary for the protection of the work or materials, as well as to protect the public and those connected with the work from accidents at the site of, or on account of the work ;

(d) All sheds mortar mills and mixing platform of every kind required for the proper execution of the work according to the specification

(e) All fees and royalties of materials; and

(f) Finally clearing away of all rubbish, surplus materials, plant, etc., on completion of the work and dressing and levelling off and restoring the site to a tidy condition, prior to handing over the work to the Division Officer or his authorised assistant and also its maintenance until so taken over.

2. In the case of supplies of materials such rubble, broken stones, gravel sand, etc. which may have to be measured prior to being used on the work the Contractor must always stack or arrange them neatly on level ground or on ground cleared and levelled by him for the purpose in such manner as may be ordered by the Officer-in-charge so that they may be easily susceptible of inspection and measurement, the cost of such clearing, levelling and stacking or arranging being included in the rates for work. Each stack must be straight and of uniform section throughout and of the dimensions specified by Officer-in-charge. Materials not stacked or arranged in accordance with instructions issued will not be measured and paid for.

3. The Contractor shall be bound to bear the expense of defence of any action or law proceedings that may be brought by person for any injury sustained owing to neglect of above precautions in connection with the execution of the work, and to pay any damages and cost which may be awarded in consequence.

4. The Contractor shall also help himself out of any difficulties of penalties arising from interference with private property in the execution of the contract.

5. The tenderer should state whether he has all the plant necessary for the execution of the work. If, in the opinion of the Division Officer, Contractor's own plant is neither sufficient nor suitable for the proper execution of the work, the Department may supply other available plant and recover reasonable hire for the same. The Division Officer's decision in the matter shall be final and binding on the Contractor.

6. The Contractor shall bear the running expenses inclusive of pay of the departmental staff attached to such plant and cost of repairs of all Government plant while in his possession on hire as also the cost of restoring the same in good condition at the time of return, due allowance being made for fair wear and tear.

7. All materials and plant that are to be made over to the Contractor by the Department shall be handed over to him at the Division Office or Store Yards at Division Head quarters or the P.W.D. District Stores and the charges, for their handling, loading and unloading, and conveyance to and fro for the respective work as also for stacking the materials neatly and in regular heaps on the ground or sheds to which they are brought shall be deemed to be included in the rates for the work.

8. Unless otherwise specifically provided for in the contract, the Contractor shall at his own cost keep all portions of the work free from water whether due to springs, soakage, or inclement weather and in a neat and sanitary condition and shall also see that drainage and sewage are prevented from entering the site of work or accumulating therein.

9. The contractor shall be responsible for the proper use and bear the cost of protection of materials made over to him by the Department for use on the work and bear any loss from deterioration or from faulty workmanship or any other cause. The cost of materials thus allowed to deteriorate amounting as it does to an excess issue over sanctioned quantities, will be recovered at rate 20 per cent over the actual cost. The orders of the Division Officer in the matter shall be final and binding on the Contractor.

10. The Contractor shall be responsible to see that the level or other pegs, profiles, bench marks, masonry pillars or other marks set up by the department for guidance in the execution of the work are not disturbed, removed or destroyed. If any such marks are in the opinion of the Division Officer found disturbed, removed or destroyed, they will be replaced by the department at the cost of the Contractor.

11. Any materials brought to the site of work, or any work done by the Contractor but rejected by the Officer-in-charge as being not up to the specifications shall in the case of materials supplied be then and there removed from or broken up at the site of work, and in the case of work done be dismantled or rectified at the expense of the Contractor as may be ordered by the Officer-in-charge.

12. In all cases whether so specified in the contract or not, the work shall be executed in strict accordance with the Contractor's accepted tender and these specifications and with such further drawings and specifications and orders as may from time to time be issued by the Division Officer.

13. Whenever the Contractor is ordered by the Division Officer or his authorised assistant or subordinate to execute any item of work which is not in the tender, it shall be the Contractor's duty to get a special price arranged for the item and to see that it is written in the workspot order book (which shall be provided by the Division Officer and kept in the work by the subordinate in charge) and that this order is initialed and dated by the Contractor and the Officer ordering that particular item of work. For any extra item executed by the Contractor and

not so entered in the workspot order book and initialed both by the Contractor and the Departmental Officer ordering such ex -m that Contractor shall have no claim for extra payment.

14. Any dispute that may arise between the Division Officer and the Contractor the contract, shall at the instance of either party be referred to the Chief Engineer, Kerala P. W. D. whose decision given in writing shall be final, conclusive and binding. The Division Officer may at his discretion delegate in writing, to any of his subordinates any of his powers regarding these specifications.

Specifications

Part II	Materials.
Part III	Work

(As current in the Kerala Public Works Department)

Signature of Tenderer

Date

(Sd.)

Chief Engineer.

KERALA DEPARTMENT

FORM OF TENDER

Name of work

To

The Governor of the State of

(hereinafter referred to as Government)

Sir,

1/We do hereby tender to execute t c works enumerated in the Schedule accompanying in accordance with the terms in your tender notification dated..-..... and specifications and conditions of contract in force in Kerala P. W. D.

2. Copy of the specifications duly signed is also enclosed.

3. 1/We further agree to complete the whole work in weeks/months from date of receipt of order to start work, and/or in the case of Place works, maintain the minimum rate of Progress specified in the Tender Schedule.

4. 1/We do / do not agree to accept and carry out such portions of the work included in my/our tender as may be allotted to me/us if the work be not given to me/us.

5. In consideration of 1/We being registered as a contractor in the Kerala P. W. D. and invited to tender, 1/We agree to keep the tender open for acceptance days from the due date of submission thereof and not to make any modifications in its terms and conditions which are not acceptable to Government.

A sum of Rs is hereby forwarded in cash/treasury chalan/deposit at Receipt of a Scheduled bank as earnest money. If 1/We fail to keep the tender open as aforesaid or make any modifications in the terms and conditions of the tender, which are not acceptable to Government.

OR

If after the tender is accepted, 1/We fail to execute the agreement as provided in clause 13 of Tender Notification or to commence the execution of the works as provided in the conditions, 1/We agree that the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely and also recover from me/us the entire loss that may be caused to government by the re-tender or re-arrangement of the work or otherwise under the provisions of the Revenue Recovery Act or otherwise (vide G. O. (P) 2451761 PSV dated 19- 11- 1976).

Aoc.-(i) Tender Schedule. 1

(ii) Earnest money Rs. /in

(iii) Signed copy of Specification

(iv) Signed copy of plan

Usual signature of Tenderer

Full Name

Nationality

Place of residence

Date of submission

TENDER SCHEDULE

N.B.- (1) All rates to be inclusive (2) Rates to be entered in words in remarks column. (3) The amount of the tender should be filled up and totalled by subheads by the tenderer excepting for items for which quantities are not given in the schedule.

Approximate quantities			Description of items of work	Unit	Tendered inclusive rate per unit	Amount	Remarks (Here enter rate in words)
Name of Appendix	Estimate item No	Quantity					
1	2	3	4	5	6	7	8
			Carried over				

THE SCHEDULE (Contd)

Approximate quantities			Description of items of work	Unit	Tendered inclusive rate per unit	Amount	Remarks (Here enter rate in words)
Name of Appendix	Estimate item No	Quantity					
1	2	3	4	5	6	7	8
			Brought forward				
				-----	-----	-----	-----
			Grand Total				

APPENDIX XV (c)

(Referred to in para 15. 5. 1)

Earnest Money

1. Earnest money may be produced in one or other of the following forms.

(a) Chalan receipt from a Government Treasury. The Chalan will be countersigned by authorised departmental officer in the office from where tender was purchased. The earnest Money deposit has to be credited to Revenue Deposits

(b) Draft on a scheduled bank made payable to the officer who has invited tenders.

(c) Deposit-at-call on a scheduled bank pledged in the favour of officer who has invited tenders.

2. Cash remittance is not normally accepted. The officer receiving the tenders may if he considers necessary relax this rule and permit cash being received in special cases.

APPENDIX XV (d)

(Referred to in para 15. 9. 1.)

Form of Selection Notice to be issued to Contractors

No.

To

Shri

.....

.....

Sub:-

Ref:-

With reference to the above, Contractor Shri

..... is hereby informed that his quotation/tender above work has been accepted at the rates quoted by him which are mentioned in the accompanying schedule against the respective items or work. He is directed to attend this office on or before with the required stamp paper and receipted chalan for the security mentioned below and execute an agreement and start work within a week after getting necessary instructions from the Engineer.

1. Before executing the agreement on stamp paper, the contractor should deposit in the P. W. Deposit, a security of Rs for the fulfillment of the contract for which the necessary declaration form or chalan can be had from this office.

2. Any failure in this direction will be liable to result to forfeiture of his special and permanent earnest money and the cancellation of the proposed contract and the contractor shall be liable, to pay the Government the entire loss that may be caused to Government by

the re-tender or re-arrangement of the work or otherwise consequent on the contractor's failure to execute the agreement or execute the work as provided for in clause 13 of the Notice Inviting Tenders and all such loss shall be recovered from him under the provisions of the Revenue Recovery Act or otherwise. [vide G.O. (P) 245/76/PW dated 19-11-1976].

3. It must be understood that on no account will rates once fixed be increased.

4. The work should be completed by the

5. All the terms and conditions of the Notice Inviting Tenders and tender shall be binding on the contractor [vide G.O. (P) 245/76/PW. dated 19-11-1976].

Engineer

APPENDIX XV (e)

(Referred to in para 15. 9. 5.)

Form of Agreement Register

Agreement No	Date of agreement	Name of work	References to estimate sanction	Amount of estimate	PAC	Name of contractor	Date of completion	Extended date of completion if any	References to supplemental agreement	Security
1	2	3	4	5	6	7	8	9	10	11

APPENDIX XV (f)

(Referred to in para 15. 2.10.)

Register of sale of tender forms

Name of work.....

Tender No.....

Last date of sale of forms.....

Total No of tender forms for sale

[Ref: to item(s) No. in the register of valuables]

Serial No. of tender forms	Date of issue	To whom issued	Value realised	Cash receipt number	Initials of Junior Supdt./ Head Clerk	Remarks
1	2	3	4	5	6	7
Total number sold						
Balance [taken over to the register of valuables]						

NOTE: 1. Use separate page for each tender

2. If number of line is insufficient carry over to another page.

On the last date of sale close the page of register and total the number of forms sold and balance remaining.

CHAPTER XVI

EXECUTION OF WORKS THROUGH CONTRACTORS

16.1. Handing over of site.

16. 1. 1. After the award of contract and after the contractor deposits the required security and signs the agreement, the site has to be made available to the contractor for carrying out the works. A joint inspection of the site should be made by the junior Engineer and the contractor or his authorised representative and the area of operations for the contractor should be pointed out to him.

16.1.2. An acknowledgement in the form given in Appendix XVI (a) may then be got signed by the contractor or his representative after the site is handed over. If, however, this form could not be got signed then, a letter indicating the date when the site was made available should be sent to the contractor by registered post by the Junior Engineer and copy sent to the Assistant Engineer and Executive Engineer. The address given by the contractor in his tender should be utilised for this purpose.

16.2. Clearing site before commencement.

16.2. 1. The area to be cleared should be marked out by the Junior Engineer. This area should be cleared of all obstructions, loose stones, non-required materials and rubbish of all

kinds. All brushwood shall be cleared and the roots entirely grubbed up. No trees are to be cut down and removed without the instructions of the Assistant Engineer. Those, which are cut down, shall be grubbed up. The same remarks apply to jungle clearance. Trees to be preserved should be defined in an addendum specification to be sent to the contractor.

16.2.2. The products of the clearing are to be stacked in such place and manner as may be ordered by the Assistant Engineer and the ground shall be left in a perfectly clear condition. All products of the clearing shall be the property of Government and shall be disposed of, as the Assistant Engineer may direct.

16.2.3. All holes or hollows, whether originally existing or produced by digging up roots shall be carefully filled up with earth, well rammed and levelled off as may be directed.

16.3. Work-spot Order Book.

16.3.1. A work spot order book should be maintained at site of all works costing above Rs. 20,000. This is intended to help the Department in watching the progress of work and to keep a record of orders issued, at site by inspecting officers. Whenever such orders require sanction of any higher authority, it is incumbent on the officer issuing the order to address the appropriate authorities and to obtain necessary sanctions.

16.3.2. The instructions and orders issued through the workspot order book are binding on the departmental subordinates in charge of the concerned work. Copies of orders noted in the workspot order book should be sent by the subordinate keeping the book to the Junior Engineer and Assistant Engineer. So far as the contractor is concerned, all important instructions should also be intimated in writing to him since a mere order or remarks by any officer in the workspot order book is not binding on him nor will this affect the terms of the contract in any manner.

16.3.3. Similarly the contractor is not entitled to prefer any claims based merely on the observations and orders noted by the departmental officers in the workspot order book at the time of their inspections.

16.3.4. In case there is more than one Work Superintendent the Junior Engineer in charge will decide which Work Superintendent shall maintain the workspot order book.

16.3.5. It shall be printed with machine numbered pages. Each page shall have two tear off sheets below it so that all entries will be copied in the tear off sheets by carbon process. The tear off pages are intended to be submitted to Junior Engineer and Assistant Engineer.

The sample form of the book is given in Appendix XVI (b).

16.3.6. The book is to be serially numbered in the Division and issues watched through a register as in the case of Measurement Books.

16.3.7. The Work Superintendent in charge should record in the workspot order book the day-to-day progress of the work, arrivals of materials at site of work.

Remarks of inspecting officers are to be noted in the column provided.

16 3.8. Work spot order book should invariably be perused and initialed (with date) by the Junior Engineer in charge during inspection whether he has any remarks to offer or not.

16. 3. 9. Work spot order book is not to be treated as a substitute for measurement book or field book-all measurements and levels etc. being entered only in the measurement book or field book concerned.

16.3. 10. Completed workspot order book is to be returned to the office where final payment is made and filed with the records of the concerned work.

16 3 11. The Work Superintendent is responsible for the loss or missing of pages of the workspot order book issued to him for a particular work.

16.4. Setting out works.

16.4.1. Before the contractor starts supplying materials or constructing temporary sheds, the junior Engineer should inspect the site with the contractor and point out the position where the stores should be stacked where labour lines may be put up etc. The work should then be set out on the ground as per approved drawings. The responsibility for proper setting out is that of the contractor as per terms of contract. It is however necessary that the setting out is checked by the departmental officers. Normally the Assistant Engineer should check the setting out at the commencement and at intermediate stages when necessary. If in the course of checking, the Assistant Engineer feels that the advice of any higher authority is necessary he may refer the matter to such higher authority and abide by his instructions. Setting out of small works costing Rs. 20,000 and below may be checked by the Junior Engineer.

16. 4. 2. All bench marks and setting out marks adopted for a work shall be of a permanent nature. It is desirable to have more than one bench mark and they shall be properly inter-connected to enable checking at a future date. The position of these bench marks and setting out marks should be shown on a sketch drawn in the field book or where no field book is employed, in the workspot order book.

16. 5. Approval of foundations.

16. 5 1. When the excavation of foundation is completed, the same should be inspected and approved by the Assistant Engineer. Where there is any doubt regarding the bearing capacity or suitability of the foundation soil the matter should be reported to the Executive Engineer or Superintending Engineer, for orders. In the case of small works costing below Rs. 20,000 if any variation on the width, depth and type of foundation is found necessary the Assistant Engineer himself may decide the matter. Where this involves additions cost, the matter should be reported to the authority who sanctioned the estimate.

16. 5. 2. In doubtful cases, load tests should be conducted on the foundation soil and if considered necessary, the Peechi Research Station or any other approved laboratory may also

be consulted. Unless otherwise provided for in the contract, all charges for testing of foundations shall be borne by the department but the contractor is expected to make necessary arrangements for such tests.

16.5.3. If, during inspection, it is found that the contractor has over excavated the foundation in excess by what is shown in the drawings, he should not be allowed to refill this with earth but, the additional excavation should be got filled up by concrete or masonry of such proportions as decided by the Executive Engineer. No extra cost is payable to the contractor on this account.

16.5.4. In some cases it may be possible to reduce the depth or width of foundation shown in drawings due to existence of harder type of soil or rock in particular localities. The Assistant Engineer in charge may decide on the alteration necessary in such cases and instruct the contractor accordingly. A report should also be sent to the Executive Engineer clearly indicating the change effected and the reasons therefore.

16.5.5. In the case of pile foundations, the set required for the last 10 blows should be previously determined and indicated by the officer who sanctioned the estimate and the driving stopped only after such set is obtained. A careful review of the set should be kept by the Junior Engineer in direct charge of the work and the records shown to inspecting officers. In doubtful cases, test loading should also be done over a single pile or group of piles. The cost of such load tests should be borne by department unless there is a condition that the load test will be done at the cost of the contractor. If piles have to be extended, further driving should be done only after the concrete at the junction gets set and hardened sufficiently. 28 days should be allowed between the date of concreting and further driving care should be taken to avoid kinks at the junction.

16.5.6. In the case of well foundations, if the well has attained a tilt and further steining has to be carried out, care should be taken to see that the axis of the extended steining follows the axis of the well already sunk or otherwise a bend may result which will make it difficult to sink further besides causing cracks. As far as possible tilts should be corrected then and there. Before the bottom of the well is plugged the Executive Engineer should approve the scaling, after getting it properly examined.

16.5.7. In the case of dams and other heavy structures the foundation after excavation and cleaning should be examined and approved by the Executive Engineer before concrete or masonry is laid.

16. 6. Old curiosities.

16.6.1. All old curiosities, relic coins, minerals etc., found in the excavation or pulling down shall be the property of Government. Should any ancient masonry or other old work of interest be opened up, or any religious edifice or relic be involved in removal or destruction in the execution of a work, a clear report on the matter should be sent to Government through the Chief Engineer and orders obtained before the demolition or removal of such works or relics. Similarly, regarding old curiosities coins etc., during excavation the Executive Engineer should consult the Collector regarding the disposal of the same.

16. 7. Quality control.

16.7.1. Every work has to be properly supervised to ensure that it is carried out in accordance with the required specifications. Till the Kerala Standard Specifications are finalised and adopted, the Madras Detailed Standard Specifications should be followed. Where there is no specification for a particular item in the KSS or MDSS, the specification of the item should be described in the item itself. In the absence of such a description, the appropriate Indian Standard Specifications should be adopted. Every officer and subordinate controlling the construction of any work should be fully conversant with these specifications. Quality control covers control of the quality of materials used in construction, control of temporary works such as form work, scaffolding. All these have to be completely watched and supervised and defects cured then and there.

16.7.2. The primary responsibility for quality control rests with the Junior Engineer who is in charge of the work. To enable him to discharge this responsibility he is generally assisted by one or more Work Superintendents or other subordinates who should be assigned particular jobs for supervising and control by them. It is the duty of the concerned subordinates such as Work Superintendents etc., to see that the quality of materials is upto required specifications, that the mortars prepared are of the proportions specified, that the scaffolding and other temporary works are properly made, and that the workmanship in the execution of the work is of the required standard. Any deviation from the standard prescribed should be forthwith reported by the concerned subordinate to the Junior Engineer for necessary action. In case it is impossible to rectify a defect later, the concerned subordinate should also instruct the contractor to hold up the defective portion of the work till a decision on this matter is taken by the junior Engineer. He should also then and there report the matter to the junior Engineer in writing.

If there are a number of works under the control of the Junior Engineer, which are being carried out simultaneously, the responsibility for primary supervision of the different works will be jointly shared by the junior Engineer and Work Superintendent or other subordinates in charge of the respective works. The Junior Engineer must divide his time between the several works suitably in accordance with the importance of the items of work under execution. Concreting and other important items of works should be so arranged that he is present when such items are carried out.

16.7.3. Important items of work such as R.C. work should be carried out only in the immediate presence of the Assistant Engineer or officers of higher status. The Assistant Engineer may delegate supervision of small items of R. C. work like lintels, covering slabs etc. to Junior Engineer in case he is unable to be present at the time of concreting. In all major works the Executive Engineer should decide the items which should be done in the presence of officers of the rank of Executive Engineer and the contractor informed and work arranged accordingly.

16.7.4. It is also the duty of the Assistant Engineer and other inspecting officers to check the quality of the work frequently during inspection and to see whether the specifications are being properly followed. If any bad work is noticed during such inspection, this should be ordered to be removed even though it might have been passed by the subordinate or by the

Junior Engineer. No claim for extra on this account can be made by the contractor as it is his duty to carry out the work according to specifications. In respect of works costing Rs. 2 lakhs and above Executive Engineer must send up Inspection Notes in the form given in Appendix XVI (c), after every inspection. A similar form of inspection note should be used by the officers above the rank of Executive Engineer when inspecting works costing Rs. 5 lakhs and above.

16.7.5. The quality of the materials on arrival at site should be checked by the Work Superintendent and if defective materials are supplied, the fact should be forthwith reported to the junior Engineer who will inspect the materials and give appropriate instructions.

16.7.6. Samples of important materials to be used by the contractor on the work should be obtained and examined by the Assistant Engineer and if approved, the approved sample should be kept at site for comparison with actual supplies. Any consignment which is below standard as per specification (or not according to approved sample) should be rejected and the rejected materials removed from site before further supplies are made. In, case any tests have to be conducted on materials supplied by the contractor, the same should be arranged forthwith and decision on the acceptability of the materials taken after such test.

16.7.7. Materials supplied by the contractor should be properly stored and protected against weather by the contractor so that there is no deterioration due to storage. Particular care should be taken to store cement free from getting damaged. Care should also be taken in respect of timber scantlings and planks which may get warped if improperly stacked, or which may get attacked by white ants if kept in damp floor. Similarly, lime should not be stored for long periods. Explosives should be stored only in suitable magazines, and not kept in store containing other materials even if the quantities of explosive materials is small. Inflammable materials like kerosene oil etc. should not be stored in thatched shed likely to catch fire easily. Sand and water buckets and fire protection devices should be available close to places where inflammable materials are stored.

16.7.8. *Use and care of departmental materials.*-Departmental materials issued to a contractor should also be brought to site and properly stored. Quantities issued from the departmental stores should be based on the rate of usage of such materials, and the time required for getting replacement. Every time an issue is made from the departmental stores, the fact should be intimated to the Junior Engineer in charge so that he can see whether the entire lot supplied to the contractor is brought to site or not. The Work Superintendent in charge should record a certificate in the workspot order book about the details of materials brought to site and then only the materials should be used for the work. The Junior Engineer in charge should compare this with the requisition and supply made from the stores and record a certificate about the actual receipt of materials. When any discrepancy is noticed, the contractor should be asked to explain it, and steps should be taken against him as per contract if such explanation is unacceptable. Similarly, the balance in the contractors' site store should be checked from time to time to see that there is no misuse of the departmental materials. The fact that such check has been done should be noted by the subordinate Work Superintendent in charge in the work spot order book. It may be noted that as per general conditions of contract, departmental materials are given only for use on the concerned work, and the contractor is not entitled to put these to any other use or transfer them to another work or otherwise dispose of them.

16.7.9 Care should also be taken to see that there is deterioration of the departmental materials brought to site. If any deterioration is observed by the departmental officers the defective materials should be isolated and steps taken for the disposal of the same in accordance with the terms of the contract. On no account should deteriorated materials be allowed to be used on work.

16.7.10. *Scaffolding*.-Scaffolding is the contractor's responsibility, but the departmental officer must ensure that the scaffolding provided is adequate and properly fixed together and strengthened so that workmen and others using them can carry on work with safety. The conditions specified in the safety code [Appendix XVI (d)] should be enforced.

16.7.11. *Staging and centering*.- In the case of contracts entered into by the Executive Engineer or higher officers the Executive Engineer should call for plans of staging and centering work proposed to be adopted by the contractors for important R.C. works. Similarly the Assistant Engineer in charge should call for and examine such plans in respect of contracts within his competence. If such plans are not satisfactory to the Executive Engineer or the Assistant Engineer as the case may be the contractor should be asked to make such changes in them as may be required.

16.7.12 For calculating the strength of staging or centering the weight of green concrete may be assumed as 2400 Kg. per cubic metre. The contractor shall make allowance for the deflection of forms and for shrinkage and settlement of staging or centering in addition to the allowance for dead loads, deflection, and camber, as shown upon the plans.

16.7.13 The Executive Engineer may require the contractor to use screw jacks or hardwood wedges to take up any settlement in staging or centering either before or during the placing of the concrete. All staging and false work should be built on foundations of sufficient strength to carry the load without appreciable deformation. On stable soils, like rock, shale, stiff clay and sands free from scour, spread footings may be used and shall be of size to be determined by the load to be supported. In other locations, the false work shall be supported on piles. The piles shall be spaced and driven to support the required loads without settlement. Staging and centering are part of the work and are not paid for separately.

16.7.14 *Forms* .The plan of the formwork proposed to be employed by contractor should be obtained and examined by the Executive Engineer in respect of contracts entered into by him or higher officers. In respect of contracts executed by the Assistant Engineer, the plans should be obtained and examined by the Assistant Engineer. If such plans are not satisfactory to the Executive Engineer or the Assistant Engineer as the case may be, the contractor should be asked to make such changes in them as may be required. In designing forms, concrete should be treated as a fluid weighing 2400 Kg. per cubic metre and in addition a live load of 700 Kg. per square metre on horizontal projection of surfaces should also be allowed. Forms shall be so designed and constructed that they may be removed without injury to the concrete. Blocks and bracings should be removed with the forms and in no case should any portions of the wood forms be left in the concrete. The forms must be so constructed, set and maintained that the finished concrete shall be of the form and dimensions shown on the plans and true to line and grade.

16.7.15 Forms used a second time should be thoroughly cleaned and should be free from bulge, splits or warps. All forms shall be mortar tight and rigidly braced to prevent distortion due to pressure of the concrete and other loads incidental to construction. In case of compaction of concrete by vibration, the forms shall be so designed as to withstand the effects of vibration.

16.7.16 The forms shall remain in place for the period required as per standard specification.

16.7.17 The foregoing specification for forms shall also apply to steel forms. The sheets used shall be of such thickness that the forms will remain true to shape. All bolt and rivet heads shall be countersunk. Clamps, pins or other connecting devices shall be designed to hold the forms rigidly together and to allow removal without injury to the concrete. Steel forms, which do not present a smooth surface or line up properly, shall not be used. Special care shall be exercised to keep steel forms free from rust, grease or other foreign matter, which would discolour the concrete.

16.7.18 All forms should be removed in a careful workmanlike manner as per specification.

16.7.19 *Mixing of Mortars*.-Mortars should be mixed according to the proportions specified for each item in the approved manner. If lime or surki mortar is employed there should be proper means of grinding the mortar i.e. suitable mill. In the case of small works however Executive Engineer may permit mixing of lime and or surki mortar in suitable trough instead of in mortar mills. Cement mortar and concrete should be mixed in mechanical mixers. The conditions of the mixer should be examined to see that it gives the proper speed with the full load, and that the mixing blades are in good order. Here also where the quantity required is small the Executive Engineer may permit platform mixing of cement mortar, and concrete.

16.7.20 In the case of cement concrete and mortar, the water cement ratio should be carefully controlled so that only just as much water is added as will give the required workability. Slump tests should be made frequently at all important work sites. Tests of bulkage of sand should be made now and then and the result used for correcting the quantity of sand to be used for mixes. Where volumetric mixing is done there should be measuring boxes to measure out quantities of aggregate. Where the mix is controlled by weight there should be suitable weigh batching equipments. As far as possible, cement concrete should be vibrated with suitable vibrators.

16.7.21 *Testing of concrete samples*: If the contract specifies that concrete samples should be tested, such tests should be carried out at intervals as provided therein. A record should be kept of the place where each day's concrete is laid so that in the event of any test result proving unsatisfactory, it will be possible to locate where the concrete as per that particular sample was laid. In such cases the remedial action to be taken should be decided by the Executive Engineer and carried out accordingly.

16.7.22. In general a complete record of the various types of mortar and concrete mixed and laid every day should be made in the workspot register book by the Work Superintendent.

16.7.23. Bending of reinforcement should be done according to rod bending schedule as per design. If there is no rod bending schedule attached to the approved drawings, a schedule should be prepared by the contractor and got approved by the Executive Engineer in the case of all important works costing Rs. 1 lakh and above. The bending should be done as per the drawing and in accordance with specifications. Care should be taken to minimise wastage.

16.7.24. When reinforcement rods are welded the details of the manner of welding and the electrodes to be used etc. should be got approved and the actual process of welding should be supervised to see that these specifications are followed. Random testing should be done on at least 1% of the number of joints.

16.7.25. In regard to woodwork particular care should be taken to see that the same is free from cracks, shakes, or blemishes of any kinds, dead knots, splits etc. If the defects are minor and will not affect the strength or durability the Executive Engineer may accept the woodwork at such reduced cost, as he considers justifiable. Also warped pieces should not be used. The dimensions should be carefully examined so that the thickness etc., given are available after the wood work is planed and worked. All woodwork must be inspected and passed by the junior Engineer before being fitted in position. In the case of doors and windows, before the frames and or the shutters are fitted in place, they should also be inspected and passed by the Assistant Engineer who should mark the accepted pieces suitably. If there is any doubt regarding the spares of timber supplied, the advice of the nearest Forest Officer may be sought through the Executive Engineer.

16.7.26. *Construction joints.*-In major works it may be necessary to masonry, R. C. work etc. The location and joints should be carefully thought out and officers in charge of the supervision of the work proposals. Similarly in many structures of R. C. or prestressed concrete, the sequence of concreting will be of considerable importance. The design Office or the officer who sanctioned the estimate technically should wherever necessary indicate the sequence of concreting which should be followed by the officer supervising the work.

16.7.27. *Finishing.*-This is a work which will require careful attention to details and should not be rushed through as the effect of bad finish will completely spoil an otherwise good work. Standards of finish should be prescribed by the designing authority and this should be scrupulously adhered to. If necessary, a sample of the finishing should be carried out in a small area and inspected and approved by the competent authority or by the Architect. Where special types of paint or other finishing materials are used, the manufacturer's directions in regard to the application of these should be obtained and faithfully followed.

In the case of buildings, colour schemes to be adopted will be specified by the Architect.

16.8. Progress of work

16.8.1. After the contract is awarded a programme of construction should be discussed and decided between the contractor and Executive Engineer. At frequent intervals the Junior Engineer should examine whether adequate progress is made according to the programme already drawn up. He should also send up the D form progress report. If adequate progress is

not shown, the contractor should be notified and asked to speed up. The matter should also be reported to the Assistant Engineer and Executive Engineer. At the same time, it should be examined whether any departmental delay has been caused, and if so, steps should be taken for rectifying the same. It has to be noted that the time of completion is an essential feature of the contract, and extension of time should not be given as a matter of course. If however there are adequate reasons justifying extension of time and the contractor applies for such extension before the expiry of the period of completion the authority who accepted the contract should be referred to for a decision on this matter. In making this reference, the subordinate officers concerned should give their own opinion on the grounds put forward by the contractor seeking the extension of time.

16.8.2. Inspecting officers should make it a point to see whether the progress attained is satisfactory and generally according to programme.

16.9. Working drawings

16.9.1. In the case of major works, it may occasionally be necessary to supply working drawings giving details of some portions of the work. Such working drawings may be prepared by the site officers or the contractor and may be adopted with the approval of the Executive Engineer. Where, however, there is any substantial variation contemplated from what is provided in the original design, modification should not be approved except with the approval of the authority who gave technical sanction to the estimate. Wherever necessary, approved working drawings may be made to form part of the contract.

16.10. Measurements

16.10.1. A bill is normally paid once every month or at suitable intervals according to particular stages of execution of a work. Measurements should be taken by the Junior Engineer in time so as to get the same checked and bills passed as per terms of contract. In the case of works which will be covered up later, the measurements should be taken prior to such covering and also got checked even though a bill may not be immediately due. Thus for instance, works on foundation, details of rods used for reinforcement in R.C. work, etc., should be measured before these are covered up and got checked. The same applies to supplies of sand, tar, etc., to be used in road surfacing.

16.10.2. All measurements should be recorded directly in the measurement book then and there as per instructions printed in the M. Book. It may so happen that there are L. S. items paid for on the basis of actuals subject to the maximum of L. S. quoted. To enable this condition being fulfilled, a watch of the actual expenditure should be maintained through a record of labour and materials employed. This record should be signed by the contractor and the departmental subordinate every day and also frequently checked by the Junior Engineer. A daily report should also be sent by the Work Superintendent to the Junior Engineer and Assistant Engineer.

16.10.3. When an item of work is measured in an incomplete stage, it is desirable that full and up to date measurements are recorded when the item is completed and quantities already paid for are deducted instead of measuring the 'since last' quantity.

16.10.4. All measurements, levels etc., should be taken in the presence of the contractor or his representative who should be duly notified when such measurement or levels are taken. The contractor or his authorised representative should be asked to sign on every page of the measurement book/field book in token of accepting such measurements. If any corrections are effected during check-measurements, these should be pointed out to the contractor and got attested.

16.10.5. The method of measurements to be followed is indicated in the standard data book in metric system. This should be followed. Where there is no specific direction in this matter in the standard data book, the Indian Standard method of measurement of building works should be followed (I.S. 1200-1964).

16.10.6. As a general rule, earthwork should be measured by level sections where the total quantities exceed 300 cubic metres and where the site conditions are such that level sections will give correct indications of the quantity of work involved. If site conditions are not suitable for working out quantities through level sections orders of the officer sanctioning the estimate technically should be obtained for taking measurements by borrow pits or through mattoes in cases where the total quantity exceeds 300 cubic metres.

Where level sections are taken for computing the quantity of earth works the initial levels and final levels should be entered in properly numbered field books. The entry should be made by an officer not lower in rank than a Junior Engineer. The initial levels and final levels should be checked by an officer next higher in rank, to the recording officer. Superintending Engineer shall approve level sheets and proposal for earthwork the estimate of which is sanctioned either by the Superintending Engineer or by the Chief Engineer. In other cases, the authority issuing technical sanction shall approve the level sheets and proposals as the case may be.

Permanent marks should be left in each cross section where initial levels are taken and case should be taken to prevent dislocation of such marks. [vide G. O. (P) 233/76/PW dt. 29-10-1976]

16.10.7. The cross sections and calculation sheets containing the calculations of the quantity of earthwork based on these level sections should be signed by the officer recording the same, as these are supporting documents for measurements recorded.

16.10.8. *Classification of earthwork for measurement.*- One of the usual causes for extra claims and excess over estimates has been the difference in the classification of earthwork between what is actually excavated and what is provided for in the contract schedule. To minimise the difficulties arising from this cause, the number of classifications for earthwork should be reduced to the barest minimum in inviting tenders for work as instructed in departmental Technical Circular 2/69 dated 20-3-1969 [Appendix XVI (c)]. In taking measurements of earthwork the measuring and check-measuring officer should group together all types of soil that come within the classifications specified in the contract i.e., an item of soil which is capable of being brought into the classification specified in the contract should be measured unless the existence of such soil has been pointed out by the contractor and the classification approved by the Executive Engineer prior to excavation.

16. 10. 9. *Check measurements*. -For check measurements of work, para 320 of the Kerala Public Works Account Code should be followed by the Assistant Engineers and Executive Engineers. If any corrections are effected in the Measurement Book at the time of check measurement they should be got signed by the contractor.

16.11. Deviation from estimates

16.11.1. No deviation from the sanctioned estimate which is likely to involve excess over the estimate cost should be done without orders from the competent authority. The competent authority for this purpose will be the authority who has the power to sanction the excess over the estimate. In exercising this power, the total excess involved in the work including this deviation under contemplation should be taken into account. All deviation which involve major structural alterations whether excess cost is involved or not should be reported to the authority who technically sanctioned the estimate and his approval obtained before effecting the deviation. Sanction to deviations of a minor nature may be given in the form of work slips. When the major alterations or excesses are involved, a revised estimate with comparative statement should be got sanctioned. It is necessary that this is done as and when the deviations are approved without waiting for the completion of the work.

16.12. Excess quantities over estimates

16.12.1. The officer in charge of supervision should be very careful to adhere to the estimate as far as possible and not carry out excess quantities as a matter of course. If, however, in any item excess over estimates quantity is inevitable and has to be carried out, the fact should be reported to the Executive Engineer for orders. If the excess is within the power of sanction of Executive Engineer, he may deal with the case himself without reference to higher authority at this stage. In taking a decision on this issue, the Executive Engineer must be guided by the overall excess that is anticipated in the work, not only due to the excess quantity concerned, but also due to other causes. Where the excess over the estimate is beyond the powers of sanction of the Executive Engineer, sanction of the competent authority should be obtained. In the meantime, if the excess in quantity of any particular item is unavoidable the work may be proceeded with and the fact reported to the authority competent to sanction the excess. Care has to be taken however to see that the excess is caused due to conditions unforeseen at the time of preparing the estimate. If the excess is due to additional works not contemplated in the estimate unless there is sanction of competent authority for the additional works, it will not be justifiable to carry out the excess work in anticipation of sanction.

16.13. General conditions of contract

16.13.1 Departmental officers in charge of any work should be thoroughly familiar with the general and special conditions of contract applicable to the work concerned. There are a number of obligations on the part of the contractor in regard to safety of the structure, protection to public and neighbouring property, maintenance of proper labour quarters, providing water supply and arranging sanitation thereto etc. Departmental officers in charge should exercise proper vigilance to see that these conditions are faithfully observed.

16.13.2. The following are a few of the general conditions to which attention should be particularly given: -

16.13.3 The contractor should provide and maintain at his own expense such temporary fences, guards, danger lights, bridges and roads that may be necessary for the execution of his contract work or for safeguarding the public.

16.13.4 The contractor should provide water from Municipal mains or other sources, for the use of the work and workmen.

16.13.5. The contractor should provide and erect prior to the commencement of the work, sufficient latrines for the use workmen, both males and females, and should keep the same disinfected and clean at all time during the progress of the work and remove the same and restore the original ground on completion of the works.

16.13.6. The contractor should pay not less than fair wages to labourers engaged by him on the work and should comply with the labour regulations made by Government from time to time and maintenance register and other register as required or the regulations. He should also submit the periodical returns required therein.

16.13.7 All rubbish shall be burnt or removed from the site as it accumulates. All floors, stairs, landings, doors, windows, drains etc, shall be cleaned and put in a thoroughly complete, clean state to the satisfaction of the Executive Engineer, and the contractor should be responsible for the maintenance of the works executed till it is taken over by the Executive Engineer.

APPENDIX XVI (a)

(Referred to in para 16.1.2)

ACKNOWLEDGEMENT FORM OF HANDING OVER THE SITE TO THE CONTRACTOR

Shri.

1. Name of work

2. Estimate amount

3. Agreement No.

I have this day..... taken over the site for the above work subject to the conditions in the notes below.-

Taken over

Contractor's signature with date

Countersignature of

Junior Engineer with date

Submitted to the Assistant Engineer/Executive Engineer.

NOTE:- (1) Handing over site in this context would imply making available the site for the contractor and his agents, workmen etc., to enter the site and carry on the work entrusted to him.

(2) This does not mean an occupancy right in the normally accepted sense of the word.

(3) In respect of maintenance work and works of additions and alterations to existing structure, the contractor's right of entry to the site and carrying on the work should be so exercised as not to cause hindrance or disturbance to the existing structures or occupants thereof.

(4) The Contractor should vacate the site and clear it of all debris etc., on completion of the work or when the contract is terminated.

APPENDIX XVI (b)

(Referred to in para 16.3.5)

SAMPLE FORM OF THE WORKSPOT ORDER BOOK

KERALA PUBLIC WORKS DEPARTMENT

WORKSPOT ORDER BOOK

Name of Division.....

Book No.....

[Vide G.O.(P) No. 185/73/PW dated 25.8.1973]

INSTRUCTIONS

1. The workspot order book is to be maintained in all cases when the estimated cost of work exceeds Rs. 20,000.

2. This Book will be maintained by the Work Superintendent/Overseer posted for supervision of the work and he will be responsible for its proper maintenance and safe custody.

3. After completion of the work, the book will be recorded in the office of the authority who gives technical sanction to the work.

4. Each book will be numbered serially and an account of the books maintained in the Division Office.

5. The instructions and orders issued through the workspot order book are binding on the departmental subordinates in charge of the concerned work. Copies of orders noted in the workspot order book should be sent by the subordinate keeping the book, to the Junior Engineer and Assistant Engineer. So far as the Contractor is concerned, all important instructions should also be intimated in writing to him.

6. The officers, as and when they inspect the work shall record their views in the workspot order book.

1. Name of work
2. Estimated cost
3. Do P.A.C
4. Agency for the work
5. No. and date of agreement
6. Date of handing over site
7. Date of commencement
8. Date of completion

AGREED SCHEDULE OF PROGRESS OF WORK

INCUMBENCY OF OFFICERS IN CHARGE OF WORK

Work Superintendent		Junior Engineer		Assistant Engineer		Executive Engineer	
Name	Period	Name	Period	Name	Period	Name	Period

PROGRESS OF WORK

Month

Progress

DEPARTMENTAL MATERIALS

REQUIREMENTS

ACTUALLY USED

Date of issue

Particulars

TOOLS AND PLANT

Date of issue

Particulars

INSPECTING OFFICERS ORDERS AND INSTRUCTIONS

Date and time of inspection	Name and Designation of the Officer	Orders and instructions issued

APPENDIX XVI (c)

(Referred to in para 16.7.4)

INSPECTION NOTE

Inspection Notes of

Date of Inspection Estimate amount

Name of work Date of contract

Name of contractor Date of completion as per agreement.....

1. What is the stage of progress at present
2. Is the general progress of work satisfactory/unsatisfactory/poor
3. Are there any special difficulties affecting the progress of the work
4. Is the supply of departmental materials satisfactory
5. Are there any designs, working drawings or special instructions required from the Department which might hold up progress. If so what action has been taken
6. Remarks on the quality of work done so far
7. Do you find any need for deviation from sanctioned estimate of any particular item. If so briefly indicate measures of the nature of deviation
8. Any special instructions to subordinate officers
9. General remarks:

APPENDIX XVI (d)

(Referred to in para 16. 7. 10)

SAFFTY CODE

1. Suitable scaffolds shall be provided for workmen for all work that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and hand-

holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than $\frac{1}{4}$ to 1 ($\frac{1}{4}$ horizontal and 1 vertical).

2. Scaffolding or staging more than 3.25 metres above the ground or floor, swung or suspended from an overhead support or erected with stationery support, shall have a guard rail properly attached, bolted, braced and otherwise secured at least 1 meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structures.

3. Working platform, gangways, and stairways shall be so constructed that they do not sag unduly or unequally, and if height of a platform or gangway or stairway is more than 3.25 meters above ground level or floor level, it shall be closely boarded, have adequate width and be suitably fenced as described in 2 above.

4. Every opening in floor of a building or in a working platform shall be provided with suitable means to prevent fall of person or materials by providing suitable fencing or railing with a minimum height of 1 meter.

5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 metres in length. Width between side rails in a rung ladder shall in no case be less than 30 cm. for ladders upto and including 3 metres in length. For longer ladders this width shall be increased at least 6 mm. for each additional 30 cm. of length. Uniform step spacing shall not exceed 30 cm.

Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect public from accidents and shall be bound to bear expenses of defense of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceedings to any such person or which may with the consent of the Contractor be paid to compromise any claim by any such person.

6. *Excavation and Trenching.*-All trenches, 1.5 metres or more in depth shall at all times be supplied with at least one ladder for each 30 metres in length or fraction thereof. Ladder shall be extended from bottom of trench to at least 1 meter above surface of the ground. Sides of a trench which is 1.5 metres or more in depth shall be stepped back to give suitable slope, or securely held by timber backing, so as to avoid the danger of 1.5 meters of edge of trench or half of depth of trench, whichever is more. Cutting shall be done from top to bottom. Under no circumstances shall undermining or undercutting be done.

7. *Demolition.*-Before any demolition work is commenced and also during the process of the work:-

- (a) All roads and open areas adjacent to the work site shall either be closed or suitably protected;
- (h) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by operator shall remain electrically charged;
- (c) All practical steps shall be taken to prevent danger to persons employed, from risk of fire or explosion, or flooding. No floor, roof or other part of a building shall be so overloaded with debris or materials as to render it unsafe.

8. All necessary safety equipment as considered adequate by the Engineer-in-charge shall be available for use of persons employed on the site and maintained in a condition suitable for immediate use; and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

- (a) Workers employed on mixing asphaltic materials, cement and lime mortars/concrete shall be provided with protective footwear and protection goggles.
- (b) Those engaged in handling any material which is injurious to eyes shall be provided with protective goggles.
- (c) Those engaged in welding works shall be provided with welder's protective eye shields.
- (d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
- (e) When workers are employed in sewers and manholes, which are in use, the Contractor shall ensure that manhole covers are opened and manholes are ventilated at least for an hour before workers are allowed to get into them. Manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to public.
- (f) The Contractor shall not employ below the age of 18 and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 are employed on the work of lead painting, the following precautions shall be taken:
 - (i) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.
 - (ii) Suitable face masks shall be supplied for use by workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scraped.
 - (iii) Overalls shall be supplied by the Contractor to workmen and adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

9 When work is done near any place where there is risk of drowning all necessary equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

10. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following:-

- (a) (i) These shall be of good mechanical construction, sound material and adequate strength and free from patent defects and shall be kept in good repair and in good working order.
- (ii) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.
- (b) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting machine including any scaffold winch or give signals to operator.
- (c) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of suspension, safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or of any gear referred to above in this paragraph shall be loaded beyond safe working load except for the purpose of testing.
- (d) In case of departmental machine, safe working load shall be notified by the Engineer-in-charge. As regards Contractor's machine the Contractor shall notify safe working load of each machine to the Engineer-in-charge, whenever he brings it to site of work and get it verified by the Engineer-in-charge.

11. Motors, gearing, transmission electric wiring and other dangerous parts of hoisting appliance shall be provided with efficient safeguards, hoisting appliances shall be provided with such means as will reduce to the minimum risk of accidental descent of load, adequate precautions shall be taken to reduce to the minimum risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energised, insulating mats, wearing apparel such as gloves, sleeves and boots, as may be necessary, shall be provided. Workers shall not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.

12. All scaffolds, ladders and other safety devices mentioned or described herein shall be, maintained in a safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near place of work.

13. These safety provisions shall be brought to the notice of all concerned by display on a notice board at a prominent place at the workspot. Persons responsible for ensuring compliance with the safety code shall be named therein by the Contractor.

14. To ensure elective enforcement of the rules and regulations relating to safety precautions, arrangements made by the Contractor shall be open to inspection by the Engineer-in-charge, or his representatives and the Inspecting Officers.*

15. Notwithstanding the above conditions 1 to 14 the Contractor is not exempted from the operation of any other Act or Rules in force.

*'Inspecting Officer' means any Labour Enforcement Officer or Assistant Labour Commissioner of the Chief Labour Commissioner's Organisation

APPENDIX XVI (c)

(Referred to in para 16. 10. 8)

No. METRIC 4169

Office of the Chief Engineer, General, Building
and Roads, Trivandrum, dated, 20-3-1969.

Departmental Technical Circular No.2/1969

Sub:-Classification of Earth Work items in Estimates and tender schedules for Road work.

(1) The current departmental data provides the following classifications under Excavation and Earth work.

- | | |
|---------------------|------------------|
| (i) Ordinary soil | vide item No. 51 |
| (ii) Hard soil | vide item No. 52 |
| (iii) Ordinary rock | vide item No. 53 |
| (iv) Hard rock | vide item No. 54 |

Normally these separate classifications are to be followed as such, only in cases where soils of various types exist in separately identifiable locations, and in more or less uniform strata.

(2) But, in almost all cases of road works where large quantities of earth work cutting are involved, soils of various types do not exist as such in separately identifiable layers or locations; but they exist in a more or less mixed condition, except perhaps in deltaic regions and coastal belts. Such naturally occurring mixture of soils are invariably excavated, conveyed and dumped in a mixed condition and it is practically impossible to separate the mixture into its various constituent varieties (classifications) of soil for separate measurements, to arrive at the quantity of each classification. In spite of best efforts, disputes regarding the classifications and

the quantities under different classifications are very common. Unfortunately these lead to unnecessary expenditure and loss to Government.

(3) Such a situation is often anticipated by some contractors even at the tender stage of a work and they take undue advantage of the situation by quoting very low and unworkable rates for certain classifications and high rates for certain others, presumably with the idea of raising disputes regarding classifications during or after completion of the work and interpreting the classifications in their favour. In other words, adopting different classification for earthwork in the *tender schedule* will give room for speculative tendering which helps only to lull the department into a false sense of cheapness at the initial stage of adjudication and settlement of tenders. It leaves the doors wide open for post tender manipulations. The initial illusion of cheapness will vanish during execution of the work and the lowest tenderer may possibly turn out to be the highest in the ultimate analysis, when the work is completed. This happens mainly because certain inherent practical difficulties are ignored while preparing the *tender schedules*. A few instances in which highly speculative tenders made out with the obvious intention of post-tender manipulations, have come to the notice of the Chief Engineer and Government recently. The question has therefore been examined in detail, with a view to devise ways and means of preventing such speculative tenders to safeguard the interests of Government.

(4) To eliminate all possibilities of deceptive and fictitious tendering resorted to by unscrupulous and speculative contractors, and to prevent post- tender manipulations and consequential loss to Government, the following directions are issued with regard to classification of earth work items in (A) estimates and (B) tender schedules.

(A) *Classification for Estimating purposes*.-When different types of soil are anticipated, particularly in major works involving large quantities of earth work in cutting the existing practice is to take trial pits at salient and representative locations and ascertain the thickness of the various classes of soil from ground level to the proposed formation level (or to level of hard rock which requires blasting if it is higher than formation level). *This should be Followed in future also and the quantity of earth work under the various classifications calculated separately on the basis of the determinations stated above*, and estimate framed as at present, providing individual quantity and rate for each classification. A typical example of such an estimate is enclosed as Appendix (A) to illustrate what is incant by the above. It is prepared on the assumption that all the four classifications mentioned in para (1) above 8 will be involved in the work. If in any particular case, any particular .i classification/s do not exist, then of course, the corresponding quantity/quantities (Q1, Q2, Q3, Q4) in the typical estimate will be zero.

(B) *Classification to be adopted in tender schedules*.- (1) The present practice is to adopt the estimate classifications verbatim for the tender schedule also. It is this procedure that leads to all the practical difficulties and loop-holes for post-tender manipulations mentioned in paras (2) and (3) above. Therefore it is hereby ordered that the quantities under all the various classifications in the estimate, *other than hard rock which requires blasting* shall be added and clubbed together as *one item under one combined specification as below:-*

"Earthwork for cutting in *all classes of soil (except only hard rock which requires blasting)* from the high reaches of the alignment and, conveying, dumping in layers and levelling in the

low places requiring filling, and compacting correct to profiles and formation levels as per drawing, instructions, and specifications, *including all leads and lifts involved.*"

The contractors shall be required to quote their own average rate for the total quantity noted in the tender schedule under the combined specification mentioned above.

(ii) When tenders are received there will be no need to compare the quoted average rate with the rates for the various constituent classifications adopted for estimating purposes only. It will be sufficient to compare the total of the amounts of such item in the estimate with the amount worked out for the combined item at the single average rate quoted.

A typical example of the application of the above procedure for preparation of tender schedule for the estimate exemplified in Appendix (A), is shown in Appendix (B) attached.

(5) In the case of quantities of earthwork in filling required to be done with the *the Contractor's own earth*, details of the leads, lifts, and modes of conveyance assumed or reckoned for preparing the estimate shall not be specified in the corresponding item of the tender schedule. Only the nature of soil (earth) required to be provided by the contractor (such as sand, gravelly earth etc.) shall be specified and the words "including all leads and lifts, and compacting as specified" added.

(6) The specification for item 53 of standard data book shall be modified as below in all the future *estimates* for road works.

"Excavating in ordinary rock and depositing on bank with initial lead upto 50 m. and lift upto 1.5 m including breaking clods, watering compacting and sectioning of spoil bank."

(7) Similarly the specification for item 54 shall be modified as below in all the future *estimates*.

"Blasting in hard rock and stacking the materials for measurement within the initial lead of 50 m.. and lift upto 1.5 m".

(8) All Superintending Engineers, Executive Engineers, Assistant Engineers and Junior Engineers are hereby instructed to study this circular carefully and see that the instructions are followed strictly from 1-4-1969 onwards in all cases of road work.

(Sd.)

For Chief Engineer.

APPENDIX A

Typical Estimates

[Vide para 4 (A) of Departmental Technical Circular No. 2/1969]

Sl No	Quantity	Description	Schedule item No.	Unit rate	Amount	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Q1	Earth work excavation in ordinary soil and depositing on bank with initial lead upto 50 m. and lift upto 1.5 m. including breaking clods, watering, compacting as specified and sectioning spoil bank correct to levels and profiles etc. complete-.	51	R1	Q1 x R1	= (A1)
2	Q2	Earthwork. excavation in hard soil including -do- -Do. -do.	(52)	R2	Q2 x R2	= (A2)
3	Q3	Earthwork in ordinary rock including- Do. -do.	(53)	R3	Q3 x R3	= (A3)
4	Q4	Add for extra lead of (X) metres and/or average lift of (Y) metres for conveying part of the cut spoil obtained in item@ 1, 2 and 3 above.	(59 and/or 58)	R4	Q4 x R4	= (A4)
5	Q5	Blasting in hard rock and stacking the materials for measurement within the initial lead of 50 m and lift upto 1.5 m.	(54)	R5	Q5 x R5	= (A5)

NOTE FOR GUIDANCE IN PREPARATION OF ESTIMATES

1. (Q1 + Q2 + Q3) is the total quantity of earth work involved in the whole work (other than hard rock which requires blasting). Q4 is only that portion of (Q1 + Q2 + Q3) which requires extra lead and/or lift for conveying and filling as per L. S. and G. S. sheets.

2 In working out the estimate rate for item (4) the actual average lead and/or lift over and above initial lead and lift only shall be reckoned.

APPENDIX B

Typical Tender Schedule

[based on the typical estimate in Appendix A (vide para 4 B) of the Departmental Technical Circular No. 2/1969]

Sl No	Quantity	Description	Unit rate	Amount	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
1	(Q1+Q2+Q3)	Earthwork for cutting in all classes of soil (except only hard rock which requires blasting) from the high reaches of the alignment and conveying dumping in layers and levelling in the low places requiring filling and compacting correct to profiles and formation levels as per drawings, instructions, and specifications <i>including all leads & lifts involved</i>	Rq	(Q1+Q2+Q3) x Rq	= (Ac)
2	Q5	Blasting in hard rock and stacking the materials for measurement including all leads and lifts involved.	Rr	(Q5) x (Rr)	= (Ar)

Points to be noted for scrutiny of tenders and preparation of tender tabulations (to accompany Departmental Technical Circular No. 211969).

1. Only the amount Ac has to be compared with the estimated amount of (A1+ A2 +A3+ A4) for ascertaining the tender excess or reduction for the combined earthwork item (1) referred to in the typical tender schedule.

2. If it is considered that the average estimated rate for the combined classification as given under item (1) of typical tender schedule is necessary, it can be worked out as follows:

$Ra = (A1+A2+A3+A4)/(Q1+Q2+Q3)$. But it may be seen that the percentage excess or reduction arrived at based on the quoted rate Rq and averse estimate rate Ra will be the

same as that arrived at based on the total amounts A_c and $(A_1 + A_2 + A_3 + A_4)$ of the typical estimate shown in Appendix. A.

CHAPTER XVII

MAINTENANCE OF ROADS & BRIDGES

17.1 General:

17.1.1. Roads in the State are classified under the following heads:-

- (a) National Highway,
- (b) State Highway,
- (c) Major District Roads
- (d) Other District Roads
- (e) Village Roads and Traces
- (f) Town and Municipal Roads.

Out of the above, maintenance of National Highways is the responsibility of the Union Government. The State Government acts as the agent of the Union Government for carrying out maintenance works. Maintenance of State highways, Major District roads and Other District roads is the responsibility of the P. W. D. Village roads have been transferred to the Panchayats and are to be maintained by the Panchayats. In respect of Corporations and Municipalities all roads falling within their jurisdiction are to be maintained by them with the exception of certain specified roads in each Corporation or Municipality which Government have ordered the P. W. D. to maintain. In addition to the above, there are roads constructed by certain departments of the State like Forest, P. H. F. D. and Statutory bodies like Electricity Board etc., and also certain planter's roads. The maintenance of these vests with the Department or the Statutory Body or the planter concerned, as the roads are mainly intended for meeting the requirements of the particular Department or Statutory Body etc. Where, however, any road so constructed serves also serves the general public without any restriction on its use a portion of the maintenance cost of such roads may, under special orders of Government, be reimbursed by the P. W. D. though the actual maintenance is done by the concerned authorities. Amounts which are so reimbursed will also be charged to the grant for maintenance of roads in the concerned Divisions.

17.1.2. Based on the surfacing provided roads may be divided into the following categories:-

- (a) Concrete roads

(h) Black topped roads

(c) Metalled roads

(d) Earth and Gravel roads.

17.1.3. *Ferries*:- Maintenance of any road includes also the maintenance of ferry service, if any, across streams which are crossed by the road. In case of erstwhile Travancore area, ferry services except at the border of the state were free, the cost of the ferry service being entirely met by the State. In the case of the erstwhile Cochin and Malabar regions, fares were charged for transport by ferry under the respective Canal and Ferry Acts. The right of collecting fares and maintaining the ferry service in such cases were entrusted to a suitable contractor by auction or otherwise. This system is still continuing. Until the system is unified, the P. W. D. should continue to operate and maintain ferries which are in their charge in the same manner as above.

17.2. Maintenance of National Highways.

17.2.1. Government of India have appointed a technical committee to study and recommend suitable norms for the assessment of maintenance cost in respect of National Highways and have accepted their report as the basis for allotment of funds for this purpose. A copy of the order of the Ministry of Shipping and Transport (Roads Wing) No. NH-11- (6)/69/24-7-1969 together with the technical report is given in Appendix XVII A. The procedure outlined therein should be followed in preparing estimate for maintenance. Reference is also invited to the form in which maintenance estimate for National Highways should be prepared as described in para 3.3.3 in the Chapter on Estimates of the P. W. D. Manual.

17.3. Maintenance of State Highways, Major District Roads, Other District Roads

17.3.1. The work of maintenance on these roads may be broadly divided into the following heads:-

(a) Ordinary Repairs

(b) Renewal and recoating of surface

(c) Special repairs.

17.3.2. *Ordinary repairs*.-All items of routine maintenance except renewal of surface required to keep the road in good condition and which are of a repetitive nature should be included under ordinary repairs. The following are some of the main items likely to be included under this head:-

(i) Thorough repairs including clearing of jungle growth, sectioning and forming, clearing side drains

(ii) Clearing of culvert and opening outlets.

- (iii) Filling up erosions and removal of slips.
- (iv) Repairs to pitching, retaining walls, masonry works, culverts.
- (v) Patchwork to metalled and black topped and gravelled roads.
- (vi) Watering and blinding on metalled roads.
- (vii) Painting Signboards, Kilometre stones, Guard stones etc.
- (viii) Planting avenue trees and maintaining avenue trees.

17.3.3. *Renewal and recoating:* 17.3.3.1. This provides for resurfacing the road at regular intervals or when found necessary. Normally the following periodicity may be adopted for renewals.

Concrete roads	once in 10 years
Black topped roads	once in 5 years
Metalled roads	once in 3 years
Gravel roads	once in 3 years

If in any particular reach renewal has to be carried out earlier than the period mentioned above the necessity should be specially brought to the notice of the Superintending Engineer and his sanction should be obtained.

17.3.3.2. In the case of Black topped roads the renewal should be in the form of premixed carpet of thickness varying from 2.5 cm. to 5 cm. The actual thickness and the specification to be adopted should be approved by the Superintending Engineer. GA3es may also arise where the old Black topped surface has been very badly damaged or the old Black topped surface did not have enough crust thickness. In such cases, if found necessary, the old surface may be completely removed and a fresh metalled surface provided before black topping is adopted as a final cost. Here again the nature of the work to be done should be got approved by the Superintending Engineer.

17.3.3.3 In the case of a metalled road, the renewal should be metalled surface and the thickness of metalling should be from 5cm. to 7.5cm. If an increase in thickness is required in any particular reach, the approval of the Superintending Engineer should be obtained before sanctioning the renewal estimate.

17.3.3.4. A road chart should be maintained in the form given in Appendix XVII.B for each important road which will give all data about the history of renewal of surfacing of different sections of the road. This will be helpful in selecting the reaches requiring renewal or special attention.

17.3.3.5. It is not expected that the funds available under renewal should be utilised to upgrade the surface of the road. Thus it will not be proper to black top a metalled road using funds provided under renewal and recoating. The same applies to other forms of road surfaces.

17.3.3.6. The traffic on roads generally goes on continuously increasing and sometimes it may be necessary to provide greater width of pavement than was provided originally. Such widening and improvements to the surfacing would normally come under the classification of 'Original works'. However, if the widening is to be done in a stretch of road where renewal of surface is contemplated, it may be advisable to carry out both works together. Hence it is permissible to charge the cost of widening the pavement in such cases to the maintenance of the road provided,-

(i) the particular stretches & the works to be adopted are approved by the Superintending Engineer;

(ii) the widened portion is given adequate foundation to support the pavement.

17.3 4. *Special Repairs:* Special repairs are such items of repairs, reconstruction, or additional construction found occasionally necessary to keep the road in good condition. These may be divided into (a) Special repairs to roads, such as construction or reconstruction of retaining walls, raising a portion of the road, widening of pavements etc. (b) Special repairs to culverts upto 20' span. These may include reconstruction as well as construction of new culverts if found necessary. (c) Repairs to flood damages. The nature of repairs consequent of floods may fall under one or other of the above categories or may be a new type of work such as training of a river course etc. Even when a flood damage work comes under the category of Special repairs to roads or to culverts, this is kept distinct from original repairs mentioned in (a) and (b) above since the financing is from an allocation specially earmarked for this purpose.

17. 4. Schedule of maintenance operations.

17.4. 1. Maintenance of roads involves several operations some of which can be done during rainy weather and others which can be done only in dry weather. A time table for the various operations in the different roads under each section should be drawn out by the Junior Engineer and should as far as possible be adhered to.

The table on the Schedule of maintenance operations given in Appendix XVII C. may be used as a guide in preparing the time table.

17. 5. N. M. R. Gangs.

17.5.1. The department has a number of workers employed in the maintenance of roads, whose attendance is watched through Nominal Muster Rolls. These workers should be suitably divided into small gangs and each gang should normally be controlled by one Work Superintendent. Each gang should have sufficient Tools and Plant for carrying out the routine maintenance operations involved in preventive maintenance and repairs. When repairs need services of masons or artisans such persons may be temporarily employed on departmental rolls or such works may be awarded on contract.

17.6. Work Superintendents on Road Maintenance

17.6 1. Each Work Superintendent with the gang of N. M. R workers under him should be assigned the task of maintaining a definite stretch or stretches of roads. The Work Superintendent is responsible to the junior Engineer for carrying out the maintenance works of the roads in his sub- section in accordance with the instructions received from time to time. He should organise and control the work of the N. M. R. workers under him mark their attendance and keep an inventory of the Tools and Plant supplied to N M. R. workers and see that they are safely stored and carefully used on the work. He should submit accounts of road metal or other materials consumed during the maintenance operations to the Junior Engineer. He should also keep with him details of all road metal, sand etc, supplied and stacked along side the roads within his sub-section and watch their disposal. He should inspect the roads in his sub-section as often as necessary at least twice every month and help the Junior Engineer in preparing estimates for ordinary repairs, renewal of surface, special repairs and original works. He should also report the condition of avenue trees from time to time and take such steps as lie within his means to prevent unauthorised cutting of avenue trees or damages to culverts, Kilometre stones, signboards etc. In other words he should consider himself to be the department's representative in the subsection responsible to prevent loss or damage or encroachments to public property entrusted to his care. Should there be any accidental obstruction to traffic by fallen trees, erosions slips, damages to bridges, culverts etc., the Work Superintendent must immediately provide necessary caution boards and report the fact to the Junior Engineer and under his instructions arrange the removal of the obstruction as early as possible.

17. 7. Supply of Materials for Road Maintenance

17.7.1. Metal supply required for patchwork should be estimated based on past experience, giving also due consideration to the period which has elapsed since the last recoating. Having determined the quantity to be so provided in different sections in each road, supply should be arranged sufficiently early so as to be available for patchwork according to the programme already drawn up.

17. 7. 2. Similarly supply metal for recoating should be arranged so as to be available at site in time for the recoating work being taken up according to programme.

17. 7. 3. All metal supplied either for patchwork or for recoating should be properly stacked in stacking areas provided to the road side in such a manner as not to interfere with traffic. Before the stacking is done the stacking area should be examined to see that it is level.

17. 7. 4. Metal should not be stocked until it has been thoroughly screened to gauge and freed from all earth, rubbish, vegetable matter and other foreign material. When ready, it should be stacked entirely clear of the roadway either upon the beams and platforms provided for the purpose or outside the said drains where such beams do not exist. When metal supply for renewal and for patchwork are both to be supplied i.e. the same reach of a road these should be stacked on opposite sides.

17. 7. 5 Road metal should be stacked in heaps of uniform cross section measuring 1.5 m. at base 0.5 at top, and 0.5 m. in height. The deposition should commence at one end of the

kilometre and be carried continuously to the other end unless the Executive Engineer shall direct otherwise. Stacking should begin at points farther from the quarry and progress continuously towards the nearer point. Each two hectometer length in a road will be considered one stretch and the materials required for this stretch should be fully supplied and stacked before measurements are taken. No road material in excess of requirements in any two hectometer length should be stacked in that stretch. Any excess quantity should be removed to where it is required, before the materials in that reach are measured.

17. 7. 6. All road metal should be measured and checked before it is spread. After check measurement, each stack should be marked by whitewash or otherwise as may be directed by the Executive Engineer to prevent the possibility of it being measured again. As a rule, collecting and spreading should not be carried on at the same time in one and the same kilometre, or in two adjoining kilometres.

17. 7. 7. During the time the metal is supplied and stacked, there should be frequent inspections by the Work Superintendent as well as by Junior Engineer to guard against stacks being formed over heaped up earth or debris.

17. 7. 8. Supply and stacking of sand for road works should also generally follow the pattern outlined for metal supply in the preceding paragraphs. Sand should not be kept at road side for long periods as it is likely to be spoilt by admixture of road dust, dirt etc. and also likely to be washed away during heavy rains. Hence sand supplies to the road should be carefully controlled so as to avoid storage at road side for periods exceeding a fortnight.

17. 8. Important points to be attended to when carrying out maintenance operations

17. 8. 1. *Thorough repairs including clearing jungle, clearing drains, sectioning etc.*-The surface of the road should be sectioned properly so as to facilitate easy drainage to the sides and outlets should be cut across berms to lead water to side drains. The side drains should be cleared of all jungle growth and obstructions and graded so as to have proper slope. All overhanging jungle growth which may obstruct traffic or vision should be cut along with such repairs. In the case of masonry works, if any, jungle growth is observed, the same should be cut and the vegetation killed by the application of tar.

17. 8. 2. *Stabilising soft spots.*- In a number of places certain soft spots develop due to lack of drainage, poor soil and bad exposure. The drainage must be improved by providing either a pipe culvert or an Irish Drain at the site. Sometimes this may also be due to shallow side drains by deepening, which the water table can be lowered. If the soft spot is due to poor soil conditions, the remedy is to replace it with good soil or to add deficient materials in sufficient quantity to ensure stability. Correction of bad exposure may be done by clearing overhanging branches and bushes so as to let the soil dry in the sunshine. Careful attention is necessary to see that soft spots are attended to during maintenance.

17. 8. 3. *Corrugations or waviness on roads.*- This condition is caused by several reasons and a careful study must be made where corrugations persist as to the possible cause. Some of the main reasons which may cause corrugation are poorly drained subgrade, too thin a crust, the use of very sandy material for bringing and inadequate or improper consolidation. Early

opportunity to cure the concerned defect must be made where renewal of surface in such reaches is carried out.

17.8.4. *Floating metal or travelling on metalled roads.* This is generally due to the use of a binder that is too sandy and will not therefore stay put. Insufficient compaction and aid climate also add to the tendency of loose metal floating on the roads. Ravelling must be detected at the early stages by the presence of tiny hair cracks along the interstices. Prompt blinding with good gravel or red earth will arrest the damage. If the damage has progressed too far, the loose metal must be removed and the surface blinded and watered using red earth for blinding. Future renewal of surface in such places should be carefully done paying particular attention to the quality of gravel or earth used for blinding.

17.8.5. *Patchwork.* -In carrying out a patchwork it should be ensured that the surface of the compacted patch conforms to the adjoining surface and is completely flush with it. The pothole should be cut to proper shape and the old metal surface loosened with pickaxe so as to ensure bond with hard metal. A good blinding material should be used after profuse watering and compaction.

17.8.6. In the case of patch work with bitumen, premixed chips should be used after cleaning the pothole and applying a tack coat of bitumen or tar. Care should be taken to see that the pothole is dry when the patch work is done. For bitumen required in small quantities for patch work, it is permissible to heat it in the open using cut drums for the purpose. The fuel for heating should be split firewood and should be got supplied in sufficient quantity. It is improper and wasteful to use a part of bitumen itself as fuel for the purpose of melting the bitumen to be used on the work.

17.8.7. *Heating of Bitumen, metal and sand for renewal work.* - Bitumen required for renewal work should invariably be heated and melted in a proper bitumen boiler. The molten bitumen should be drawn at the specified temperature. For bituminous concrete work, metal and sand should also be heated before mixing with the bitumen. If heating cannot be done in the mixer itself, then it must be done outside and the heated aggregates fed to the mixer.

17.8.8 *Camber on roads.* -For proper drainage of road surfaces, it is essential that the road should have suitable camber so that water flows out of the edges and from there into side drains. While camber is necessary, too much of camber is undesirable as under such conditions, the traffic will tend to use only the centre of the road. The actual camber required for different types of surfaces has been indicated in the chapter on Investigation and Design of Roads (see para 2. 1 and its Appendix). When recoating is done the camber should be checked by using a proper template.

17.8.9. *Superelevation.* - Lack of superelevation for many of the curves in roads is a very common fault but this can be rectified inexpensively by a little forethought during maintenance operations. Super-elevation may be based on the following formula, viz.-

$$3v^2$$

$$e = \frac{3v^2}{1274.6}$$

$$80R$$

where e is the superelevation in feet per foot width.

V = Design speed in M. P. H. and

R = Radius of the centre line in feet.

Converted to metric units this formula will be $25.5V^2$

$$80 R$$

The maximum superelevation should be limited to 1 in 15.

If the superelevation to be provided in an existing road is found to be too high, this may be gradually built up in the course of 2 or three years while attending to maintenance work.

17.9. Planting and Maintenance of avenue trees

17.9.1. Whenever it is decided that avenue trees should be planted on any road, this work should be carried out in the early part of the rainy season so that the tree saplings can take root and grow. Suitable guard fences should be provided for a height of 1½ metres to protect the young tree from cattle, until it reaches sufficient maturity.

17.9.2. Avenue trees should be properly numbered and a register of avenue trees maintained in each sub-division vide form given in Appendix XVIIID. The numbering should be clearly made after stripping the bark stripping for an area not less than 15 cm. x 15 cm. at a height 1.2 metres from ground level and facing the road. The numbering should be checked and re-numbered once every five years.

17.9.3. The usufructs of Revenue Yielding trees should be properly disposed. The right of enjoying the usufructs may be sold by auction or tender and the amount realised credited to P.W. Revenue. It should be ensured through suitable conditions in the auction or tender notice that the person who is enjoying the usufructs does not cause any injury or damage to the tree as such. This right may be auctioned either for an year or for such longer period as the Executive Engineer thinks fit.

17.9.4 The Work Superintendent in charge of sections of road should keep a careful watch of the avenue trees. If any unauthorised attempt at cutting damage or removal of avenue trees is observed he should take immediate action to protect Government property and also concurrently report to higher officers and lodge complaints with the police.

17.9.5 In the case of dead trees and decayed branches of trees, the Assistant Engineer in whose jurisdiction the tree exists has the power to authorise cutting and removal of such dead tree or branches. When a tree or branch is in a condition as to cause damage to the road or adjoining property and the removal of such dangerous tree or branch is imminent, the Junior Engineer may order such removal in anticipation of approval of the Assistant Engineer after

making a report to the Assistant Engineer explaining the circumstances. In all cases where a living tree has to be cut, sanction of the Executive Engineer should be obtained.

17.9.6. It may sometimes happen that branches of avenue trees may have to be cut for maintenance or extension of electric lines, telegraph lines or telephone lines. In the case of maintenance of existing lines, the authorities in charge can cut the obstructing branches in order to restore service quickly without prior intimation to P.W.D. In the case of extension however, the Executive Engineer in charge of the concerned road should be informed of the proposal by the authority concerned. Even here the actual cutting of branches may be arranged by the authority in charge of the time after intimating the Executive Engineer P.W.D. All branches, leaves etc. cut during such process should however be disposed by the P.W.D. For this purpose, the Work Superintendent with the help of the N.M.R. workers, if necessary, should collect the branches etc., in suitable places and help in disposal as directed by the junior Engineer, or Assistant Engineer.

17.10. Road Signs

Road signs are classified under the following groups

17.10.1. (a) *Mandatory signs.*

(b) Cautionary signs.

(c) Informatory signs.

(d) Special signs.

(a) *Mandatory signs.* - are used to indicate to the road users certain laws and regulations enacted to promote safety and convenience on the Highways.

Example: "SPEED LIMIT" "ROAD CLOSED" "NO PARKING" "NO HORN" "DEAD SLOW" "ONE WAY TRAFFIC" "NO ENTRY" etc.

These should be erected at the places where the regulations are applied. Normally it is the traffic authority in charge of the area who can authorise the fixation of such mandatory signs.

(b) *Cautionary signs.* - are used for warning traffic of dangerous conditions on the roads.

Examples: "RIGHT TURN" "CURVES" "ROUGH ROAD" "ZIG-ZAG" "LEVEL CROSSING" "SCHOOL" "SIDE ROAD" "STEEP HILL" "HAIR PIN BEND" "NARROW BRIDGE" "HUMP" "SOUND HORN" and "Flood warning signs" and "Flood gauges" etc.

(c) *Informatory signs.* - Such as PLACE AND ROUTE INDENTIFICATION SIGNS and signs such as "ROAD JUNCTION" "BUS STAND" "HOSPITAL" etc.

(d) *Special signs*. - Conditions sometimes may occur where signs not coming in the above category may have to be put up on the highways.

Example. Municipal limit, elevation of places,

Clearance markings for overhead structures etc. These should be placed not less than 150 metres from the actual site.

17.10.2 All signs posts should be according to standard sizes and shapes as *per* type designs. They should not be placed closer than 2 metres from Electric, Telegraph or Telephone posts. Care should be taken to avoid a bunch of sign boards at any place so as to avoid confusion. If more than one post has to be erected at a place, they should be properly spaced apart at distances, if not less than 30 metres between each set of sign posts.

17.10.3. The location of mandatory sign has to be fixed in consultation with the traffic authority. All road signs fixed on roads maintained by P.W.D. should be inspected at least twice an year by the junior Engineer. The Work Superintendent in charge of road should always keep a close watch on the condition of the road signs and report any loss or damage of these to the junior Engineer immediately. He should also re-erect fallen down posts with the help of N M.R. gang under him. The junior Engineer should also, during his inspection, examine whether the position of any of the sign boards needs change due to any altered condition at the site.

17 10.5. Road signs (other than enamelled signs) should be painted legibly once a year.

17.11. Kilometre stones.

Kilometre stone as per type designs should be planted on all the roads in the manner described in Appendix XVII. E. They should be planted clear of the shoulders of the road so as not to obstruct traffic but should be in such a position as to be quite visible. They should be maintained clean and legible always.

17 12. Advertisement Board.

17.12. 1. In the case of National Highways advertisement boards can be fixed up only with the sanction of the Roads wing of the Ministry of Transport, Government of India.

17.12.2. In respect of other roads, the authorities in charge of the local body within whose jurisdiction the road lies, have the power to sanction display of advertisement boards in consultation with the Executive Engineer, P.W.D. in charge of the road. The Executive Engineer should be careful to see that display of advertisement boards is not allowed.

(a) at or within 100 metres of any road junction.

(b) where the planting of such boards is likely to obstruct the vision of the Driver.

(c) at hair pin bends of curves.

(d) near dignified buildings, hospitals, educational institutions etc.

(e) within 50 metres of any of the sign board erected.

(f) in such a manner as may obstruct the vision or distract the attention of the driver of a vehicle on the road.

(g) to mar the aesthetic appearance of this background especially In localities which are predominantly residential or where the national scenery is likely to be spoiled by such display.

17.13. Cutting open roads

When roads are to be cut open for laying of water and drainage pipes electric and telephone cables etc., the concerned departments should inform the Executive Engineer in charge of the particular section of the road giving an indication of the details and nature of work required and the period within which the work will be completed. On receipt of such information, the Executive Engineer should see whether it is necessary to completely close the traffic on the road or whether it will be possible to maintain traffic with caution sign at both ends of the place where the trenches are being cut. In the former case a notification of the closure should be made in the gazette as well as in the notice board of important public offices in the district. There important roads are involved the information may also be published in one daily paper having wide circulation in the district and the local automobile Association may also be kept informed. The department which cuts open the road should provide caution, cry signals along with other protective measures, when carrying out trenching work. As soon as the work is completed and trench refilled, the P. W. D. should arrange to restore the road to trafficable condition by providing such thickness of soiling, metalling etc., is found necessary in each case. The approximate cost of such restoration by P W D. should be indicated in advance to the department or authority which wanted the road to be cut open and actual amount incurred should be realised from the authority. If this authority is a department of the State Government the amount may be realised through invoice in the normal course. If this authority is not department of the State the cost of restoration of road surface should be got deposited in advance and work carried out as a deposit work. It may be noted that the filling of the trench is the responsibility of the authority requesting for the road being cut open and the restoration of the surface is the responsibility of the P. W. D.

17.14. Ferries.

17.14.1. Ferries are of 2 kinds one for transport of vehicles and the other for transport of persons in single boats.

17.14.2. In regard to the first type of ferries generally called junghars) it must be possible for vehicles to move in and move out of the ferry platform at all stages of water level in the waterway to be crossed. For this purpose, sometimes landing stages are built at two or three different levels accessible from the approach roads. Where the approach road is steep, there may be sufficient depth of water for the junghars to be maneuvered cross to the road during flood season without having the necessity of a wharf for embarkation and disembarkation of

vehicles. There may also be cases where, during summer, the flow may be confined to a small stream in a portion of the bed, requiring temporary dry weather roads from one or both banks to enable vehicles to approach the ferry. The maintenance of the ferry service will include proper maintenance of landing stages approaches, floating craft, and its guide planks. Boats supporting the junghar platform should be periodically examined by the Junior Engineer once in 6 months to see that they are water worthy. In the case of motor boats and landing crafts they should have the certificate of fitness issued by the Chief Inspector of boats as per Canal & Ferry Rules and the operating crew should also possess certificate of competency.

17.14.3. In regard to ferries for passengers alone, there should be suitable landing stages for embarkation and disembarkation, which should be approachable at different stages of water level. It is also necessary that there should be a proper white mark on each side of the boats 5 cm. wide and at least 30 cm long indicating the maximum depth to which it can be loaded with safety. The loading of the boats should be so regulated that the mark should be always above water level. Notice Boards showing the maximum number of person., and luggage that can be loaded in ferry boat should also be prominently displayed. The boatmen employed should be capable of manipulating the vessel. A regular inspection of the boats used for ferry se, vice should be made by the junior Engineer (at least once in 6 months) and only boats which are water worthy should he allowed to be plied. If the services are only seasonal, repairs to boats should be carried out in the 'Off season' when there is no service. If the ferry service is required to be operated throughout the year, a substitute boat should be provided when withdrawing a boat in service for repairs. The number of vehicles to he allowed on the junghar and the load to be carried should be determined with reference to the dimensions of the platform and the depth to which the boats can be loaded with safety. Only skilled boatmen should be allowed to operate boats.

17.14.4. Where fares are to he collected, the schedule of fares should also be displayed.

17.15. Maintenance of Bridges

17.15.1. *General.*- It is necessary to see that important bridges and culverts are properly maintained. For this regular and systematic inspection of the structures should be made to find out defects or deterioration of the various members and urgent action taken to remedy the defects.

17.1.5.2. *Inspe6tion.*- All bridges should be inspected periodically by the several officers as detailed below and the results recorded in the form given in Appendix XVII F. Weak bridges should be inspected more often according to necessity and appropriate steps taken to remedy defects noticed.

Junior Engineers.- All culver is the total length of which does not exceed 20 feet between abutments-once a year.

Assistant Engineers.- All minor bridges the total length of which is More than 20 feet and less than 100 feet between abutments, and causeways of like length once a year. Also culverts which are reported by the Junior Engineer to be in a dangerous condition and test cheek of culverts inspect- ed by junior Engineer.

Executive Engineers.- All major bridges the total length of which is more than 100' and less than 500' in length from end to end—once a year. Also, all minor bridges marked weak and dangerous, and test cheek of other bridges and culverts inspected by the subordinate officers.

Superintending Engineers.- All bridges over 500' in length between abutments once a year. Test check other cases.

17.15.3. *Annual Inspection.*-The following instructions may be followed as an aid to systematic inspection.

(a) *waterway.*-Conditions in the stream bed should be noted as to

(i) adequacy of channel afforded by the existing structure.

(ii) risk of scour that may endanger the foundation

(iii) presence of obstructions such as drift, logs, undergrowth, stumps of old piers etc. that may be diverting the current so as to cause undermining of the foundation.

(iv) Need if any for bank protection to keep the channel properly confined.

(b) *Piers and abutments.*-Piles supporting timber bridge, should be inspected carefully at and below the ground line as this is where decay first sets in. A crow bar with one end sharpened to a long tapering point and the other end provided with a chisel face is a very useful tool in such an examination. It can be jabbed in to a pile to disclose deterioration not apparent on the surface and to determine the extent of sap rot. Piles in which the diameter of sound materials has been reduced to 15 cm or less should be marked for replacement. Sills bottom of posts and mud sills for trestle piers should be similarly tested. Steel or CI tubular piers should be carefully examined for corrosion in rivet or bolt head connecting the cylinder sections. Examination should also be made to note whether there has been appreciable movement or sinkage of the tubes due to impact of heavy loads on the structure; if so additional footings or bracings may be needed. If the tubes are out of plumb, it should be checked whether this is due to undermining or the lack of proper bracing or inadequate support below.

(c) *Concrete or masonry piers or abutments.*-These should be examined for damages if any arising from impact of floating matter or undermining or cracks. Further, they should be examined whether they are plumb. If cracks exist, the cause should be properly investigated so as to choose appropriate remedial measures. In the case of masonry abutments any tendency of bulge should be particularly noted as this will indicate excessive lateral pressure. When any such defect is noticed, corrective steps should be taken to relieve such pressure.

(d) *Pipe culverts.*- in the case of pipe culverts, examine whether the pipes have gone out of alignment either vertically or laterally and also whether any of the pipes has cracked. The waterway should also be examined whether it is obstructed by jungle growth, on silting etc. The condition of the headwalls should also be noted particularly to see whether they are plumb and free from cracks.

(e) *Flooring*. - Where a flooring is provided as in culverts and small bridges, any upheaval or sinkage in the flooring should also be carefully noted and corrected.

(f) *Deck*. - Where the deck is of reinforced or prestressed concrete, the examination should cover the following:

- (i) Expansion joints and bearing plates to ensure that they are functioning properly, and that their lubricating arrangements are satisfactory.
- (ii) Drainage facilities to see that there is no collection of water in any part of the structure and that water is drained easily.
- (iii) Roadway surface to see whether there is excessive scaling or unevenness.
- (iv) The bottom and sides of girders or slabs to note whether there is any honeycomb area exposing reinforcement and further whether any cracks appear on such parts.
- (v) Kerbs and handrails.

(g) *Steel trusses*. - The inspection should include the following points. -

- (i) General alignment of the span to see whether in the case of 'through Bridges' the end posts and top chords are straight and in line. Any buckling would indicate that the structure has been overloaded.
- (ii) Whether any of the structural members is kinked or rusted or has in any other manner suffered deterioration.
- (iii) Where there is excessive deflection of any member.
- (iv) Whether any of the rivets and bolts in important junctions have worked loose.
- (v) Whether the conditions of end shoes and rollers are good.

(h) *Timber Trusses*. - The examination should cover the following:-

- (i) Whether there is any noticeable sag. If sag is present, note whether it is due to failure of splices. Improper adjustment of vertical rods or crushing of diagonal members.
- (ii) The condition of the bearing and the caps over the pier piling.
- (iii) Whether all bolts through splices packing blocks and cross bracing are tight and in good order.
- (iv) The condition of the stringers.

- (v) The condition of the stringers as seen from the bottom particularly with regard to full bearing on pier caps and indications if any, of crushing.
- (vi) Examination of the deck and hand rails from roadway.
- (vii) Whether all bolts in the deck are properly tightened or have become loose due to shrinkage of the timber.
- (viii) The condition of the underside of the decking.

17.15.4. The purpose of detailed inspection as outlined above is to find out whether damage or deterioration has occurred in any part of the structure and if so to take appropriate remedial measures. The inspection report of each bridge should contain a specific remark as to the works necessary to be taken up based on the results of such inspection. These works should have the highest priority regarding maintenance of bridges. In addition to such special works, certain works of a routine nature should invariably be carried out in respect of bridges and culverts. These are:-

- (i) Keeping the water clear.
- (ii) Where there is any growth of vegetation, shrub, etc. in the masonry or concrete part of the structure, the removal of such vegetation and steps to prevent such growth.
- (iii) Wherever bearings are provided the greasing or oiling of such bearings.
- (iv) Periodical painting of steel and cast iron structures of parts of bridges. Normally painting should be done once every year unless special circumstances warrant changing the periodicity.
- (v) Wherever scours are noted, filling up the scours with stones of suitable size in such a manner as is found best suited to circumstances.

17.16. Grant of Maintenance of Road:

17.16 1. The total grant required for maintenance of roads may be split into:-

- (a) Kilometre wise maintenance grant intended to meet cost of ordinary repairs.
- (b) Grant required for renewals and recoating of surfaces.
- (c) Grant required for special repairs.
- (d) Grant require for flood damage works.

It may be noted that the funds provided for maintenance of roads under the above three, heads are distinct and should not be transferred from one head to another without the approval of Government.

17.16.2. The norms for grants under the different heads noted above are detailed in Government Order No. MS. 19/72/PW dated 29-1-1972 extract reproduced in Appendix XVII G.

Detailed instructions issued by Chief Engineer (GB & R) regarding the maintenance of road charts which should form the basis for the preparation of the programme for the maintenance works in Circular No. G A6. 16119/69 dated 9-8-1972 are reproduced in Appendix XVII H. [Vide G. O. (P) 192173/PW dated 5-9-1973]

17.16.3. In each division the total amount requires for the different classes of roads under the, above system of grant/KM will be worked out and made available to the Executive Engineer by the Chief Engineer as a lump sum. It is likely that some roads or some stretches of roads may require amounts in excess of the Kilometre wise grant while some other stretches of roads may require less amount. The Executive Engineer may judiciously distribute total amount under Kilometre wise grant between various roads and stretches of roads of that class in his jurisdiction according to necessity, taking care to see that no road is neglected and that the amount is spent only for items of work which could be classed under 'Ordinary Repairs'. The Kilometre wise grant should also be utilised for the purposes of maintaining bridges and culverts unless there is in any particular case a separate grant sanctioned for the maintenance of the particular bridge. Works necessary for maintenance of bridges should have priority in the matter of allocation of funds over other items of maintenance on the road.

17.16.4. The wages of the N. M. R. labour has to be met out of the grant for ordinary and special repairs to roads, flood damages, etc. and the extra amount allotted to each division to meet difference in wages for N.M.R. labourers is given in para 11 (d) of the G. O. No. MS. 19172/PW dated 29-1-1972 (mentioned in para 17-16-2 above). The N. M. R. labour should therefore be utilised to the extent possible, in carrying out ordinary and special repair work and flood damage, work in the, maintenance of roads, and bridges. It may some time happen that this labour is inadequate for all the works involved in a particular division. In such cases, a few of the roads may be specially earmarked for arrangement of maintenance works through contract agency. Similarly if artisan labour or skilled workmen have to be employed for carrying out any of the above works done departmentally and if such labour is not available in the N. M. R, temporary recruitment of such labour may be made for the period absolutely necessary to carry out the works. As an alternative, the Executive Engineer may also arrange such works involving artisan or skilled labour through contract agency. All such charges should be debited against the appropriate minor head under maintenance of roads.

17.16.5. The approaches to ferries and maintenance of all works at the site of ferries should also be met from out of the Kilometre-wise grant. The cost of repairs to floating craft need not be so charged but should be debited to 'Repair of Tools and Plant'.

17.16.6. *Grant for renewals.*- Along with the budget for an year, each Executive Engineer in charge of works should prepare the list of stretches of roads in his jurisdiction where the renewal of surfacing is required to be carried out in the next financial year. The approximate cost of such renewal should also be indicated. In preparing this list, the Executive Engineer should also send an extract of the road chart of the concerned road indicating the history of the previous renewal. After scrutiny by the Superintending Engineer, a final list of roads and sections thereof where the, surface renewal is prepared should be compiled together with the

cost of such renewal and sent to Chief Engineer. In case the funds allotted to the circle falls below the requirement, the Superintending Engineer should suitably select from out of the list of roads where renewals are proposed such lengths as can be provided with funds for renewals from out of the available allotment. Renewal works should be arranged only on such roads for which grant can be found as per distribution made by the Superintending Engineer. As far as possible, the work of recoating any particular stretch should be completed within the financial year and paid for, but where this is not possible, it is permissible to carry over the liability to the succeeding financial year. When any such unpaid liabilities are brought forward, these will be a first charge on the funds allotted for renewals and only the balance amount should be distributed for a new renewal works.

17.16.7. Special Repairs.-The amount allotted under this head in each division should be judiciously apportioned between the various works by the Executive Engineer. Special repair works should be completed within the year itself if possible, so as to avoid having to carry over the liability to the next year. But if this is unavoidable, it is permissible to continue the work in the succeeding financial year and make payment from out of the funds of that year. Any such unpaid liabilities of the previous year will have priority over new works when the available funds are being distributed.

The Chief Engineers reserve is intended to meet unforeseen calamities such as flood damages and should not be drawn upon merely because the available funds in any particular division are insufficient to meet the requirements.

17. 17. Encroachments.

17 17.1 Under the P. W. D. Code (Article 22) encroachments into lands pertaining to roads, canals etc., are to be guarded against by the subordinates of the Revenue Department. The Assistant Engineer, junior Engineer and Work Superintendent in charge of roads, bridges etc., should also be vigilant in this matter and promptly report to the District Collector and Tahsildar any cases of encroachment or attempted encroachment, noticed by them.

APPENDIX-XVII A

(Referred to in Para-17.2. I.)

TELEGRAMS

GOVERNMENT OF INDIA

"ROADIND"

Ministry of Transport & Shipping

(Roads Wing)

TRANSPORT BHAVAN

No. 1, PARLIAMENT STREET.

No. NHI-41 (11)/68, New Delhi-1, dated the 9th July, 1968.

To

The Secretary to the Government of
Hariyana/Uttar Pradesh/Bihar/Mysore/Madras
(Departments dealing with roads)

Subject: Maintenance and widening of National Highways.

Sir,

1 am directed to say that at their Seventh meeting held at Mysore on the 24th and 25th June, 1968 the Transport Development Council considered *inter-alia* an item relating to the 'Maintenance of National Highways and Other Roads'. In this connection the Council recommended that in order to fix suitable norms for assessing maintenance costs a small Technical Group should be set up at the Centre. The Government of India have accordingly set up a Group for this purpose consisting of the following:-

1. Director General (Road Development)	Chairman
2. Chief Engineer, Hariyana	Member
3. Chief Engineer, Uttar Pradesh	"
4. Chief Engineer, Bihar	"
5. Chief Engineer, Mysore	"
6. Chief Engineer, Madras	"
7. Chief Engineer (Roads Wing)	Member- Secretary.

2. The terms of reference of the Committee will be as under.-

(1) Suggest suitable norms for assessing maintenance costs.

(2) Recommend a formula for the widening of roads from single lane to double lane carriageway.

3. The Chairman of the Committee will be addressing the Members concerned directly regarding the detailed programme about the functioning of the committee. Meanwhile, I am to request you kindly to accord necessary permission to the Chief Engineer in so far as your State is concerned to attend the meetings of the Committee as and when required and to treat him as on official duty for purposes of T. A. and D. A. while attending the meetings of the Committee.

Yours faithfully,

(Sd.)

VINAYAK DUTT,

Under Secretary to the Government of India

Copy forwarded for information to:-

1. Shri J.S. Marya, Chief Engineer, PWD (B&R) Hariyana, Chandigarh.
2. Shri P.N.Srivastava, Chief Engineer, PWD (B& R), Lucknow.
3. Shri M. M. Bose, Chief Engineer, PWD (B&R), Patna.
4. Shri K. Basanna, Chief Engineer (B&R) Mysore, Bangalore
5. Shri O.S Sivasankaran, Chief Engineer Highways & Rural Works) Madras

(Sd

VINAYAK DUTT,

Under Secretary to the

Government of India.

Copy to CB (N) and SER(PL)

(Sd

VINAYAK DUTT,

Under Secretary to the

Government of India.

GOVERNMENT OF INDIA

Ministry of Shipping and Transport

(Roads Wing)

Telegrams

TRANSFORT BHAVAN

'ROADIND'

1, PARLIA.MFNT SREET

No. NHI-41 (6)169.

New Delhi the 24th,July, 1969.

To,

All State Governments and Union Territories.

(Departments dealing with roads)

Subject:-Maintenance of National and State Highways.

Sir,

1 am directed to say that in pursuance of the decision of the Transport Development Council taken at its 7th meeting held at Mysore in June, 1968, the Government of India appointed a Technical Group consisting of the following in order to evolve suitable norms for assessing maintenance costs in respect of National Highways and other highways in the country:-

Director General

(Road Development)

Chairman

Chief Engineer, Haryana

Members

Chief Engineer, U. P.

Chief Engineer, Bihar

Chief Engineer, Mysore

Chief Engineer, Madras

Chief Engineer, Roads Wing

Member-Secretary

2. The Technical Group have submitted the Report. A copy thereof is enclosed for your information and guidance.

3. I am to say that action has already been initiated in this Ministry for determining the amount of overall maintenance grant required for National Highways on the basis of the above report

and this assessment shall form the basis for the budget demands that would be presented to the Ministry of Finance from time to time in future with the objective of relating the maintenance allotments for different National Highways to the norms recommended in this report subject to the requisite funds becoming available.

Yours faithfully,

(Sd.)

HARBANS SINGH,

Under Secretary to the

Government of India.

Encl: As above.

Copy with a copy of the report forwarded to:

(1) All State Chief Engineers/P. E. Os.

Attention of the Chief Engineer of Haryana/U. P /Bihar/Mysore/Madras is invited to the observations made in paragraphs 2. 4. 1 and 2. 4. 2 of the report according to which he was required to carry out further studies in regard to the improved maintenance standards as per norms recommended in the report on some stretches of the National Highways under his control and to report the results in this behalf. It is requested that the further studies may be carried out and a report on the results furnished to this Ministry as early as possible

(2) All Regional Superintending Engineers and Engineer Liaison officers.

(Sd.)

H.ARBAN SINGH,

Under Secretary to the

Government of India.

Encl. As above.

Office of the Chief Engineer,

No. NH4-64746169.

General, Buildings and Roads,

Trivandrum, Dated, 6-9-1969.

.Copy with copy Of enclosure is forwarded to the Superintending Engineers (B&R) South Circle, Trivandrum/Central Circle, Alwaye/North Circle Calicut/Investigation and Planning (B&R) Circle, Trichur for information and necessary action.

Copy also to the Executive Engineers (B&R) Trivandrum/Quilon Alleppey/ Kottayam/ Muvattupuzha/ Ernakulam/ Trichur /Palghat/Calicut/ Cannanore/Buildings Division, Trivandrum/Trichur/Calicut/Medical College Division, Kottayam/West Coast Roads Division, Tellicherry/Investigation and Planning Division, Quilon/ Alwaye/Manjeri for information and attentions.

Copy to General Section and Communication Section.

Copy to Executive Engineer (Planning) Technical Assistant (NH) H.D (NH) and Stock file.

(Sd/)

For Chief Engineer.

Final report of the Technical Group set up by the Government of India regarding norms for maintenance of National and State Highways

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PART I

COMPOSITION OF THE COMMITTEE AND TERMS OF REFERENCE

1.1. Introduction.

For the preservation of the huge public investment in highways, their timely upkeep and maintenance is an inescapable necessity. In so far as Indian roads go, the problem of maintenance has acquired a fresh colour in recent years as the traffic using the roads has shown a steep climb and this has been to the accompaniment of an all round rise in the cost of

materials and labour. Highway maintenance budgets have, however, not risen correspondingly over this period in keeping with these changed conditions. As a consequence there has been a general fall in the maintenance standards and deterioration of surfaces in many cases. With maintenance slipping behind actual requirements, attention has been focused on the need for enlarged maintenance allotment.

The problem is nowhere as acute as in the case of the National Highways, which form the backbone of the country's road system and carry the bulk of the nation's long-distance heavy traffic. The maintenance of National Highways figured prominently at the Transport Development Council meeting held at Bangalore in June 1968, where the consensus was that the maintenance allocations needed to be stepped up in tune with the spiraling traffic and prices of construction. The council further expressed the view that in order to fix suitable norms for assessing maintenance costs, a small Technical Group should be set up at the Centre.

1.2. Composition of the Committee.

Pursuant to this conclusion, the Government of India set up a Technical Group of the following composition vide their letter No. NHI-41 (11) 168, dated 9th July, 1968 (Appendix A):-

Director General (Road Development)	Chairman
Chief Engineer, Haryana	Member
Chief Engineer, U.P.	
Chief Engineer, Bihar	
Chief Engineer, Mysore	
Chief Engineer, Madras	
Chief Engineer, Roads Wing	Member Secretary.

1.3. Terms of reference.

The terms of reference to the Group were as follows:-

- (i) to suggest suitable norms for assessing maintenance costs; and
- (ii) to recommend a formula for the widening of roads from single-lane to double lane carriage way.

1.4. Scope of the report.

This report by the Technical group relates to maintenance problems of the National Highways and State Highways.

5. Framework of the report

The report of the Committee has been divided into four parts as under: -

Part I. Composition of the Committee and terms of reference.

Part II. Considerations involved in maintenance of National Highways.

Part III. Estimation of maintenance costs for National Highways.

Part IV. Norms for computing maintenance costs for State Highways.

PART II

CONSIDERATIONS INVOLVED ON MAINTENANCE OF NATIONAL HIGHWAYS

2.1. The problem of maintenance of National Highways can be properly appreciated only if factors peculiar to their past development and present use are well understood. The different factors are identified and commented upon in the succeeding paragraphs first before going into a discussion of the components of maintenance and making suggestions for estimation of the costs of these.

2.2. Factors affecting maintenance of the National Highways.

2.2.1. Inherent Deficiencies of the Crust. The National Highway system came into being in 1947 when at one stroke over 12,200 miles of roads belonging to the State Governments or other local authorities were brought within fold of the Central Government. Some of these roads were old through routes like the Grand Trunk Road running from Peshawar to Calcutta and the trunk road between Bombay and Delhi. But many other sections were more District Board roads replete with deficiencies and having substandard surfaces and temporary or low capacity culverts/bridge crossings. National Highway No. 6 traversing Orissa is one example of such roads. The thickness of the road pavements in majority of these newly designated National Highways ranged from barely 6 to 10 inches. As explained later this thickness is far from sufficient for the traffic intensities actually sustained by most of the National Highway sections. Although in the past two decades a lot of effort has been exerted in the direction of strengthening as many weak sections as possible, the stark fact stares in the face that all the National Highways by and large have only inadequate crust thickness. This inherent deficiency is a key factor aggravating the maintenance problem.

The majority of the National Highways have a flexible type of pavement surface. For the purpose of checking if a road is provided with sufficient crust thickness, the most widely used method of flexible pavement design is an empirical method going by the designation California Bearing Ratio Method. This method has been evolved after extensive observation of actual behaviour of

thousands of miles of existing roads situated under varying traffic and climatic condition by different road authorities. The minimum thickness of pavement is determined after finding out the strength of the soil in the laboratory at the worst moisture content the subgrade is expected to attain during its entire service life. This parameter of soil strength is known as the C.B.R value. Curves have been developed correlating the CBR value with pavement thickness "or various traffic intensities. One such set of curve which has emanated from the Road Research Laboratory, U.K. is at figure 1. It will be seen that the range of traffic of these curves is from 0 to over 7000 commercial vehicles of 30CWT unladen weight per day.

As mentioned above, for very long lengths in our National Highway System, the thickness of metalling is between 6 to 10 inches only. The average CBR value of the subgrade at the same time is of the order of 3 to 6%. For these values of CBR and the amount of traffic actually plying over the National Highway sections (usually in E curve range) the desired thickness according to CBR design charts works out to between 14 and 19 inches. Thus, there is a wide gap in the thickness of crust of actually existing and what ought to be available. The effect of deficient thickness is that with accumulating wheel load repetitions the surfaces are increasingly showing signs of distress and payment failures have become common place. As an end result, heavy patch repairs and frequent renewals of surfaces are a common feature of maintenance even for retaining the surfaces in their present substandard and condition.

2.2.2. Preponderance of single lane carriageways. - Another factor aggravating the maintenance problem of National Highways is that almost 70% of the total mileage belongs to single lane category. In such lengths both passing and crossing maneuvers of vehicles are made most difficult as the vehicles are forced to frequently get on and off the central paved width, Barring few stretches most of the National Highways have got only earth shoulders and these get very soon badly rutted under passage of vehicles. The deterioration is even more in the monsoon periods when the softening effect of water is an additional source of destruction causing practically a dislocation of traffic on certain sections of the National Highways.

Studies carried out by the Road Research Laboratory, U.K. (1) have succinctly shown that on a single lane road where traffic is about 100 vehicles per day each vehicle has to cross the edge of the running surface about once every two miles. When traffic flow is 1000 vehicles per day each vehicle must cross the edge about 5 times every mile and it will be running on the shoulders for approximately a quarter of the time. At the moment about 80% of the single lane sections of the National Highways (which means about 8,000 miles out of the total length of about 15,000 miles) are supporting traffic in excess 1000 vehicles per day. All these sections are therefore, obviously badly stressed and the side shoulders and edges of the pavement in their case require additional care to keep them traffic worthy.

Another feature of extra strain exist in the case of lane carriageway on single lane roads which does not exist in the case of lane carriageways is the concentration of wheel loads at a particular spot across the transverse width of the carriageway. Experiments conducted (1) elsewhere have demonstrated that this concentration of wheel loads can be of the order of 3 to 4 times than that in the case of two lane roads. This signifies that the crusts of single lane roads should be stronger and fit for 3 to 4 times the intensity of traffic than that on comparable two lane sections. Unfortunately this is not true of the single lane sections of the National Highways.

- (1) Milliard R.S.; "Roads, Road Transport and traffic in developing countries"; Conference on Civil Engineering Problem overseas 1962, organized by the Institution of the Civil Engineers, UK.

The preponderance of single lane carriageways, therefore, is a major cause for the fast degenerating maintenance of the National Highways. It will be not out of place to mention that in other advanced countries two lanes of traffic are considered the barest minimum for all arterial roads connecting major centres of population, commerce and industry. In the introduction to the Highway Capacity Manual, (2) this requirement has been stressed in the following words.

- (2) "Highways Capacity Manual – 1965"; Highway Research Board USA; Special Report No. 87.

"At least two lanes for traffic Government, one in each direction, represent the minimum highway installation normally provided. The decision to provide a two lane highway many times is not justified on demand and capacity requirements alone, but on minimum level of service requirements which justify at least one travel lane in each direction for safety, convenience and tolerable operating conditions".

2.2.3. *Increase in the intensity of traffic.*- Although the National Highway network constitutes just 2.5% of the country's road system it carries traffic much in excess of its linear share on purely mileage basis. Practically all long distance traffic is concentrated along the National Highways and in it the minor component is of heavily laden commercial vehicles. Therefore, the number of commercial vehicles as per cent of the total traffic is far higher on National Highways than on other roads. The number of commercial vehicles in the traffic stream has a direct bearing on the thickness of pavement requirements.

Further, gross laden weights of vehicles have risen substantially in the course of the past few years. A contributory factor has been the permission granted by the Central Government some years back for an *ad hoc* increase of 25% over the maximum axle weights certified previous to that with the objective of relieving the their occurring serious shortage in the country's goods carrying capacity. The result was that whereas the axle weights did not previously exceed about 18,000 lbs. their limit was suddenly increased to over 22,000 lbs. In the recent multimillion dollar AASHO Road Test (1) it has been proved that the destructive effect on pavement of 22,000 lbs axle load is a little over two times than for a 18,000 lbs. axle. In actual practice even overloading beyond this limit is not uncommon. In contrast the axle loads of buses and trucks plying on highways of India in 1940 hardly exceeded 9,009 lbs.

- (1) "The AASHO Road Test", Special Report No. 6i, Highway Research Board, U. S. A. 1962.

Some of our highways cater for even higher loads when special machinery required for factories has to be transported by road owing to dimensional limitations of the railway wagons. An example of this demand for increasing the permissible loads is the Madras-Neyveli section of N-H. 45 where all the structures had to be reconstructed for, the transport of machinery required for Neyveli Lignite Complex.

Increasing axle loads, therefore, are a major cause of determination of the National Highway surfaces.

Apart from this, traffic within the country has increased by leaps and bounds to phenomenal levels in the course of just 10-15 years. This is exemplified by the figures of motor vehicle registrations ⁽²⁾ in the country from 1951 to 1967 reproduced below which show that the vehicle number hot up by three times over this period. The Magnitude of this increase is about 8% compound every year.

(2) "Basic Road, Statistics" published yearly by the Ministry to Trans- port and Shipping, Government of India.

<i>Year</i>	<i>Number of Vehicle</i>	<i>Index</i>
1950-51	159,263	100
1955-56	203,184	128
1961-61	309,576	194
1961-62	339,644	213
1962-63	375,396	236
1963-64	387,947	243
1964-65	428,055	269
1965-66	456,793	287
1966-67	477,250	299

Maintenance allotments for National Highways have, however not sympathetically increased over the same period. As a consequence the maintenance operations have been left behind in relation to the requirements, generated by heavier and larger number of vehicles.

2. 2. 4 *Increase in cost of labour and materials.*- In the years immediately, preceding there has been an appreciable rise in the cost of labour and materials. But the maintenance grant have not increased at the same pace with the result that it has not been possible to pay the desired amount of attention to National Highways and in the process their ridding quality has steadily

gone down. The maintenance grants (1) for the past ten years are shown below along with the length of National Highways in that year and the index number (2) of the wholesale prices:-

(1) Annual Reports of the Ministry of Transport.

(2) "Records and Statistics" issue of August, 1968.

YEAR	MAINTENANCE ALLOTMENT (Rs. lakhs)	LENGTH OF NATIONAL HIGHWAYS (Miles)	INDEX No. OF WHOLESALE PRICES
1958-59	461.54	13922	112.9
1959-60	505.95	13906	117.1
1960-61	531.63	13906	124.9
1961-62	567.54	14815	125.1
1962-63	582.61	14815	127.9
1963-64	620.50	14913	135.3
1964-65	709.80	14922	152.7
1965-66	780.00	14922	165.1
1966-67	700.00	14922	191.3
1967-68	700.00	14955	212.4

It will be seen from the Table that during the last five years the cost of materials, labour, etc. which are reflected by the index of wholesale prices have shot up by over 30% the incidence of rise in labour costs (which constitute the major part of maintenance expenditure) being much higher. On the other hand, the amount allotted for maintenance has practically been at a standstill. This is in spite of the fact that the length of the National Highways has also increased

somewhat over this period and concurrently there has been upgrading of several section from single lane to two lane width. The maintenance grant should have been automatically raised on the score of rise in prices alone, but this was not done.

2. 3. COMPONENTS OF MAINTENANCE

2.3.1. The Technical Group has considered the maintenance of the National Highways under the following three main heads:-

- (i) Ordinary repairs
- (ii) Periodic renewals
- (iii) Special repairs on account of flood damages etc.

2.3.2. Separately, consideration has also been given in assessing the total cost requirements to special features of maintenance like the heavy rainfall areas, hilly areas add desert terrain.

2. 3. 3. The scope of the three major components of maintenance and the basic principles underlying the calculation of unit costs for each are explained in the succeeding paragraphs.

2.3.4. *Scope of ordinary Repairs.*- 2.3.4.1. The main items of routine maintenance involved to keep the road in good condition are as under:

- (i) Keeping the road pavement and shoulders in proper shape and Condition;
- (ii) Ensuring that the shoulders and roadside areas were free from undergrowth and other obstructions;
- (iii) Attending periodically to drainage system so that it functioned efficiently at all times;
- (iv) Maintenance of highway signs, kilometre stones and other traffic aid devices and safeguarding these against damage;
- (v) Repairs to culverts and bridges, including their periodic painting;
- (vi) Repairs to Inspection Bungalows;
- (vii) Taking care of avenue trees; and
- (viii) Annual traffic census.

The scope of some of these items is explained in detail below.-

2.3.4.2. *Road Pavement.*- The majority of the National Highway have only a thin bituminous wearing surface on top. The wearing surface usually overlies one or two layers of water bound

macadam but the thickness of the water bound macadam base in most cases is less than what would be considered optimum worked out from due application of the design principles. Through wear and tear brought about by traffic, rise in sub-soil water level, and action of other similar factors like the destructive effect of climatic elements, the surface is constantly undergoing decay. The resulting deterioration manifests in the form of following type of failures.-

- (i) Unravelling
- (ii) Waviness in surface
- (iii) Cracking of surface
- (iv) Pot holes; and
- (v) Edge breaking.

The road gangs employed by the various PWDs have to attend to these above defects as soon as these come to notice by means of simple patch repairs, employing the most elementary equipment to which they have access and using materials like bitumen, stone and sand. Unless these defects are alleviated in time they may well lead to a total disintegration of the crust and the scope of the repair work may become enhanced many times over.

2.3.4 3. *Shoulders (Berms)*.- Berms serve many functions. They provide side support to the pavements, are used for passing and overtaking man-oeuvres by the traffic when carriage way width is insufficient, come in handy for the parking of disabled vehicles, and at the times serve as a track for slow moving vehicles. In order to satisfactorily perform these functions it is necessary that the surface of the shoulders be hard enough to resist the abrasive action of vehicles, and likewise the disrupting influence of the elements of nature. The shoulder surface should always slope uniformly away from the edge of the pavements so that any water falling on the road surface or shoulders is speedily drained off. In most other countries it is a common practice to pave a part of the shoulders nearest to the carriage way. But on National Highways, but in very few instances, the practice of paving of shoulders is as a rule absent from the scene. Consequently shoulders which consist mostly of earth borrowed from the sides get rapidly worn out under traffic. The work of maintenance staff consists in periodically replacing earth or moorum carried away from the shoulders by combined effects of abrasion by traffic and wind action, to remove ruts, and to restore the camber to the former design level. This work is particularly heavy during and immediately after rains in most parts of the country and during summer in arid regions.

2.3.4.4 *Bridges and Culverts*.- In respect of bridges and culverts the following tasks are regularly required to be carried out as part of the maintenance effort:-

- (i) Keep the area in the vicinity of the bridge clear of undergrowth and rubbish.

- (ii) Preventing accumulation of logs and debris against upstream side of the piers at the time of floods.
- (iii) Undertaking minor repair works for timber bridges.
- (iv) Periodic painting of steel bridges and greasing of bearings.
- (v) Temporary repairs to structures involved in accidents.
- (vi) Attending to expansion joints of concrete bridge.
- (vii) Cleaning pipe and other culverts of blocked material.
- (viii) Pointing or/and plastering exposed masonry faces of structures.

If the above repairs are not attended to in time it is quite likely there may be a more serious damage to the structure itself and traffic may be seriously interrupted.

2.3.4 5. Drainage.- Drains are necessary for collecting run off water from the roadway so that it does not enter the body of the pavement and weaken it. If the drainage system is not effectively functioning, the road may be damaged in various ways, as under:

- (i) Scouring of shoulders and drains.
- (ii) Softening of subgrade to such an extent as to cause failure or distortion of the pavement surface.
- (iii) Extensive slips both at cuttings and embankments, caused on account of infiltrating water.

As the ill effects of a defective drainage system show up normally only when it is too late to undertake remedial measures, a great lot of care must be exercised during periods of routine maintenance itself to see that efficacy of the system is in no way impaired. Lack of attention to this fact of maintenance may lead subsequently to expenditure of several times the money saved originally in routine maintenance to make good the damage caused by rain and flood waters.

2.3.4.6. *Roadside Plantations and other miscellaneous works.*- The work of maintenance includes paying attention to the general appearance of the roadside, by preserving natural scenery, planting of fresh avenue trees and repairing of damages to the existing trees and shrubs. In addition fallen branches and dead plants must be removed at intervals to improve the way- side appearance. Further, road must at all times be kept free of all obstructions, so whenever any tree falls and obstructs the roadway it must be speedily removed. Periodic lopping of trees to maintain necessary clearances and keeping tree guards and fences in trim are other tasks falling within orbit of the maintenance work.

Proper maintenance of highway signs and other traffic aid devices which would include such signs as road direction signs, warning signs as at sharp curves, signs informing about maximum speed limit on the highway, route markers, kilometre stones etc., is also of equal importance. All these signs must always be in their designated positions and be renovated periodically as and when that becomes necessary.

2.3.4.7. *Annual Traffic Census.*- Another important item that has to be taken up annually the census of highway traffic. Since the programme of widening, strengthening and other improvements to National Highways depends largely on the volume, axle weights and mix of the traffic, it is necessary to have information about these on every section of the system brought up to date by annual census.

2.3.5. *Method of computing the costs of Ordinary Repairs.* - 2.3.5.1. For the purpose of computing the cost of ordinary repairs for the National Highway network, the Technical Group recommends that the country may be demarcated into convenient zones on the basis of average cost of the stone chips in these and the National Highways further categorised in each according to carriageway width and the intensity of traffic.

2.3.5.2 *Division into Zones.*- The cost of stone chips, which in essence is labour cost, was taken as the basis for grouping because in the opinion of the Technical Group this is the single most important factor which is responsible for the prevalent difference in the costs of ordinary repairs between various areas. Chips are the main element both in patch and renewals and their cost varies widely in the country. It is as low as Rs. 90 per 100 cft. in parts of Madras and Mysore but as high as Rs. 230 per 100 cft. in West Bengal and parts of U. P. and Bihar.

The Technical Group recommends the division of the country into four zones as regards cost of stone chips. The recommended divisions are shown in the map enclosed at figure 2. This map is based mainly on the divisions recommended in the M.E.S. Standard Schedule of Rates, 1962 except for the modification that areas to north of Ganga in U. P. and Bihar have been considered in Zone IV instead of Zone III and States of Kerala and Himachal Pradesh have been brought under Zone II.

This division is, however, based on the conditions obtaining at the time of this report. The pattern of costs of road works in the various sections of the country is likely to change with time. Therefore, it is suggested that the divisions into Zones should be revised periodically in keeping with cost changes. A periodicity of 4 years is recommended.

2.3.5.3. *Categorization of Roads by Intensity of Traffic and Width of Carriageway.*- The National Highways, single and two lane sections separately, have been categorised into 3 classes as under so as to reflect the effect of traffic.

- (i) Sections carrying traffic less than 450 commercial vehicles per day.
- (ii) Sections supporting traffic of commercial vehicles in the range 450-1500 commercial vehicles per day; and
- (iii) Sections carrying traffic in excess of 1500 commercial vehicles per day.

2.3.6. *Scope of Periodic Renewals.*- While routine repairs can certainly prolong the life of a surface, a time comes when the cost of maintaining the roadway in its original condition by purely routine maintenance not only becomes prohibitive but even impossible. Renewal of the wearing surface at periodic intervals is thus inescapable. The renewal in the case of National Highways consists usually of a bituminous surface dressing or in few cases, where traffic is more, of the more durable type $\frac{3}{4}$ inch thick premix carpet.

In the Technical Group's opinion patch repairs can stretch the life of new surface by only 3 to 6 years depending upon local circumstances. After that a good part of the carriageway is covered by patchwork and further work of this type does not help in removing the rapidly growing deficiencies of riding quality. Unless surface is renewed at the juncture the structural failure of the whole pavement may well be in sight.

On evaluation of all the variables involved, and on the basis of experience of renewals in various parts of the country, the following general norms for surface renewals are recommended. These are subject to two conditions recounted later:

(i) In the case of single lane sections of National Highways with traffic less than 450 commercial vehicles per day the renewal should consist of a single coat of surface dressing to be placed every four years. The same treatment may be imparted to two lane sections with traffic intensity in the range 450-1500 commercial vehicles per day.

(ii) For the case of single lane National Highways carrying traffic between 450 to 1500 commercial vehicles per day, the renewal may similarly take the form of a single coat of surface dressing but it should be repeated at a clo3cr interval, every three year.

(iii) In the case of two lane National Highways with traffic volume below 450 commercial vehicles per day the renewal treatment may consist of a single coat of a surface dressing to be repeated in a 5 year cycle.

(iv) For National Highways carrying traffic in excess of 1500 commercial vehicles per day, be they of single lane or two lane width the renewal treatment should consist of a $\frac{3}{4}$ inch thick bituminous carpet (with allowance for extra material for initial levelling prior to laying) to be renewed every six years.

The adoption of above norms is recommended subject to the following two conditions:

(i) The recommendations of the Technical Group are based on a fair riding quality standard not different from the type of surface in vogue presently on most of the National Highways, i.e. one or two coat surface dressing. Increase in traffic, however, is making it necessary that the riding quality standards should be upgraded in the near future and then it should be the aim to renew National Highway surface with only $\frac{3}{4}$ inch premix carpet rather than a single coat of surfaces dressing advised currently. For National Highways, which are burdened by more than their normal share of heavy vehicle traffic, a premix carpet of $\frac{3}{4}$ inch thickness is regarded as the minimum acceptable standard of renewal capable of moving traffic at design speed. When this change in maintenance policy comes about, and the sooner it

happens the better shall it be, it will result in a slight increase in the maintenance expenditure for renewals.

(ii) The renewal cycle suggested above are on the assumption that almost the entire National Highway pavements will be taken up for strengthening and a major portion strengthened and widened or provided with hard shoulders during the period of the Fourth Five Year Plan. Until strengthening of the pavements is taken up in right earnest, no amount of renewals, even at closer intervals, will succeed in attaining the desired level of service for the road users. If for some reason it is not possible to take up a large programme of strengthening and widening and providing shoulders and make a substantial headway on these during the next plan period an extra allowance for increased maintenance requirements, which will arise on account of the crust thickness being inadequate for the traffic presently on the roads, will be absolutely necessary. The Technical Group feels that to cater for this exigency a surcharge of 25% must be permitted over the amount otherwise accepted for periodic renewals.

2.3.7. Method of computing the Costs of Periodic Renewals.-The technical group recommends the categorisation of National Highways for periodic renewals under the same four Zones and three intensities of traffic suggested for Ordinary Repairs.

2.3.8. Scope of Special Repairs including Flood Damages.- Next to ordinary repairs and periodic renewals, the expenditure on special repairs which becomes unavoidable on account of flood damages or other calamities or minor improvements is of essence in a maintenance programme. The need for special repairs may arise on account of:-

(i) Damage by flood, cyclones or other natural calamities

(ii) Special repairs made necessary on account of such occasional items as reconstruction of a retaining wall, providing water supply and electricity to Inspection Bungalows, etc.; and

(iii) Major improvements such as improvements to curves visibility, etc.

As will be evident, making provision for special repairs and flood damages involves evaluation of several unknown factors. The cost of those repairs cannot, therefore, be predicted with confidence in advance, and only lump sum provision can be made.

2.3.9. Other factors requiring cognizance during assessment of the total cost of maintenance.-- Besides the requirement of funds for ordinary repairs renewals and special repairs, it is also necessary to cognise, while estimating total funds for maintenance, certain special factors of terrain and climate which demand an increased allotment for corrective maintenance. Worthy of consideration under this head are the needs of areas of heavy rainfall mountainous areas and desert regions.

For each of these areas, amount of maintenance allocations will need to be enhanced for the following reasons:

(i) *High rainfall areas.*- In heavy rainfall sections the renewals will require to be done at closer intervals. Moreover, the expense on patch repairs and berm repairs will be more than otherwise.

(ii) *Roads in Hilly Sections.*- In hilly sections the cost of maintenance rises on account of extra work involved in the removal of slips, maintenance of high retaining walls, breast walls, hairpin bends, drainage facilities etc.

(iii) *Roads in desert areas.*- For roads situated in desert terrain, the extra work befalling the maintenance personnel is removal of sand from road surface.

4. General Recommendation.

2.4.1. *Maintenance Studies.*- The Technical Groups also wishes to record that continuous attempts should be made to relate allotments to actual requirements based on scientific field control experiments. For this purpose the Committee recommends that systematic maintenance studies organised over a few representative sections of the National Highways under different terrain and climatic conditions should be carried out on a continuing basis. The maintenance studies will consist of chosen road sections subject to the effect of different variables, being maintained to standards prescribed by the Technical Group for a period of at least one renewal cycle which will vary from 3 to 6 years. Accurate records of expenditure will have to be kept during this period. The Technical Group have already arranged with the Chief Engineers of the five States who are members of the Group to take up the experiments on 30 miles in each of their States with effect from 1969-70.

2.4.2. *Modernizing of Maintenance Operations.*- The Technical Group wishes to stress that to overcome the difficulties of maintenance operations, experienced all round in recent years, a change in the present methods of road maintenance affected solely through gang labour is necessarily called for. It is high time a shift was made to the system prevalent in other advanced countries where instead of moving individually on foot the labourers move about collectively in groups of about 10 in a truck equipped with the necessary basic tools for routine maintenance. Such groups, because of their mobility, are capable of looking after sections of road from 20 to 30 miles with much greater ease and efficiency than dispersed gang labourers as now. Such a system may be expensive to start, with but in the long run its advantages should outscore the apparent disadvantages. A party of 10 trained workmen is better placed to execute a heavy job of patch repairs or berm repairs than a batch of 4 or 5 gangmen who must walk several miles to reach the spot of work.

It is recommended that in some sections of National Highways mobile gangs must urgently be set up on an experimental basis so that the effect of the experiment could be watched and long-range decisions on the basis of result for a complete re-organization of the maintenance operations, for improved efficiency, taken. It was decided that this experiment also will be undertaken in the five States, whose Chief Engineers are members of the Technical Group and who are fully aware of the requirements of reorganisation. The five Chief Engineers have undertaken to commence work on this system in 1969-70.

PART III

ESTIMATION OF MAINTENANCE COSTS FOR NATIONAL HIGHWAYS

4.1. For computing the total requirement of maintenance funds for National Highways in different States costs of the following must separately be determined:-

- (a) Unit cost of Ordinary Repairs,
- (b) Unit cost of Renewals,
- (c) Provision to be made for Special Repairs including Flood Damages, and
- (d) Premium to be allowed for difficult areas.

4.2. Unit cost of ordinary repairs

For computing the unit cost of ordinary repairs, it has already been indicated in Part II that the country will be divided into 4 divisions (See fig. 2) on the basis of divisions recommended in the M. F. S. Standard Schedule of Rates 1962. The cost of chips in these zones based on 1962 M. E. S. Schedule of Rates increased by a flat premium of 40% to more truly reflect the present day costs is given as under:-

<i>zones</i>	<i>Range of cost of chips</i>	<i>Average cost</i>
	<i>(in Rs. per 100 cft.)</i>	<i>(in Rs. per 100 cft.)</i>
Zone I	80-100	90
" II	100-130	115
" III	130-170	150
" IV	170-230	200

The National Highways, single and two lane sections separately, have been further classified in each of the Zones according to the traffic classification as recommended in Part II.

Taking into account the various items of routine maintenance outlined in Part 11, the Technical Group first worked out the cost of labour required for maintenance for all the above referred classifications. For the purposes of these costs it was decided on *ad hoc* basis on the strength of experience of the Chief Engineer of the five Zones that optimum requirement of gang labour was 0.5 gangman per mile in the case of single lane sections of National Highways supporting low intensity of traffic. In the case of 2 lane sections carrying a higher volume of

traffic the optimum requirement of gang labour could be assumed as 0.75 labourer per mile of road.

In the next step, the costs for such items as, patch repairs berms repairs arboriculture, repairs to culverts, inspection bungalows, etc. have been computed and added to the former to obtain the final figures of unit cost of ordinary repairs.

The tabulation of costs is at Table 1. It will be seen that the unit cost varies from Rs.2,700 per mile for two lane road situated in Zone I supporting a low volume of traffic to Rs.4,450 per mile in the case of a two lane section situated in Zone IV subject to heavy volume of traffic.

4.3. Unit cost of renewals

On the basis of recommendations made in Part II, the Technical Group has worked out the cost of renewals for National Highways in each of the 4 Zones by width of pavement and traffic intensity. The abstract of Unit Costs is at Table 2. It will devolve there from that the annual cost of renewals varies from Rs. 1688 for a single lane National Highways situated in Zone 1 having a low intensity of traffic to Rs. 8733 per mile in the case of a two lane section situated in Zone IV and supporting a very heavy intensity of traffic i.e. about 1500 commercial vehicles per day.

4.4. Provision for special repairs including flood damages

The Technical Group examined the question of quantum of money required for these types of repairs in detail. Drawing from the experience of various Public Works Departments, the Group decided that provision for special repairs and flood damages should be on a lump sum basis at 20% of the total cost of routine repairs and renewals for all the National Highways in the country. Of this 12½% will be meant for repairs arising out of damage by floods etc. and 7½% for other Sunday repairs termed as special repairs.

It was also realised that whereas the allotment for ordinary repairs and renewals was purely on a per mile basis, the allocation for flood damages and special repairs had of necessity to be on the basis of works specifically required. Examination and sanction of individual estimates by competent authorities must, therefore, precede before any allotment from the special repairs quota of the maintenance grant was made.

4.5. Premia for difficult areas

(a) *High rainfall areas.*- The Technical Group decided to provide an extra allowances of 700 per mile per year for roads situated in heavy rainfall Zones to cope with the extra patch and berm repairs in these areas.

(b) *Roads in hilly areas.*- It was felt that the provision of Rs.1,500 per mile per year will meet the needs of extra maintenance in hilly sections.

(c) *Roads in desert areas.*- A provision of Rs.500 per mile per year has been made to meet the extra demands in desert areas.

4.6. Total requirements of maintenance funds for National High. ways in different States.

4.6.1. Based on the unit costs for ordinary repairs and renewals and the premia for difficult areas given above, the Technical Group has worked out the cost of maintenance of National Highways in different States in Table 3. Maintenance requirements have been estimated first under the two major heads of Ordinary Repairs and Periodic Renewals and afterwards an allowance has been made over and above these in lieu of the terrain requirements. Agency charges at 7½% have been added in the end as is customary for all National Highway works. The categorization of single and double lane sections in the various States under different traffic intensities has been done on the basis of available information and is subject to periodic review on the basis of latest traffic figures.

4.6.2. *Flood Damages and Special Repairs*- For Flood damaged and special repairs provision is made on a lump sum basis at 20% of the total cost of maintenance worked out for ordinary repairs, renewals, premia for difficult areas and agency charges. Since the fund requirements under flood damages and special repairs will vary in each State from year to year this lump sum provision will be distributed by the Ministry of Transport (Roads Wing) only after receipt of detailed reports from the State Chief Engineers. The estimates for special repairs will be reviewed usually between July and September every year and of flood damages during November and December.

4.7. Periodic computation of maintenance amounts

The maintenance amounts worked by the Technical Group in Table 3 for different States are for the period 1968-70 as they were prepared on the basis of traffic, cost and highway Width data of 1968. Because of constantly shifting costs, changing traffic and width, it is left that these estimates should be periodically modified, and in any case at least biennially. The next review is recommended to be carried out in January- February, 1970.

4.8. Abstract of cost.

The abstract of total costs worked out in Table 3 is reproduced below:-

1. Cost of Ordinary Repairs	Rs. 438.3 lakhs
2. Cost of Renewals	Rs. 365.9 lakhs
3. Premia for Difficult Terrain	
(a) Hilly Section	Rs. 13.9 lakhs
(b) Heavy Rainfall Sections	Rs. 16.0 lakhs
(c) Desert Sections	Rs. 0.9 lakhs
Sub Total	Rs. 835.0 lakhs

4. Agency charge at 7½%	Rs. 62.8 lakhs
Sub Total	Rs. 897.8 lakhs
5. Provision for Special Repairs and Flood Damages	
(a) Special Repairs at 7 ½ %	Rs. 67.35 lakhs
(b) Flood damages at 12 ½ %	Rs. 112. 25 lakhs
Total	Rs. 1,077.4 lakhs

4.9. The above estimate of costs is subject to the assumption that a sufficiently big programme of strengthening the payment will be undertaken during the 4th plan period and Simultaneously as many sections will be widened or provided with hard shoulders as found necessary from needs of traffic. If this promise is not fulfilled, and strengthening of pavements cannot be tackled to the Scale envisaged, the maintenance allocations will require to be increased by an *ad hoc* amount of 25% calculated over the cost of the periodic renewals. With this addition the total amount required for maintenance will work out to Rs.1,175.8 lakhs instead of Rs.1,077.4 lakhs.

PART IV

NORMS FOR COMPUTING MAINTENANCE COSTS FOR STATE HIGHWAYS

5. The Technical Group considers that the problem of maintenance of State Highway is identical to that of the National Highways. The norms for assessing maintenance requirements in their case will, therefore; be the same as those developed for the National Highways in the preceding sections. It is suggested that the funds required for maintenance of its State Highways be calculated by each States with the help of these norms These estimates should be periodically reviewed, and in any case biennially, as already recommended under para 4.7.

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Sd. (J.S. Marya) Chief Engineer P WD (Buildings & Roads) Haryana, Member.

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(Buildings & Roads) Bihar, Member. Transport (Roads Wing), Member-
Secretary

Sd. (W.G.H. Saldhana)

Chief Engineer, P. W. D.

(Buildings & Communications),

Mysore, Member.

APPENDIX XVII B

(Referred to in para 17.3.3.4)

Road Chart

Name of Road

Position of quarry

Metal Gravel Sand

Rates

Metal Rs. m₃

Gravel Rs. m₃

Sand Rs. m₃

Kilo	Renewals in previous years	Proposals for		Notes on condition of Roads	Remarks
		Current year	Next year		
1					
2					
3					
4					

5				
6				
7				
8				

APPENDIX XVII C

Table

(Referred to in para 17.4)

Schedule of Maintenance of Operations

Item of maintenance	Ap ril	M ay	Ju n e	Ju ly	Au gus t	Sept emb er	Oct ob er	Nov emb er	Dec emb er	Jan uar y	Feb ruar y	Mar ch
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Through repairs including clearing of jungle growth sectioning & forming and clearing side drains	X	X	..	..	..	X	..	..	..	..	..	..
2. Clearing culverts and opening outlets	X	X	..	..	X	X	..	..	..	..	..	..
3. Filling erosions and removal of slips	As and when such or erosions occur											
4. Patchwork to metalled & graveled roads Do. Black topped	..	..	X	X	X	X	X	X	X	..	..	..
5. Watering and blinding metalled	X	X	..	..	..	..	..	..	X	X	X	X

roads													
6. Planting avenue Trees	..	..	..	X	X	..	..	..	..	..	..	..	..
7. Collection of metal for patchwork (metalled roads)	..	X	X	..	..	..	..	..	..	..	..	..	..
8. Collection of metal for renewal (metalled roads)	..	X	X	X	..	..	..	..	..	..	..	..	..
9. Collection of metal for renewal (BT Roads)	..	..	..	..	..	..	X	X	X	..	..	..	..
10. Repairs to pitching, retaining walls etc.	..	..	..	..	..	..	..	X	X	X	X	X	X
11. Painting sign boards, Kilometre stones, guard stones etc.	..	..	..	..	..	..	..	X	X	X	X	..	..
12. Painting steel bridges	..	..	..	..	..	..	..	X	X	X	X	X	X
13. General maintenance, unforeseen works	All the year round and according to necessity.												

APPENDIX XVII D

(Referred to in para 17.9.20

Register of avenue trees

As on

Division.....

Subdivision.....

Section.....

Edge clearances:

TOP	5 cm
Bottom	7.5 cm
Sides	5 cm
Spacing between lines	5 cm

III. SCRIPT OF THE INSCRIPTION

3.1. The place names shall be inscribed in different scripts in the following order, only one script shall be used on any one Kilometre stone:

<i>KM. No</i>	<i>Script for place names</i>
0	Roman
1	Hindi (Devanagari script)
2	Local Languages
3	Hindi (Devanagari script)
4	Local Language
5	Roman
6	

and so on repeated in the same order.

3.2. The above order and weightage of a script may be modified at the discretion of the Road Authority.

3.3. The numerals shall in every case, be inscribed in the international form of Indian numerals as detailed in plate VI and plate VII local or Devanagari numerals shall not be used vide Article 343 (i) of the Constitution of India.

3.4. On Kilometre stones fixed on other District Roads and Village roads the inscription may be in the national language, ie. Hindi in Devanagari script, or the script of the recognised regional language, at the discretion of the local Road Authority. Inscription in the Roman script is not necessary unless such a road leads to a place of tourist or archaeological interest.

IV. SEQUENCE OF INSCRIPTION

4.1. Ordinary kilometre stones (plate 1) shall indicate the name and distance of the next (intermediate) important town only, whereas every 5th kilometre stone (plate 11) shall show the name and distance of the terminal or the starting station also above those of the intermediate towns.

4.2. On the side of a kilometre stone facing the carriageway the number (*) of the kilometre stone shall be inscribed (without the name of any place). In the case of thin stones made of R. C. C. or any other material the digits may be inscribed one below the other, thus:

4

2

6

* This numbering is meant for the use of the maintenance staff and will start with 0 at the starting station and increase progressively upto the last kilometre stone at the terminal station.

V. THE SHAPE AND SPACING OF LETTERS

5. 1. The shape and spacing of letters in the Roman script and of numerals shall conform to those shown in the appended plates as given below:

(i) 8 cm letters (**) Plate V

(ii) 13 cm numerals Plate VI

(iii) 10 cm numerals Plate VII

** For long place names the thickness of letters and spacing between them may be reduced suitably. Their height, however, should not be changed.

5. 2. On kilometre stones, which are inscribed in a script other than Roman, the style of lettering shall be the one in general use. The spacing between single or compound letters shall be at least equal to the thickness of the vertical strokes or the thickness of strokes of letters in the scripts having no vertical strokes, such as in Oriya, Telugu and Kannada.

VI. COLOUR OF THE BACKGROUND AND OF THE INSCRIPTION

6. 1. The background colour shall be white with black letters and numerals for names of stations and distances. The semi-circular portions of kilometre stones on National Highways, State Highways and Major District Roads shall be painted canary yellow (I.S. Shade 309) brilliant green (I.S. Shade 221), and white respectively. The route numbers to be written on the semi-circular portion, shall be in black on the canary yellow and white backgrounds, and in white on the brilliant green background.

VII. ORIENTATION

7.1. Kilometre stones shall be fixed at right angles to the centre line of the carriageway (see plate IV)

8. 1. Kilometre stones shall be fixed on the side of the road other than that on which mile stone exist. On new roads they shall be located on the left-hand side of the road as one proceeds from the station from which the kilometre count starts.

8 2. On embankments kilometre stones shall be fixed at the edge of the roadway, outside the shoulder, on specially erected platforms, if necessary. In cuttings, they shall be fixed clear of the shoulder and the side drain (see plate IV).

APPENDIX XVII F

(Referred to in para 17. 15. 2)

Inspection Report of Bridges

Sl.No	Particulars
1.	General
	A. Name
	B. General Description
	C. Locality
	D. Inspection made by
	E. Date

2. Waterway

- A. Adequacy
- B. Scour
- C. Obstruction
- D. Under growth
- E. Channel revetments
- F. Shifting
- G. Other features
- H. Other remarks if any

3. Piers & Abutments, Masonry

Timber, Steel or concrete

- A. Under mining
- B. Settlement
- C. Cracking
- D. Disintegration
- E. Decay
- F. Corrosion
- G. Other defects
- H. Filling foundation
- I. Other remarks if any

4. Concrete structures

- A. Cracking

- B. Scaling
- C. Scour
- D. Settlement
- E. Disintegration
- F. Bulging
- G. Tilting
- H. Water proofing
- I. Other defects
- J. Other remarks, if any

5. Steel Construction

- A. Condition of paint
- B. Corrosion
- C. Joints
- D. Loose rivets
- E. Camber
- F. End shoes
- G. Other defects
- H. Other remarks if any

6. Timber Span & Floor

- A. Condition of paint
- B. Decay
- C. Wear (floor)

- D. Structural defects
- E. Crushing at joints
- F. Splicers
- G. Other defects
- H. Other remarks if any

7. Proposal for Remedial Measures

- A. Details
- B. Approximate amount

8. General Remarks

9.

Note: (i) All columns appropriate to the bridge should be filled up by the Inspecting Officer.

(ii) The condition of the particular part or parts of the structure detailed above should be generally described as "good" 'fair' or 'deteriorated' as may be considered suitable by the Inspecting Officer

(iii) where there are special damages or dangerous developments noted these should be specially mentioned in the column "other remarks" pertaining to the concerned part of the structure.

(iv) If the officer who is inspecting is unable to suggest proposals for remedial measures or finds it difficult to work out the appropriate cost, the inspection report should not be delayed on the account. The report should be sent without filling these column, but with a letter explaining why he is unable to do so.

APPENDIX XVII G

(Referred to in para 17. 16. 2.

GOVERNMENT OF KERALA

Abstract

FUNDS-DISTRIBUTION OF FUNDS FROM "50 (D) REPAIRS" FOR MAINTENANCE, RENEWALS, REPAIRS ETC., OF ROADS AND BUILDINGS AMONGST THE VARIOUS B & R DIVISIONS – NORMS PRESCRIBED-ORDERS ISSUED.

PUBLIC WORKS (BUILDINGS & COMMUNICATION I) DEPARTMENT

G.O. MS. No. 19/72/PW.

Dated, Trivandrum., 29th January 1972.

Read: Correspondence ending with D.O.No. CA6-16902/70 dated 16-11-1970 from the Chief Engineer (General and, Buildings and Roads).

ORDER

At present there is no uniform standard, adopted for the, allotment of funds for the maintenance of roads in the various Divisions in the State. The State roads are classified into four categories, namely the National Highways, the State Highways, the Major District Roads, and other District Roads. The maintenance of National Highways is being executed in Accordance with the directions of the Government of India. Provision is made in the State Budget for the maintenance of the roads falling under the other three categories. Government have been examining the question of laying down certain norms for the maintenance of these roads.

2. A conference was held in the Office of the Chief Engineer (General and Buildings & Roads on 24-2-1970 to discuss the whole aspect and to evolve some procedure for the judicious distribution of funds from "50 (d) repairs" for carrying out ordinary maintenance, renewal programme and special repairs to roads and buildings in the State. The Secretary to Government, Public Works Department, the Chief Engineer (General and Buildings and Roads), the Superintending Engineers of three (B&R) Circles and the Executive Engineers of B and R Divisions were present. 'After the discussion' the Chief Engineer (General and Buildings and Roads) has submitted certain suggestions for approval of Government. The Chief Engineer has suggested that the norms for the ordinary repairs of roads be fixed with reference to the type (Black topped or Water Bound Macadam) width (single or double lane), and the classification (State Highways, Major District Roads or the other District Roads) of roads, and the lengths of such roads in each Division. Similarly, he has also suggested certain programme for renewals and special repairs of these roads in the Divisions. He has also submitted proposals for the maintenance of buildings in the State.

3. After examining the matter in detail, Government are pleased to fix the following norms for the ordinary maintenance and repairs, " Special Repairs, Renewal works etc. of the roads, and buildings in the State.

I. Instead of the present practice of debiting the -expenditure towards the ordinary repairs, renewals, and special repairs to roads and buildings to the minor head of '(d) repairs 1 Buildings' Communications and Miscellaneous. Public Improvements under '50 PW' the expenditure on the above accounts will be classified with effect from the financial year 1972-73 under the following sub heads so as to watch the progress of expenditure in respect of different categories of maintenance works.

50 PW (d) (1) Buildings.

1. Maintenance of Buildings-Ordinary Repairs
2. Do. -Special Repairs
3. Electrical Maintenance

50 PW (d) (2) Communications.

1. Ordinary Repairs and renewals
2. Special Repairs.
3. Flood damage repairs.

The remaining heads of account 2, 3, 4, 5 and 6 under '50 (d)' will be renumbered as 3, 4, 5, 6 and 7. The Finance Department will introduce the new heads of account in the budget for 1972-73.

The nature of works which could be carried out under the different sub-heads mentioned above, will be governed by the relevant code rules as amended from time to time.

II. Ordinary Repairs (Roads).

The norms for ordinary repairs of roads will be as follows based on the type and width of surfacing and the classification, of roads.

Category of roads	Grant/per K.M
(a) State Highway	
(i) Black Topped	Rs.2,100

(ii) Concrete surface	Rs.500
(b) Major District Roads	
(i) Black Topped (5. 5. M. width)	Rs. 1,650
(ii) Black Topped (3. 66 M. width)	Rs. 1,100
(iii) Metalled surface	Rs. 960
(c) Other <i>District Roads</i>	
(i) Black Topped (3.66 M. width)	Rs. 1,100
(ii) Metalled	Rs. 960
(iii) Gravelled surface	Rs. 500
(iv) Village, roads taken over from Panchayats	Rs. 500
(not improved)	
(d) Difference in wages to NMR Workers	Rs. 27 lakhs
(i.e. excess pay to NMR Workers)	
(e) Pay for the seasonal ferrymen	Rs. 3 lakhs

III. Renewal Works (Roads)

The norms for renewal of roads will be as follows:

<i>Category of road</i>	<i>Amount fixed for annual renewal works</i>
(a) <i>State Highways.</i>	

- | | | |
|------|--------------------|----------------------|
| (i) | Black topped roads | Rs. 24,000 per K. M. |
| (ii) | Concrete roads | Rs. 24,000 per K. M. |

Note: 1/5th of the total length of black topped roads and 1/10th of the total length of concrete roads may be renewed every year.

(b) Major District Roads

- | | | |
|------|--------------------|----------------------|
| (i) | Black topped roads | Rs. 15,000 per K. M. |
| (ii) | Metalled roads | Rs. 9,500 per K. M. |

Note: 1/5th of the total length of item (i) above may be resurfaced every year and 1/3rd of the total length of item (ii) above may be remetalled every year.

(e) Other District Roads

- | | | |
|-------|--|------------------------------|
| (i) | Black topped roads | Rs. 11,000 per K. M. |
| (ii) | Metalled roads | Rs. 9,500 per K. M. |
| (iii) | Gravelled roads | Rs. 3,000 per K. M. |
| (iv) | Village roads taken over from Panchayats Ave | Rs. 500 per K. M. per annum. |

Note: (i) 1/5th of the total length of item (i) above may be resurfaced every year.

(ii) 1/3rd of the total length of item (ii) above may be remetalled every year.

(iii) 1/3rd of the total length of item (iii) above may be regavelled every year.

(iv) The programme for renewal work to be carried out every years will be drawn by the Executive Engineers and got approved by the Superintending Engineer.

IV. *Special Repairs (Roads)*

The norms for the special repairs of roads will be as follows:-

- (i) Special repairs-road (Rs 2 lakhs) each for the 11 regular B&R Division
Rs. 22 lakhs.
- (ii) Special repairs and reconstruction of culverts. (Rs. 2 lakhs) each for the 11 regular
B&R Divisions Rs. 22 lakhs.

Note: The above amounts will be placed at the disposal of the Superintending Engineers concerned who will distribute it to the Executive Engineers based on definite programmes to be drawn up by the Executive Engineers and approved by Superintending Engineers.

- (iii) Flood Damage Rectification Works Rs. 22 lakhs.

Note: This amount will be kept as reserve with the Chief Engineer (General and Buildings & Roads) who will distribute the same amongst the various B&R Divisions depending upon the requirement and urgency in each Division. The amount is meant for carrying out the urgent and unavoidable "flood and rain damage rectification works".

V. Buildings.

The norms for the annual maintenance, special repairs etc., of the Government buildings of all Departments in the State will be as follows:-

- (a) Maintenance grant for buildings should be fixed based on typical estimate.
- (b) For ordinary buildings 2% of the capital cost can be taken as the upper limit.
- (c) For special buildings like, Hospitals, Rest Houses, Residential quarters etc. 3% of the capital cost can be considered as the upper limit.
- (d) The Capital cost referred to shall be based on 1971-72 valuation without exacting depreciation.
- (e) All Taxes, current charges, if any and such other item not directly connected with the maintenance of the building proper can be separately provided for in the maintenance; estimates and the percentage limits mentioned above will not include such charges.
- (f) Items of work which come under the classification "Special repairs to Buildings" and which are essentially to be carried out only by the P. W. D., can be taken up, upto a limit of Rs. 2500 at a time with the specific sanction of the Superintending Engineer.
- (g) In respect of Trivandrum Division an amount of Rs. 2 lakhs will be allotted to be kept as reserve for urgent works to be done.

- (h) In the case of newly constructed ordinary buildings maintenance has to be started in the 2nd year. For special buildings like hospitals residential buildings etc., vide (c) above, maintenance has to be started in the year succeeding the year of completion of the buildings.

4. At present the N.M.R. workers are paid out of the funds earmarked for ordinary repairs estimate of roads. So also according to the provisions in the Kerala Account Code, the Corporation Municipal and Panchayath taxes on buildings have to be debited to the maintenance estimate of the buildings concerned. The question of opening separate subheads of account for the above items in the budget for 1972-73 is under consideration of Government and separate orders will follow.

5. The norms ordered above will be strictly adhered to in the execution of repair works in the divisions for the financial year 1972-73 onwards. The Divisional Officers will programme the works in the divisions suitably so that the works to be taken up are arranged and planned on a proper basis even from the beginning of the year and unnecessary rush of work towards the close of the year avoided. They will assess the requirements of the division as per these norms separately under the various sub-heads of account and forward them to the Chief Engineer before the 15th April 1972 this year and before 15th November of the financial year in succeeding years so as to know the correct requirements at the time of framing the budget for the year 1973-74 onwards. However, when the total budget provision under '50 (d) repairs' finally allotted is less than the requirement as per norms owing to constraint of resources, the Chief Engineer (General and Buildings & Roads) should distribute the funds on a prorata basis amongst the divisions under the different sub-heads in April of every year and the Divisional Officers should plan their programmes within the funds so allotted.

6. Maintenance of buildings should be taken up as soon as the monsoon is over and all items according to the sanctioned estimate carried out. If changes are required in the approved estimate for any reason, it should be effected before according sanction to the estimate. On no account should the limits set out for carrying out the repairs be exceeded.

7. These norms will come into force for the financial year 1972-73 onwards, and the performance of the divisions in terms of kilometres of roads maintained and the area of buildings maintained will be reflected in the performance budget of the department in future.

8. The Chief Engineer (General and Buildings and Roads) will issue further supplementary instructions to ensure the proper implementation of this order. He should ensure that proper road charts are maintained to watch the programme of renewals and special repairs to roads and appropriate registers kept to watch the programme of repairs to buildings. He is requested to issue these instructions before 15th April 1972.

9. The Chief Engineer (General and Buildings and Roads) will also forward proposals for issuing necessary amendments to the P. W. D. Code.

(By order of the Governor)

R. GOPALASWAMY,

Secretary.

To

The Chief Engineer (General and Buildings & Roads)

The Chief Engineer (Irrigation)

The Chief Engineer (National Highways)

The Chief Engineer (Projects)

All Executive Engineers and Superintending Engineers of PWD (B&R) and Irrigation wing.

All Heads of Departments.

All Departments of the Secretariat.

Finance Department.

Accountant General.

Finance (Budget Estimate) Department.

Public Works (Special) Department.

Public Works (Buildings and Communications II) Department.

APPENDIX XVII (II)

(Referred to para

No. CA6.16119169

Office of the Chief Engineer,

General, Buildings and Road,

Trivandrum, dated, 9-8-1972.

CIRCULAR

Sub.- Road chart and programme for road maintenance- State road -Further instructions issued.

In this office letter No. CA6-16119169 dated 23-7-1971, directions were issued to all Executive Engineers in charge of road, to prepare road maintenance chart in respect of each of the roads under their charge and to keep them up to date. They were also informed that the charts will be in the same form as that for the National highways. Based on these instructions only the Executive Engineer, B&R, Ernakulam and Muvattupuzha have prepared the maintenance charts in respect of all the roads coming under their charge. The difficulty in preparing these charts if any have not been reported to this office by the other Executive Engineers. However it is very necessary that the charts are not ready in all the Divisions without delay. The following detailed instructions are also issued regarding road maintenance charts:-

The purpose of these charts is mainly to programme the yearly maintenance works on roads systematically and to exercise proper financial control in regard to the utilisation of maintenance funds. In this connection the attention of the Executive Engineers is also drawn to GO M3.19/72/PW.dated 29-1-1972 in which the norms for ordinary maintenance and repairs, special repairs and renewal works for the State roads have been finalised. Their attentions specially drawn to the para in the G.O. in which it has been stipulated that proper road charts should be maintained to watch the programme of renewals and special repairs to roads. According to the above norms maintenance and repairs should be done periodically observing certain cycle of renewals. The road chart will form the basic record for this programming work. The cycle of renewals based on the norms, it is expected, will enable to keep the roads in a satisfactory condition.

Under the present practice it is noticed, that the renewal of the B.T. surface has not been done according to any definite programme, but in portion here and there. This is not a satisfactory method since proper controls cannot be ensured and a cyclic recoating enforced. As far as possible the renewal works should be done for full widths and for definite lengths ensuring that the entire road length is recoated within a predetermined period. Patch repair works may however be done as the situation warrants depending upon the condition of the particular stretch of the road. While preparing maintenance charts and programming maintenance and repair works consideration should be given to these aspects and all the works should be properly planned.

As per G.O.Ms.19172/PW.dated 29-1-1972 the programme for renewal works to be carried out for every year will be drawn up by the Executive Engineer and got approved by the Superintending Engineer. Similarly the funds under a special repairs also will be distributed by the Superintending Engineers based on definite programmes to be drawn up by the Executive Engineer and approved by the Superintending Engineer. Therefore, it is the duty of the Superintending Engineers/ Executive Engineers to chalk out the programme for the renewal and special repairs at least by the end of each calendar year. During their tours and inspection% they should see that proper road charts are maintained in accordance with the instructions and that the maintenance programmes are done according to the programme based upon these charts.

A specimen form for the road chart is herewith enclosed.

The charts may be prepared in the form of loose sheets which can be filed together to form a complete eh-Art for each subdivision. Depending upon the length of the roads No. of sheets for each road can be increased but these sheets should be fastened together.

The charts should give all the details as shown in the columns and the remarks should see realistically written so as to exhibit the correct condition of the road surface and drainage works.

The inspecting officers especially the Executive Engineer and Assistant Engineer should see that the correct details are entered in the road charts and verify them during their frequent inspections. The chart for the year should be got ready by the end of October. It should be inspected, verified and finalised by the 15th of November so as to enable the Executive Engineers to chalk out the maintenance programme for the next year while preparing the Annual Budget. The Superintending Engineers in turn will see that the charts are prepared and the maintenance programme is chalked out for each of the roads as suggested above and report defaults, if any, to the Chief Engineer.

The road chart for 1972-73 should be finalised in October and submitted to this office for perusal and record.

The road charts should be properly bound and recorded in the division office after the preparation of the programme (in any case before end of January each year) for future reference. The road charts should be kept for a period of 10 years (ten years).

Separate volumes, maybe maintenance for State Highway, Major District Roads and other District Roads.

The bound chart for each subdivision containing the 3 Vols. should also have the list of roads included in the chart together with the length of the roads maintenance grant sanctioned for the road and the page number in the chart.

Sufficient copies of the road chart sheets required for each division should be got printed and supplied to the Assistant Engineers in time.

The receipt of this circular may be acknowledged.

Ace.- Road chart-I.

(Sd)

Chief Engineer

EXECUTION OF WORKS DEPARTMENTALLY

Preliminary Arrangements

18.1.1. Before taking up a work departmentally, it must be ensured that all necessary sanctions exist, that land required is available with the Department and that adequate funds be forthcoming. Each item of the work in the estimate should be split up into its components of labour and materials and an abstract of the various materials and labour required worked out.

18.1.2. A phased programme of construction should then be drawn up showing works to be done during every month. In drawing up this programme all relevant factors affecting progress should be taken into account such as whether conditions, difficulty if any in procuring materials or tools and plants etc. From this programme, the requirement of materials and labour for each month should be worked out in detail. In working out the requirement of labour, the number of persons required trade-wise should be separately estimated.

18.1.3. Arrangements must be completed to get the required supply of departmental materials at least for the first 2 months of construction and standing arrangement must be entered into for the supply of materials during the succeeding months. Where materials are procured through District Stores, sufficient advance intimation should be given to the Assistant Engineer, District Stores concerned so that materials are arranged in time.

18.1.4. Arrangements of materials other than those normally supplied by the Stores may be made on the basis of piece-work contracts or on the basis of local quotations.

18.1.5. The requirement of tools and plant including hand tools and implements should also be estimated and arranged. Normally the artisans like Masons, Carpenters, Stone Masons etc., bring their own tools. Unskilled workers however do not bring any tools. Such tools have to be provided by the Department, and this should be made available before the labour is recruited.

18.1.6. A proper store shed and office should be arranged at the site of the work for storing materials and tools and plant etc., on arrival. If labour has to be provided with accommodation, provision for such accommodation for the number required should also be made. Proper water supply, sanitary arrangements and lighting must also be provided. If machinery operated by electric power has to be employed, power supply should also be arranged, stacking yard for materials to be collected in the open should be properly levelled, drained and prepared. These works may require a small quantum of labour if arranged departmentally otherwise these preliminary works may also be got done through piece-work contracts.

18. 1. 7. Concurrently, the requirement of site supervision staff should also be properly estimated and they must be appointed progressively according to requirements as soon as preliminary works in the site are started. Steps should also be taken for appointing watch and ward staff to look after the materials stored at site. If there is no proper access road to site, possibility of opening a temporary access road should be examined and arranged. If, however, this is disproportionately costly, the cheapest form of transporting materials to site should be

investigated and arranged. This includes cutting of traces, foot-paths, steps etc., as may be found suitable.

18.2. Recruitment of labour.

18. 2. 1 After all these preliminaries are over; arrangements should be made for recruiting the required labour. It is not often possible to make large changes in the labour strength. So, based on the monthly require merits as per phased programme the optimum number of workers that can be employed should be determined and the work should be rephased if necessary so as to keep the optimum number employed to the maximum extent possible within the construction period.

18.2.2. It is generally advisable to have one or two labour intensive items of work such as earth work to extend throughout the period of construction as this will serve as a reservoir to occasionally draw additional labour for other items of work when required.

18.2.3. Having detailed the number and type of labour required, steps should be taken for their recruitment. All recruitment for construction works should be on a casual basis. Before recruiting fresh labour, it should be ascertained from the Executive Engineer (B&R) of the District whether available labour can be diverted for this work or not. If so, first preference must be made for such available department labour. Wherever Government have issued priority orders to employ any particular retrenched labour, such priorities should also be taken note of. For the balance requirement the Employment Exchange may be approached.

18.2.4. Particular care should be taken in regard to recruitment of, artisans and skilled worker to see that they possess the necessary skill in the concerned trades. If necessary, suitable tests may be arranged for selecting the required persons. If the required labour is not available at Employment Exchange or other Departments, recruitment may be made through open election after advertising this fact. It should be made clear in the advertising that the employment is only a casual nature and is not likely to last more thanmonths. If labour is not locally available for recruitment may be done through such places where labour is available. This recruitment if necessary may be arranged through an agent or a commission basis subject to approval of the Executive Engineer.

18.2. 5. Each worker on recruitment should be given an employment card as indicated in Form II (Appendix XVII). Such card should be given even to departmental labour transferred from elsewhere. Concurrently, a register of workmen in Form I (Appendix XVII) should also be opened. Items of works should be watched through N.M. Rolls or rolls applicable to seasonal labours as the case may justify.

18.2.6. The above procedure regarding recruitment of labour etc. may be relaxed in the case of urgent works and works of short duration lasting less than one month. In such cases, recruitment may be made in any manner found convenient including engagement of labour supplied by a contractor (see para 313 of K. P. W. A. Code).

18.3. Wages

18.3.1. The wage of each worker may be fixed on the basis of the scale of wages applicable to N. M. R. Workers/Seasonal labourers. In any category of worker is included in the above scale of wages then the rate for that category should be fixed on the basis of the fair wages prevailing on the locality but it should on no account be less than the minimum wages if any applicable to the particular category of labour. If there is no fair wage published for that locality, the schedule of rates for the division may be taken as the basis for fixing fair wages.

18.3.2. If the wage of any particular trade is in the form of running scale, the workmen's wage should be fixed at the lowest point in the running scale. The wages of N.M.R. skilled workers will be paid in accordance with orders of Government issued from time to time.

18.3.3. The question as to whether the worker should be paid every week or month may be decided by Assistant Engineer in consultation with the workmen. The Payment of Wages Act may be referred to regarding conditions of payment.

Note: Even when labour is recruited through a contractor agent, wages should be paid direct to labour and the commission if any should be paid to the contractor or agent.

18.3.4. To ensure that payment of wage is made on the due date all the formalities regarding closing of N.M.R checking and passing and encashment of cheque should be completed with utmost expedition. If any delay is anticipated payment should then be made and of an advice to be obtained for the purpose and the advance account closed as quickly as possible after payment.

18.3-4. *Unpaid wages.* - This should be dealt with as provided in para 344 of K.P.W.A. Code.

18. 3.4. Control of execution

The total labour employed on a work should be suitably split among gangs or groups and the work of one or more gangs or groups should be properly directed and supervised by a subordinate posted for this purpose. Such subordinates should be given instructions by the Junior Engineer, of the work to be performed each day by the labour under his charge. At convenient intervals say once or twice every week, the progress of the work should be checked by the junior Engineer to find out whether there is any redundancy or insufficiency of labour in any particular item of work and if so he should arrange to correct the imbalance. Similarly if any hold-up are observed due to lack of any materials, tools, or plant or facilities like gang way etc. then the Junior Engineer should arrange to set right the defect urgently. Measurements of the work taken at the time of closure of the NMR will also give indication whether the overall performance is satisfactory or not, as in the estimate. The Assistant Engineer must keep watch of this and if the work is being done at rates higher than those provided for in the estimate, he should try to identify the cause of this excess and take corrective steps to the extent possible. If in spite of such efforts, the cost is found higher than what is provided in the estimate, the fact should be reported to the Executive Engineer explaining the reason for the excess and the corrective steps taken by the Assistant Engineer to keep the cost within the estimate. On receipt of such reports, the Executive Engineer should investigate whether any other step should be

taken to reduce the cost and if so arrange for the same. If in spite of all these the cost cannot be reduced, the authority sanctioning the estimate should be informed and steps taken to revise the estimate. The quality control aspect of the work should also receive careful consideration and no relaxation should be made.

18.4.2. Over-time work should be avoided as far as possible. If however, this is unavoidable, the minimum number of workers absolutely found necessary should be so employed. The general labour regulations regarding over-time work should be strictly observed.

18.4.3. Labour not required for the work should be progressively retrenched as and when their services are no longer required. One month's notice may be given workers who have worked for 240 days in a year. The workers who have worked for 240 days in a year are also entitled for certain privilege such as leave with wages, retrenchment benefit etc. The concerned labour rules in force from time to time should be adhered to.

APPENDIX XVIII

FORM I

Register of Workmen (Regulation 7)

1. Name and address of the Contractor
2. Number and date of the contract
3. Name and address of the Department awarding the contract
4. Nature of contract and location of work
5. Duration of the contract

Sl. No	Name & surname of the worker	Age & Sex	Father's / Husband's name	Nature of employment/ Designation	Permanent home address of employees (Village, Dist., Thana)	Present home address of employee (Village, Dist. Thana)	Date of commencement of employment	Date of termination or leaving of employment	Signature of thumb impression of the employee	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

APPENDIX XVIII

FORM II

Employment Card (Regulation 8)

1. Name and sex of the worker
2. Father's/Husband's name
3. Address
4. Age, or date of birth
5. Identification marks

Particulars of next of kin (wife/husband and children, if any, or of dependent next of kin in case the worker has no wife/husband or child):-

Name

Full address of departments

(Specify Village, District and State)

Sl.No	Name and address of	Particular of location of	Total period for which	Actual number of days	Leave taken (No. of days)	Nature of work done	Wage rate (with particu	Total wage earned by the	Remarks	Signature of
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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
employe r (specify whether a contract or sub contract or	workers worksite & descripti on work done	the worker is employe d (from.. to..)	work days)	period by the worker	lars of unit in case of piece- work)	of worker during the period shown under column 5				

N. B. For a worker employed at any time on piece-work basis and at another on daily wages, relevant, entries, in respect of each type of employment should be made separately.

CHAPTER XIX

MAINTENANCE OF BUILDINGS

19.1. General

All Government buildings have to be maintained properly from out of funds, provided by the State. As a matter of convenience heads of various departments of the, State are authorised to arrange and carry out maintenance works of buildings under their administrative control provided the annual maintenance cost of any building or group of buildings in one campus does not exceed Rs. 1,000. In addition, departments other than P.W.D which are carrying out engineering works of a specialised nature such as Public Health Engineering Department and departments having engineering wings under them such as Forest Department are allowed to carry out maintenance works of all the buildings under their administrative control. Quasi Government Organisations and local bodies and Government owned corporations attend to maintenance of their buildings even of the buildings were originally put up at Government cost. Subject to these and other exceptions ordered by Government from time to time, the P. W. D. has the responsibility to maintain all Government buildings.

19.2. Register of buildings

19.2.1. Each Division of the P.W.D. should keep a register of buildings, which are maintained by that Division. The register should be in the form given in Appendix XIX (a). Whenever anew building whose maintenance is to be attended to in that Division is completed, details regarding

the building should be added to the register. Disposal of any building should be added in the register by dismantling, sale, transfer of control to other Divisions/Departments etc. should also be similarly noted. Alterations or additions of substantial nature in the buildings included in the register should be noted as and when such changes are completed. Similarly, if the land surrounding a building is increased or decreases by acquisition, transfer or otherwise, the fact should be noted in the register. The intention is that the register should give full and up-to-date information about the buildings under the maintenance charge of every division.

19.3. Fixing of maintenance grant.

19.3.1. Each building or group of buildings in one campus forming one administrative unit should have an annual maintenance grant fixed for it. This grant is intended to meet the cost of ordinary repairs to the buildings or group of buildings concerned. Ordinary repairs comprise of items of work such as white washing, painting etc. which are of a recurring nature. This should also include petty repairs to walls, floors, doors and windows, roof etc., which though not of a regularly recurring nature are often found necessary. Ordinary repairs are intended to preserve the structure in the condition when it was completed subject to normal depreciation due to age. The grant for each building or group of buildings should be fixed on the basis of a standard estimate for its ordinary repairs. Certain items of ordinary repairs such as painting are taken up at intervals of more than one year. Provisions for such items should also be included in the standard estimate but the amount to be so included should be the proportionate amounts of such items which will represent the annual cost. The grant also includes cost of maintenance of water supply, sanitary installations and electric installations. The norms for fixing the upper limit for maintenance grant for buildings and general principles regarding carrying out of maintenance works are set in G.O. MS. 19/72/PW dated 28-1-1972 extract of which is given in Appendix XIX (c) attached. The fixing of grant for ordinary repairs subject to the conditions laid down above should be approved by the Chief Engineer. In any particular case where the grant of 2% will not meet the needs of the situation, sanction of the Government should be obtained for the fixation of the grant.

19.3.2. In some cases requiring expenditure by way of staff charges may have to be met from the maintenance, as for instance, staff appointed to look after rest houses, or staff for operation of Water Supply Scheme to colonies etc. The amount required for such staff employment may be considered as over and above the 2% ceiling fixed for ordinary maintenance grant. The nature of staff to be employed, the number and the grades of persons should however be got sanctioned by Government as per rules in force.

19.3.3. In the case of certain classes of buildings like Tourist Bungalows, Rest Houses etc. Linen; curtains, crockery etc. may have to be renewed occasionally. The cost on account of these need not be included as part of the ordinary maintenance grant of the concerned building. These items should be dealt with as part of special repair, such charges can be incurred only in building like Tourist Bungalows, Rest Houses etc., where linen, crockery etc. were originally provided at Government cost and where the responsibility for renewal is with the P. W. D. In all other cases such charges should not be incurred by the P.W.D. except under special orders of Government.

19.3.4. The grant fixed for ordinary repairs for every building should be revised once every five years or as often as found necessary. In all cases where the existing grant is altered, the alteration should be on the basis of the standard estimate and the 'then current schedule of rates. The, ceiling of 2% of capital cost will not apply in such cases.

19. 4. Periodicity of certain items of ordinary repairs.

19.4.1. White washing in Government buildings should be carried out once every year. One coat will normally suffice.

19.4.2. Distemper washing when provided should normally be carried out once every two years. Here also one coat will suffice. However, in buildings where distemper washing is badly soiled, the bottom portion of the wall for a height of 2 metres may be distempered with one coat even in years when the full distempering is not done.

19.4.3. Water proof coloured cement washing like snowcem etc. need be redone only once in 3 years. The renewal need be of only one coat. If fungus or moss growth is observed here and there, such portions may be cleaned and touched up with the water proof cement wash of the same colour (snowcem etc.). Ordinary cement washing wherever provided may be redone every year.

19.4.4. Painting of walls, wood work and doors and windows is to be normally redone once every two years. As an exception to the above painting of walls etc. in the case of laboratories, hospitals, such other buildings as are considered by the Chief Engineer to require special treatment may be carried out once every year. One coat of paint will do in all cases except where the old paint has peeled of or has shown blisters. In such cases the old paint has to be completely scraped and two coats of new paint applied.

19.4.5. Painting of iron work including fittings and fastenings in doors, windows etc. should be redone once every year with one coat. Where the existing paint is damaged and rust or corrosion is seen, the particular area should be thoroughly cleaned of all old paint and two coats of paint one base coat and one final coat should be applied. Particular attention to this aspect is necessary in respect of buildings within half a mile of the sea shore where iron work is subjected to severe corrosion.

19. 4.6. Galvanised iron work as in pipes, or G.I. sheets etc. need not be painted for the first 2 years. Thereafter because of gradual wearing out due to abrasion etc., the protection afforded by galvanisation gradually wears out and hence after the first two years such items may also be included along with iron work for painting purposes.

19.4.7. Varnishing and wood oiling are to be redone once in two year with one coat.

19.4.8. Wherever there are thatched roofs, re-thatching should be done normally once every year with one old and one new cadjan leaf.

19.5. Special repairs

19. 5. 1. These refer to repairs which are not periodical or frequent eg.-rebuilding a damaged wall, reroofing a building, renewal of flooring etc. Although funds for such special repairs are allotted from the grant under maintenance, such works should be treated generally as original works and should be arranged only after the estimate is sanctioned and funds are specifically allotted for the purpose. In other words special repairs should not be started anticipating sanction to estimate and funds except in emergent cases when certain works may have to be carried out in the interest of safety of life and or property. Officers sanctioning special repairs estimates must take care to see-

(a) that the works do not involve substantial additions or alterations. Petty items costing not more than Rs. 2,000 in respect of any building other than residential buildings may be carried out as special repairs even though they may be of an original nature.

Example:- Construction of drains, small retaining walls, enclosing verandhas etc.

In respect of residential buildings the cost of original works, if any carried out as special repair work should not exceed Rs. 1,000 or 2% of the value of the building whichever is less;

(b) that the standards prescribed for the class of buildings are not increased. For instance, it will not be proper to replace cement flooring with mosaic flooring (under special repairs) if the latter is not prescribed for the particular class of building. Similarly while it may be proper to arrange to renew the electric wiring for a building under special repairs it is not proper to increase the number of points or provide special fittings etc. over and above the standards prescribed for that class of building;

(c) that the estimate does not include items which should be provided by the occupant or occupying department

Superintending Engineers are empowered to sanction special repairs estimates up to Rs.2500. vide extract of G.O. MS.19/72/PW. dated 29-1-1972 extract given in Appendix XIX (c) attached.

19.6.1. Responsibility of the occupant or occupying department.

19.6.1. It is the responsibility of the occupant or occupying department to attend to the following works in regard to the building and premises.

- i. Sweep and keep the building and premises clean.
- ii. Remove cobwebs and white ants as and when they are detected.
- iii. Remove rubbish and silt from drains and grit chambers if any, and keep them clean.
- iv. Keep the sanitary fittings cleaned up.
- v. Replace electric bulbs and tube lights when they get fused.
- vi. Arrange watch and ward.

- vii. Arrange lease of usufructs of trees in the premises and dispose decayed, dangerous or unwanted trees (applicable only to occupying departments).
- viii. Maintain garden, if any.
- ix. Maintain furniture.
- x. Keep overhead tanks, if any, cleaned up periodically.
- xi. See that the structure is not damaged in any way, as for instance by heavy furniture being dragged on the floor.
- xii. Deal direct with the electric supply authorities in regard to payment of bills, and in regard to complaints regarding service.
- xiii. Deal direct with the authority controlling the public water supply system supplying water to the building in regard to payment for water charges and complaints regarding service.
- xiv. Deal direct with the authority controlling the public sewerage system serving the building, regarding payment of bills and complaints regarding service.

19.6.2. Further, the occupant or occupying department should not make any structural alterations or put up additional structures, or dismantle any portion of the building without notifying and getting the concurrence of the Executive Engineer who is responsible for the maintenance of the building. They should not also make any alterations to the electric circuits or cause overloading of any of the circuits provided.

19.6.3. In case any defect in the structure or the internal electrification or water supply or sanitary installation is noticed the defect should forthwith be intimated by the occupant or occupying departments to the Executive Engineer or the concerned Assistant Engineer or Junior Engineer for necessary action. On receipt of any such complaint it is the responsibility of the P.W.D. officers concerned to arrange to inspect the building and rectify the defect as early as possible. If such rectification is likely to take time the fact should be intimated to the occupant or occupying department and where possible, necessary temporary arrangements may be made to enable the building being occupied and put to use before permanent rectification is done. Such temporary arrangements should be treated as special repairs.

19. 7. Inspection,

19.7.1. It is essential that buildings under the maintenance of the P.W.D. are periodically inspected so that defects, if any, are noted and attended to then and there and not allowed to cause deterioration of the structure. The junior Engineer should inspect all the buildings (whose maintenance is under his charge).

- (a) at least once before preparation of estimate for annual repairs;

- (b) as often as is necessary for quality control during the execution of repair work;
- (c) as often as is necessary for measurements and for accompanying superior officer for check measurement;
- (d) when defects are pointed out by the occupying department.

19.7.2. The Assistant Engineer should inspect all buildings under his maintenance charge as often as possible for quality control of maintenance works and for check measurement. Further, where the annual maintenance grant is over Rs. 2,000 he should also inspect the building before sanctioning the maintenance estimate.

19.7.3 The Executive Engineer should inspect once every year all the major buildings under his maintenance charge where the annual maintenance grant is Rs. 2,000 or more. He should also inspect once every year at least 50% of the other buildings under his charge.

19.7.4. Inspections should be purposeful. Attention should be particularly directed to the following:-

- (a) Whether any wall is cracked or is bulged or is thrown out of plumb.
- (b) Whether doors and windows close and open properly and have all their fastenings and fittings.
- (c) Whether the drainage from the bath room is satisfactory.
- (d) Whether the general drainage is satisfactory.
- (e) Whether there is any subsidence or crack in floor.
- (f) Whether there is seepage of water and consequent damages in walls and floors.
- (g) Whether the compound wall and fencing, gate etc. are in good condition.
- (h) Whether wood work particularly in roofs show signs of decay or rot.
- (i) Whether there are leakages.
- (j) Whether the floors of open terraces are properly sloped towards outlets and whether the down water pipes are in tact and clear.
- (k) Whether the valley sheets are in good condition.
- (l) Whether the yard is clear of jungle growth and unwanted vegetation.
- (m) Whether the sanitary installation is satisfactory.

(n) Whether water supply installation is satisfactory.

(o) Whether the electrical installation is satisfactory.

Note: The examination of the electrical installation should be got done by the Overseer/ junior Engineer, Electrical Wing of the P.W.D.

19.8. Calendar for Maintenance of buildings.

19.8.1. The work of maintenance of building should be so programmed as to cause least inconvenience to the occupants. As far as possible, special repair, if any, should be carried out along with ordinary repairs. Work should be started only after all the requisite materials are available and completed within the shortest time possible. Suitable penalties should be prescribed for delays when drawing up tenders and contract agreements for maintenance works.

19.8.2. In the case of vacation departments like Schools, Colleges, Courts etc., the maintenance works should be carried out during the vacation period (generally April and May) unless such vacation period happens to be the monsoon season.

19.8.3. In the case of buildings other than those of vacation departments and buildings of such vacation departments as have the vacation in monsoon period; the maintenance work should be done in the dry weather between December and February.

19.8.4. For buildings whose maintenance work has to be carried out between April and May, tenders should be invited and finalised even before the commencement of the new financial year so that work can be started as early as possible in April.

19.8.5. Tenders for the other buildings should be invited and finalised well before December every year.

19.8.6. Since the buildings will be under occupation, the actual period when maintenance works are to be done should be settled in consultation with the authorities of occupying department.

19.9. Funds

19.9.1. Funds required for maintenance of buildings under the charge of any division during any financial year will be made up of-

(i) Amount for ordinary repairs as per sanctioned grants for the several buildings.

(ii) Amount for payment or dues on account of carry over portion if any of special repair works of the preceding year or years.

(iii) Amount for payment of such portion of staff charges as is directly debitable to maintenance and not included under establishment charges.

(iv) Amount required to meet emergent and unforeseen items of repairs.

(v) Amount required to carry out new special repair works during the current year.

19.9.2. Out of the above, items (i) to (iii) are more or less in the nature of inevitable expenditure and should, therefore, have a prior claim on the funds allotted for maintenance of buildings. Item (iv) is a provision for emergencies and a reasonable forecast should be made based on past experience and a L.S. amount reserved for this. The L.S. amounts should be retained by the Superintending Engineer and distributed suitably. Item (v) should be based upon rough estimates of cost of the works proposed to be taken up in a division. The Executive Engineer when moving for funds under this item should also list the works in the order of priority. If the total funds allotted falls short of the requirement some works of lower priority should be dropped out. Such works which are dropped out in a year may be accorded higher priority next year. As far as possible special repairs should be completed and paid during the year itself but if this is not possible, it is permissible to carry over the work to the next year. It has to be noted that it is not proper to carry over a special repair work to the next year merely because the funds allotted are insufficient to make final payment. The number of works to be taken up from out of the available grant should be so fixed that it is possible to make payment for all works completed during the year.

19.9.3 Non-project items of maintenance carried out by the Irrigation Department in the head-works of Irrigation Projects should be distributed among the various departments according to the nature of incidence of the share. It is likely that some portion of that expenditure may relate to maintenance of buildings. In order to accept debit on account of such charges when raised, by the Irrigation Executive Engineer, a suitable provision should be made in the budget of the (B&R) Division under whose jurisdiction the concerned buildings exist. A register-of such buildings may also be separately kept in the B & R Division together with the annual maintenance grant (vide G.O MS. No. 56/69/W & P dated 12-8-1969).

19.10. Sanctioning Authority

19.10.1 No administrative sanction is required to carry out maintenance works. Technical sanction may be accorded by the officer of the P.W.D. but the following condition should be satisfied before according technical sanction.

(a) In the case of ordinary repairs, the amount of the estimate should not exceed the maintenance grant sanctioned. If due to special circumstances, the estimate cannot be Limited to the grant, approval of the Superintending Engineer should be obtained for the increased amount.

(b) In the case of special repairs, the concurrence of the department occupying the building should be obtained. Such concurrence should be from an officer of the concerned department not below the rank of a District Officer. Further, funds should be got specifically earmarked for the concerned work from out of the maintenance grant.

(C) In the case of electrical works, the technical sanction is it to be accorded by the Executive Engineer in consultation with the Assistant Engineer (Electrical) attached to his Division upto a

maximum of Rs. 25,000. When the amount exceeds Rs. 25,000 (in respect of electrical works) technical sanction will be accorded by the Chief Engineer in consultation with the Executive Engineer (Electrical Wing) attached to Chief Engineer's Office.

(d) In the case of emergent works charged to maintenance, the technical sanction should be accorded by an officer not below the rank of an Executive Engineer.

19.11. Arrangement of contracts for maintenance works.

19.11.1. To avoid inconvenience to occupants it is advisable that special repairs and ordinary repairs are arranged to be done simultaneously to the extent possible.

19.11.2. It is preferable to arrange contracts for maintenance works on the basis of percentage rate contracts as described in para 1 (v) of the Chapter on tender and arrangements of contracts. The modified form described in that paragraph may be adopted where the items and quantities of work are likely to alter.

19.11.3. The quality of paints, wood oil, varnish etc. which should be used in any particular maintenance work should be clearly specified (referring to ISI or Kerala specifications) in the tender documents. This is because there is a wide range of quality of paints etc. available in the market and it is essential that the quality to be used should be understood by the tenderer. During execution the departmental subordinates should ensure that the proper quality of paint etc. as provided in the contract has been used.

19.11.4. In all contracts for maintenance works there should be condition that the contractor should carry out the work without causing hindrance or disturbance to the occupants of the building. If during the course of the work, the floor or walls or other portions of the structure under use are spoiled by debris, spots of paint, white wash etc. Such portions should be cleaned up then and there without waiting for the whole work to be completed. This is in addition to the contractor's responsibility for removal of debris on completion of work.

19.12. Use of standard measurement

19. 12. 1. It is very desirable that standard measurement books containing detailed measurements of various items of ordinary repair of major buildings are maintained as prescribed in para 317 and 318 of the K.P.W.A. Code. This will considerably lighten the work of measurements of maintenance works year after year.

19. 13. Inventory of Furniture and Fittings and miscellaneous equipments in Residential Buildings.

19. 13. 1. A full list of furniture, fittings and equipments like Ammikal, Attukal, locks, keys etc. of each residential building should be maintained by the junior Engineer in charge of the maintenance of the building. When the building is handed over for occupation, the occupant should sign and acknowledge the various items included in the inventory. This acknowledgement should be in the form given in Appendix XIX (b). When the occupant vacates the house he should give prior intimation to the Junior Engineer.

APPENDIX XIX (a)

(Referred to in para 19.2.1)

Register of Buildings under the maintenance of

..... Division

			Brief particulars of buildings and land							Nature of Construction			No. of electrified points				Water Supply					
Sl. No.	Name of building	Location & Sy No.	Land extent	No. of stories	Plinth area GF	I Floor	II Floor	III Floor	Total	Walls	Roof	Floor	Lights	Fans	Plug Points	Power Plugs	wash basin	Closets and other fittings	Years of construction	Value	Maintenance grant and sanction NO. and Date	Remarks (here enter reference to alterations and addition)

N.B. – Out houses may be given subsidiary numbers and details furnished as above.

APPENDIX XIX (b)

(Referred to in para 19.13.1)

Handing over/Taking over Statement of Residential Buildings

Reference.

Quarter

No

Building has been taken over from

on the Forenoon/Afternoon of

with the following fixtures and fittings.

Details of fixtures and fittings.

Water meter reading at the time of handing

----- over/taking over is

Ele. meter reading

Handed over

Taken over.

APPENDIX XIX (C)

[Referred to Para 19.3.1. and 19.5.1. (c)]

GOVERNMENT OF KERALA

Abstract

FUNDS - DISTRIBUTION OF FUNDS FROM "50 (d) REPAIRS" FOR MAINTENANCE, RENEWALS, REPAIRS ETC. OF ROADS AND BUILDINGS AMONGST THE VARIOUS B&R DIVISIONS - NORMS PRESCRIBED ORDERS ISSUED.

PUBLIC WORKS (BUILDINGS & COMMUNICATIONS I) DEPT.

G.O. MS. No. 19/72/PW. *Dated, Trivandrum, 29th January 1972*

Read-Correspondence ending with D. O. No. CA6-16902170 dated 16-11-1970 from the Chief Engineer (GB&R)

ORDER

X X X X X X X

V. Buildings:

The norms for the, annual maintenance, special repairs etc., of the Government buildings of all Departments in the state will be as follows:-

- (a) Maintenance grant for buildings should be fixed based on typical estimate.
- (b) For ordinary buildings 2% of the capital cost can be taken as the upper limit.
- (c) For special buildings like, hospitals, rest houses, residential quarters etc. 3 % of the capital cost can be considered as the upper limit.
- (d) The capital cost referred to shall be based on 1971-72 valuation without effecting depreciation.
- (e) All taxes, current charges if any and such other items not directly connected with the maintenance of the building proper, can be separately provided for in the maintenance estimates and the 2% limits mentioned above will not include such charges.
- (f) Items of works which come under the classification "Special repairs to building" and which are essentially to be carried out only by the P. W. D. can be taken up, up to a limit of Rs. 2500 at a time with the specific sanction of the Superintending Engineer.
- (g) In respect of Trivandrum Division an amount of Rs. 2 lakhs will be allotted to be kept as reserve for urgent works to be done.
- (h) In the case of newly constructed ordinary buildings maintenance has to be started in the 2nd year. For special building like hospitals, residential buildings etc., vide (c) above, maintenance has to be started in the year succeeding the year of completion of the buildings.

4. At present the N. M. R. workers are paid out of the funds earmarked for ordinary repairs estimate of roads. So also according to the provisions in the Kerala Account Code, the Corporation, Municipal and Panchayat taxes on buildings concerned. The question of opening separate sub heads of account for the above items in the budget for 1972-73 is under consideration of Government and separate orders will follow:-

5. The norms ordered above will be strictly adhered to in the execution of repair works in the divisions for the financial year 1972-73 on wards. The Divisional Officers will programme the works in the divisions suitably so that the work to be taken up are arranged and planned on a proper basis even from the beginning of the year and unnecessary rush of work towards the close of the year avoided. They will assess the requirements of the division as per these norms separately under the various sub heads of account and forward them to the Chief Engineer before the 15th April 1972 this year, and before 15th November of the financial year in succeeding years so as to know the correct requirements at the time of framing the budget for the year 1973-74 onwards. However, when the total budget provision under 150' (d) repairs, finally allotted is less than the requirements as per norms owing to constraint of resources, the Chief Engineer (General and B&R) should distribute the funds on a *Pro-rata* basis amongst the divisions under the different sub heads in April of every year and the Divisional Officers should plan their programmes within the funds so allotted.

6. Maintenance of buildings should be taken up-as soon as the monsoon is over and all items according to the sanctioned estimate carried out. If changes are required in the approved estimate for any reason it should be effected before according sanction to the estimate. On no account should the limits set out for carrying out the repairs exceeded.

7. These norms will come into force for the financial year 1972-73 onwards, and the performance of the divisions in terms of kilometres of roads maintained and the area of buildings maintained will be reflected in the performance budget of the department in future.

8. The Chief Engineer (General and B and R) will issue further supplementary instructions to ensure the proper implementation of this order. He should ensure that proper road charts are maintained to watch the programme of renewals and special repairs to roads and appropriate registers kept to watch the programme of repairs to buildings. He is requested to issue these instructions before 15th April 1972.

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By order of the Governor

R. GOPALASWAMY,

Secretary.

CHAPTER XX

ELECTRICAL WORKS IN GOVERNMENT BUILDINGS:
DESIGN, EXECUTION AND MAINTENANCE.

General.

20.1.1. The term "Electrical Works" is used to connote all works necessary for distributing electrical energy from the suppliers service within particular premises. In addition, the installation and maintenance of certain appliances operated by electricity may also be carried out as part of electrical works eg. lifts, air conditioners, water coolers, refrigerator, heaters, cooking ranges etc.

20.1.2 The responsibility for carrying out electrical works in Government buildings is vested with the Electrical Wing of the P.W.D. Even where the cost of the work involved is small, it is necessary that the estimate for electrification is prepared, technically scrutinised, and the work supervised by the technical personnel of the Electrical wing of the P.W.D;

20.1.3. The number of lights, fans and other fixtures to be provided should follow the norms specified in the chapter on 'Investigation and Design of works buildings' - para 6.13.2. If additional points, fixtures, etc., are found necessary,, specific sanction of the Chief Engineer should be obtained before provision for this is included in the estimate. Wherever it is essential to have lights even when there is failure in power supply system such as in operation theatres of hospitals emergency lights capable of functioning independently of power supply system should be installed and maintained by the Electrical Wing. The buildings where such installations should be made will be decided by Government. If a Building is to be used for industrial purposes and power wiring is necessary, the requirement should be assessed on the basis of the various machinery to be installed and the wiring designed as per I.S.S. to suit the same. A general specification of the electrical works in Government buildings is given in Appendix XX (a).

20.1.4. In the case of new buildings to be constructed by the P.W.D. the detailed estimate for electrification should be prepared by the junior Engineer, Electrical Wing, attached to the concerned Executive Engineer, of the P.W.D., B & R Division, Buildings Division etc., as the case may be and scrutinised by the Assistant Engineer, Electrical Wing. This should be dealt with along with the main estimate for the building so that sanction is obtained for the civil works and electrification works together. The concerned Executive Engineers of the P.W.D. should be informed of the requirements of electrical installation in that building as required by the occupying Department and the estimates are to be framed and scrutinised by the junior Engineer and Assistant Engineer of the Electrical Wing based on these requirements but subject to the prescribed norms. Where the amount of the estimate for electrifications exceeds the competency of the Executive Engineer for sanction, this should be got scrutinised by the Executive Engineer, Electrical Wing in Chief Engineer's Office, before inclusion in the main estimate. There may however be stray cases of some estimates for buildings where there is only a L.S. provision for electrification. In such cases before commencement of the civil construction

work, a working estimate for electrification should be got prepared by the Junior Engineer, Electrical concerned and scrutinised by the Assistant Engineer, Electrical Wing and sanction for the same obtained from the competent authority.

20.1.5. The estimate should be accompanied by a dimensioned plan indicating the purpose for which each room is proposed to be used and an estimate report quoting the following details specifically:

1. Location of the building:-Village, Panchayat or Municipality Taluk and District.
2. The purpose for which the building is used with the designation of the officer and the name of the officer and the nature of work conducted in the building.
3. Details of light points, fan points, light fittings, fan fittings plug points, etc., with the details of existing wiring.
4. Make and specifications of wiring accessories and fittings.
5. Details of major fixed and portable appliances.
6. The cost of the existing installations and fittings.
7. Details of repair and replacements last effected in the installation and the approximate cost.
8. Proximity of electric supply lines (single phase or 3 phase and feasibility of service connection.
9. The authority who will look after the maintenance of the building when it is put to use.

20.1.6. In some cases existing buildings under the control of other departments or buildings to be put up by other depts. of the State may have to be electrified. In such cases, at the request of the District Officer of the concerned department, the concerned Executive Engineer, P.W.D. should arrange through the Junior Engineer and Assistant Engineer, Electrical Wing to prepare and to scrutinise the estimate for electrification provided it is confirmed that funds are available for the execution of the work. If the amount the estimate exceed the competency of the Executive Engineer for sanction the estimate should be got approved by the Chief Engineer before it is forwarded to the concerned Department. Normally such electrification work should be done by the P W.D. Electrical Wing. For this purpose the required funds should be placed at the disposal of the Executive Engineer of the concerned division by the department requiring such works. The head of the department should also accord approval of the estimate for electrification. After this is done the Executive Engineer may arrange for carrying out the work.

Specifications for materials and works

20.2.1. Detailed specification for the materials to be used and the principal items of work normally involved in electrification works should be drawn up by the Executive Engineer

(Electrical) in the office of the Chief Engineer (Buildings and Roads). After approval by the Chief Engineer, this should be published for adoption in the department. In preparing the specification, wherever I.S. specifications are available, the relevant I.S. specifications should be followed. In other cases, detailed specifications should be prepared to suit the requirements.

20.2.2. To facilitate easy check of the quality of materials, the Executive Engineer (Electrical) in the Office of the Chief Engineer B & R, should also prepare a list of brands and makes of different wiring materials, fans, fluorescent and other fittings which are, in conformity with the specifications and circularise the list. This list should be reviewed and revised and brought up-to-date from time to time. If any material or fitting outside such accepted list is proposed to be used in any work, the Assistant Engineer (Electrical) in charge should report the matter to the Executive Engineer (Electrical) who will arrange for tests etc., necessary and give instructions as to whether such materials can be used or not.

Schedule of Rates

20.5.1. The Executive Engineer (Electrical) in the Office of the Chief Engineer (B&R) should also prepare a schedule of rates for the electrification works in Government buildings. With the approval of the Chief Engineer B&R, this should be published for use by the Department. The schedule should be revised and brought up-to-date at the commencement of every year. Estimates for electrification should be based on this schedule of rates and whenever any deviation is necessary, sanction of the Chief Engineer (B&R) should be obtained. Before issuing such sanctions the Chief Engineer, B&R should consult the Executive Engineer (Electrical) in his office.

Materials fittings to be provided and stocked by the department for use in electrification works

20.4. 1. It may sometimes be advantageous to procure some materials and fittings directly by the department and arrange to have the same used in electrification works. The general principles indicated in para 1 - 2 of the chapter on stores should be kept in view when deciding which items should be so purchased and stocked by the department. The list of items (for electrification) which the Chief Engineer (B&R) has approved to be stocked and supplied by the department should be published for the guidance of all concerned officers. In all contracts involving the use of such listed items, it should be actually stated that such items will be supplied by the department.

Registration of Contractors for wiring works

23.5.1. The electrification works in Government buildings should be arranged only through licensed electrical contractors registered in this department.

Invitation of Tenders

20.6. 1. Before inviting tenders for electrification, it should be ensured that there is a sanctioned estimate for the work and that funds are available for carrying out the work. In the case of buildings under construction where there is a provision for electrification

in the main estimate, the estimate for electrification will be a working estimate against such provision. In the case of existing buildings under construction where electrification was not originally contemplated, the electrification estimate will require both Administrative Sanction and Technical Sanction.

20.6.2. The scope and extent of work to be carried out should be clearly explained in the tender documents and drawings. The specification of the materials to be used should be indicated by reference to I.S.S. or departmental specification. Where only certain approved brands of fittings are to be employed the makes of approved brands should be indicated in the tender. Similarly, the list of items if any to be supplied departmentally should also be noted therein, with the details of the place of the supply and the recovery rate in case the cost of departmentally supplied items is to be recovered. Where the departmental items are issued free of cost for fitting in the work this fact also should be indicated in the tender.

20.6.3. Tenders for all electrification works will be invited by the Executive Engineer, in charge of the buildings taking advice from the Assistant Engineer, Electrical attached to his office. However for petty works at estimated cost of less than Rs. 1000 the scrutiny by the Junior Engineer Electrical may be sufficient if an Assistant Engineer, Electrical is not attached to the Division. The papers will however be scrutinised by the Assistant Engineer, Electrical when he attends the division officer later. The general principles of tendering, accepting tenders as given in para 15 24 to 1.9.7 of the chapter on "Tenders and arrangements of the Contracts" should be followed.

20.7. Supervision and measurements

20.7.1. Detailed supervision of the work during the course of execution should be arranged through subordinates who have sufficient proficiency in execution of electrical works. The work should also be inspected by Junior Engineer (Electrical) and Assistant Engineer (Electrical) as often as possible during the course of execution. The general principles to ensure good quality of work specified in paras 7.1, 7.2, 7-3, 7-4 7-5, 7-6, 7-7, 7-8, 7-9 and 7-10 should be followed mutatis mutandis. Before accepting the work a careful insulation test should be made and the Meter readings should be within the limit specified in the Indian Electricity Rules.

20.7.2. In case of poor readings, the faults should be located by isolating different circuits and necessary rectifications effected. This test should be done irrespective of the test specified by the Electric supply authorities before providing service connections.

20.7.3. The measurements for the work must be recorded by the Junior Engineer, Electrical and duly checked by the Assistant Engineer (Electrical). In addition, in the case of major work where estimates for electrification are sanctioned by the Chief Engineer the Executive Engineer (Electrical) should also check the measurements before final payment. A total of not less than 50 works should be check measured by the Executive Engineer in a year covering not less than three works from each District.

20.7.4. Before making final payment, the contractor should set right damages if any caused to walls, floor, ceilings etc., as a result of his work. He should also set right any defects which the

electric supply authority may ask to do at the time when service connection is made. If the Assistant Engineer (Electrical) Wing is satisfied that the work is completed in all respects the final payment to the contractor may be made. But the security deposit should be released only after obtaining service connection and satisfying that the installation is perfect.

20.8. Service Connection

20.8.1. On completion of the Electrical wiring and check of the same, the Junior Engineer (Electrical) should give to the Executive Engineer P. W. D. a completion certificate stating that the wiring work is complete and that service can be applied for. He should also furnish along with the certificate an inventory of the fittings and a brief description of the wiring and control points. The Executive Engineer P. W. D., should then direct the Junior Engineer in charge of the building to take over the Electrical wiring work and arrange for this also being transferred to the occupying department along with the building and other civil works. The completion certificate of the Junior Engineer (Electrical) and inventory of fittings should also be handed over to the occupying department. The application for service connection should be made by the authority in administrative control of the building, who will also be responsible for payment of electrical charges.

20.8 2. If there is any delay on the part of the occupying department to take over the completed building together with the electrical installations, the fact should be reported to Government so that appropriate action can be taken on the basis of Government orders.

20.9. Inventory of Electrical Installations in Government Buildings.

20.9.1. Inventory of electrical installation in all Government buildings should be taken and an inventory register of these installations maintained at the Division Level. This should contain the plan of the building, schematic diagram of the wiring. All fittings specifying the make, size etc. date of completion and handing over the installation, cost and subsequent changes effected, maintenance done etc.

Installations should be tested periodically and test readings should be recorded in the inventory register.

The inventory register should be reviewed periodically and the installation also should be inspected.

20.10. Maintenance

20.10.1. In an electrical installation a defect which remains unnoticed can cause serious and fatal accidents. It is therefore very necessary that electrical installations in Government buildings are periodically inspected and minor defects set right then and there. During such inspection, besides attending to minor repairs, if major repairs are necessary details should be collected and the estimates prepared on the basis of such inspection.

20.10.2. A periodical inspection of the electrical installation in all buildings costing, Rs. 5 lakhs and above and in other buildings specially considered important such as Government hospitals, buildings in college campus, Government quarters etc., and prestige buildings like Museum, V. J. T. Hall etc., should be made by the Junior Engineer, Electrical at least once every year. Whenever such inspections are conducted, defects noticed if any should be arranged to be rectified then and there. The report of such inspections and the details of works attended to will be recorded in the register maintained by the Junior Engineers in the Sections and an extract of the same submitted to the Executive Engineer through the Assistant Engineer (Electrical) within 3 days after inspection for perusal and further necessary action if any. If no Assistant Engineer Electrical is attached to a division the notes will be put up to the Executive Engineer by the Junior Engineer, Electrical. For petty repairs and maintenance, which could be attended to then and there, immediate action should be taken to arrange for the same.

20.10. 3. Special repairs in the nature of rewiring and replacement of major parts if any found necessary during such annual inspections and testing will be reported to the Executive Engineer through the Assistant Engineer (Electrical) accompanied by a detailed report and estimate on receipt of which the Assistant Engineer, will inspect the installations and verify the necessity for such works included in the estimate and arrange further necessary action for the early execution of the works.

20.10.4. Apart from the annual inspections suggested above, it is also quite likely that service calls are also generally to be attended to when some defects or failures are reported from the occupants. Supply should be restored or defects rectified immediately by the staff attending to such calls who should normally carry a few spares and required tools for attending to such defects.

20.10.5. Whenever opportunities are available for Electrical Wing staff during service calls to inspect an installation they should examine the installation as a whole, attend to the petty defects notified then and there and also make a record of such inspections with a report to the junior Engineer (Electrical) concerned. Any major repairs and replacements deemed found necessary during such service calls have to be reported to the Junior Engineer (Electrical) and farther action pursued to get them done by obtaining sanction from competent authority.

20.10.6. Insulation resistance and earth readings of all installations subject to periodical inspection vide para 10-2 should be conducted at least once in a year and the reading should be recorded in the inventory register. In case the readings are not within the permissible limits immediate action should be taken to rectify the defects.

20. 10.7. Funds required to meet the expenditure for the rectifications maintenance and also special repairs if any required for electrical installation, should be made available from the allocation made for the maintenance and repairs of the buildings under the concerned Executive Engineer. The requirement should be assessed early in financial year and the amount required earmarked for this purpose, subject to availability of grant.

20. 1 0.8. Such minor repairs and replacements necessitated during the periodical inspection and testings have to be carried out charging to 50 (d) repairs. With regard to major

repairs and replacements such as rewiring replacements of fans, florescent lights etc., special estimates have to be got prepared and sanction obtained from competent authority and work executed charging to 50 (d) repairs. All such maintenance and special repairs estimates have to be prepared and submitted at the beginning of the financial year so as to take up the works after obtaining necessary sanction in time. In preparing the revised maintenance estimates, the cost should not exceed the limit allowed as per Government orders or departmental circulars.

20.10.9. Tool kit must be available with the field staff which they should carry with them while they visit a centre either on routine inspection or on receipt of any notice. The following set of tools must be available with this staff.

Helper to Lineman.

1. Neon Tester	1
2. Connector screw driver	1
3. Screw driver 4"	1
4. Do 8"	1
5. Insulated cutting plier	1
6. Electrician's Pen Knife	1
7. Fuse wires --	Assorted size.
8. Test lamp complete	1
9. Fan condenser	1
10. Starter for fluorescent light	1
11. Choke	1

II Grade and I Grade Overseer.

1. Neon Tester	1
2. Connector Screw driver	1
3. 4" Screw Driver	1
4. Measuring Tape	1

20.10. 10. The field staff should maintain a diary of works attended and submit the same to the Junior Engineer periodically for review.

20. 11. Electrical works in Irrigation and other Projects, and Lift Irrigation etc.

20. 11.1. In the case of projects or other works requiring large scale electrical works to be carried out, a separate staff (other than the Electrical wing of the P. W. D.) qualified to carry out electrical works may be appointed to work under the concerned Executive Engineer. This staff so appointed need not necessarily be exclusive for electrical works but may be in charge of other works also according to convenience. The Chief Engineer B & R and the Executive Engineer Electrical wing, P. W. D. should be kept informed of the arrangements for this purpose.

20.11.2. The norms, specifications, data and procedures approved for the Electrical Wing of the PWD should also be followed by the special staff carrying out Electrical works in Projects etc. If any modification is found necessary in regard to norms, sanction of Government should be obtained and if any modification is required in specification or data, the advice of the Executive Engineer, Electrical should be obtained before orders are issued.

21. 12. Accidents.

20. 12. 1. In all Industrial establishments notices indicating how to treat persons who have suffered Electric shock should be displayed at prominent places as per rule 14-A of the Indian Electricity Rules.

20. 12 2. When accidents are caused due to Electricity, information should be given to the Electrical Inspector to Government as per Rule 44 A of the Indian Electricity Rules.

APPENDIX XX (a)

(Referred to in Para 20. 1.3)

General Specifications for Electrical Works in P.W.D. Prescribed by C E (G. B & R) for adoption from 1-4-1971.

1. Electrical installations and wiring should be done in conformity, with the relevant ISI specifications and Code of Practice for Electrical Wiring Installations.
2. Only materials approved by Chief Engineer (B & R) shall be used.
3. Power wiring should be kept separate and distinct from light and fan circuits. The T. W. battens are to be fixed at a distance of 1 cm. (approximate).
4. The wires used for all systems of wiring should be insulated and sheathed.

5. Wires used for light and fan points shall be of size not less than 1/1.4 (1.5 sq. mm) and that for power 1/1.8 (2.5 sq. mm) flexible wires of size not less than 23/0076 or its equivalent shall be used.
6. The ends of standard conductors shall be well soldered before connecting them to the terminal ends.
7. Unless otherwise specified looping back system of wiring should be followed.
8. Where the voltage exceeds 250 volts, only 650 volts grade wires should be used. For installations where the total load exceeds 4000 watts, wiring should be done to suit 3-phase service.
9. The number of light in each such circuit should be limited to six points in addition to 2 plugs subject to a total load of not more than 800 watts. Under no circumstances more than 2 nos. 10/15 amps plugs should be looped in a circuit.
10. Good workmanship is an essential requirement for compliance with the rules.

Systems of Wiring.

(a) T. W. Batten system.

11. In this system, wiring is to be done in T. W. batten of not less than 10 mm. finished thickness and width of which is such as to suit the total width of cable laid on the batten.
12. Only well seasoned perfectly straight teak wood battens shall be used and prior to erection they shall be painted or varnished with 2 coats of suitable varnish or approved paint and colour to match with the surroundings.
13. Teak wood plugs of size 50x25x20 mm, shall be used at intervals not exceeding 75 cm. and the batten is fixed with suitable size iron screws on these wood plugs. The wood plugs shall be flush with the wall.
14. Wires are held on the batten using tinned brass clips of gauge not less than at intervals of 10 cm. in case of horizontal runs and 15 cm. in case of vertical runs.
15. The clips shall be fixed on varnished or painted wood battens with brass or copper nails. One single clip shall not hold normally more than 2 single core cables. However for wires of size 1/1.4 a maximum Number of 3 wires can be permitted in one clip.
16. Wiring when run alone, walls shall be as near the ceiling as possible and preferably within 15 cm. from the ceiling.
17. Cables of size 7/16 and above shall be wired either with wooden cleats or spacers or on T.W. battens with special clamps. Special clamps shall be made of at least 16 SWG brass of a minimum of $\frac{3}{4}$ " width bent to size and fixed with 2 screws on T.W. plugs.

18. Suitable size metal conduits with polythene or wooden bushes or complete polythene pipes should be used for wall crossings.
19. Bends, Tees and corners of suitable size and shape should be used in wiring wherever necessary.

(b) Conduit wiring.

20. In the above system, wiring should be done in heavy gauge solid drawn or lap welded conduit pipes finished with stove enamelled surface.
21. No conduit pipe less than 16 mm. dia. shall be used.
22. Only threaded type conduit pipes and accessories shall be used and the number of wires drawn through the pipes should be as per ISI specifications.
23. Conduit pipes shall be joined by means of screwed couplers and in long distance straight run of conduit, inspection type couplers or junction boxes at reasonable interval, shall be provided. Inspection type accessories such as bends, elbows, tees etc., should be used wherever required.
24. Thread on conduit pipe shall be at least 11 mm. long and sufficient to accommodate the full threaded portion of the couplers or accessories. The exposed threaded portion of the pipe shall be treated with anticorrosive preservative or covered with plastic compound.
25. Conduit pipes shall be fixed by heavy gauge saddles of correct size screwed to wood plugs when running along walls or with special type of clamps at intervals not more than 1 metre, but on either side of couplers or bends or similar fittings saddles shall be fixed at a distance of 30 cm. from the centre of- such fittings. Cheek nuts should be used for fixing the conduit wherever necessary.
26. The entire system of conduit after erection shall be permanently connected to earth by means of special approved type earthing clamps fastened to conduit pipe for perfect continuity.

Wood casing wiring.

27. This system of wiring shall be tried only when other systems of wiring cannot be adopted and it should be done in conformity with ISI specifications.

Under Ground Wiring.

28. Cables are laid in trenches of 50 cm. depth and 30 cm. width. The trench bed is filled with river sand to about 5 cm. thickness. Cables are covered on three sides with well burned bricks and then the trench is filled with earth.

29. Road crossing shall be through suitable size of cast iron or G. I. pipes properly laid and buried underground.
30. Joints of U. G. cables within the trenches are not allowed.
31. Sufficient free length of cables should be provided at the free ends.
32. Suitable size saddles or special clamps should be used where U. G. cables are run along walls.

Over Head Line.

33. Rail, steel tubular or R. C. poles may be used for Over Head construction. Wooden poles may be avoided.
34. Length of poles shall be between 8 to 10 metres.
35. Posts and struts shall be erected in deep concrete foundation 60 x 60 x 200cm.
36. Pole caps should be provided for steel tubular poles.
37. Metal posts should be painted with 2 coats of aluminium paint over a coat of anti-corrosive primer.
38. The sizes of cross-arms to be used for line work are given below:-

Angle 2 line 50 X 50 X 6mm X 60 cm.

 4 line 50 x 50 x 6mm x 120 cm.

Channel 2 line 75x50X6mm x 60 cm.

 4 line 75 x50 x 6mm x 120 cm.

Cradling cross arms Angle 2 line 50 x 50 x 6 mm x 100 cm.

 4 line 50 x 50 x 6 mm x 150 cm.

39. Cross-arms should be either galvanised or painted with 2 coats of aluminium paint over one coat of primer.
40. Clamps for fixing cross-arms shall be fabricated out of M. S. flat 50 X 6 mm.
41. Neutral wires are to be drawn on C. I. knob where insulations are not used and the neutral wire should be properly earthed.
42. Shackle insulators are to be used where the angle of the lines is less than 160°.

43. Joints in O. H. lines between supports may be avoided.
44. Stay rod used shall not be of less than 16 mm. dia. and the plates shall not be less than 30 x 30 x 6 cm. The size of stay wire shall be 7/14 stranded. Stay set should be complete with stay insulator, stay tightener, stay clamps and trimple.
45. Cross-arms, stays, neutral conductors etc. shall be bounded together and properly earthed at one in 5 poles.
46. Lightning arresters are to be provided at the terminal end of the lines.
47. 35 cm. D. C. reflectors with 3 to 4 metre G. I. pipe bent to size with M. S. flat or scroll shall be used as street light ratings.
48. M. V. lamps should be avoided as far as possible.
49. Sub meters shall be provided with I. C. cut outs and I. C. neutral links. G. I. upright pipe must go up to the meter just like in the case of K. S. E. Board service connections.
50. Generally the T. W. batten system of wiring shall be employed, but in workshops, stores, godowns etc. conduit system may be adopted. Conduit system, preferably PVC conduits, alone shall be adopted for damp walls or ceiling and socket outlets and control switches should be avoided on such walls.

Electrical fittings and accessories.

51. Unless otherwise specified a light point shall consist of one 5 Amps S. P. switch, 2 way ceiling rose and the required wiring in the specified system. But ceiling rose is not required for batten light points.
52. Fan points should be wired in the specified system using 5 amps S. P. switch, 2 way ceiling rose and a regulator board.
53. Plug points should be wired in the specified system with required length of wires, 3 pin socket, pin and control switch of the same capacity.
54. Stair case light points should be wired in the specified system with 2 nos. of 2 way switches and one ceiling rose and required length of cable.
55. Exhaust fan point is similar to a light point and regulator board is not normally required.
56. Iron screws and hinges are permitted.
57. Wall brackets should be avoided and only welded brackets shall be used.
58. Only brass holders shall be used for all types of light fittings.

59. Unless otherwise required all light fitting shall be hung at a height not less than 2.5 metre above the floor level.
60. Joints in suspension rods of fans should be avoided and if it is unavoidable such joints should be done as per ISI specifications (IS-732-5. 8. 1).
61. Unless otherwise specified all ceiling fans shall be hung at a height between 2.75 and 3.5 metres above the floor.
62. The switch for controlling the general lighting of an area or room shall be provided adjacent to the normal entrance to that area or room.
63. Unless otherwise specified switches and socket outlets shall be installed at 1.5 metre above floor level and shall not be obstructed by a door or window in its fully opened position.
64. All socket outlets shall be controlled by a switch immediately adjacent to it for 15 amps plug sockets metal clad double pole switches are to be used.
65. 5 amps 3 pin plugs should be specified for combined and independent positions.
66. Only E. I. white opal and langham shades should be used. Lamp locks may be insisted wherever necessary.

Switch gears and accessories,

67. Only metal clad switches and D. Bs. shall be used.
68. Main switches of capacity 60 amps and above shall be fitted on angle iron frame work (minimum size 35 x 35 x 6 mm). There shall be a clear space of 1 metre in front of the switch board.
69. Switch boards shall be at a minimum distance of 2.5 metre away from any washing unit in washing room of laundries or in bath rooms, lavatories or toilets or kitchens.
70. T. W. boxes should be on two separate frames (bottom plank must be on a frame and covering plank also must be on a frame work) and 2 nos. of iron hooks should be used. The plank should not be less than 10 mm. thickness.
71. The following sizes of T. W. boxes are to be used for ordinary works:-

1. 15 x 10 x 5 cm. } Non-inspection type.

2. 15 x 15 x 5 cm. }

3. 30 x 20 x 5 cm. }

4. 37.5 x 25 x 5 cm}. Inspection type.

5. 45 x 30 x 5 cm }

72. Floor mounting T. W. Boards shall be with 25 mm. thick T. W. plank fitted on 50 x 50 x 6 mm. angle iron frame work with back supports grouted on ground and walls with a clearance of 80 cm. at the back and 80 cm. at the bottom covering the top and front bottom with 13 mm. thick T. W. plank providing T. W. pannelled doors of suitable size at the hinges, locking arrangements, locks and keys and painting the iron parts with 2 coats of aluminium paint over a coat of red oxide primer and varnishing the wooden parts with 2 coats of varnish.
73. D. Bs. with more than 6 ways shall not be used. One spare circuit shall be left out in the D. Bs of light circuits for future extensions.
74. D. Bs. and sub boards may be fitted at 1.5 metre above the floor. 75. Separate D. Bs. shall be used for light and power circuits.
76. For important works where aesthetic appearance is also to be considered, the sub boards and D. B. should be recessed in the wall. The front may be fitted with a hinged pannel of teak wood or other suitable material such as bakelite or with glass doors on T. W. frame with locking arrangements, the outer surface of the doors being flush with the wall.
77. Sub boards and D. Bs. are to be serially numbered with any indelible paint.
78. For all installations a line diagram showing the circuit mains shall be prepared and hung near the main switch board.
79. If the total connected load of the installations exceeds 500 amps a suitable oil circuit breaker is preferably incorporated in the main supply line as a protective device for the apparatus and the associated cable work.
80. To facilitate easy connection to sub main switches and D. Bs., a bus bar unit may be used at loads above 100 amps. Upto 100 amps suitable D. Bs. may be provided.
81. For workshops and factories where independent connections are to be given to various motors and other power consuming devices, totally enclosed and insulated O. H. bus bar extending over the entire length of the Bay can be provided.
82. Wires from plug in boxes shall be preferably drawn in conduit pipes or in flexible metal pipes.
83. The main control of the electrical installations should be housed in a well ventilated and spacious room located at the load centre of the building.
84. A caution board written 'Danger' in red paint shall be hung just outside the switch room.

Earthing.

85. All metal conduits, trunking cable sheaths, switch gears, distribution fuse boards and other metal parts shall be bounded together and connected by means of a distinct conductor to the earth electrode.
86. Earthing of the installation shall not be effected through any structural metal work which houses the installation.
87. Conduits, cable sheathing and armouring shall be earthed at ends adjacent to switch board at which they originate.
88. Pipe electrodes shall not be less than 38 mm. dia. and if made of iron or steel shall have their outer surface galvanised and the electrodes shall be driven to a depth of 1.75 metre vertically below the ground. In case rock is encountered at a depth less than 1.5 metre, the electrodes can be buried in a horizontal trench to a length not less than 2.5 metres.
89. Ordinary pipe earthing should be carried out as per the diagram enclosed.
90. Earthing shall be done at a minimum distance of 1.5 metre from the foundation.
91. Copper wires used for earthing main boards, main switches and sub main controls shall not be less than No. 10 SWG. Any earthing wire should not be less than No. 14 SWG.

CHAPTER XXI

MAINTENANCE OF IRRIGATION WORKS

21.1. General

21.1.1 Irrigation works on completion have to be maintained. Some of them will have to be operated as well. Unlike other public works, the responsibility for maintenance and/or operation of irrigation works is not in all cases undertaken by Government. Major and Medium Irrigation works on completion are maintained and operated by the P. W. D. Minor Irrigation works costing Rs. 1 lakh and less are maintained by the Panchayats and operated by the benefitted ryots. For this purpose, the Panchayats are given a grant at the rate of Rs. 2.50 per acre of benefitted area. As regards lift irrigation works the maintenance and operation is to be done by the following agencies depending upon the area benefitted.

Benefiting area 200 acres and above by Government through the P. W. D.

Benefiting, area less than 200 acres but by Lift Irrigation Co-operative Societies

more than 500 acres

Benefiting area less than 50 acres

by the ryots themselves directly or
through Co-operative Societies

21.1.2. Works of a flood control nature are maintained by the P. W. D. The general principles outlined above are modified in some instances based on prevailing practice or due to certain special circumstances. Whatever has been the practices so far should be continued in regard to existing completed irrigation works. In the case of new works proposed to be taken up, the question of authority responsible for maintenance and/or operation on completion should be considered and decided when sanctioning the estimates for such works. The general principles set forth above should be followed in deciding this question unless there are special circumstances justifying a departure. When such a departure is to be made, sanction of Government should be obtained before according sanction for the original work.

21.1.3. Each Division, Subdivision and Section of the Irrigation Branch (except such of those engaged solely in investigation and/or design and/or construction of original works) should keep a registry of irrigation works which are under departmental maintenance and/or operation. The register should contain the name of the work, salient features benefitted area, year of completion, and maintenance grant.

21.1.4 As soon as any irrigation work is completed and is put to beneficial use, the Collector of the District in which the benefitted lands lie should be informed so that cess if any, realisable under the Irrigation Act, may be arranged to be collected. The intimation to the Collector should be sent irrespective of whether the concerned irrigation work is under departmental maintenance or not. In some of the major irrigation systems, even before all the works are completed, some portion of the benefitted area may get the advantage of the system. The extent of areas so benefitted and details thereof should be intimated to the Collector. Similarly as and when more areas get the beneficial use of the irrigation systems, the Collector should be informed, instead of waiting for the whole project to get completed.

21. 2. Fixation of grant for maintenance and operation of Irrigation works

21.2.1. For the normal yearly maintenance (and/or operation) of every irrigation system or work under departmental maintenance (and/or operation) there should be a recurring grant. This grant should be fixed on the basis of a standard estimate for maintenance (and/or operation). It should be got sanctioned by the Chief Engineer (Irrigation) subject to such norms as are prescribed by Government in the matter.

21.2.2. In the case of works already under maintenance and operation for which regular grants have not been fixed such sanction should be sought and obtained as early as possible. For this purpose the latest sanctioned estimate may be treated as the standard estimate and grants fixed accordingly.

21. 2 3. Once the grant is fixed, the detailed estimates for maintenance and/or operation every year may be prepared and sanctioned by the Superintending Engineer, Executive and Assistant Engineer according to their powers of sanctioning estimates provided the sanctioned grant is next exceeded and provided also that the staff strength and pattern, if any, provided in the standard estimate are not altered. It is however permissible to exceed the sanctioned grant in cases where the excess is solely due to increase in the emoluments to the staff included in the standard estimate, such increase in emoluments being a result of general or special orders of Government.

21.2.4. The sanctioned grant should be renewed and refixed once every five years.

21.2 5. The maintenance grant is intended to cover all items required to be carried out periodically to preserve the concerned work in good order. Original works should not normally be charged to the recurring maintenance grant. It is, however, permissible to include the following types or original works in the maintenance estimate.

(a) Reconstruction of damaged portion of work

(b) Closing breaches.

(c) Strengthening of weak structures, provided the cost of such strengthening is less than Rs. 1,000 or 5% of the recurring grant whichever is less.

21.3. Extensions improvements and special repairs

21. 3. 1 . In addition to routine maintenance, it may become necessary now and then to carry out improvement, extensions or special repairs. Such works should be dealt with as though they are original works but the expenditure may be debited to the budget minor head "working expense." in the case of irrigation works classified as "Commercial" and to the minor head "Extensions and improvements" in the case of irrigation works classified as "Non-commercial". As far as possible, such works which are of the nature of extensions, improvements and special repairs should be completed and paid for in the same year. If, however, this is not possible in any particular case, the financial commitment may be met from the succeeding year's grant under this head.

21.4. Estimate for maintenance of irrigation works

21.4.1. Every year an estimate for the maintenance and/or operation of each irrigation work should be prepared and got sanctioned. The amount of the estimate should normally be within the sanctioned grant. The estimate should include all items of routine maintenance and in addition wherever necessary provision for strengthening weak spots after a thorough and careful examination of the various parts of the works concerned. The following may be considered as a guide for points to be looked into.

(a) In the case of earthen dams, examine whether there is

(i) subsidence

- (ii) slip
- (iii) percolation behind the dam
- (iv) leakage by the side of sluices or conduits
- (v) growth of unwanted vegetation
- (vi) choking of drains in the rear of the dam
- (vii) bulging of the rear slope
- (viii) disturbance of pitching or rip rap protection to slope

(b) In the case of masonry or concrete dams, the following features should be particularly looked into.

- (i) whether the contraction joints are working satisfactorily
- (ii) whether cracks are noted anywhere in the body of the dam
- (iii) whether there is any increase or decrease in the flow of water
through drainage galleries
- (iv) whether there is leakage past any sluice or conduit through the body of the dam.

(c) In addition to the above, both in earthen and masonry on concrete dams check whether it should be examined-

- (i) whether there is scour or damage to protective works below surplus sluices etc.
- (ii) any unusual change in bed levels below 300 metres of the dam.

(d) If instrumentation is provided, readings should be taken at periodic intervals, and if any abnormal reading is obtained, this should be investigated and corrective steps taken.

(e) If there are any saddle dams provided within the water spread area, they should be inspected and subjected to the same scrutiny as in the case of the main dam particularly just before the flood season and during the season when the reservoir is full.

(f) Aprons of barrages, pick up weirs, anicuts etc. wherever provided have to be particularly examined to see whether there is any subsidence or crack noticed. If any such damage is noticed the cause must be investigated and rectification steps should be taken. If clay pudding has been provided in the apron, after every flood it should be examined whether the pudding is in place and of sufficient thickness. A proper record of deep pools in the stream for a distance of at least 300 metres on each side should be maintained and any tendency for these

pools to deepen or other scours getting formed should be carefully watched and corrective steps provided.

(g) The piers, abutments and wing walls as well as the body wall of barrages, weirs or anicuts etc. should be examined for subsidence, cracks, bulging or titling. Growth of vegetation in the joints of masonry anywhere should be promptly prevented.

(h) Wherever shutters are provided the shutters and operating mechanism should be periodically examined and lubricated. Painting of the shutters and other parts should be undertaken during the non-irrigation season. The working of the various sluices and surplus gates should be checked without causing undue loss of water to ensure that these movable parts will function satisfactorily when required. During such trials, examination should be made whether any part or parts of the operating mechanism or the shutters show wear and tear or defects and if so, steps should be taken to set right such parts.

(i) The bank connections should be examined and strengthened wherever necessary.

(j) In the case of lift irrigation systems in addition to carefully locating and providing for strengthening of weak spots in the channel, pump house etc. the course of the river in the vicinity of the pump house should also be watched and provision made for training the river in case there is a tendency for it to meander away from the pump house or cause undesirable scours its vicinity.

(k) In the case of canals, a careful watch of the banks should be made to locate soft spots, leakages, subsidence, slips etc. and the repairs of such weak sections should be provided in the maintenance estimate. Further areas where shoaling is noticed should be identified and provision should be made not only for removal of the silt but also if possible for corrective steps to minimise silting or shoaling. Under tunnels, aqueducts, syphons and all cross drainage works should be inspected and provision made to rectify any weakness noticed such as by development of creep choking of waterway etc. The same attention should be paid in regard to sluices and other masonry works in canals.

21.5. Inspection

21.5. 1. Irrigation works are often subjected to water pressure and constant vigilance is necessary to see that no part of a structure is weakened to such an extent as to be unsafe against the pressure to which it is exposed. Even a slight negligence in attending to a weak spot can cause serious damage not only to the structure concerned but also to the benefited or adjoining lands. Hence it is essential that there should be a systematic inspection of the irrigation works by the officers in charge.

21.5.2. In the case of dams, and other forms of storage, unless otherwise ordered by the Chief Engineer, the frequency of inspections should be as given below:

(a) Work Superintendent or other subordinate in charge of any portion of the work at least twice every week and at closer intervals during the monsoon season.

(b) Junior Engineer in charge of the dam-once every week and test check reports of Work Superintendent.

(c) Assistant Engineer in charge of the dam-once every month normally and at closer intervals during monsoon-Test check the inspection reports of the junior Engineer.

(d) Executive Engineer in charge-at least once in 3 months of which one inspection should be just prior to the monsoon, and one inspection during the monsoon, test check reports of the Assistant Engineer. If any of the Inspecting Officer notices some unusual or potentially dangerous feature, the matter, should be specially brought to the notice of the superior authority from whom instructions should be sought as to the action to be taken. All officers of the department to whom such references are made should give the highest priority in dealing with the matter. It will be considered dereliction of duty, if an officer to whom such reference has been made fails to respond promptly. Further, officers in charge of Irrigation works should be able to identify vulnerable parts in structures under their charge, keep them under constant observations and arrange immediate rectification of defects thereto in the manner described in technical books and manuals such as Maintenance Guidelines for Safety of Dams-Reproduced in Appendix XXI (a).

21.5.3. In the case of canals, the entire length of the canal under departmental maintenance should be divided into reaches of convenient lengths and each such reach should be placed under the immediate charge of a Work Superintendent or other subordinate. The Work Superintendent or other subordinate in charge should make a round of the entire reach of the canal under his charge at least once every day during the irrigation season. During the closure period he should devote his attention to the execution of maintenance works as directed by the junior Engineer in charge. The junior Engineer in charge of Irrigation canals should inspect the full length of canals under his charge at least once every week during the irrigation season and more often if necessary. During the closure period he should inspect maintenance and other works under his charge as frequently as possible. The Assistant Engineer in charge of canals should inspect the canals and works under his jurisdiction at least once every month during the irrigation season. During the non-irrigation season he must concentrate on the execution of maintenance works in addition to any original works he is in charge of the work Superintendent or other subordinate, junior Engineer and Assistant Engineer should make it a point to investigate about complaints regarding the supply of water during the irrigation season without any loss of time. The Executive Engineer in charge of the irrigation system should inspect the main canals at least twice during the irrigation season and the branch canals and distributaries as often as found necessary, Care should be taken to see that all the structures are maintained in a safe condition Particular attention should be paid to places where signs of weaknesses are noticed.

21.5.4. In the case of barrages, vented dams and salt exclusion works etc. where any of these works is in excursive charge of a Work Superintendent or other subordinate he should examine the work every day and submit a report on the condition observed by him during such examination. Where more than one such work is so entrusted to the same person the Work Superintendent or other subordinate concerned should divide his time between the several work in such a manner that he visits and examine each of the work at least twice a week. The junior Engineer should inspect the work at least twice a month. Assistant Engineer should

inspect the work at least twice during the irrigation period and once during flood. The Executive Engineer should inspect the works at least once a year.

21.5.5. As far as possible each lift irrigation work under operation by the department should be in charge of a Work Superintendent or other subordinate who must carry out the day-to-day operations needed and keep a watch on the safety of the structure. Where more than one such work is entrusted to a Work Superintendent or other subordinate, such Work Superintendent or subordinate must devote his time between the several works under his charge in such a manner that he visits and attends to the requirements of each of the works at least twice a week during the period of execution. The junior Engineer should inspect each lift irrigation work in his charge at least once every week and Assistant Engineer once every month.

21.5.6. Flood banks and river training works such as groynes etc. should be inspected sometime before the advent of the floods so as to take note of defects, if any, and arrange remedial measures. In regard to groynes, river regulators anicuts, cross bars, vented dam etc. it is desirable that at the site a permanent reference line is established and a survey showing the bed contours of the stream in the vicinity of the structure for a distance of at least 200 metres on either side is kept as a permanent record. On this survey, variations in bed level and other features observed after each flood "son can be interpolated to watch the effectiveness of the work and the tendency of the river in regard to silting, shoaling etc. The junior Engineer must inspect every flood bank and river training work in his jurisdiction at least twice during the year-once, sometime in November or December for examining and if necessary making proposals for strengthening, and once in April or May before the advent of the floods. In case during his inspection he notices any serious damage to existing works or the river exhibits tendency for shoaling or erosion in a manner different from what was expected, he should report the matter to the Assistant Engineer who should make it a point to inspect such works to decide upon the nature of remedial measures. Whenever the Assistant Engineer feels that higher technical direction is necessary he should move the Executive Engineer for guidance. Where regular watchmen are provided, they should be instructed in their duties and asked to watch the bund within their jurisdiction particularly during the flood season. If a watchman detects any weakness or sign of damage in a flood bank during flood season he must seek the assistance of the local people to attend to immediate rectification measures and concurrently report the matter to his official superior. The officer who receives a message about damage to a flood bank should give the highest priority to this matter and proceed to the spot to direct remedial or strengthening operations.

21.5.7. In the case of works not mentioned above, the periodicity of inspection should be fixed by the Executive Engineer in individual cases.

21.5.8. All inspections should be purposeful and the forms in which results of inspection should be recorded by the junior Engineer, Assistant Engineer and higher technical officers is given in Appendices attached. [App. XXI (b) to App. XXI (f)].

21. 5. 9. Under the T.C. Irrigation Act, it is the duty of the Irrigation Officer to inspect periodically all petty and minor irrigation works situated within the local limits of his jurisdiction and to report to the Collector the condition of these works (see section 10 Act No. VII 1956). Even though such works are not under departmental maintenance the inspections

should be carried out so that each work is inspected at least once during the year. Where any defects are noticed the concerned work should also be inspected by the Assistant Engineer.

21. 6. Execution of Maintenance of works

21.6.1. As most of the component parts of irrigation works will be retaining or conveying water during certain portions of the year, it will be possible to carry out maintenance works only during the period when these parts can be drained of water. Usually most of the Irrigation systems have a non-irrigation season when such works should be carried out. In order to take up and complete these works during this short period, preparation and sanction to estimates invitation of tenders, and all preliminary works must be completed well in time to enable works being put on hand as soon as the closure period or non-irrigation season commences. Works may have to be taken up at different portions simultaneously, and all available supervision staff should be suitably employed and posted to supervise the various works. It is essential that the works are completed, measurements taken and check measurement done before the system is put into operation at the commencement of the next Irrigation season. If absolutely unavoidable, the work will have to be carried out during night shift also to ensure completion before the due date. It should be borne in mind that there should be no delay in putting this system into use at the time of the next irrigation season.

21.6.2. In the case of Irrigation systems where there is no defined non-irrigation season, maintenance of works will have to be carried out in bits after closing concerned portions of the system to irrigation for brief periods. It is obvious that in such cases, the execution of maintenance works will have to be done at considerable speed to minimise the inconvenience to irrigation due to closure.

21.6.3 In the case of lift irrigation systems, the pumps, motors etc. should be thoroughly serviced during the period when the irrigation system is not in operation and all maintenance works necessary in the channel and head works completed during that period. A study of the current consumed by the pumps operating on full load for every week should be made so as to identify pumps, which are operating inefficiently. The pump operator must also keep a constant watch as to whether any pump is heated up or otherwise shows any defects. A few motors and pumps must be kept in reserve when large number of lift irrigation schemes are in operation within a short distance of each other so that when a defect is noticed, replacement may be made without much loss of time. In some cases the motors are not kept above the high flood level and it is necessary that before the flood season commences the motors should be lifted and removed to a place of safety.

21. 7. Rules of operation

In the case of major irrigation works rules of operation should be framed by the Chief Engineer in consultation with the representative organisation of the interested ryots as well as the Revenue, Agriculture and Development Departments and sanction of Government sought. After the rules are approved by Government, they should be published in the Gazette for the information of the interested ryots. Letting out of water from the reservoir should be controlled by the officers in charge of the system in the manner prescribed in the rules of operation. If due to inadequate storage or other reasons any modifications in the prescribed scheme of operation

is necessary, such modification should be effected only in consultation with the Collector of the District concerned. Government sanction should also be sought wherever time permits. In urgent cases, the revision as found necessary may be put through by the Executive Engineer in charge and ratification sought. Such revisions should also be notified in the press for the information of the interested ryots.

Rules of operation of the reservoirs concerned should also contain detailed instructions as to when and in what manner surplus gates etc., should be operated to let out surplus water without endangering the safety of the structures and without causing undue flood below the dam. In all cases where heavy flooding may result from the operation of surplus gates, flood warning telegram/telephone messages etc. should be sent to the Tahsildar, Collector, Assistant Engineer and Executive Engineer, P.W.D. in charge of the areas likely to be affected by the flood. Where time permits, just before the reservoir is filled the likelihood of the surplus gates being opened without further notice should also be notified in the press by the officer immediately in charge of the dam or other structure concerned. If the flood is likely to affect a railway line the concerned Executive Engineer and Assistant Engineer of the Railway should also be informed.

In the case of Medium and Lift Irrigation works similar rules of operation should be framed and published by Chief Engineer. Sanction of Government is not necessary in such cases.

APPENDIX XXI (a)

(Vide para 21.5.2.)

MAINTENANCE GUIDE-LINES FOR SAFETY OF DAMS

INTRODUCTION

This Manual of 'Maintenance Guide-lines for Safety of Dams' prepared by the Central Water and Power Commission, sets forth the important points needing attention in the safe maintenance of dams:

Every dam which impounds water presents a potential danger; and the risks can be increased as much or even more by neglect of proper and timely maintenance and defects in construction.

"The earliest record of a dam failure relates to an earth embankment near Grenoble which failed in 1219 after 28 years' service. A list of 1764 dams has been published in America, giving all those built up to 1959. Of these 33 had failed between 1918 and 1958. Five of these failures were classed as major disasters involving the loss of 1680 lives. Two thirds of the failures were attributed to geological and technical causes. The number of failures was greatest among multiple arch dams (10%) while among those classed as concrete gravity dams failure occurred in less than 1%. Up to this time there had been no recorded failure of an arch dam.

In 1961 the Spanish publication "Revista de Obras Publicas" mentioned a list of 16'90 dams. Over the 145 years between 1799 and 1944, 308 of these had been the subject of serious accidents. In the case of over half of them actual breaching had not occurred, while in 77 cases the cause of failure was not described. Of the failure listed 163 were classed as earth embankments. 14 were described as dykes, 70 were concrete gravity dams, two were arch dams, seven were multiple arch dams, while 52 were of other types.

The causes of failure of the dams listed were attributed as *follows:-*

Foundation failure	40%
Inadequate Spillway	23%
Poor construction	12%
Uneven settlement	10%
High pore pressure in the case of pumped fill embankments	5%
Arts of war	3%
Embankment slips	2%
Defective materials	2%
Incorrect operation	2%
Earthquakes	1%

(Extracts from Paper on 'Dam Disasters by Edward Gruner - Proceedings of the Institute of Civil Engineers Jan., 1963)"

From the study of failures of fourteen earth dams during 1918 to 1958, it is seen that the chief reasons of failure are:

- (i) Insufficient spillway
- (ii) Piping and sloughing
- (iii) Seepage along embedded outlets
- (iv) Development of high pore-pressure

(v) Excessive exit pressure gradients in cohesionless soils.

(vi) Excessive settlement of the embankment

(Refer Paper on 'Structural Failure in Weirs and Dams by Dr. K.L.Rao - Journal of the Institution of Engineers (India), Vol. XL, No. 12, August, 1960).

The main causes of failure of masonry (concrete) dams can be:

(i) Crushing of masonry (Poor construction or deterioration due to ageing or washing out of construction material by excessive percolation).

(ii) Excessive uplift pressures

(iii) Erosion or scouring under foundations

(iv) Yielding of the abutments and softening of the foundations. Benefiting from knowledge of past failures, the points specifically needing attention in the maintenance of dams are set forth in the following pages; a check list forms part.

The necessity for diligent maintenance cannot be over-stressed, the saying 'a stitch in time saves nine' is never truer than in the case of dams; what is saved may not be only the saving in the avoidable expenditure but the structure itself, and the misery or disaster that will be unleashed on unsuspecting people below. In the case of dams, eternal vigilance is the price of safety.

MAINTENANCE GUIDE-LINES FOR SAFETY OF DAMS

The failure of a water storage structure is fraught with serious consequences; the fact, that human life is concerned, in addition to property damage, particularly makes it a matter of very great concern. The recent tragic failures of a few dams and the knowledge of conditions of distress in a few others have led to a more intense recognition of the necessity for a review of the design features and the exercise of concurrent check during construction and operation of the dams. The idea of a 'Service for the Safety of Dams' is under active consideration; however, irrespective of whoever is the organisation, necessary vigil shall continue to be maintained.

Towards this end, this present manual sets forth only the important points needing attention in the maintenance of dams. These instructions are overall and general; and in every case, shall be considered together with specific instructions that have been stipulated by the design, construction, or earlier during maintenance.

It is emphasised that each agency in charge of a reservoir should examine this manual and take such steps as may be indicated to improve or strengthen the supervision during maintenance with the objective of ensuring safety at all times. An officer, who has been specifically designated must be in over-all charge of the dam and reservoir. Particularly during flood,

seasons this principal officer or his deputy, specifically nominated, should be constantly available at the dam site.

Immediately following unusual disturbances (such as high floods, earthquakes, rockfalls, mountain slides) which may affect the safety of the dam or cause downstream flooding, the officer-in-charge must take the following action:

(a) issue warning to downstream settlement, inhabitants, plants industries and transportation agencies;

(b) operate the spillway and outlets judiciously in the best interest of public safety, regardless of economic loss through loss in storage and power;

(c) inform the appropriate authorities immediately of unusual conditions or impending danger.

RECORDS/DATA TO BE AVAILABLE AT SITE

General

Data in respect of upstream gauging station, flood warning system and communication channels, if installed.

The following records/data must be available at site in the charge of a responsible engineer.

In the case of masonry /concrete dams

1. Geological data on the foundations and abutment. Copies of geological reports, details of special foundation /abutment treatment carried out.

2. A set of drawings according to which the work was actually carried out.

3. Details of instruments embedded in the structure and summarised data of observations thereon.

4. If available summarised data on control tests during construction in respect of concrete, mortar and their constituent materials. Details of construction stages, particularly like in the low blocks where considerable time elapsed prior to resumption of work.

In the case of earth /rockfill dams

1. Complete foundation data and foundation treatment adopted.

2. A set of construction drawings indicating actually constructed profiles.

3. Photographs showing all phases of construction.
4. Details and location of instruments installed, if any, and summarised data of observations.
5. Stage-wise construction record of the dam showing volumes and height achieved in each season and the time rate of progress.
6. Important inspection reports and reports of consultants.
7. Summarised records of compaction control, sampling and complete laboratory and field test results on all record samples and records of special compaction done near concrete /masonry structures, abutment contacts and outlet location, if available.

In the case of gates, hoists and other operating mechanism

1. A complete set of detailed design calculations together with the drawings of gates, gate grooves embedded parts, hoisting mechanism details including controls etc.
2. Designer's operating criteria and/or detailed operating instructions for the various types of gates installed in the dam.
3. Operating charts for various gates with suggested precautions, if any considered necessary based on model studies.
4. Record of all the previous operations, giving reservoir level of operation, duration of operation and any other important observations during the period of such operation.

Schedule for regular and periodical checks

Adequate inspection by competent personnel shall be ensured to investigate performance of the dam and reservoir, to watch carefully any condition which might adversely affect the safety, such as excessive settlement, deflection, seepage, uplift pore-pressure or deterioration of mortar or concrete. The following need particular attention..

In the case of masonry /concrete dams

1. Inspect and ensure that the drainage system in the foundation and the dam body is in good repair.
2. Look for leaks, cracks and spalling on the surface of the dam and in openings like gallery and adits.
3. Keep the abutment under observation, particularly looking for leaks, cracks, slides.
4. Look for scour downstream of spillway and ensure measures for protection against harmful retrogression.

5. Ensure that no blasting operations are carried on in the vicinity of the dam within permissible limits.
6. Ensure availability of access to vital parts and adequacy of lighting facilities.

In the case of earth/rockfill dams

1. Keep stockpiles of suitable and sufficient filter materials, rockfill, gravel and sand near the downstream side of the dam, adequately protected at vulnerable locations for use in any emergency.

2. Do not proceed with reservoir filling until the stage of progress of works will permit it without endangering public property. The first filling of the reservoir should only be done after carefully examining the competency of the dam and adequacy of the outflow control devices, etc.

3. If there are instruments installed in the dam, make the following observations:-

- (i) Hydrostatic pressures within the foundation and the embankment to check on seepage condition and performance of the drainage system. Observations on pore pressures at the downstream with respect to filling of reservoir to know whether the increase in pore pressures is proportionate or excessive.

- (ii) Settlement of various zones of the embankment and that of foundation at different reaches.

- (iii) Observations of seepage discharges to evaluate whether the drainage arrangements are functioning as intended without undue increases in pore pressures.

- (iv) Observations of wet, patches, sloughing erosion of material from the dam foundation or abutments.

4. If there are no instruments installed in the dam, carry out the following visual inspection and observations:

- (i) General condition of seepage through the dam foundation and abutments, whether seepage is increasing or decreasing, any departure from normal conditions of seepage which may result in seepage flow, springs, bubbles, wet patches, washing out of fine materials on the dam slope. -

Watch for occurrence of boils on the downstream where the top layer of the foundation is of a cohesionless nature. Control boils if they occur, by placing suitable filter material till such a time clear water emerges from the boil.

If the boils are large and uncontrollable, lower the reservoir level suitably. At the earliest opportunity, introduce suitable permanent remedial measures.

Continued observation of seepage should be reach-wise and not in a consolidated single observation point. Set up facilities for observation of water level in the river upstream and downstream of the dam

(ii) Condition and performance of drains and relief wells.

(iii) Condition of upstream slope protection of the dam within the visible portion of the dam.

(iv) Condition of the crest and slopes of the dam specially in the zones adjacent to concrete structures. Detect the deformations, settlement cracks or other distress conditions caused by external erosion due to rain, wind etc. Set up permanent observation system for the same at places of its occurrence.

Seepage at junctions between earth dam and masonry/ concrete retaining wall or core-type junctions with concrete dams is a possible source of trouble and should be carefully watched.

5. Careful examination of the upstream slope of the dam after periods of sustained high velocity winds and when reservoir surface is being drawn down for evidence of cracks, slides, subsidence or damage to slope, protection such as displacement of riprap or other signs of sea erosion.

6. Periodic sampling of reservoir water that collected from seepage to find out whether any material is being washed out.

7. Outlet conduits located in the earth dam are vulnerable points and need special attention, during maintenance. Special watch should be kept on amount of seepage, cracks longitudinal or transverse near the outlet location. Sometimes it may be desirable to have continuous observation of seepage for the outlet reach alone.

In the case of gates, hoists and other operating mechanism

Gates installed in dams form an important item to be looked after for the safety of the dam as a whole. A catastrophe can occur if the gates are not looked into periodically. Cleanliness and good care of the entire equipment are prerequisite for proper and safe operation of the gate.

Schedule of checks-on gates:

These checks are to be carried out periodically at specified time, particularly well before commencement of flood season,

1. The paint on gate should be always kept in good condition. Any damaged patches should be repainted.

2. The rubber seals shall be checked for wear and tear and replaced if visual inspection reveals damage. They shall be cleaned from any dirt that might have lodged on it.

3. The gate wheels shall be thoroughly lubricated once a year, after cleaning them of any silt, etc. It should be ensured that wheels are freely rotating on bearings. Similarly trunnion bearing shall be attended to in case of radial gates.

4. Check for any foreign material, boulders log of woods, etc. being wedged in the gate grooves, periodically to remove such foreign matter.

5. Inspect all the embedded parts to see that they are in proper shape.

6. Periodical raising and lowering the gates through the full range of travel to check that the gates are in good working order.

For Hoist Mechanism

1. Rope or chain would be the connecting link between gate and hoist mechanism. Examine all wire ropes for rusting, broken strands reduction in diameter and conditions of sockets and clamps. Change wire ropes, if found defective. Grease the wire rope periodically as per recommendations. The chains shall be inspected for wear of pins and plates. These shall be periodically lubricated to avoid rusting.

2. It is essential that all bearing points, hinges, spur gears and pinions are properly lubricated.

3. Check the gear teeth of all the gears for any cracks, undue wear damages. Repair/replace such damaged component parts in the hoist mechanism.

4. The worm gear reducer and limit switches must be filled with best suitable gear oil upto marked level.

5. The oil may be drained from gear boxes which then rinsed with cleaning oil, cleaned and filled with lubricating oil.

6. The brake shoe should always be set so that the brake shoe when lifted will not drag, but would bear tightly when applied. Attend to any wear of brake shoe lining.

7. Check all electrical wiring system including control panel and ensure that there are no loose contacts or defects.

8. The hand cranks must always be kept under lock and key, and they should not be attached on hoist mechanism when operated by electrical energy.

9. All the keys, bolts, etc. must be checked and tightened if found necessary prior to operation of hoist.

10. During maintenance of hoist mechanism parts, a warning sign should be hung indicating "Danger, Do not switch on".

11. The operating crane should be kept in 'A' one condition.

12. For operating crane to lift the emergency gates/stoplogs, care should be taken to hoist the loads in vertical direction only, and that allowable carrying capacity is not exceeded.

Other precautions

1. Ensure that the gates are operated by fully trained operators and that they are familiar with the operating instructions.

2. No other person should be allowed to go near the operating mechanism without the operator or his superior officer.

3. A date wise register of record of operation, maintenance, as per schedule and any other repairs carried out should be maintained.

4. Any unusual phenomenon such as excessive vibrations, noises should be recorded and fault8 and damages immediately reported to the competent authority.

5. Adequate stock of such spare parts which may be required for immediate replacement due to damage, etc. should he maintained.

6. It is always desirable to get power supply from two independent sources, also in all important installations having large spillway capacity, diesel generating sets, at the dam site should serve as standby.

SAFETY OF DAMS

Maintenance Guide-lines

CHECK LIST

Sl. No.	Description/Details of Checks	Cheeks have been carried out	Date	Initials	Remarks
1	2	3	4	5	6

	<p>A GENERAL</p> <p><i>Check/ Verify</i></p>				
1	<p>That reservoir is not filled until the stage of progress of works will permit it without endangering public property. The first filling of the reservoir should only be done after carefully examining the competency of the dam and adequacy of the outflow control devices, etc.</p>				
2	<p>That an officer is specifically designated to be in overall charge of dam and reservoir.</p>				
3	<p>That the following records/data are available at site in the charge of a responsible Engineer:</p> <p>(a) In case of Masonry/Concrete Dams:</p> <p>(1) Geological data on the foundations and abutment, along with reports, details special foundation/ abutment treatment carried out.</p> <p>(2) A set of drawings according to which the work was actually carried out.</p> <p>(3) Details of instruments embedded in the structure and summarised data of observations thereon.</p> <p>(4) Data on control tests during construction in respect of concrete, mortar and their constituent materials Details of construction stages. Particularly like in the low blocks where considerable time elapsed prior to resumption of work.</p> <p>(5) Important inspection reports and reports of consultants.</p> <p>(b) In case of Earth/Rockfill Dams</p> <p>(1) Complete foundation data and foundation treatment adopted.</p> <p>(2) A set of construction drawings indicating</p>				

	<p>actually constructed profiles.</p> <p>(3) Photographs showing all phases of construction.</p> <p>(4) Details and location of instruments installed, if any, and summarised data of observations.</p> <p>(5) Stage-wise construction record of the dam showing volumes and heights achieved in each season and the time rate of progress.</p> <p>(6) Important inspection reports and reports of consultants.</p> <p>(7) Summarised records of compaction control, sampling and complete laboratory and field test results in all record samples and records of special compaction done near concrete/ masonry structure, abutment contacts and outlet location, if available.</p> <p>(c) In the case of gates, hoists and other operating mechanism.</p> <p>(1) A complete set of detailed design calculations together with the drawings of gates, gate grooves embedded parts, hoisting mechanism and controls, etc.</p> <p>(2) Designer's operating criteria and/or detailed operating instructions for the various types of gates installed in the darn.</p> <p>(3) Operating charts for various gates with suggested precautions, if any considered necessary based on model studies.</p> <p>(4) Record of all the previous operations, giving reservoir level of operation, duration of operation and any other important observations during the period of such operation.</p>				
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4	That responsibility is assigned to a competent person to be alert in looking out for defection, seepage, uplift pressures, pore pressures and deterioration of mortar concrete.				
5	And ensure availability of access to vital parts and adequacy of lighting facilities.				
6	The adequacy and proper functioning of alternate lighting, flood warning and communication systems				
7	That outlet conduits location in the earth dam, which are vulnerable points or given special attention, during maintenance. Special watch should be kept on amount of seepage, cracks longitudinal or transverse near the outlet location. Sometimes it may be desirable to have continuous observation of seepage for the outlet reach alone.				
8	That careful examination of the upstream slope of the dam is carried out after periods of sustained high velocity winds and when reservoir surface is being drawn down for evidence of cracks, slides subsidence or damage to slope protection such as displacement of rip rap or other signs of sea erosion.				
9	That the drainage system in the foundation and the dam body is in good repair				
10	And look for leaks, cracks and spalling on the surface of the Masonry/Concrete dam and in openings like galleries and adits.				
11	That the abutment is kept under observation particularly looking for leaks, cracks, slides etc.				
12	That no blasting operations are carried out in the vicinity of the dam or its appurtenant structures.				

13	<p>Where instruments are installed in the Earth dam, the following observations are made.</p> <p>(a) Hydrostatic pressures within the foundation and the embankment to check on seepage condition and performance of the drainage system. Observations on pore pressures at the downstream with respect to filling of reservoir to know whether the increase in pre pressures is proportionate or excessive.</p> <p>(b) Settlements of various zones of embankment and that of foundation under various reaches.</p> <p>(c) Observations of seepage discharges to evaluate whether the drainage arrangements are functioning as intended without undue increases in pore pressures.</p> <p>(d) Observations of wet patches, sloughing, erosion of material from the damage foundation or abutments.</p>				
14	<p>Where no instruments are installed in the Earth dam, following visual inspections and observations are carried out.</p> <p>(a) General condition of seepage through the dam foundation and abutments, whether seepage is increasing or decreasing any departure from normal conditions of seepage which may result in seepage flow spring bubbles, wet patches, washing out of fine materials on the darn slope. Such continued observation of seepage should be reach wise and not in a consolidated single observation point. Set up facilities for observations of water level in the river upstream and downstream of the dam and also for measurement of flows. When such phenomena are observed, set up permanent observation at the affected portions in regard to changes in seepage, and unlift pressures with respect to time.</p>				

	<p>Take special care during floods or reservoir filling.</p> <p>(b) Condition and performance of drain, relief well, particularly those which are accessible for inspection.</p> <p>(c) Condition of upstream slope protection of the dam within the visible portion of the dam.</p> <p>(d) Condition of the crest and slopes of the dam specially in the zones adjacent to concrete structures, Detect the deformations settlement, cracks or other distress conditions caused by external erosion due to rain, wind etc. Set up permanent observation system for the same at places of its occurrence. Seepage at junctions between earth dam and masonry/concrete retaining wall or core-type junctions with concrete dam is a possible source of trouble and should be carefully watched.</p>				
15	That stock piles of suitable and sufficient filter materials, rockfill, gravel and sand near the downstream site of the dam adequately protected at vulnerable locations for use in any emergency.				
16	That sample of reservoir water is collected periodically from seepage to find out whether any material is being washed out.				
17	For Scour downstream of spillway and ensure- measures for protection against harmful retrogression.				

B GATES & HOIST MECHANISM

1	<p>Before Floods:</p> <p><i>Check</i></p> <ul style="list-style-type: none"> (i) That paint on gates is in good condition and damaged patches are repainted. (ii) The rubber seal for wear and tear and replace, it necessary. (iii) That prior to operation of gates, hoists etc. all the keys, bolts are tightened. (iv) That all gates and sluice valves installed at the dam site (for crest, sluice etc.) can be raised and lowered through full range of travel. (v) That gates, wheels tunction bearings are cleaned and thoroughly lubricated. (vi) That gate grooves are cleaned and no boulders long of wood etc. is wedged. (vii) That all embedded parts are in proper shape (viii) The ropes and chains for rusting, broken strands, reduction in diameter and condition of sockets and clamps Replace or repair immediately. (ix) Report check under B 1 (iv). (x) That wire ropes, chains, bearing points hinges, spur gears and pinions are lubricated. (xi) The gear teeth for any crack, undue wear /damage and replace if necessary. (xii) And replace oil in warm gear reducer and limit switches and gear boxes. (xiii) For adjustment of brake shoe so that it bears tightly when applied. Shoe lining is 				
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	<p>to be replaced immediately if required.</p> <p>(xiv) For defects, loose contacts in electrical wiring system including control panels</p> <p>(xv) That hand cranks are kept under lock and key and are not attached on hoist mechanism when operates by electrical energy.</p> <p>(xvi) That a warning sign indicating "Danger, do not switch on" is hung during maintenance.</p> <p>(xvii) That the operating crane is in "A" one condition and the operators are instructed to lift the emergency gates stoplogs in a vertical direction so that allowable carrying capacity is not exceeded.</p> <p>(xviii) That adequate stock of spare parts which may be required for immediate replacement is maintained.</p> <p>(xix) That the power supply is from two independent sources and in addition, for important installation having large spillway capacity a diesel generating set is installed as a stand by.</p>				
2	<p>During Floods:</p> <p><i>Ensure</i></p> <p>(i) That the officer who is specifically designated to be in overall charge of Dam is constantly available at Dam site.</p> <p>(ii) That a date wise register of records of operation of gates is maintained. This should also include details of any unusual phenomenon like excessive vibration, noises, etc.</p> <p>(iii) That downstream settlement, inhabitants, plants, industries and transportation</p>				

	agencies are warned in time.				
3	<p>Immediately after earthquake, rockfalls, mountain slides Ensure:</p> <p>(i) That the spillway and outlet works are operated judiciously in the best interest of public safety, regardless of economic loss through loss in storage and power.</p> <p>(ii) That the appropriate authorities are informed immediately of unusual conditions or impending danger.</p>				

APPENDIX XXI (b)

(Vide para 21.5.8.7)

REPORT OF INSPECTION OF IRRIGATION STRUCTURES UNDER THE MAINTENANCE OF THE DEPARTMENT

Earthen Dams

(a) Have you noticed any of the following defects, and if so, give a brief description against the defect concerned indicating the location and the extent of the defect. In the case the defect had already been previously noticed indicate whether the defect is further developing or not. Indicate also proposals made or steps taken for correcting the defects. Reference to correspondence will be sufficient where the matter has already been separately taken up.

- (i) Subsidence.
- (ii) Slip.
- (iii) Percolation behind the dam.
- (iv) Leakage by the side of sluices or conduits.
- (v) Growth of unwanted vegetation.

- (vi) Choking of drains in the rear of the dam.
- (vii) Bulging of the rear slope.
- (viii) Disturbance of pitching or rip rap protection to slope.
- (ix) Scour or damage to protective works below surplus sluices etc.
- (x) Any unusual change in bed levels below 300 metres of the dam.
- (b)
 - (i) When were the shutters and sluices examined last.
 - (ii) Have any defects been noticed? if so, what are the defects?
 - (iii) Are the shutters operating satisfactorily?
 - (iv) Are the bank connections to masonry structures like sluices surplus etc. in good order?
- (c) Any other defect or special feature which has come to your notice?

APPENDIX XXI (c)

(Vide para 21.5.8)

Masonry Dams

- (a) Have you noticed any of the following defects and if so give a brief description against the defect concerned indicating the location and the extent of the defect. In case the defect had already been previously noticed indicate whether the defect is further developing or not. Indicate also proposals made or steps taken for correcting the defects. Reference to correspondence will be sufficient where the matter has already been separately taken up.
 - (i) Cracks anywhere in the body of the dam.
 - (ii) Increase or decrease in the flow of water through drainage galleries.
 - (iii) Leakage past any sluice or conduit through the body of the dam
 - (iv) Growth of unwanted vegetation.
- (b)
 - (i) Is instrumentation provided and are readings taken at periodical intervals?
 - (ii) Are the contraction joints working satisfactorily?

- (c) Are any saddle dams provided and are they in good condition?
- (d) (i) When were the shutters and sluices examined last?
 - (ii) Have any defects been noticed? If so, what are defects?
 - (iii) Are the shutters operating satisfactorily?
 - (iv) Are the bank connections to masonry structures like sluices, surplus etc., in good order?
- (c) Any other defect or special feature, which has come to your notice.

APPENDIX XXI (d)

(Vide para 21.5.8)

Barrages, Pick up weirs, Anicuts etc.

(a) Have you noticed any of the following defects and if so give a brief description against the defect concerned indicating the location and the extent of the defect. In case the defect had already been previously noticed indicate whether the defect is further developing or not. Indicate also proposals made or steps taken for correcting the defects. Reference to correspondence will be sufficient where the matter has already been separately taken up.

- (i) Cracks, subsidence or bulging in any part of the structure including aprons.
- (ii) Piping or leakage past wing walls or aprons.
- (iii) Leakage by the side of under sluices.
- (iv) Slip, scour or subsidence in the earth fill forming part of the bank connections.
- (v) Growth of unwanted vegetation.
- (b) (i) Is clay puddling provided in the apron and if so, is it tact?
 - (ii) Are any scours noticed in the apron?
 - (iii) Are there scours in the stream bed upstream or downstream of the apron within 300 metres from the structure? If so are records kept of the extent of scour and the way it develops?
- (c) (i) When were the shutters and sluices examined last?
 - (ii) Have any defects been noticed? If so, what are defects?

(iii) Are the shutters operating satisfactorily?

(iv) Are the bank connections to masonry structures like sluices surplus etc. in good order?

(d) Any other defect or special feature, which has come to your notice?

APPENDIX XXI (e)

(Vide para 21.5.8)

Flood Baulks and River Training Works

(a) Have you noticed any of the following defects and if so give a brief description against the defect concerned indicating the location and the extent of the defect. In case the defect had already been previously noticed indicate whether the defect is further developing or not. Indicate also proposals made or steps taken for correcting the defects. Reference to correspondence will be sufficient where the matter has already been separately taken up.

(i) Scours, slip, subsidence.

(ii) Growth of unwanted vegetation

(iii) Dislodgment, bulging or slip of pitching if any provided.

(iv) Leakages past any sluice or culvert if any provided.

(v) Malfunctioning of shutters where provided in sluices.

(b) (i) Are there marks indicating High Flood Level?

(ii) If the top of the flood bank above High Flood Level? If not indicate the location where the flood bank is low.

(c) (i) Are there scours in either bank or bed of the river in the vicinity of the structure? If so are there plans showing the extent of scours and further development if any?

(ii) Is any shoaling noticed in the vicinity of the structure? If so are there plans showing the shoaling and its further development? Have the above plans been marked up-to-date?

(d) Any other defect or special feature, which has come to your notice?

APPENDIX XXI (f)

(Vide para 21.5.8)

Canals

(a) Have you noticed any of the following defects and if so give a brief description against the defect concerned indicating the location and the extent of the defect. In case the defect had already been previously noticed indicate whether the defect is further developing or not. Indicate also proposals made or steps taken for correcting the defects. Reference to correspondence will be sufficient where the matter has already been separately taken up.

(i) Subsidence, slip or scour in the banks.

(ii) Growth of unwanted vegetation.

(iii) Shoaling or scours in the bed.

(iv) Piping or leakage at the toes of canal banks particularly where the canal is in embankment.

(v) Leakage around the masonry work of under tunnels or sluices

(vi) Dislodgement, bulging or slips in pitching if any provided.

(vii) Pot holes, ravelling corrugations or any defect in the roadway if any provided on canal bank.

(b) In respect of cross drainage works have you noticed-

(i) Cracks, subsidence or bulging in any part of the structure.

(ii) Piping or leakage past wing walls, aprons etc.

(iii) Slip, subsidence or scour in the earth fill forming part of bank connections.

(iv) Defects in the working of the shutters if any provided.

(c) Any other defect or special feature, which has come to your notice?

APPENDIX XXI, (g)

(Vide para 21.5.8)

Lift Irrigation Works (Head Works)

(a) Have you noticed any of the following defects and if so, give a brief description against the defect concerned indicating the location and the extent of the defect. In case the defect had already been previously noticed indicate whether the defect is further developing or not. Indicate also proposals made or steps taken for correcting the defects. Reference to correspondence will be sufficient where the matter has already been separately taken up.

- (i) Scour, shoaling etc. in the river in the vicinity of the pump house.
- (ii) Slip, subsidence, scour etc. in the bank close to the pump house.
- (iii) Cracks, subsidence or bulging in any part of the structure of the pump house.
- (iv) Leakages in the roof or swating through walls or flood of the pump house.
- (v) Cracks or displacement or any other damage to machine foundations.
- (vi) Cracks or displacement or any other damage in the forebay tank where the pump discharges.

(b) How many pumps are installed?

- (i) Give the size and horse power of each.
- (ii) Are all the pumps in good working order, if not what are the defects?
- (iii) Are there any defects in the electrical wiring?
- (iv) Are there any defects in the meters, switches and protective devices?
- (v)** Is the voltage at the installation satisfactory for the working of the pump?
- (vi) Have you examined whether there is full load on all the pumps?

(c) Any other defect or special feature which has come to your notice?

CHAPTER XXII

INLAND NAVIGATION

22.1. General

22.1.1. Inland Navigation in the State is regulated through following Acts.

- (i) Travancore Public Canals and Public Ferries Act (applicable to the erstwhile Travancore Area)
- (ii) Cochin Put lie Canals and Backwaters Navigation Act (applicable to the erstwhile Cochin Area)
- (iii) Canals and Public Ferries Act, 1890 (Madras Act 11 of 1890) (applicable to the erstwhile Malabar Area).

Until these acts are unified the provisions in the act and rules applicable to the particular area should be enforced in that area. All officers of the P.W.D. dealing with Inland Navigation should be conversant with the Act and Rules relating to the area under their charge.

22.1.2. These navigation routes and wharves specified in Appendix (attached) are subject to regulation as per the above Acts & Rules framed there under. In these routes and wharves the concerned officers of the Department have to ensure adequate depth for navigation, landing facilities, arrange for operation of locks, provide, and maintain public jetties, direction light for navigation etc. for the benefit of craft navigating through such routes. In addition, the officers have to carry out all the functions devolving on them in terms of the provisions of the Act and Rules.

22.1.3. The minimum draft, width and other dimensions to be maintained in each of the navigation routes will be specified by the Chief Engineer. It will be the duty of the officers in charge of the navigation routes to carry out all works necessary to comply with the above.

22.1.4. Wherever the navigation route involves narrow channels with banks and bed of soft materials, the Chief Engineer may restrict the type of vessels, the size, horse power etc. to be allowed to ply in such reaches in order to prevent heavy erosions and damage due to the operation of such vessels.

22. 2. Navigation Routes

22.2. 1. A regular programme of silt removal and clearing of jungle growth, floating weeds etc. which may obstruct navigation should be evolved in respect of the notified navigation routes and work arranged accordingly. The intention should be to maintain the minimum draft and width as specified for the route. Where there is tidal variation the depth and width specified should be available even at the lowest tide level. Particular attention should be paid to sections likely to get shoaled and in such places silt removal should be done more frequently as required.

22.2.2. In addition to maintaining the draft and width required, care should be taken to remove all obstructing branches of trees and vegetation and prevent unauthorised encroachment in the navigation routes. One cause for siltation of canals is cattle crossings. As far

as possible, this should be restricted to specified locations where cattle ramps should be provided. In case there is a submerged obstruction in a navigation route, the same should be got marked out so as to serve as warning for operation of boats and other floating craft. The Junior Engineer should go over the entire length of the navigation route at least twice every month to identify locations where there is insufficient draft or insufficient width or obstruction of any kind and take urgent remedial action. Particular care should be taken to prevent private persons from encroaching into the navigable waterway by driving in fishing stakes or creating any other form of hazard to navigation. Such encroachments should be promptly got removed seeking the help of the Revenue and Police Officers if necessary. Annual maintenance works should be planned and arranged in such a manner as not to cause hindrance to navigation.

22.2.3. Where the extent of silt removal is large and the width will permit the operation of a dredger, it may be advisable to use a dredger for silt removal. When using a suction dredger, the dredged material has to be pumped into an area from where the slurry will not flow back into the canal. Similarly when using a bucket dredger, the silt removed should be conveyed and dumped in suitable places from where there is no chance of slit moving, into the navigation route. Operation of the dredger should be so arranged that there is no interference with navigation.

22. 3. Wharves and jetties

22. 3. 1. The maintenance of public jetties is also a matter that should receive Proper attention. The piles supporting the jetty structure should be examined and wherever weakness is noted, the same should be replaced or strengthened as the case may require jetties should have rubber buffers at sides to avoid damage to the vessels, as also to the structures. The jetty platform should be kept in a state of proper repair by replacement of broken or damaged planks in the case of planked structures and by filling up of pot holes, etc. in the case of concrete structures. Occasional scrubbing to prevent slipping should also be arranged. Wherever shelters are provided for passengers, these have to be properly maintained 1 including urinals, lavatories etc.

22. 4. Locks

22.4.1. Where locks are provided, regular maintenance personnel should be at site always. The gates should be carefully examined, particularly the under-water portion at least once a year and necessary repairs carried out without causing inconvenience to navigation. Similarly, the masonry structure, particularly, the floor should receive proper attention if any defects are noticed. There should be suitable places for navigating craft to tie up on either side of the lock if they have to wait for their turn in passing through it. The operating mechanism of the gates should be properly lubricated and maintained to facilitate easy manipulation of the gates.

22.4.2. Normally vessels should be allowed passage through the lock in the order in which they arrive at the lock site except where special priority is ordered for any vessel or class of vessels by Government or the Chief Engineer. If tolls are levied the rate of toll to be -paid should be prominently exhibited in the vicinity of the lock on both sides and vessels should be allowed passage only on such payment and obtaining receipts (the counterfoils should contain

details regarding nature of goods, tonnage and fees charged) unless they are specially exempted by Government.

22.5. Licensing and Registration of Vessels

22. 5. 1. Vessels using the notified navigation routes have to be either registered or licenced under the rules unless they are exempted from such registration or licence. Vessels intended for the personal use of the owners and not plying for hire nor employed in carrying goods, animals or passengers for purposes of trade nor used for towing vessels carrying goods are to be got registered. All other vessels except those which are exempted from such registration or licensing should be licenced under the concerned Act. Vessels which are exempted from registration or licensing are:

- (a) All vessels belonging to the Government of Kerala.
- (b) All vessels belonging to the Government of India.
- (c) All vessels belonging to the Government of Tamilnadu in respect of navigation routes notified under Section 5 of the Canals & Public Ferries Act 1890 (Madras Act 11 of 1890).
- (d) All vessels less than A ton Registered Tonnage.
- (e) All vessels other than Steamers and Motor Vessels using lines of navigation in the erstwhile Malabar District numbered 1, 2, 6, 7, 3 & 9 in the notification published under the Madras Canals & Public Ferries Act of 1890. (See Appendix attached).

22.5.2. Before a vessel is registered or licensed for the first time, it has to be inspected with regard to its fitness for being used for navigation, fitness for carrying passengers etc. as provided for in the respective Acts and rules. The inspecting authorities for conducting such inspections as well as the duties which are to be discharged by such inspecting officers are specified in the concerned rules. All officers functioning as canal officers, Inspectors etc. under the Acts should be fully conversant with the Act and Rules applicable to the particular area. The registration and licensing should be done in the manner prescribed in the rules pertaining to the respective areas.

22.5.3. The method of ascertaining gross tonnage and the registered tonnage for a vessel has been described in rules 10 & 11 of the rules under the Travancore Public Canals and Ferries Act, in so far as lines of navigation in the erstwhile Travancore area are concerned, and in rule 10 & 11 of the revised rules under the Cochin Public Canals and Backwaters Navigation Act so far as the erstwhile Cochin State is concerned, and Rules 8 & 9 of the notification and navigation rules under the Madras Canals and Public Ferries Act 1890-West Coast Canals in respect of the erstwhile Malabar area.

22.5.4. In respect of vessels which are propelled by steam, before registration is made or license given, there should be current Certificate of fitness from the Boiler Inspector.

22.5.5. The licenses and registration certificates require renewal on expiry of the period specified therein. Inspection should be conducted at the time of renewal or at such closer intervals as specified in the rules. During such inspection, it may not be necessary to take fresh measurements unless there have been structural alterations to the vessels. But the fitness of the vessel for navigation and for compliance with provisions as per the rules should always be examined at the time of every inspection.

22.5.6. Canal Officers in charge of notified navigation routes should take particular care to see that all vessels plying over any part of such routes except those, which are specifically exempted, possess current registration certificates or licenses. If any vessel which is not exempted as per rules is found plying in such waters without licence or registration which is current, appropriate action should be taken against the owner/master of the vessel as provided in the rules.

22.6. Control of Public Passenger Traffic

22.6. 1. There are certain established routes through which passenger boats operate. Canal officers have to control such traffic in accordance with the appropriate rules under the respective Acts so as to ensure safety and afford convenience to the public. The following are some of the important duties they have to perform in this context.

(a) Fix the timings for the services in the different routes. The timing should be fixed by, the Executive Engineer (Irrigation) who is in charge of the originating part of the service. If the route ends in another division, concurrence of the other Executive Engineer should also be obtained before finalising the timings. For fixing timings for the route, the total time required for the travel should be estimated based on the distance to be covered, the average speed of the passenger boats likely to be employed on this route and the time required for embarkation and disembarkation of passengers at the various jetties. Further an extra period of 1/2 hour should be allowed for unforeseen hold ups enroute. The actual timings for the departure of the scheduled services from the jetty where from the service originates should be fixed taking into consideration the likely density of traffic during the different hours of the day. This should be periodically revised if there is sufficient demand for alteration from the public making use of the services or if experience of operation proves the need for such alteration.

(b) Allot particular schedules to the different boats offered for operation in each route. This is to be done by the Chief Engineer (Irrigation) after consulting the different operators. For this purpose, the scheduled timings should be notified in the gazette at least 2 months before the expiry of the current schedules and offer to operate the new schedules called for from operators. On a day duly fixed and notified for this purpose the offers should be considered by the Chief Engineer or his nominee at a suitable place in the presence of the operators or their representative. As far as possible the operators themselves may be allowed to exercise their choice of different schedules in a route. Where there is more than one applicant for a particular schedule preference may be given to the operator whose boat has greater passenger capacity/horse power and tonnage. After such discussion, the Chief Engineer (Irrigation) should decide the allotment of schedules and arrange to notify the same in the gazette and in Notice Boards at different jetties. The concerned operators should also be informed.

In the case of navigation routes reserved for operation by Kerala Water Transport Corporation, the schedules and timings alone need be specified, the choice of vessels being left to the Kerala Water Transport Corporation.

(c) If any scheduled service is not operated the reasons should be enquired into and action taken against the operator as per conditions of the licence. It is expected that the operator concerned should except in unavoidable cases, intimate the Department concerned the possibility of stopping a particular vessel for urgent repair or other needs and simultaneously suggest an alternate spare one readily available so that this can be inspected in time and certified as a substitute measure. In such cases, the substitute vessel should have almost identical carrying capacity only. In cases where this is not done the Executive Engineer should make enquiries and if possible arrange for a substitute boat to operate the schedule provided such substitute boat and the crew employed fulfil all the conditions necessary for issue of the licence.

(d) Check whether the scheduled timings are properly adhered to. If the Master of any boat delays the departure of the boat from the authorised jetty by more than 112 hour of the scheduled departure time, he should be called upon to explain the reasons for the delay, and if such delays persist for more than 3 days, appropriate action under the rules should be taken. The jetty Superintendent and other staff posted at the jetties are expected to be vigilant to keep watch over the arrival and departure of the boats and make timely report of the irregularities noticed.

(e) See that the passenger boats do not carry excess number of passenger or Cargo which may endanger safety.

This is very important, and the vessel's load of Cargo and passengers should be invariably checked on arrival and departure from every jetty by the jetty Superintendent. In addition, surprise checks should be made by the junior Engineer and Assistant Engineer while the boat is already in motion. Any irregularity in this regard should forthwith be reported to the appropriate authority as per the canal rules for necessary action.

(f) See that all the safety appliances, navigation aids etc. as provided in the rules are available and in good condition.

The availability of these should be checked before a vessel is allowed to depart from a wharf. The condition of these appliances should be frequently checked at suitable intervals, say once a month by the Jetty Superintendent and as often as possible by the Junior Engineer.

(g) Ensure that the master and crew of the vessel are fully qualified and or experienced in the duties they have to perform. Qualifications have been prescribed for these posts and the certificates should be verified by the Jetty Superintendent before the vessel is allowed to leave the wharf.

(h) See that the notified passenger fares are not exceeded. The approved passenger fares should be prominently exhibited in the jetties and frequent check should be made by the jetty staff and

junior Engineer and Assistant Engineer concerned to see whether extra fare is being charged. Any violation of this should be dealt with under the rules.

(i) See that the authorised jetties and wharves which the vessel will touch are kept in a good state of repair so as to enable passengers to embark and disembark in safety. Iron barricades must be provided to enable passengers getting in and out, to have separate passages with proper enforced queue arrangements. The Junior Engineer should frequently inspect the jetties and take appropriate action to see that they are in a safe and usable condition.

(j) See that the vessels do not touch unauthorised jetties and wharves. Surprise checks should be made to detect whether any of the boats touch unauthorised jetties and thereby violate the conditions of the license. All such violation should be dealt with promptly as per rules.

(k) See that the mooring of boats along side jetties, the entrance of passengers to and from the jetty, sale of refreshments, drinks, fruits, snacks at jetties are all properly controlled. Proper rules should be prepared for the above depending on the conditions at each of the jetties. The intention is to avoid overloading and to facilitate easy embarkation and disembarkation of passengers and making it possible for them to obtain refreshments or drinks at the jetty site.

22.7. Investigation into Accidents

22. 7. 1. When an accident occurs to a vessel such as collision, sub- murgence partially or wholly whether or not it involves loss of life or property, it shall be the duty of the owner or master or other person in charge of the vessel to intimate the fact to the nearest canal and police authorities within twelve hours of the occurrence of the accident. The master or other person in charge of the vessel should also render all help for the rescue of passengers or other persons involved in the accidents. It is the duty of every steam and motor vessel as also of other classes of boats plying along the water ways to halt and give assistance to vessels in distress.

22.7.2. The vessels involved in the accident shall not be moved or changed from their position and from the place of accident and no repairs shall be attended to them until necessary mahazars of those VCSSC13 are prepared and vessels are ordered to be removed from the place of incident by the Canal Officer. Where the accident necessitates that the condition of the boat should be examined the Inspector of boats should be notified by the Canal Officer to arrange to do so and the Inspector of Boats should carry out the inspection with the least possible delay. If there is also a Police enquiry the canal officer should render assistance to conduct the same. The canal officer should forward a detailed report of the accident together with his recommendation of the action to be taken against persons responsible for the accident to Chief Engineer within a week of the completion of the enquiry. He may also concurrently take such action against those responsible for the accident as is within his powers and report this fact also to the Chief Engineer.

22. 8. Funds for Maintenance

22.8.1. The expenditure for the maintenance of navigation canal is met with from funds provided under the Budget head 44B (b) Maintenance and repairs. This is exclusive of the cost of establishment. The amount provided under maintenance and repairs is intended to cover maintenance works and the budget provision is based on the previous year's expenditure plus a reasonable margin for variations. This L.S. amount is distributed to various divisions by the Chief Engineer in accordance with the requirement. Limited to funds available estimates for maintenance works may be sectioned by the appropriate officers within their powers of sanction. Every officer so sanctioning an estimate should do so only if-

- (i) the canal is under the maintenance of this department.
- (ii) the work is of a maintenance nature.
- (iii) the standard of depth, width etc. prescribed for the canal are not altered.

APPENDIX

Navigation Routes & Wharves in the Erstwhile Travancore Area

(a) WHARVES

1. Kalpalakadavu, Trivandrum.
2. The Whole Wharf at Chakay, Trivandrum.
3. Chilakur Wharf, Varkalai.
4. The Big Bridge Wharf, Quilon.
5. The Kurusummoodu landing, Quilon.
6. The Cutcherry landing, Quilon.
7. The Stone Bridge Wharf, Commercial Canal, Alleppey.
8. The Large Landing Ghat for Steamers, Wadi Canal, Alleppey.
9. Wharf in the West Junction Canal, Alleppey.
10. The Market Wharf, Changanacherry.
11. The Cutcherry Landing Wharf, Kottayam.
12. The Market Landing at Kottayam,

13. The Kodimatha Landing at Kottayam.
14. The Thevarkadavu Landing at Vaikom.
15. Chakrakadavu, Parur.
16. Cutcherry Kadavu, Parur.
17. Market Landing. Karunagappilly.
18. Salt Bankshall landing, Kottayam.
19. Landing at Kozhithottam, 50th mile T.S. Canal.
20. do. Maruthurkulangara.
21. do. Vallikadavoo.
22. do. Aiyrenthengoo.
23. do. Thrikunnapuzha.
24. do. Thottapalli.
25. do. Karumadi.
26. do. Thanneermukkom.
27. do. Sherthallai.
28. do. Pannaikadavu.
29. do. Athirampuzha.
30. do. Talavady.
31. do. Pulikeel.
32. do. Pulinkunnoo.
33. do. Varapuzha.
34. do. Patiakadavu.
35. do. Aravila.
36. do. Ashtamudi.

37. Landing at Koivila.
38. Adorinallur.
39. Poochakkal between Vaikom and Arukutty.
40. Landing at Chathankari on the Alleppey Chathankari line Vai Pulinkunnu.
41. Prakulam on the QuilonPattakkadavu line.
42. Kailikad on the Kayamkulam lake on the Quilon-Alleppey line.
43. Arur.
44. Parur Thattugalikadavu.
45. Landing at Ambalapuzha.
46. Landing at Vechoor.
47. Jetty at Kumarakam.
48. Chavara jetty.
49. Jetty at Sampranikodi.
50. Jetty at Kongam.
51. do. Arattupuzha.
52. do. Varanapaili.
53. do. Ponmana Kannittakadavu
54. do. Ponmana Ferry.
55. do. Monkombu.
56. do. Mangalam.
57. do. Cheriazheekkal.
58. da. Valiazheekal.
59. do. Thayamkari.
60. do. Thettikddom Puduval.

61. do. Mammotil.
62. do. Chavara South.
63. do. Thurayil Kadavoo.
64. do. Champakulam.
65. do. Kanakakunnoo.
66. do. Keerikad North.
67. do. Tharyil kadavoo.
68. do. Kuthira Parampu.
69. do. Alappad.
70. do. Kadapuzha.
71. do. Thrinayamkudam.
72. do. Konjiram.
73. do. Kainakary Monastery.
74. do. Paruthipally (Edathva)
75. do Pallam.
76. do. Kaipuram Muhomma.
77. Landing at Munambam D. Dis. 4408/51/PWC/ 19-8-1952:
78. do. Moothakunnom.
79. do. Near Kannankara Church.
80. do. Munnathumukom, D Dis. 8625/52/PWC/30-8-1952.
81. do. Padimuliom. D.Dis. 8626/52/PWC/30-8-1952.
82. do. Kottayathukadavoo. D.Dis. 13052/52/PWC/24-11-1952.
83. do. Chavara (TMC No. 1).
84. do. Kayamkulam.

85. do. Near Cherupuzha Vijayam Monastery, Purakad, Thottappally.
86. do. Ramankari.
87. Landing at Vattadi
88. do. Puthenvelikara.
89. do. Vettathukadavoo.
90. do.
91. do. Vaduthala north.
92. do.
93. do. Arookutty.

(b) LINES OF NAVIGATION

The Trivandrum-Shoranur canal from Thiruvellam to the northern limits of Travancore which shall include..-

1. The Kadinanikulam lake with its branches to Kaniapuram and Chirayinkil.
2. The Anjengo lake with all its branches and arms.
3. The Edava and Paravoor lakes with all their branches.
4. The Ashtamudi lake with its branches.
5. The Ponmana lake with all its branches including the one leading to Karunagapally.
6. The Kayamkulam lake and the canals branching therefrom.
7. The Karipuzha and Danapadical canals.
8. The Alleppey canals and their branches, including those leading to Ambalapuzha.
9. The Kottayam canal from the Vembanad lake to the Division Cutcherry landing including the Kodur river and the canals to the market landing, Kottayam.
10. Alleppey to Changancherry canal.
11. Vaikom canal from Vaikom to Kottayam.
12. The Vembanad lake with all its branches and arms within Travancore limits.

13. The Parur backwater and its branches.
14. The Parur canal and its branches.
15. Canal from the Parur Court to Manjali canal.
16. Manjali canal to Parur.
17. Varapuzha canal.
18. Cheriapally canal.
19. Annandai canal.
20. Clakrakadavu canal.
21. Munambam lake and its branches.
22. Water route (branch river of the Pamba) from Mannar (Pannaikadavu) to Karumadi.
23. Alleppey to pulikee1 canal (water route).
24. Athirampuzha canal.
25. Alleppey to Chathankari via Pulinknunu.
26. Alleppey Thalavadi line.
27. Kallada river from Arinalloor to Muthiraparambu

Navigation routes in the Erstwhile Cochin Area

1. The main backwater from southern limits of Cochin to Karupadana.
2. The backwater and canal from Karapadana to Enaniakkal bund via conolly canal.
3. The canals in Trichur Lake from Karanchira to Kokkalai and from Puliezhi to Enamakkal bund and its branches
4. The portion of Karuvannur river from Karanchira to Parakkadavu including Puthen thodu, Kanakkan thodu and Chirakkal thodu.
5. The canal from Crangannur to Mala including Pulloot thodu and Krishnankotta thodu and all the canals that lead from and open in it.

6. The Kollikathara canal and Kavu canal.
7. The portion of the river from Kottarnakku up to the eastern extremity of Gothuruthu.
8. The canal between Chennamangalam and Gothuruthu and Pazhampillithuruthu and portion of Chalakkudi river upto Palikkadavu.
9. The newly opened canal from Anapuzha to Kottappuram called the Vijayanthodu.
10. The portion west of Azhikode ie. Pozhil and Karathodu which extends upto Eriyad.
11. The Balangachal and Arappu thodu upto Edavilangu including Vedi thodu.
12. The Padanna thodu (Perimthodu) and its branches.
13. The Pallippuram canal.
14. The Karithala thodu, Cherai thodu in Cherai and Pozhil.
15. The Kuzhupilli thodu.
16. Ayyampilli thodu.
17. The Pazhanad thodu.
18. The Edavanakkad thodu.
19. The Nayarambalam thodu.
20. Elangunnappuzha thodu.
21. The interior thodu commencing from Manjankkael and running as far as Edavanakkad via Narakkal and Nayarambalam.
22. Narakkal Bunder canal and canals, branching from its western end and the Malippuram canal and its branches.
23. The Edacochi thodu between Edacochin and Palluruthy.
24. The Puthenthodu commencing from Kandakadavu and running as far as the southern limits of Chellanam including the Chellanam canal and all canals that lead from or open into it.
25. All the canals and minor backwaters on the south that lead from or open into the main backwaters via. Vaduthala.
26. All the canals and minor backwaters on the south that lead from or open into the in backwaters on the Ernakulam side through the Thevara thodu and the Kumbalam canal.

27. The Padiath thodu and the new canals in the Ernakulam town.
28. All minor poramboke canals that lead from or open into the main backwater or navigable canals in the taluks of Cochin Kanayannur, Mukundapuram, Trichur and Cranganur.

Navigation routes in the Erstwhile Malabar Area

1. From Kavvayi to Azhikkal (via) the Elimala river Sultan's canal and the mattool river.
2. From Badagara to the Beypore river (via) the Cotta, Agalapuzha and Korapuzha rivers, the Conolly canal and the Kallayi river.
3. From Tirur to Ponnani (via) the Tirur and Ponnani rivers.
4. From Ponnani to Ala (via) the Conolly canal and the connected backwaters.
5. The Kalvetti canal in British Cochin.
6. From Irukkur to Azhikkal (via) Baliapatam river.
7. From Edayana to Beypore (via) the Beypore river.
8. From Kuttiadi to Badagara (via) the Kuttiadi and Muriat rivers.
9. From Beypore river to the north end of the Pooraparamba cut (via) Cheriapuzha, Kadalundy river and keeranallur stream.
10. From Keetanallur stream at north end of the Pooraparamba cut to Tirur river (via) the Pooraparamba river and the improved Conolly canal.