Final Report

Study on working and reorganization of CPWD

Submitted to: Ministry of Urban Development

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List of Abbreviations

AA	Administrative Approval
ACR	Annual Confidential Report
ADG	Additional Director General
ADH	Additional Director Horticulture
AE	Assistant Engineer
AEE	Assistant Executive Engineer
BD	Business Development
BIM	Building Information Modelling
BPR	Business Process Re - engineering
BRO	Border Road Organisation
CA	Chief Architect
CE	Chief Engineer
CPM	Chief Project Manager
CPSU	Central Public Sector Undertaking
CPWD	Central Public Works Department
CSSA	Cash Settlement Suspense Accounts
D & DM	Design and Disaster Mitigation
DDH	Deputy Director Horticulture
DE	Detailed Estimate
DG	Director General
DMC	Drain Maintenance Companies
DOH	Director of Horticulture
DR	Delhi Region
EE	Executive Engineer
ERP	Enterprise Management System
EPC	External Processing Cost
ER	Eastern Region
GFR	General Financial Rules
GPRA	General Pool Residential Accommodation
GREF	General Reserve Engineer Force
JE	Junior Engineer
KM	Knowledge Management
KMS	Knowledge Management System
KPIs	Key Performing Indicators
MIS	Management Information System
MoU	Memorandum of Understanding
MoUD	Ministry of Urban Development
MTS	Multi Tasking Staff
NDR	New Delhi Region
NDZ	New Delhi Zone
NR	Northern Region
PE	Preliminary Estimate
PFMS	Public Finance Management System

PIMS	Personnel Information Management System
PM	Project Manager
PMC	Project Management Consultancy
PMS	Project Management System
PNBPZ	PNB Project Zone
PSU	Public Sector Undertaking
PWD	Public Works Department
QA	Quality Assurance
R & D	Research and Development
RCCs	Road Construction Company
RDA	Railway Development Authority
RTI	Right to Information
SDG	Special Director General
SE	Superintending Engineer
Sen. Arch	Senior Architect
SLA	Service Level Agreement
SOP	Standard Operating Procedures
Spl DG	Special Director General
SR	Southern Region
TD	Technology Development
Tech & PR	Technology and PR
TOR	Terms of Reference
TS	Technical Sanction
UT	Union Territory
WIP	Work in Progress
WR	Western Region

1. Introduction

1.1 About Central Public Works Department

Central Public Works Department (CPWD), an attached office of the Ministry of Urban Development, is a principal agency of Government of India which was set up 160 years ago with a mandate to create and maintain Central Government assets, with exception of Defence, Railways and Telecommunications. Since inception, CPWD, has played a pivotal role in developing infrastructure in the country. In addition, CPWD is also responsible for performing an informal, partial and quasi regulatory role as it undertakes benchmarking and development of standards for the built environment and infrastructure through Specifications, Schedule of rates, Guidelines and Advisories.

Administratively, CPWD is subdivided into Regions, Sub-Regions, Zones, Circles, Divisions, Sub-Division and Sections. It is headed by a DG who is also the Principal Technical Advisor to Government of India. Regions are headed by Special DGs, Sub-Regions by Additional DGs, Zones by Chief Engineer, Circles by Superintending Engineers, Divisions by Executive Engineers, Sub- divisions by Assistant Engineers and Sections by Junior Engineers.

CPWD is an All-India organization and possesses capability to undertake construction of projects including in difficult terrain and their maintenance, post construction. It executes projects on turnkey basis with all the services including water supply, sewerage, roads construction and maintenance, electrical, air-conditioning, firefighting etc. It possesses in-house expertise in all fields of building construction namely Architecture, Civil Engineering, Electrical Engineering and Horticulture under one umbrella. The organisation takes upon itself full responsibility for planning, designing, estimation, evaluation of bids, finalization of contracts, construction, clearances and approvals, maintenance, redevelopment etc.

Some of the prestigious projects of CPWD have been construction of stadia and other infrastructure requirements for Asian Games 1982 and in the Commonwealth Games 2010. CPWD has also undertaken projects internationally - one such project being construction of Afghan Parliament Building in recent years.

Vision

CPWD carries a vision of "Excellence in Public Works" with an objective "To create and maintain a sustainable and inclusive built environment within the available resources while ensuring world class quality."

The vision of CPWD is built on three core values:

- To create and maintain a sustainable built environment
- To promote inclusive growth within the resources available and
- To ensure International best practices and timely delivery

Mission

The mission of the organisation is to play a lead role in execution, maintenance and standardization of the built environment in India. CPWD aims to strive to educate its clients to aspire for green buildings and develop norms for the same. To support its activities through Sound Planning and Design, Engineered Construction, Effective Maintenance, Benchmarking the Standards, Capacity Building, Manpower Planning, and Transparency in Management of Works.

Functions of CPWD

CPWD is the agency of the Central Government with Pan-India operations and is responsible for following functions:

- Planning, construction, maintenance and repairs of works and buildings financed from Civil Works Budget. The scope of work excludes certain departments and Ministries which have their own engineering wing, or which have been granted special exemption, such as the Atomic Energy Department, Central Water Commission, Department of Posts, All India Radio, Department of Space, and Railways. The Department however executes the works of Ministries of Defense, External Affairs (for works outside India), Shipping and Surface Transport (Roads Wing), among others as and when asked for.
- Estate work at places where the Directorate of Estates does not have its offices.
- Valuation of properties/assets under Income Tax Act as and when requested for by Income Tax department.
- Assessment of rent for hiring of properties and assessment of value of properties for purchase by various Ministries/ Department of Government of India.
- Advising Government of India on various Technical matters relating to public works

Geographical Presence

CPWD is executes works across the length and breadth of India. There are seven Regions, namely New Delhi Region, Delhi Region, PWD Region, North Region, West Region, East Region and South Region.

Table 1: Geographical Presence

Region	Headquarter	Jurisdiction
New Delhi	New Delhi	Areas covered by the Municipal limit of NDMC. Mostly areas having offices & residences of VIPs & VVIPs in Central Delhi, three Central Govt. hospitals, Supreme Court
Delhi	New Delhi	Delhi, except areas covered by New Delhi Region
PWD	New Delhi	Works of GNCTD in National Capital Territory of Delhi
Northern	New Delhi	Punjab, Haryana, H.P., Uttaranchal, J&K, U.P., Rajasthan & U.T. of Chandigarh
Western	Mumbai	Maharashtra, Gujarat, Goa, M.P., & U.T. of Dadra & Nagar Haveli, Chhattisgarh
Eastern	Kolkata	West Bengal, Bihar, Jharkhand, Orissa, Sikkim, and North Eastern States
Southern	Chennai	Tamil Nadu, Andhra Pradesh, Kerala, Karnataka, U.T. of Pondicherry, Lakshadweep, and Minicoy & Andaman & Nicobar Island

1.2 Scope of Work

The scope of work of this study covers the following:

i. Study in detail the working of CPWD keeping in view its mandate and functions.

ii. Carry out an analysis of the structure and organization of CPWD considering all the verticals viz. original works, deposit works, maintenance functions, technical advisory functions etc.

iii. Carry out a comparative analysis with similar / comparable Central Government organizations in the Government, such as Military Engineering Service, Border Roads Organization etc. as well as Public Sector Undertakings in the field of civil/electrical construction.

iv. Examine recommendations made by various committees/bodies in the past regarding working of CPWD.

v. Recommend different options for enhancing efficiency and effectiveness of the organization.

1.3 Approach and Methodology

Organisation structure is defined as the way in which the organisation's units and levels, roles, capabilities and resources are arranged to deliver on the vision, mission, goals and strategy. It is the formal system of accountability that defines key positions and enables the efficient allocation of resources to support organisational outcomes.

A comprehensive approach to organisation structuring is driven by strategy and operating processes and takes into account infrastructure, governance, performance, talent and culture components of the organisation.

For this study, a systematic and structured approach was adopted, considering all interdependent components of an organisation before completing the design. At the same time dimensions such as talent, performance and cultural elements of CPWD were considered while arriving at the final design of the organization to make it more relevant and meaningful.

2. Current State Assessment

2.1 Human Resource Overview

2.1.1 Organization Structure

CPWD is divided into several cadres, namely Group 'A' cadres, controlled by Ministry of Urban Development, Group 'B' and Group 'C' cadres controlled by Director General (CPWD) and workmen cadre.

Group 'A' cadre has 6 cadres viz.:

1. Civil Engineers
2. Electrical Engineers
3. Architects
4. Horticulturists
5. Finance Officers
6. Assistant Accounts Officers

Group 'B' cadre has 8 cadres viz.:

1. Civil Engineers
2. Electrical Engineers
3. Architects
4. Horticulture
5. Accounts
6. Ministerial Staff
7. Stenographer
8. Drawing Staff

Group 'C' cadre has 6 cadres viz.:

1. Architects
2. Horticulture
3. Ministerial Staff
4. MTS
5. Stenographer
6. Drawing Staff

In addition:

1. CGA Cadre supports CPWD through 40 Accounts Officers and 370 Assistant Accounts Officers
2. Also, CPWD is supported by Ministerial Staff of Central Secretariat Service Cadre (Strength - 550) and CPWD Cadre (Strength - over 9100)

Current Structure:

- CPWD is headed by Director General who is also the Principal Technical Advisor to the Government of India. The regions and sub-regions are headed by Special DGs and Additional DGs respectively, while the zones in all state capitals (except a few) are headed by Chief Engineers.
- Each Region is headed by Addl. Director General/Engineer-in-Chief apart from dedicated unit of Additional Director General (Border), which is looking after border fencing, road and lighting works along Indo-Pak and Indo-Bangladesh borders.
- Regions are an independent unit in the matters of execution of works and Chief Engineer Civil, Electrical and Chief Architect of the Region report to the Regional head.
- ADG (Arch) is assisting the Director General (Works) at the headquarters in Architectural Planning and designing of projects.
- ADG (Training) is in charge of Training activity.
- ADG(S&P) and ADG (TD), discharge Headquarters functions relating to administrative, personnel matters, technical policies etc.

Organizational Setup at Head Quarter

- The Director General is assisted by Additional Director General (Works) for effective control of works and administration matters. The field units are located all over India to take up construction and maintenance works even in the remotest parts of the country. The departments has a decentralized system of working, which provides for better and easily accessible service as the units are placed closed to work centres.

Following organizational setup is currently operational for the office of the Director General excluding the PWD.

Figure 1: Organization set up at Headquarter

Various Units in Directorate

Various Units in Directorate are headed by SDG (HQ). Various units currently functional in the Directorate being:

- ADG (Training) - For all cadres in CPWD
- ADG (Border) - Border works on Indo-Pak, Indo-China, Indo - Bangladesh and Indo-Myanmar border
- CE (D&DM) - Design and Disaster Mitigation

- CVO Unit - Vigilance functions of CPWD - CVO Reports to DG
- DDG(e Gov) - E- Gov initiatives like eSewa, eOffice, PIMS, WBPMS
- DDG (HQ) - Cadre matters of Grade B, C cadres, SC/ST matters, PG cases
- CE (HQ) - Cadre matters of JE / AE
- Director(S&D) - Cadre matters of Grade A, Shifting of Projects, PQ
- Director (P&WA) - Work policies, Establishment of various Ministries, Pre-sanction
- Director (PM&PG) - Project Monitoring, Public Grievances, VIP Refer
- Director (Tech & PR) - Staff Officer to DG, Interaction with HODs
- Director (Finance) - All Budget & Finance, Finance Advisor to DG
- Director (Personnel) - All T&P of EE/Arch, AEE/Dy. Arch level

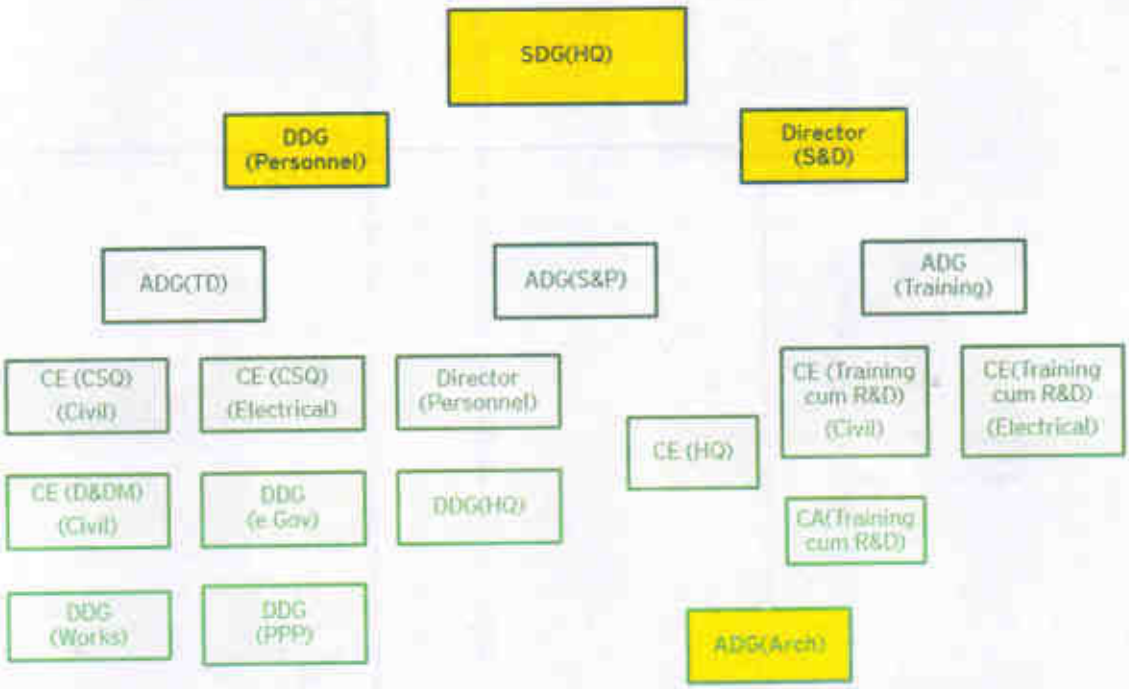


Figure 2: Organization set up at Headquarter

Organizational Setup at Regional Level

The regions are categorized as follows:

1. Delhi Region
2. Northern Region
3. Eastern Region
4. Western Region
5. Southern Region

Delhi Region

Special DG (DR) is responsible for the works under Delhi Region. There are Additional Director Generals - NDR, DR and Arch. There are 12 Chief Engineers and two Chief Architects in Delhi region.

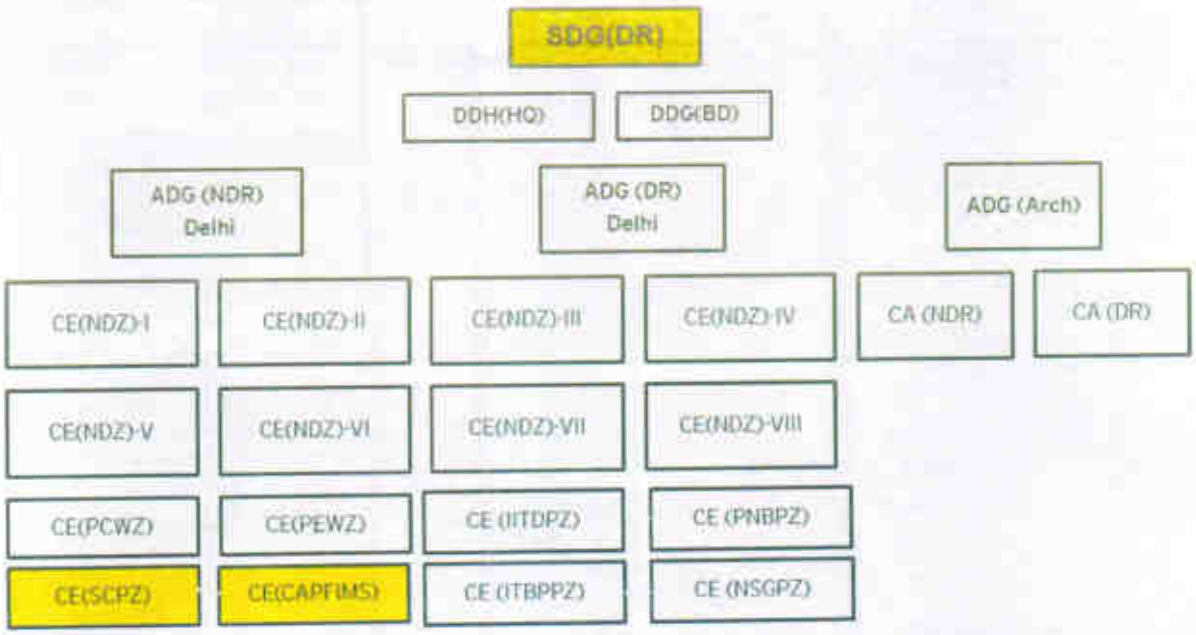


Figure 3: Organization set up - Delhi Region

Northern Region

Special DG (NR) is responsible for the works under Northern Region. Jurisdiction of the Region covers the states of Uttar Pradesh, Uttarakhand, Punjab, Haryana, Chandigarh and J&K. There are two ADG at Lucknow and Chandigarh respectively, five Chief Engineers and two Chief Architects

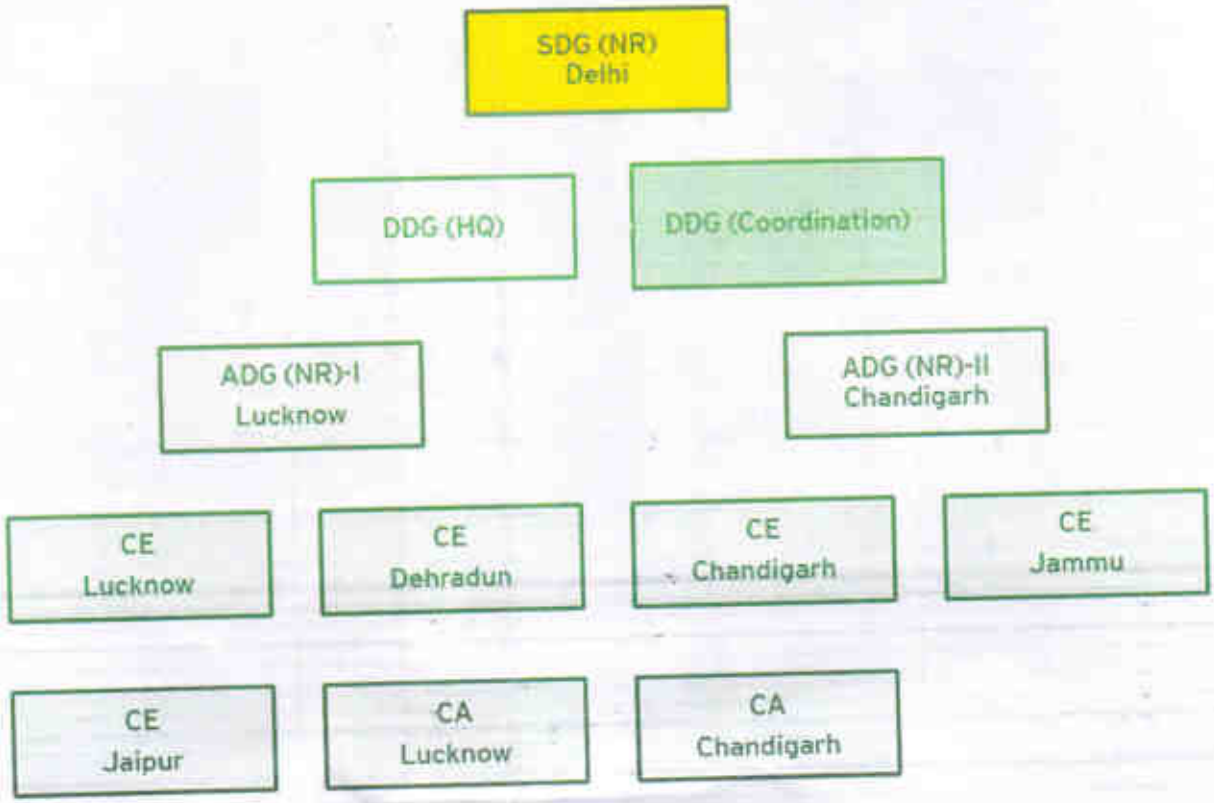


Figure 4: Organization set up - Northern Region

Eastern Region

Special DG(ER) is responsible for the works under Eastern Region. Jurisdiction of the region covers the states of West Bengal, Bihar, Jharkhand, Sikkim, Orissa and the North Eastern States. There are three ADGs at Kolkata, Patna and Guwahati respectively, seven Chief Engineers and two Chief Architects.

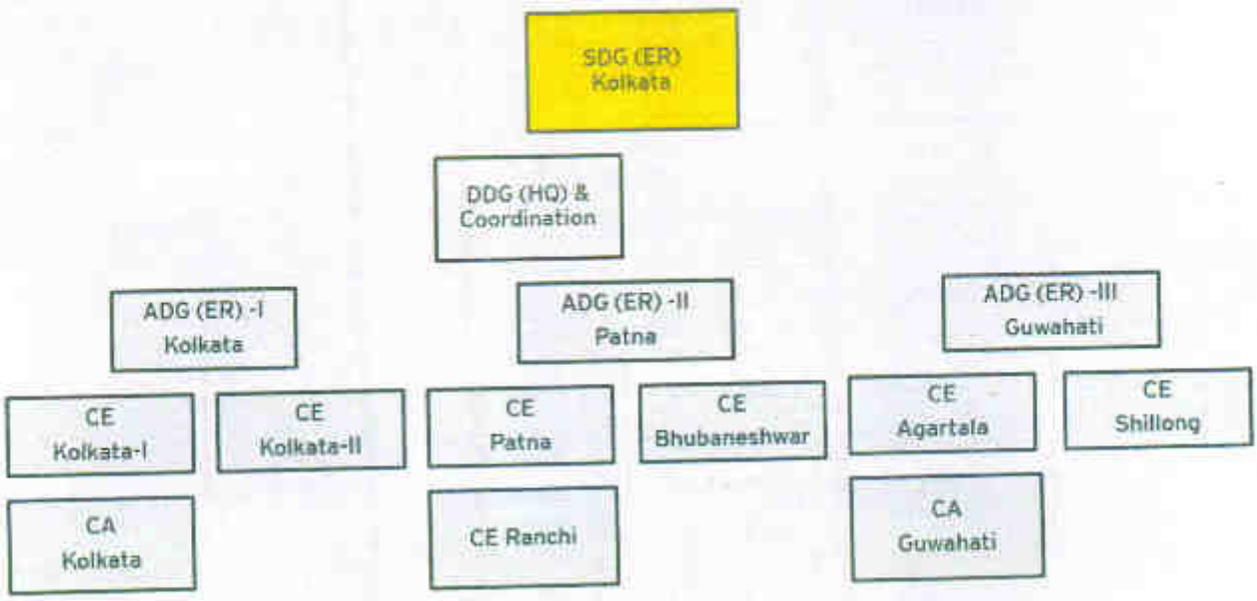


Figure 5: Organization set up - Eastern Region

Western Region

Special DG (WR) is responsible for works under Western Region. Jurisdiction of the region covers the states of Maharashtra, Madhya Pradesh, Chhattisgarh, Goa, Gujarat, and Union Territory of Dadra and Nagar Havell. There are two ADG, six Chief Engineers and one Chief Architect.

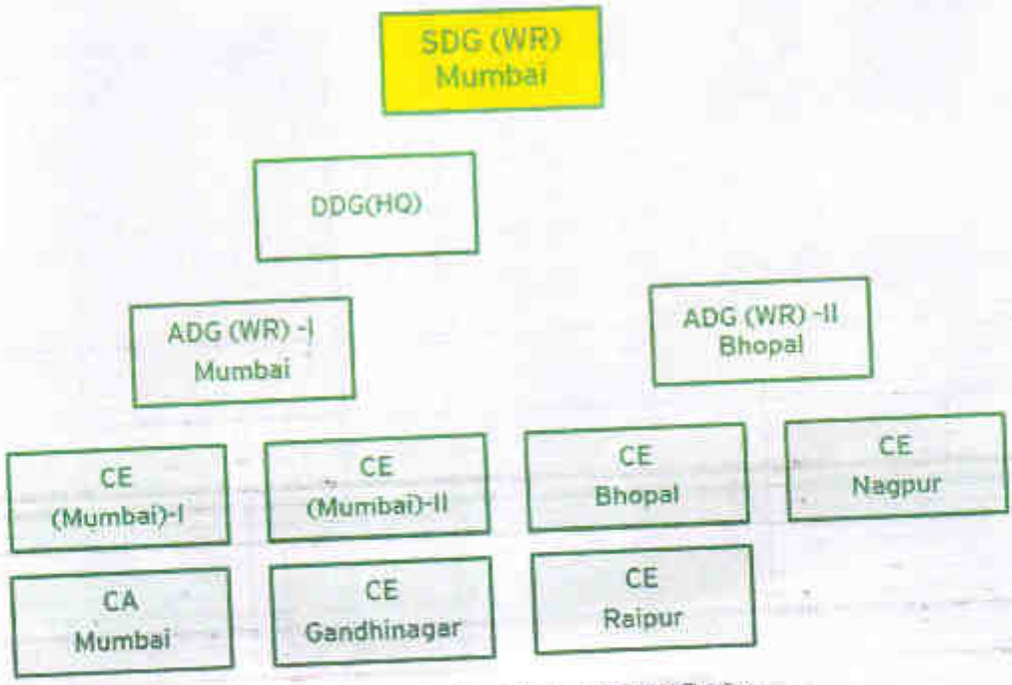


Figure 6: Organization set up - Western Region

Southern Region

Special DG (SR) is responsible for works under Southern Region. Jurisdiction of the region covers the states of Tamil Nadu, Andhra Pradesh, Karnataka, Kerala and Union Territory of Pondicherry, Andaman Nicobar and Lakshadweep Islands. There are two ADG, five Chief Engineers and one Chief Architect.

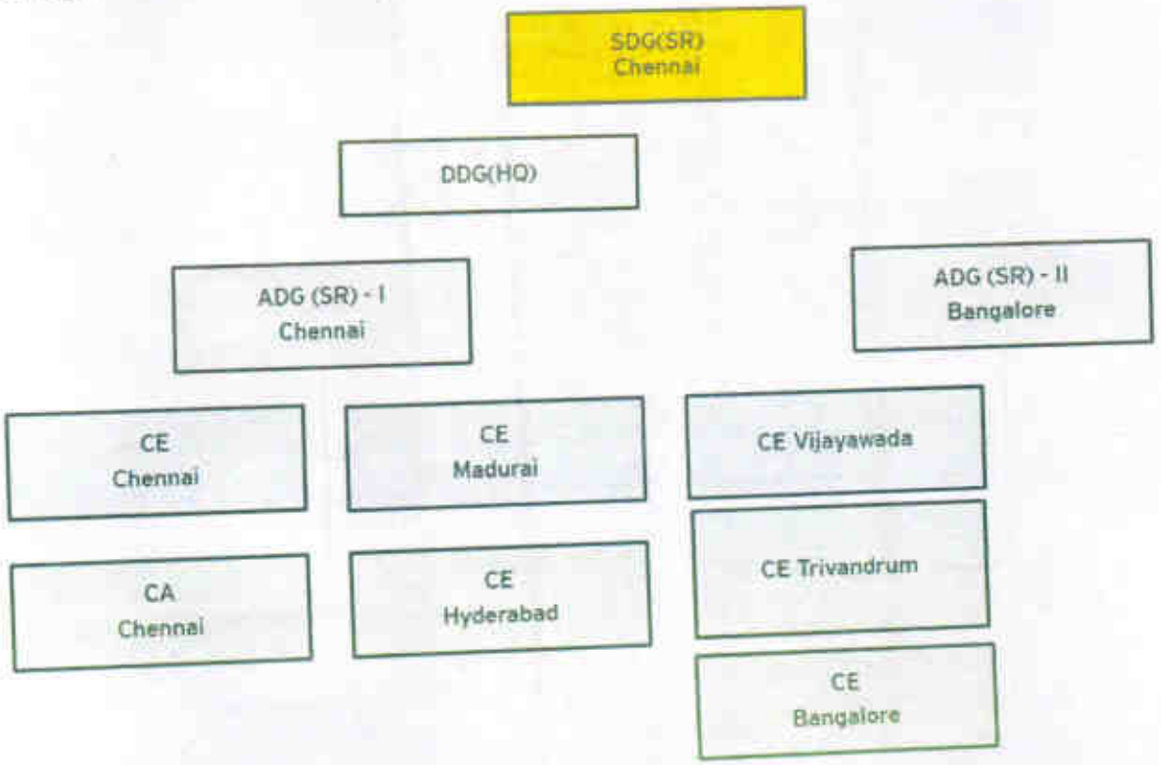


Figure 7: Organization set up - Southern Region

CPWD fitment in Government Structure

- Is a Central Service under Article 309 of the Constitution of India **(Part XIV -Article 308 to 323)**
- Governed by
  - Central Civil Services (Conduct) Rules - 1964
  - Central Civil Services (Classification, Conduct and Appeal) Rules - 1965
  - Central Civil Services (Medical Examination) Rules - 1957
- MoUD is CPWD's Cadre Controlling Authority
- General Financial Rules 2017 apply to all CPWD transactions.
- Secretary UD is the Principal Accounting Officer
- DG CPWD enjoys powers delegated to him vide DFPR 1978

2.1.2 Challenges

CPWD handles large scale execution of projects which involves very dynamic processes that require coordinated engineering, administrative and financial efforts. Some of the crucial internal and external factors that lead to time and cost overruns are enumerated here.

Internal Challenges

- CPWD follows a rigid hierarchical structure which requires approval for every activity till the apex levels, contributing to delays and cost overruns. Employees are bound by the works manuals, which adds to the rigidity in work and which need to be rewritten.
- The operational levels are not empowered for taking on-the-spot operational decisions required for smooth execution of the project and have to follow either the rigid set of rules and procedures or wait for approvals from the higher-ups.
- CPWD follows traditional pyramid structure resulting in few opportunities for people at junior levels for an upward movement in the hierarchy. This results in low motivation of officers and staff as the number of years they have to serve at every designation is very long.
- The process of deputation to other department is very restrictive which limits exposure and new learnings
- The fear of vigilance often prevents employees from innovating and taking decisions , where required
- Lack of training has emerged as another major concern within CPWD. Lack of adequate exposure and training has resulted in stagnation of competence of many of the CPWD employees. This is preventing innovation in the construction technology and systems & in effectively dealing with cost and time over-runs in new projects.
- There is no concerted PR due to which positive stories of CPWD do not get highlighted enough on which the existing employees can feel proud of and through which the external world is adequately informed about CPWD success stories.

External Challenges

External Factors (Direct Impact)

- CPWD faces very stiff competition from Construction PSUs like NBCC, which have been given the status equivalent to Public Works Organization in the GFR. They enjoy financial, functional and administrative autonomy. These PSUs are, therefore, able to carry out their construction projects at a faster pace.
- Over the years, CPWD's credibility has weakened, because it is unable to take effective action for an organizational turnaround on aspects like timely completion, quality of maintenance etc.

External Factors (Indirect Impact):

- Shortage of reputed contractors with long term vision and known for quality work within time who would like to work on CPWD contracts.

2.2 Processes

2.2.1 Introduction

As previously discussed in section 1 above, the mandate of CPWD primarily includes the following:

a) **Construction management:** Public works ranging from roads, bridges, hospitals, workshops, border fencing to public housing and government buildings.

b) **Maintenance management:** Maintenance of residential, non-residential buildings, including civil, electrical, mechanical, air-conditioning, horticulture, and other related services. Maintenance activity is significant for CPWD as a large percentage of its work force is deployed in this activity.

c) **Non-construction activities:** CPWD takes up non-construction activities, which are undertaken

by specialised units at CPWD like the Central Design Organization (CDO), Contract, Manual & Specifications and Quality Assurance (CSQ), Consultancy Services Organization (CSO) and the E-Governance unit. These are:

i. Preparation of specifications, Schedule of Rates and work related policies for design, materials, disaster mitigation etc.

ii. Executes vigilance, quality control and techno-legal functions

iii. Registration of contractors and training activities

iv. Valuation for Income Tax Department

The detailed assessment of the key functions i.e. construction and maintenance management is given below.

Execution statistics

Annual project execution value: For the year 2016-17, CPWD undertook work worth 13,304 crores. There has been a steady increase in the value of work being handled annually by CPWD over the last decade, as is obvious from the chart below. It has increased from 4516 crores in 2005-2006 to 13304 in 2016-17.

Figure 8: Annual Execution value

Distribution of construction vs. maintenance projects: Of the total annual project execution value, maintenance work accounts for only 20% or 45% equivalent workload (multiplied by a factor of 2.25 as maintenance activity requires more time and effort). The same is illustrated in the chart below. This is in line with the trends over the years. In 1990-91, the equivalent maintenance workload was the same i.e. 45% of CPWD's total workload. Similarly, it was 48% of the CPWD's total workload in 2003-2004.

Figure 9: Annual Execution value (construction vs. maintenance projects) in crores
***Note:** The chart does not take into consideration equivalent workload for maintenance work*

Ongoing projects: As per the web-based Project Management System (PMS) data, the total number of ongoing projects in CPWD are 3616 out of which 2021 (56%) are construction projects and the rest are maintenance works. This is close to a 50-50 share whereas in terms of project value, maintenance is only 20% of the total value. This points to the skewed workload per person ratio between construction and maintenance projects.

As per the Nitin Gadkari Report (of 2003), out of a total workforce of 42,919 employees, 37,500 are work charged staff from which 24,000 (i.e. ~64%) are involved in maintenance activity only. (Currently, there are 9420 work charge staff out of the total CPWD strength of 27,692 employees.)

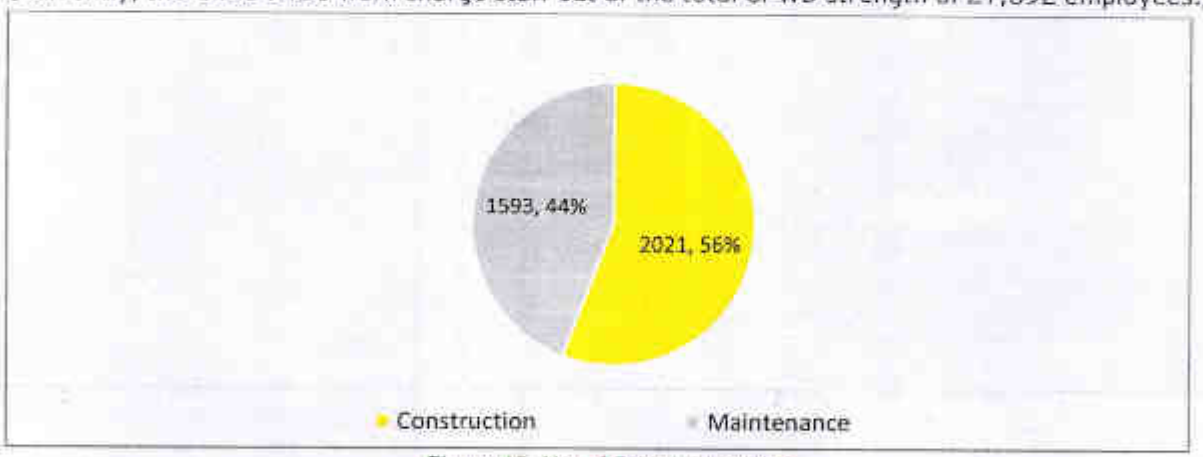


Figure 10: No. of Ongoing projects

High quantum of low-value projects: CPWD as a nodal agency for "Public Works" is liable to get projects of low value to strategic projects involving huge funds. While there is no formal categorization, projects are largely classified in the following value categories (a) under 1 crores, (b) 1-5 crores, (c) 5-50 crores, (d) >50 Crores. It is observed that the quantum of low value projects which are less than 1 crore (project cost) is the highest in the Department with the lowest value share. For example, projects less than 5 crores of project cost accounts for 41% of the work but contributes only 1% of the Department's work value (workload).

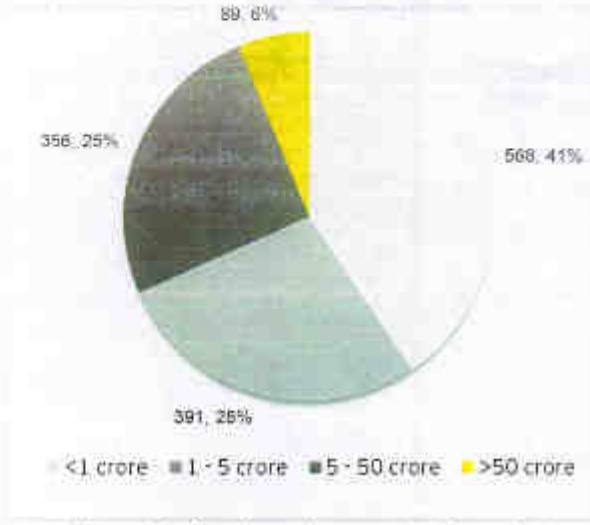


Figure 11: No of ongoing construction projects

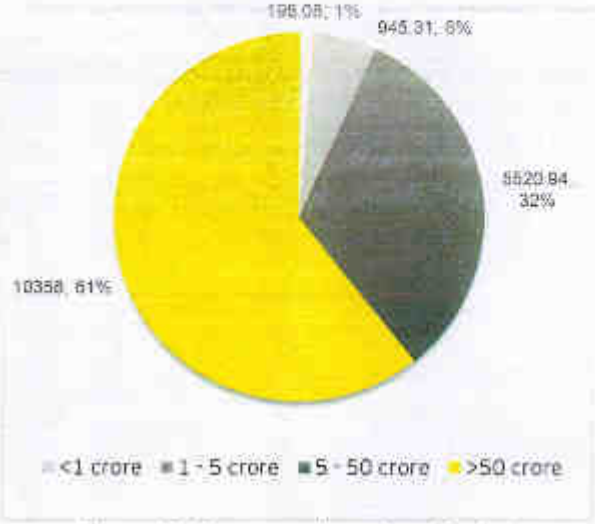


Figure 12: Corresponding value of projects

Major clients: Work is awarded to CPWD from all ministries, departments and associated offices except for those which have their own engineering wings or those who have been granted special exemptions such as Atomic Energy Department, Central Water Commission, Department of Posts, All India Radio, Department of Space, and Railway. CPWD's major clients according to the total project value are:

#	Client	No. of Construction projects	Funds demanded (crores)
1	Ministry of Home Affairs	50	2532.67
2	Border Security force	196	1862.78
3	Central Reserve Police Force	100	1842.99
4	Indo Tibetan Border Police	98	1009.99
5	Supreme Court of India	1	884.30
6	Kendria Vidyalaya Samithi	67	863.48
7	Sashastra Seema Bal	66	726.29
8	Indian Institute of Science Education and Research	13	659.11
9	Indian Institute of Management	14	644.50
10	Indian School of Mines	6	555.87

2.2.2 Project definitions & categorization

The Works Manual, 2014 categorizes and defines projects within CPWD as follows:

1. ***On basis of nature of work, works can be divided as:***

    a. **Original works-**

i. all new constructions.

ii. all types of additions, alterations and/or special repairs to newly acquired assets, abandoned or damaged assets that are required to make them workable (construction piecemeal)

iii. major replacements or remodelling of a portion of an existing structure or installation (construction piecemeal)

b. **Repairs and maintenance work** - These cover operations undertaken to maintain the assets in a proper condition and include maintenance and operation of all services which can be further classified as

i. Annual (routine as well as yearly operation and maintenance works) and

ii. Special (major repair or replacement or remodelling of a portion of an existing structure or installation or other works due to major breakdowns, or deterioration, or periodic renewal, which do not result in a genuine increase in the value of the property)

Apart from the Works Manual, a separate Maintenance Manual of CPWD is referred to, for execution of maintenance work. The Maintenance Manual of CPWD further classifies the maintenance projects as follows:

Table 2: Classification of works as per Maintenance Manual

Classification (as per Maintenance Manual, 2012)	Sub-Classification	Examples
Original work (Addition & Alteration): Necessitated on accounts of improvement by means of additions or alterations to existing buildings.	Nil	Providing additional toilets, renovating existing kitchens and toilets, providing false ceiling etc.
Repairs: Operations undertaken to ensure serviceability of buildings and facilities for their original intended use	**Preventive maintenance** - Periodical repairs carried out before or with change of seasons and rectification of defects identified during inspections	Repair of cracks due to plant outgrowth, painting of exteriors before monsoons or other works before winters
	Periodic maintenance (Annual Repairs) - regular repair to be done as per prescribed norms	Regular white washing, painting etc.
	Maintenance on request or attending day to day service requirements	Repairing damaged or worn out fixtures/fittings

Classification (as per Maintenance Manual, 2012)	Sub-Classification	Examples
Special repairs: Major repairs or replacement of elements to prevent buildings from reaching a level of un-serviceability. High costs and usually attended through contracts.	Nil	

c. **Minor work** - Works within delegated powers of DG, CPWD (for sanction of minor works), under MoUD Head of Account shall be treated as minor works.

CPWD uses the term 'construction works' to refer to 'Original works' which includes construction projects as well as addition/alteration works, special repairs, remodelling etc. Therefore, for ease of reference, all Original works are referred as 'construction works' or 'construction projects' in the subsequent chapters.

2. ***On basis of fund, works can be divided as:***

a. **Budgeted works:** These are works that are undertaken under an outlay that is provided wholly from the financial estimates and accounts of the Union of India that are laid before and voted by both the Houses of Parliament.

(These funds are made available as per parliamentary decisions regarding Public Works, subject to the financial year. They are further classified, for the ease of maintaining different heads, as

i. Budgetary works - When project comes from MoUD itself, these are put under Budgetary works

ii. Authorized works - When it comes through any other Ministry with a letter of authorization is issued to CPWD, authorising it to debit funds from the authorized ministries who then become clients for CPWD)

b. **Deposit works:** These works are undertaken at the discretion of the Department. Outlay for these works is either provided from Government Grants to autonomous or semi-autonomous bodies or institutions through their Administrative Ministries, or is financed from non-Government sources wholly or in part from:

i. Funds of a public nature, but not included in the financial estimates and accounts of the Union of India.

ii. Contributions from the public.

Deposit works don't lapse irrespective of the passing of the financial year. Whenever a Deposit work is to be undertaken, the deposit should be realised before any liability is incurred on the work.

Although not formally included as a classification in Works Manual, Cash Settlement Suspense Accounts (CSSA) are used to execute high security or urgent works. In such cases, CPWD executes

the work and charges the expenditure in a suspense account. The Cabinet then reimburses the expenditure (either through cheque or DD) and the suspense account is cleared.

CPWD is entrusted with largely Budgetary Works from MoUD and other GOI ministries which accounts for almost 57% of the work. Moreover, for both construction and maintenance projects coming through budgetary, deposit or CSSA funds, the number of projects are directly proportional to the value of work being handled under each of the categories.

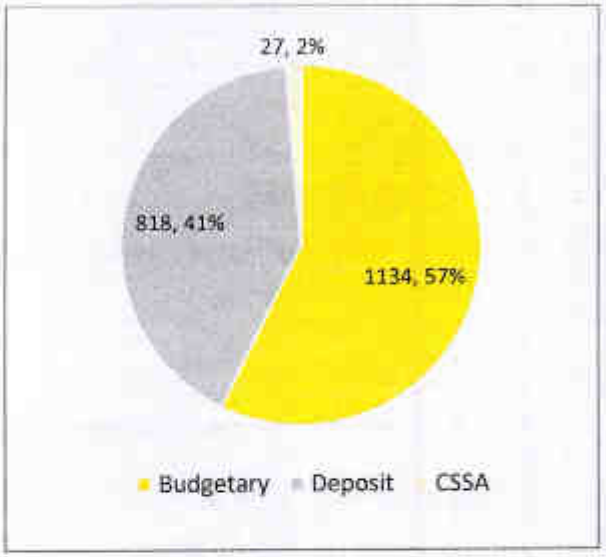


Figure 13: No of projects (Construction)

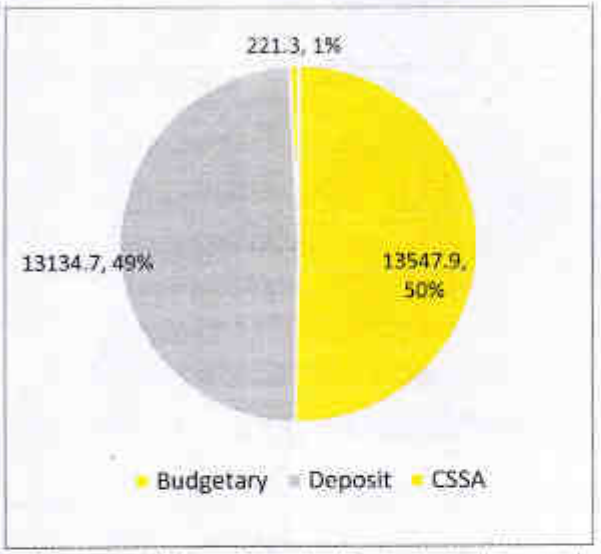


Figure 14: Value of construction projects (in crores)

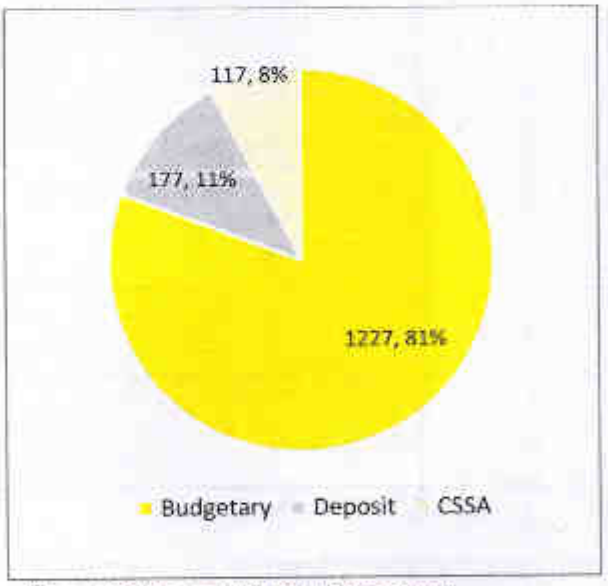


Figure 15: No of projects (Maintenance)

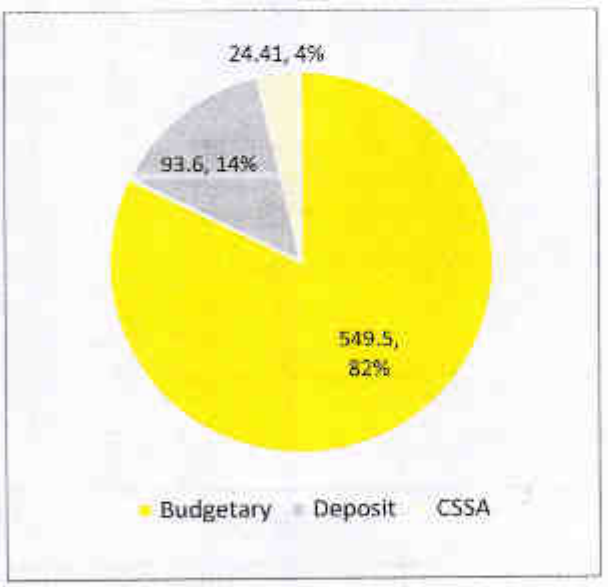


Figure 16: Value of maintenance projects (in crores)

3. *Work of inescapable nature*

a. **Emergency works** – those works which arise all of a sudden and require immediate action without any delay. This may come up in situations of natural disasters, fire and arson, war and sudden collapse of structure, terrorist attack, mass strike affecting civic services, ceremonial functions at time of death of presidents or prime ministers, restoration of buildings of natural importance and services in case of accidents, maintaining law and order in abnormal situation, any other work declared emergent by chief engineer

b. **Urgent works** - The urgent works need not to be treated as par with the works to be taken up under emergency situations. Urgent works may be defined as those kinds of works which requires fast start/completion within compressed schedule and are to be taken up on top most priority at the instructions of Competent Authority

2.2.3 Project execution

CPWD follows two project execution modes, basis the project cost. These are:

i. **Execution by Divisional structure:** All projects below 200 crores of project cost are executed in this mode only. In this mode, the Executive Engineer (EE) of the respective division that the project lies in, functions as the head of the project team. The EE also acts as the Drawing and Disbursing Officer (DDO) for the project.

ii. **Execution in Project mode:** For project above 200 crores, project specific teams headed by either a Chief Project Manager (CPM - CE level officer) or a Project Manager (PM - SE level officer) are formed for planning and execution. The CPM or PM is allotted a team of EE, AE/AEE and other supporting staff according to requirement.

iii. **EPC mode:** Additionally, as per the latest guidance by GOI, CPWD has been instructed to carry out all projects above the value of 100 crores in EPC (Turnkey) mode. This move is anticipated to reduce slowdowns and delays in projects.

In both (i) and (ii), the projects are executed in a mixed manner i.e. some part of the work is done in-house and some is outsourced. As a general trend in the past, the design and estimation elements were always in-house and execution was largely on item rate contracts. Of late, especially for larger projects (in Project mode), the design and estimation are also being outsourced but there is no set pattern/trend or reasons for the same. This aspect of execution is further discussed in details in *Section 1.1.3 Typical outsourcing pattern.*

Process lifecycle management

Even though the Works Manual formally categorizes the projects basis nature of work and fund, the Standard Operating Procedure (SOP) given in the Works Manual for all projects irrespective of their variation in nature and size remains the same. Hence, as per the process described in the Works Manual, the common steps of project execution is as follows:

A. **Inception stage:** This step includes requisition of work to its approval and sanctioning. While the detailed steps are given below, the key milestones under this include:

   1. Requisition received from Client
   2. Preparation of Site Survey Plan and Geo-technical Surveys and feasibility reports
   3. Preliminary Drawings and Specifications
   4. Approval of drawings by client
   5. Preliminary Estimate
   6. Administrative Approval & Expenditure Sanction (AA&ES)

B. **Pre-construction and planning:** The key milestones under this include:

   7. Preparation of DPR (done for specific crucial projects)

8. Detailed Drawings and Estimate (DE)
9. Approval of plans by the Local Bodies
10. Technical Sanction
11. Preparation of Tender Documents/NIT with DE info
12. Tendering and Awarding of Tender

C. **Construction:**

13. Land Possession: Handing over site ready for construction
14. Commencing Construction and Execution
15. Interim Inspection and reviewing work or auditing
16. Stage wise bill clearance & Interim payments

D. **Closure:**

17. Post Construction Certification of completion of work along with submission of Final Bill
18. Physical Hand Over to Client
19. Financial Submission
20. Security deposit release

Process mapping- Original works, Annual & Special Repairs & Maintenance

The following steps are applicable for all Original works as well as maintenance projects (Annual and Special repair). The same SOP is also followed in Project Mode, only the team configuration and accountability changes, as has been explained above.

Table 3: Standard Operating Procedure (SOP) for Construction and Maintenance works (Annual and Special)

#	Steps	Team Involved	Issues
	Description of the step including format (online/offline) and tentative time taken	*All stakeholders involved along with step owner/approver*	*Description of challenges faced*
INCEPTION STAGE			
1	Requisition received from Client (not the end user but the Competent Authority who is providing the fund for work) manually in the form of a letter. Requisition forwarded to Architecture wing post which they forward a proforma to the client which has to be vetted by the client's Competent Authority. This formally starts the process of determining client requirements and scope of work.	Client (owner), Architecture wing (Sen. Arch, Arch)/SE/CE/ADG /DG (as per the financial power delegation of the Works Manual)	▸ In many cases, the architecture wing is not engaged at all. It may be executed by the appointed EE. ▸ In some of the projects, the client gets their own consultant and requests CPWD to only validate the consultants work. There is no established SOP for the same. ▸ The practice of sending proforma to the client is not enforced. Usually designing work commences before or without taking up these steps.
2	Existing infrastructure, site survey plan, geo-technical surveys and feasibility reports (if required) to be prepared after Architecture unit sends proforma to EE to carry out site survey/study	Architecture wing has to coordinate with field units headed by EE. EE may do this in house with his team of AEE/AE and JEs or can outsource work to consultants/surveyors through open tender. For the pre-construction planning etc.,	▸ Client is not charged for step 2 and 3. It was suggested that DPRs be also made for Inception stage for which the Client may be charged (Enabling Estimate) separately but has been opposed by many. Under the existing set up, DPRs are prepared only for large scale

#	Steps	Team Involved	Issues
		Enabling Estimate may be called for by EE/SE/CE/ADG/DG under the purview of financial powers delegated to them in the Manual	projects operating under the project mode.
3	On the basis of the above reports, concepts and preliminary drawings and specifications (PD, PS) are prepared. These are also based on discussions with the client to assess and appreciate their requirements. ***Note:*** *1) This is not done for Border works. Border works are divided into three parts- Indo-China, Indo-Pak and Indo-Bangladesh. Mostly border fencing and border outposts (BOPs)- it is directly executed with pre fixed designs and specifications* *2) Special Repairs are done only on basis of PD, PS*	Client, PD prepared by Architectural, Civil and Electrical Wing (Senior Architect (SA))/ SE (planning) in case of roads and bridges Consultant may be involved (for either or both design and structural planning) and their drawings are vetted by Architecture Wing if requested by the Client	▸ Non-DSR specifications can also be given for projects, if the client approves but are mostly not considered since pre-made list of specifications are usually followed for most projects. At the same time DSR is not updated according to the changing product and services availability ▸ For drawings etc., BIM is not used. Architectural drawings made on AutoCAD. Structural drawings are largely outsourced and not made in-house.
4	Approval of drawings by client	Client	▸ In practice, generally sign off is not taken by the client causing challenges at a later stage due to incorrect expectation setting
5	**Preliminary Estimate (PE)** is prepared by the EE based on final drawings, Plinth Area	Prepared by the Planning unit (headed by CE)	▸ Rates are usually quoted as per present day rates without considering inflation of rates. By

#	Steps	Team Involved	Issues
	Rates (PAR) and taking into consideration levying of departmental charges (if applicable). The PE needs to be countersigned for approval by higher officials in the Department and sent in triplicate to the client.		the time detailed estimates are prepared and the actual work starts it leads to deviations beyond the set limit of 10%.
6	**Administrative Approval (AA):** The Client shall return one copy of the PE, duly countersigned as a token of acceptance, while communicating the Administrative Approval as a token of acceptance. One copy of the Administrative Approval shall be endorsed to the concerned Accounts Office. ***Note:*** *No concurrence is required for minor repairs and maintenance works.* **Expenditure Sanction (ES):** ES indicates that funds for the project have been provided and a liability of undertaking the construction work can be incurred. In other words, it signifies the concurrence of the Government of India in the expenditure proposed. This is sort of a guarantee that the project will come to the Department even in case of delays.	Client; to be accorded by Accounts wing and EE/SE/CE/ADG/DG/Works Board according to the financial power delegated as per the Works Manual ***Note:*** *Excess up to 10% of the amount of the Administrative Approval may be authorised by Officers of the CPWD, up to their respective powers of technical sanction. In case it exceeds this limit, a revised AA must be obtained from the authority competent to approve the cost so enhanced.*	▸ Time taken by client for sanctioning varies from months to even years affecting the project timeline ▸ Often, funds required are not deposited on the whole by client leading to problems of fund distribution and hence delay in starting ▸ CPWD does not levy any departmental charges for the work it executes (apart from Deposit works), be it construction or maintenance and all its expenditure is met by budgetary appropriation or re-appropriation.

#	Steps	Team Involved	Issues
	Note: *In case of Ministry of Finance, AA is given at the first step itself.*		
PRE-CONSTRUCTION AND PLANNING			
7	Preparation of DPR	If required for any crucial project and need raised by EE/SE/CE/CPM/PM or client, consultants may be involved by CE/CA (full powers delegated by the Works Manual) alternatively it could be done by CPWD itself.	▸ It needs skilled work force but divisions lacks the same and hence leads invariably to outsourcing
8	Detailed Drawings and Estimate (DE)	CE(Civil), SE (Planning), SA (Architecture), CE (Electrical) or Consultants for specialized projects ***Note:*** *ADG(Border) in case of Border works*	▸ This is generally outsourced to consultants leading to underutilization of existing staff. For e.g. since 2011, onwards only type quarters has been done in house and major projects have been out-sourced. ▸ System of specifically detailing and capturing market variances in available items is not in place. Modern IT based tools such as BIM etc. is not used for project management for all scale or types of projects ▸ Lack of coordination amongst different service lines (Architecture, Civil and Electrical) while preparing detailed drawings and DE

#	Steps	Team Involved	Issues
9	Approval of plans by the Local Bodies.	SA(Architecture) ***Note:*** *In case of dependence on local authorities for external services, the EE shall furnish the services plans to Senior Architect. The Senior Architect will submit through the concerned EE (Civil) the complete plans to such local bodies for their approval prior to commencement of the work.*	▸ Even in cases where the work is outsourced, the responsibility of taking approval rests on CPWD architecture or sometimes even the engineering wing. Thus, time and effort is wasted on unnecessary coordination.
10	Technical Sanction: A "technical sanction" amounts to a guarantee that the proposals are technically sound, and that the estimates are accurately prepared and are based on adequate data. ***Note:*** *1) The technical sanction can be exceeded up to 10% beyond which revised 'technical sanction' shall be necessary.* *2) A copy of the technical sanction should also be endorsed to the concerned SA/CA, SE (Elect)/ CE (Elect)/EE (elect)/SE (elect)/CE (elect) as well as the DoH/DDH for initiating action at the appropriate time*	AE/AEE/ADH/EE/DOH/SE/DOH/CE/CPM/PM has the power to accord the TS based on the financial powers delegated to them in the Works Manual	▸ Time taken for intra-departmental circulation of documents is excessive delaying the overall process for TS ▸ Does not come to Architecture wing in practice

#	Steps	Team Involved	Issues
	3) *For a project costing INR 10 crores or above, the Administrative Ministry or Department will set up a Review Committee (rep. from the Administrative Ministry, Finance (Internal Finance Wing) and the Executing Agency) to review the progress of the work and accept variations of the approved estimates. For other works a similar reviewing committee may or may not be founded.*		
11	Preparation of Tender Documents/ NIT with DE info: This could be in the following packages: a) Single package (composite) covering entire sanction including drawings etc., b) Different packages under single sanction	AE/AEE/ADH/EE/DOH/SE/DOH/CE/CPM/PM has the power to accord the NIT Documents based on the financial powers delegated to them in Works Manual ***NOTE:*** *For 'Different packages', approval of ADG is necessary.*	
12	Tendering and Awarding of Tender	Depending on the type of tender floated, AEE/AE/ADH, EE/DDH, SE/DoH, CE,ADG, Spl. DG, CW Board has the power to accept the bid based on the financial powers delegated to each in the Works Manual	▸ Competitiveness of tenders is an issue ▸ In practice, local approvals are taken post tendering and award of tender, hampering the execution timeline.
CONSTRUCTION			
13	Possession of land: Handing over site ready	Architecture unit to EE and Contractor	▸ Since in practice, work is awarded before all

#	Steps	Team Involved	Issues
	for construction. On receiving Copy of Agreement the Architecture unit issues the "Good for Construction" drawing to all key stakeholders. All other approvals (tree cutting, demolition, disposal of waste etc.) and fund should be in place. All the concerned units dealing with civil, electrical and horticulture work are immediately informed about commencement of work along with copies of estimates and plans furnished to them to initiate further action. For external services, Municipal Corporation/ local bodies, electric companies are written simultaneously		clearance and approvals are received, work cannot be started at site leading to delays ▸ Many a times, assured funds do not reach the units for whatever reasons leading to appropriation or re-appropriation of funds. This leads to further delays ▸ In practice, all drawings are not issued to the contractor in time ▸ Ideally, client should hand over an encumbrance free site to the EE and Contractor, but the same is not always put into practice.
14	Commencing Construction and Execution	Appointed Empanelled Contractor	▸ Coordination between contractors and Department with respect to changes required, material or other resource flow, is not adequate due to absence of full-time site architects, construction managers, design coordinators or site engineers
15	Interim Inspections with respect to 1) Work in Progress (WIP), Extension of Time, Rescheduling mile stones 2) payment auditing	EE/SE - draw out a programme of inspection on quarterly basis Senior Architect/Architect SEs / EEs (Civil and Electrical)/AE/JE - routine inspection of WIP to ensure execution is according to the	▸ Schedule adherence, quality control and technical audit is often compromised on due to lack of intra departmental coordination ▸ Absence of representative from architecture leads to compromised design adherence

#	Steps	Team Involved	Issues
	3) Quality Control 4) Technical and Design Adherence Both in-house as well as third party inspection through signing of agreement The minimum number of inspections for each work is 1 for every 2 bills for works at headquarters and 1 for each 3 bills for works outside the headquarters. An inspection register is maintained at every site of work, duly issued by the EE and docketed from the division office. The standard performa for inspection register is prescribed in the CPWD Works Manual.	agreed design, drawing and specifications. AE(Quality Control)/CSQ team/Third Party Assessor (engaged by EE and usually are teams from local engineer collages) - quality control Separate auditing happens from time to time AE/AEE/ADH/EE/DDH/SE/DOH have been delegated with powers to grant extension of time and reschedule mile stones and levy compensations based on the financial powers delegated to them in the work Manual	▸ Client shows no responsibility towards quality control, ownership is only for expenditure and time deviations which leads to speculations during closure in context to the quality of the product
16	Stage wise bill clearance - interim payments made on the basis of the records "Measurement Books" which are the basis of all account keeping	AEE (all bills)/EE (at least 10% of bills in HQ or 1/3rd bills in regions) - certifies the work completed and the variances if any before passing the bill for payment to the Divisional Officer	▸ Manual record keeping leads to compromised information and results in considerable deviations
CLOSURE			
17	Post Construction Certification of completion of work along with submission of Final Bill	EE/SE/CE	▸ Repetitive inspection of final bills leads to delays in clearances ▸ No team (architects, civil engineers and horticulturists) to inspect and certify completed work

#	Steps	Team Involved	Issues
18	Physical Hand Over to Client	EE/SE/CE	▸ Change in client's/client nodal person's will to take the asset leads to unprecedented delays
19	Financial Submission	EE/SE/CE to Finance department	
20	Security deposit release after a year (2.5-5%) in order to correct deviations	Contractor recovers the money	

Hence, the process flow as per the Manual vis-à-vis the process followed in practice is as illustrated below:

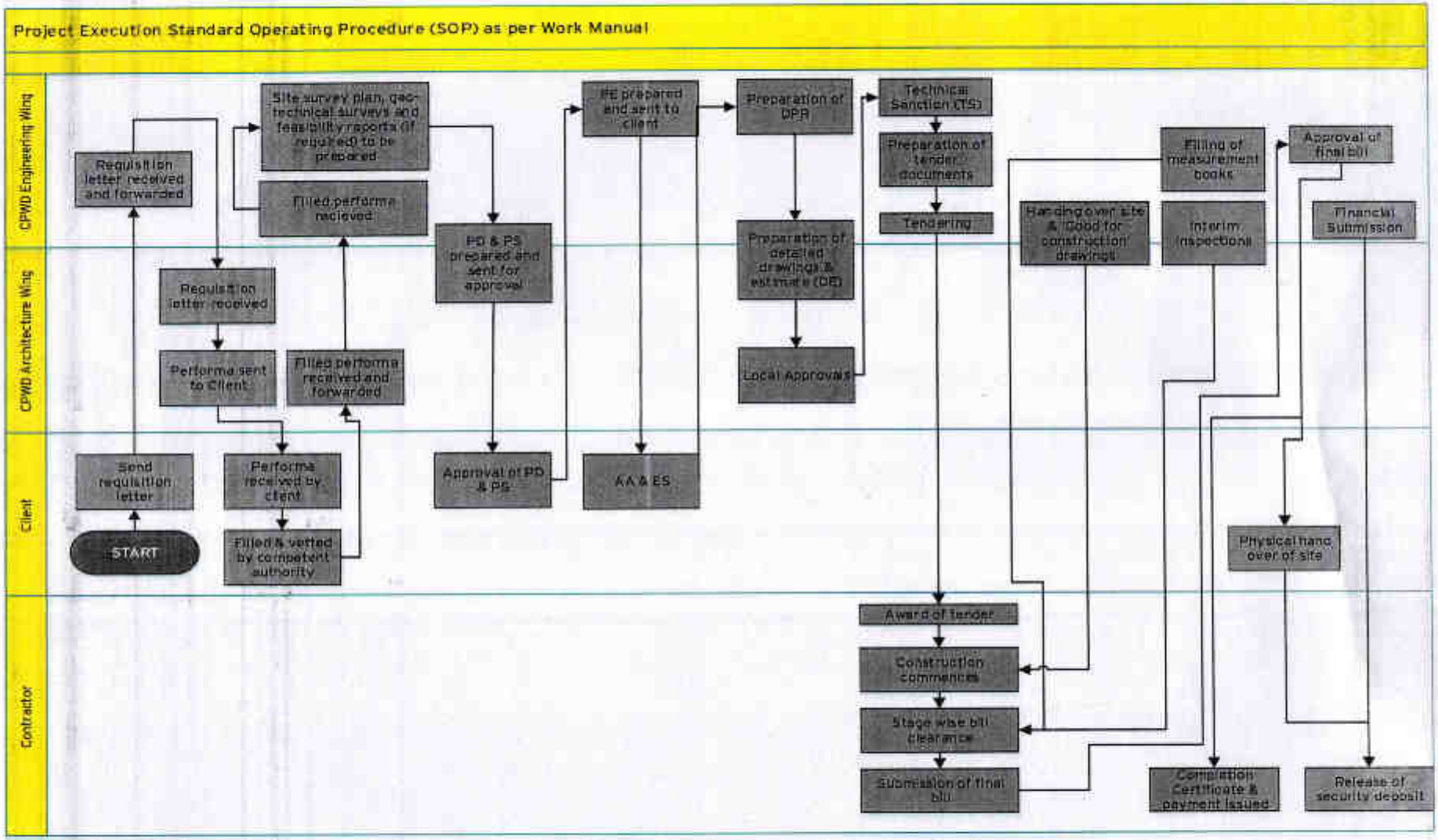


Figure 17: SOPs as per the Works Manual Provisions

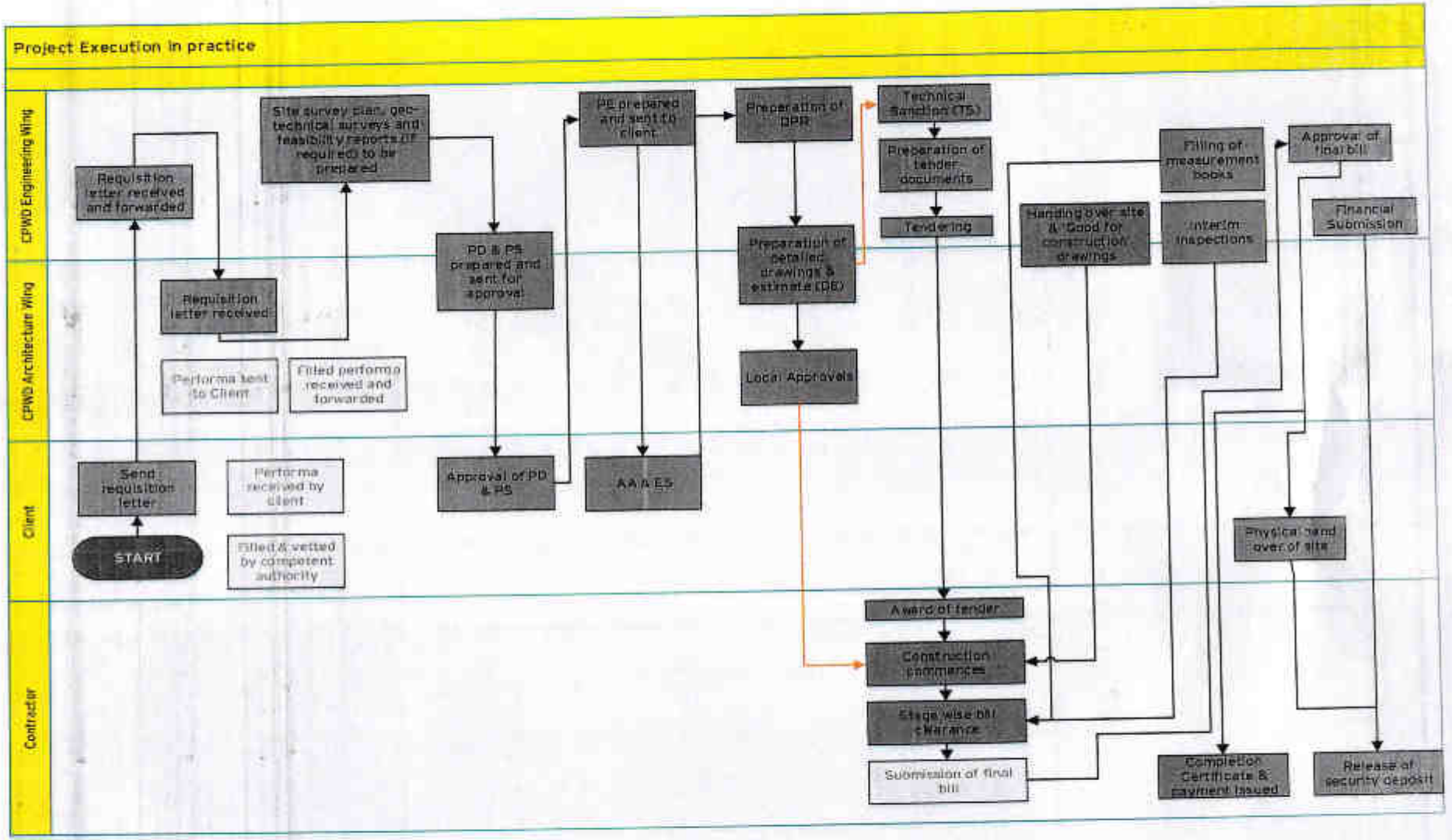


Figure 18: Project execution in practice

Process mapping- Other maintenance works

For all other maintenance works (apart from Annual and Special repairs), the key steps are:

Table 4: SOP for Maintenance Works (apart from Annual and Special repairs)

#	Steps	Team Involved	Issues
	Description of the step including format (online/offline) and tentative time taken	*All stakeholders involved along with step owner/approver*	*Description of challenges faced*
1a	Annual maintenance - Preparation of maintenance Budget: At the beginning of the year, the concerned JE/AE is expected to conduct a survey of buildings under his charge to identify the items of day to day repairs, annual repairs, and special repairs, which are required in their division /sub-division. The annual maintenance budgets are prepared at each division level, and then compiled at circle, zonal and regional level. The budget, which is approved by Competent Authority at each level, is then compiled and submitted as maintenance budget for the entire CPWD for approval to MOUD/ Ministry of Finance along with budget for construction activity.	JE/AE Competent Authority	
1b	Service based day to day maintenance - a) Registration of complaint by an occupant: In the residential areas maintained by CPWD, the tenants have following options for registering their complaints. ● In a service centre either over a phone or in person. ● Through IVRS- available in Delhi only ● Online complaint (though internet) - available in Delhi only In order to enable occupants/residents to lodge their complaints, service centres have been setup, which were previously known as enquiry offices. A service centre is generally located at a centre point in each neighbourhood covering 1,500-3,000 houses per centre. An acknowledgement slip is given to the complainant along with a complaint	Service centres, JE(C), JE (E), SO (Horticulture)	▸ Reporting and recording of the complaints are usually delayed ▸ Usually when complaints are banked to form a major complaint the time taken to attend to the complaint becomes longer due to a tedious process of resource

#	Steps	Team Involved	Issues
	number. b) Categorization of complaints: The service centre is responsible for maintenance of premises including the services within it. These service centres cater to complaints relating to civil, electrical and horticulture disciplines in the Department. c) Reporting of Complaints - Complaints based on the urgency is reported to concerned JE/AEE/AEs. Recording of complaints in respective registers - JE(C), JE (E), SO (Horticulture). The complaints are recorded in the register of the respective JE or the equivalent officer of each discipline. d) Site Inspection and Classification of complaints: The service centre reports and site visits by JE or AE leads to further segregation of the requests in the following categories: • **No delay:** To be attended earliest in any case within 24 hours. (Day to day repairs) • **Minor:** To be attended earliest in any case within 48 hours. (Day to day repairs) • **Major (Annual/Special Repair):** Attended to through contracts for specific items. Separate registers for major complaints are maintained for monitoring the disposal of such complaints. These are attended on first cum first serve basis and within the constraints of the budget available.		mobilizing
2	Carrying out maintenance a. Attending to day to day complaints by the work-charged staff: These services are provided on receipt of complaint from the users at respective service centres and are attended by work-charged staff of CPWD, which are supervised by the concerned JE. b. Attending to annual/special repairs to be done in 1 to 3 years based on annual	JE, AE	▸ Due to limited funds and low grade specifications allotted for maintenance work the quality of service is compromised

#	Steps	Team Involved	Issues
	contracts after due scrutiny and consideration are carried out on payment of certain percentage of the estimated cost of providing the facility. To be treated as Original work or project.		▸ In case complainant insists on a certain service type which is beyond the purview of the JE/AE/AEE again a long process of approval seeking has to be initiated resulting in delay of service provision
3	Feedback: The concerned JE/AE has the responsibility for getting feedback from the complainants on complaints of the nature of day to day repairs, attended to by the work-charged staff. a. Obtain feedback from the complainant on complaints attended by the work charged staff b. Respond to tenant on likely time for compliance of the compliant	JE/AE and complainant	▸ The validity of this feedback is not assured since recording system is manual and usually recorded by the staff themselves

Typical project timeline

As per the general directions of the Works Manual, the mandated timeline for a construction project allows a total period of 21 months, (excluding the time taken for according the AA and ES as well as local body approvals) from the date of requisition from client as the project planning period. The same has been shown in the table below:

Table 5: Project Timeline as per CPWD internal order

#	Steps	Months																				
INCEPTION STAGE		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Requisition received from Client in the form of a letter (manual).																					
2	Site Survey Plan and Geo-technical Surveys and feasibility reports																					
3	Preliminary Drawings and Specifications (PD, PS)																					
4	Approval of drawings by client																					
5	Preliminary Estimate (PE)																					
6	AA & ES							*Variable*														
PRE-CONSTRUCTION AND PLANNING																						
7	Preparation of DPR																					
8	Detailed Drawings and Estimate (DE) based on DPR																					
9	Approval of plans by the Local Bodies (in theory)														*Variable*							
10	Technical Sanction																					
11	Preparation of Tender Documents/ NIT with DE info																					
1	Tendering and																					

#	Steps	Months
2	Awarding of Tender	

However, a large number of projects do not adhere to these time frames. Out of 2021 ongoing construction projects, currently 1890 projects are delayed as per the PMS data. The break-up of delayed projects by cost is shown as under:

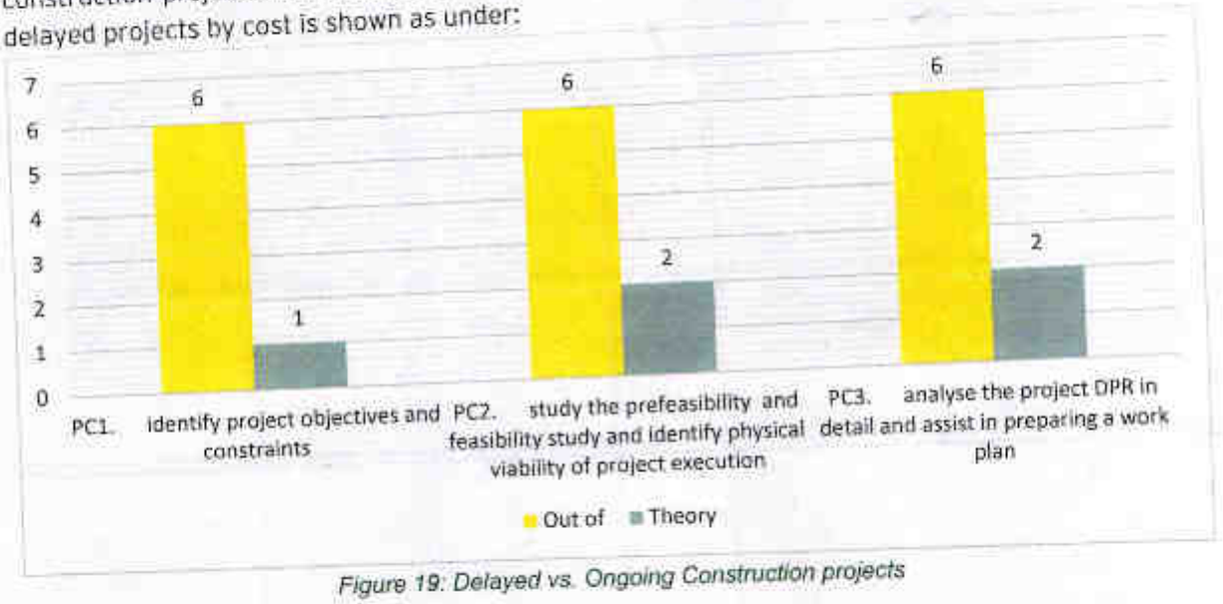


Figure 19: Delayed vs. Ongoing Construction projects

A sample of 50 projects were studied to understand the reasons of delays occurring during the project life cycle. The projects were analysed under the following heads (basis mentioned reasons for delay):

a. Changes beyond control: *Any external issues such as heavy rainfall or poor workable conditions; problem of material and labour supply due to policy level changes*

b. Delay from client's side: *Delay in structural drawings from clients; frequent changes from client during progress of work*

c. Inadequate fund flow: *Fund flow is hampered either due to shortage or lack in meeting requirements for release of fund etc.*

d. Site challenges and contractor slowdowns: *Casual approach of contractor due to too may work of different expertise under one agreement, Lack of timely response from tenders which hampers project progress, site is not ready for construction, presence of hybrid plants or monuments, inadequate water or electricity supply*

e. Delays in approvals: *Delays due to decision making such as delayed decision of flooring pattern/shades by the architect consultant; approvals of drawings. Delays could also be due to no response from local bodies or other authorities.*

As indicated in the chart below, most project delays occur due to client issues, these being delays due to lack of responsiveness, continuous scope change and delay in estimate finalization/sanctioning. Another major reason of delay in projects is inadequate fund flow.

Figure 20: Reasons for delay

Case study: Delay from client's side and inadequate fund flow

Construction of 9 CGHS dispensaries at different locations in Delhi was entrusted to CPWD between 2013-14 and 2014 - 15. Construction had started for many of these dispensaries but of the total sanctioned amount of Rs 6508.8 lakhs, only Rs 1004.5 lakhs had been released by the client. As a result, construction was not completed on these sites. This lead to a stage where CPWD has to notify the client that in case of no further funding, the project would be foreclosed.

Table 6: Fund Status - CGHS Dispensaries

Name	Sanction date / Amount (in crores)	Last release date / Amount (in crores)	Liabilities incurred (in crores)	Work Done (in crores)	Physical progress (in %)	Status
INAPD (Nauroji Nagar)	16-01-13 / 770.3	03-09-15 / 125.0	127.5	227.5	55%	Foreclosed
INAPD (Prasad Nagar)	24-11-14 / 692.51	03-09-15 / 25.0	102.9	102.9	20%	Applied for foreclosure
INAPD (Vikas Puri)	17-12-14 / 570.4	08-03-16 / 37.9	337.0	325.0	70%	Work stopped
AIIMSPD (Vasant Kunj)	23-12-14 / 684.75	02-09-15 / 30.00	600.0	450.0	85%	Work stopped
AIIMSPD (Alaknanda)	24-11-14 / 824.44	02-09-15 / 31.80	600.0	400.0	55%	Work stopped
AIIMSPD (Vasant Vihar)	18-07-14 / 837.56	10-09-15 / 40.00	600.0	250.0	65%	Work stopped
	05-07-13	30-09-16	500.0	423.0	65%	

Name	Sanction date / Amount (in crores)	Last release date / Amount (in crores)	Liabilities incurred (in crores)	Work Done (in crores)	Physical progress (in %)	Status
CD-III (Patparganj)	651.36	204.73				Work stopped
DCC-5 (Sec-9,Dwarka)	22-01-14 / 738.81	28-07-16 / 256.0	128.0	384.0	80%	Work stopped
DCC-5 (Sec-23,Dwarka)	22-01-14 / 738.81	28-07-16 / 254.0	87.0	341.0	75%	Work stopped

Project lifecycles are affected not just by the delays caused by the clients but in many cases due to the lack of will to further pursue projects with CPWD. On an average the conversion rate of projects i.e. from the PE stage to the sanctioning stage is approximately 30% which means that only 1 out of 3 projects being requisitioned to CPWD is finally awarded for execution as explained below:

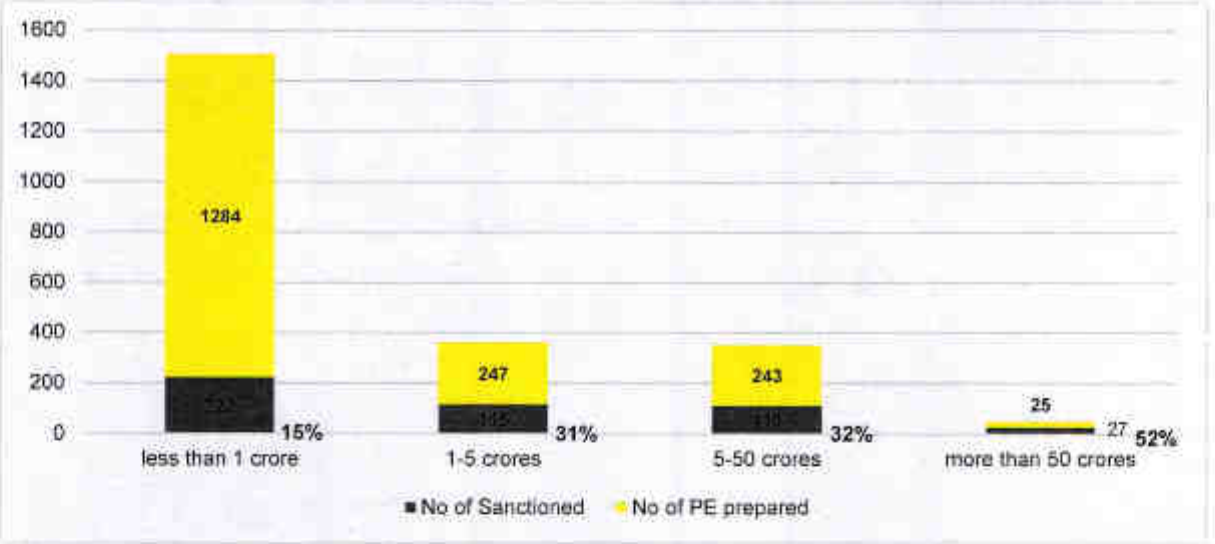


Figure 21: Transition of projects from PE to Sanctioning stage

Moreover, as per the ICRA Report of 2005:

a. Only 25% of the recorded projects were requisitioned within past six months (of the study).

b. About 33% of recorded projects were more than a year but less than two years old, for which the PE were yet to be sent.

c. Nearly 12% of the recorded projects were older than 3 years.

This means that for about 45% projects, the preliminary estimates were not sent even after one year from the date of requisition.

Similarly, MDI's analysis in an earlier report on CPWD restructuring revealed that average time taken for preparation of preliminary design and preliminary estimates is 72 weeks (about 17 months) and 19 weeks (about 5 months) respectively. All of the above clearly indicate that there are inordinate

delays in various project related activities which affect the overall operational efficiency of CPWD.

Typical outsourcing pattern

Currently, **the number of active tenders for construction and maintenance projects are 2079 and 948 respectively**. Compared to the number of ongoing projects i.e. 2021 construction and 1593 maintenance projects, it indicates that on an average, outsourcing activity is carried out for all projects (irrespective of size), thus making procurement and vendor management extensive in nature and extremely crucial for the organization. In terms of workload w.r.t maintenance project, as much as 75% work is handled in-house and about 25% work (annual and special repairs) is contracted out (as per Nitin Gadkari Report).

Given below is a table showcasing the involvement of the separate wings across the different steps of the project lifecycle and whether the activity is largely outsourced or performed in - house while '✓' refers to general involvement, '✓' refers to a step that is largely outsourced.

Table 7: Outsourcing of project activities

#	Steps	Engineering wing	Architecture wing
INCEPTION STAGE			
1	Requisition received from Client in the form of a letter (manual).	✓	✓
2	Site Survey Plan and Geo-technical Surveys and feasibility reports	✓	
3	Preliminary Drawings and Specifications (PD, PS)	✓	✓
4	Approval of drawings by client		
5	Preliminary Estimate (PE)	✓	
6	AA & ES		
PRE-CONSTRUCTION AND PLANNING			
7	Preparation of DPR	✓	
8	Detailed Drawings and Estimate (DE) based on DPR	✓	✓
9	Approval of plans by the Local Bodies (in theory)		✓
10	Technical Sanction	✓	
11	Preparation of Tender Documents/ NIT with DE info	✓	
12	Tendering and Awarding of Tender	✓	

#	Steps	Engineering wing	Architecture wing
13	Land Possession: Handing over site ready for construction	✓	
14	Commencing Construction and Execution		
15	Interim Inspection and reviewing work or auditing	✓	
16	Quality Control: Third party inspection	✓	
17	Approval of all EOTs, deviations, extra items	✓	
18	Intermittent payment to contractor on bill submission	✓	
19	Post Construction Certification of completion of work along with submission of Final Bill	✓	
20	Physical Hand Over to Client	✓	
21	Financial Submission	✓	
22	Security deposit release	✓	

It becomes obvious from the above table that throughout the lifecycle, the engineering wing is largely involved with very minimal involvement of the architecture wing. Additionally out of the above activities, the following are usually outsourced:

a) Site Survey Plan and Geo-technical Surveys and feasibility reports

b) Preparation of DPR/Detailed drawing

It is to be noted that in case of projects >50 crores, generally all design and engineering activity is outsourced and CPWD only functions as a project management unit.

Management of associated project activities

To ensure successful execution of project, CPWD has to cater to several ancillary or supporting functions and activities pertaining to research, managing vendors, record keeping, training, so on and so forth. They can be discussed under the following heads, namely:

A) Knowledge management

B) Vendor management

C) Client management

D) Legal compliance

E) Expenditure Management

F) Delivery management and monitoring

G) CPWD Sewa

The current efforts and approach of the Department in context to these activities are as follows:

A) **Knowledge management:** An important aspect in the construction industry which helps in delivery of efficient products is the component of research and market study. This allows the resources in keeping up to date with the current trends in terms of techniques, materials, processes and skill requirement. Post the ICRA report which highlighted the absence of a credible Knowledge Management System (KMS), regional design centres were created and were entrusted the responsibility of knowledge management. However, there continues to be a need for a credible integrated KMS which can be used by the project team effectively.

Additionally, a special unit called the Central Design Organization (CDO) has been entrusted with the work of design oriented research. This body is also in the position to provide consultancy or advisory services in context to design of public buildings. However, their knowledge sharing is limited to publishing articles through the annual newsletters and is considered almost redundant at present. Another unit, also redundant in the present day, is the Consultancy Services Organization (CSO) provides consultancy services for planning design and specifications. The standards and specification cell under CDO is responsible for updating and laying down specifications and benchmarking.

The CPWD Training Institute, Ghaziabad takes care of providing training across various grades of officers and also conducts orientation programmes as per the guidelines of Directorate of Training and Technical Education. The training programs are grade based and mostly conducted as face to face interactions.

B) **Vendor management:** Currently, Contract and Maintenance Cell under CDO is responsible for registration and revalidation of contractors. CPWD has a unified registration system for contractors of various services who could be considered for executing various projects. This system of contractor registration is a one-time process with minimum reviews or follow up being done on the list. Moreover, the categorization of contractors is done on the basis of value of projects handled and review of officers instead of quantum of work, competencies or expertise.

C) **Client management:** Client management allows for ease of doing business, assuring transparency and accountability of work as well as tracking progress of work and flow of funds. This is key to ensuring efficient client management programmes. Client interaction starts at the requisition of project stage and continues over the preliminary design and estimate sanctioning stage, which is mostly carried out informally. Currently, there is no platform or organization to ensure streamlined client management.

D) **Legal compliance:** Ensuring legal compliance at every stage of work is of utmost importance for any agency involved in public works. Thus, vendor, client and contract management platforms should also cover this aspect w.r.t. legal compliance in order to reduce conflict leading to disputes, vigilance cases or arbitration later. Currently, legal compliance is ensured in the following ways:

a) Contract and Maintenance Cell issues guidelines in context to contracts and upgrades the

Works Manual of CPWD. The GCC is supposed to be reviewed from time to time and the Manual is reviewed once in two years.

b) The CDO has a Techno-Legal Cell which takes care of arbitration and court cases.

c) Most of the project related legal obligations are taken care of by the EE.

E) **Expenditure management:** Tracking and fund mobilization over a vast network of executing parties requires a single point of interaction which is ensured in Expenditure Management. Nirman Lekha is a software for accounting in CPWD divisions, the primary units responsible for keeping daily accounts. While CPWD does have an IT enabled system of following up on expenditures or fund flow, the platform is outdated in terms of technology, is not linked to the PMS and lastly, is not used by the project team on a comprehensive basis. In practice, most of the records are still being held in manually fed account books.

F) **Delivery management and monitoring:** Efficient project delivery is ensured primarily by creating a balance between schedules and resources, thus it is important that intradepartmental coordination, liasoning functions and quality assurance activities are followed upon and regularly tracked. This helps in building accountability of the organisation and on a larger picture helps in achieving legal compliance. An online project status updating system, the Project Monitoring System (PMS) has been put in place which records the projects at different stages in terms of scale and time they have started. This is a portal which covers major projects of CPWD and is still being upgraded in order to serve not just as a record keeping platform but also as a means of project processing. However, the portal is outdated in terms of technology and the data fed into the system is not updated regularly. Moreover, this is not linked other IT platforms like PIMS, expenditure management, KMS etc.

G) **Quality Assurance Cell:** This also comes under CDO and CSQ unit of CPWD and is responsible for contract related matters and quality assurance functions. The CSQ works on Contract & Manual, Technical Application Development and Technology Application & Standards Unit.

H) **CPWD Sewa:** CPWD Sewa, a web based application for lodging, monitoring and managing maintenance complaints, was introduced in the year 2010 to overcome the drawbacks of traditional methods of handling complaints. The system caters to both residential and non-residential buildings.

2.2.4 Detailed review of projects:

In order to enhance our understanding w.r.t. project execution as well as substantiate some of the observations made above, a sample of 3 projects have been studied. The projects have been studied in context to the delays/challenges faced during its lifecycle. The uncertainty and vulnerabilities related to the SOP followed as well as the construction industry become clear in this segment.

a) Additional office complex for Supreme Court

The client i.e. Supreme Court of India, required an additional office space for its supporting activities for which a requisition was sent to CPWD. The project is being executed in the project mode under the budgetary head costing 884.3 crores. The work is currently in progress, with 70% of the work already executed. It is expected to be completed by December, 2017 which would put the overall delay at approx. 2 years. While the details of the project are attached in the annexure below, the key

learnings from the project are:

i. ***Delays due to client, contractor issues and site clearance issues:*** The project has suffered an overall delay of 2 years due to the following reasons:

a) From requisition to the sanctioning stage, it took 4.5 years. PD and PE were submitted only after 3.5 years due to complex nature of project. Moreover, sanction was delayed due to non-responsive client.

b) Contractors had to be re-appointed, due to competency issues. The entire process from appointment to re-appointment took 2 years.

c) The site boundaries had to be revised while work was in progress to realign the building within prescribed setback limits.

Scope definition and design finalization took around 1.5 years.

ii. ***Unforeseeable nature of construction work:*** Project was supposed to be completed in 42 months as agreed during requisition. However, due to its complex nature, an extension of 2.5 years was given, making the lifecycle of the project 5 years long. This highlights the nature of the construction industry wherein timelines have to be generally extended due to unforeseeable nature of work.

iii. ***Challenges in enforcement of Manual provisions:*** Even though the Manual mandates the client to provide an encumbrance free site, the same is a challenge in practice. The client tends to rely on CPWD to clear the site for construction.

iv. ***Reliance on outsourcing for design/planning function:*** All planning related functions were taken care by consultants instead of in-house resources.

v. ***Lean project team:*** The project team involved is lean and compact (with a total of only 17 resources)

b) PNB Headquarter, Sector 10, Dwarka:

PNB had approached CPWD with a proposal to develop a head quarter building for the bank with state of art facilities. The project is being executed in project mode under the deposit head costing 405.01 crores. The project is close to completion as 98% of the work is done, with just interior installations left to be completed. However, this project is also delayed by close to 3 years. While the details of the project are attached in the annexure below, the key learnings from the project are:

i. ***Delayed approvals:*** Local body approvals delayed the project by 2.5 years even when work had commenced in consensus with client.

ii. ***Shared accountability between CPWD and client leads to efficient execution:*** Execution becomes easier when clients are mandatorily made given shared responsibility for decision making. In this case, the client was made accountable for all decisions taken for execution using an MOU arrangement. This ensured the client's engagement through the consultants and contractors selection process, assistance in getting approvals and providing funds in time. The MoU also made CPWD legally obliged to provide justifications for estimate escalation, in order to maintain transparency in work.

iii. ***Reliance on outsourcing for design/planning function:*** All design and planning related functions were taken care by consultants instead of in-house resources. Consultants were hired at the time of requisition itself and drawings and estimates were preliminarily prepared

within a year.

iv. ***Efficient packaging can lead to streamlined execution:*** The basement was treated as a separate part of the project and was designed and executed separately on a fast track basis. However, the work was started without local body approvals and had to be temporarily stopped.

v. ***Lean project team:*** The project team involved is lean with just 15 resources in all.

c) Residential quarters for AIIMS:

This project was requisitioned to CPWD by AIIMS, proposing the construction of residential quarters and non-residential buildings at Ayur Vigyan Nagar, AIIMS, New Delhi. This was taken up as a Deposit work with the final project cost going above 300 crores. However, after 9 years from date of requisition, this project was withdrawn and awarded to NBCC. While the details of the project are attached in the annexure below, the key learnings from the project are:

vi. ***Project withdrawal without any accountability on part of client:*** Irrespective of the scale of the project, it can be withdrawn at any stage. This indicates a lack in latent marketing skills in terms of assuring the client of quality output as well as persuading the client to continue with the engagement with the Department.

vii. ***Limited CPWD mandate:*** It reflects the limited mandate of the Department since it cannot venture into competitive works such as real estate development, private commercial complexes etc.

viii. ***No enforcement of Manual provisions***: Consultants were appointed at the requisition stage for all consultancy services, even though no Enabling Estimate was charged.

ix. ***Delayed approvals:*** Almost 7 years were spent in attaining several approvals and clearances thereby delaying the entire project life cycle.

x. ***No provisions to handle changing client expectations:*** The client revised the scope of work almost 5 times in 7 years and then re-submitted the sanction after another 2 years.

xi. ***Withdrawal due to no fault of CPWD causing negative public image:*** Even after CPWD re-worked the project as per the expectations of the client, the project was terminated at the time of tendering. By this time, CPWD has already invested not just financial resources by appointing consultants but also time and human resources.

xii. ***Intact AIIMS Project division office due to tedious change management process:*** Even though the project was withdrawn in 2016, the divisional office continues to exist at the site location. Additionally, since there was no work with the division, other projects have been transferred to the division such as ITBP to ensure that there is some workload on the office.

2.2.5 Challenges

Multiple challenges related to Works Manual

The Works Manual lays down the basic framework for designing, planning and execution of construction works by CPWD. Currently, the issues with the Works Manual are as follows:

a) **Overlapping 'Project' definitions:** Definition of projects as per Works Manual allows construction and maintenance work, both to be clubbed under Original Works, hence attributable to construction works. Secondly, while the Works Manual identifies maintenance

work as one of the two type's i.e. annual or special repairs, the Maintenance Manual classifies them into five different categories. The categorizations according to the Works and Maintenance Manual are as illustrated below:

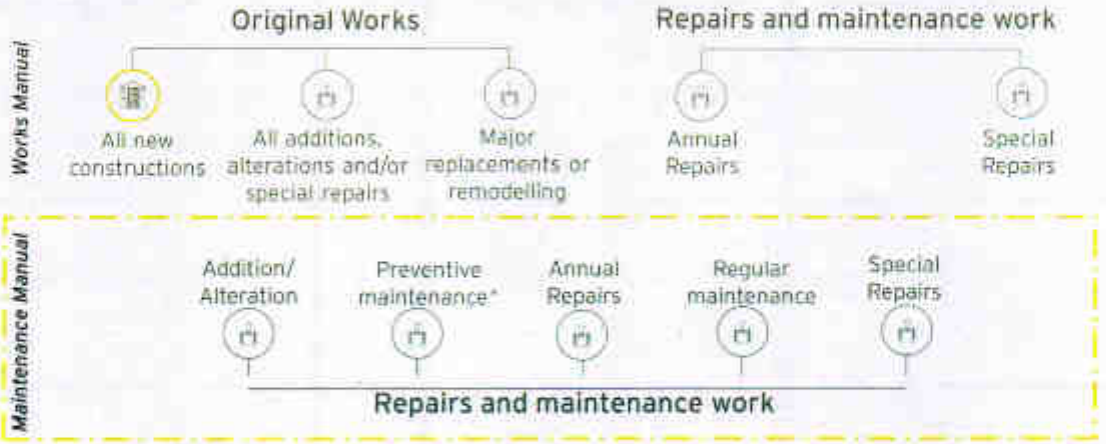


Figure 22: Categorization of projects as per respective Manuals

b) **No differentiation between mandatory and recommended provisions:** The Manual does not distinguish between mandatory and recommended provisions to execute different kind of works. This puts immense pressure on the executing staff of CPWD to ensure that all project activities are in line with the Manual, which is extensive in nature and difficult to keep track of due to continuous amendments. The Vigilance cell of CPWD comes into play whenever there is a deviation from the laid down procedures, irrespective of the motive behind the deviation. This has made engineers very cautious about deviating from the Works Manual procedures as vigilance enquiries get quite cumbersome, apart from adverse remarks in the appraisal reports. This cautious approach, more often than not, results in project delays, which ironically is not subjected to vigilance or departmental enquiries.

c) **Adhoc revisions to the Manual:** The Manual was last revised in 2014, although parts of it get revised regularly through office orders etc. These revisions to the Manual occur on an as-and-when basis leading to confusion in the SOPs to be followed. This directly affects the functioning due to unnecessary time spent in ensuring that all project activities are in line with the updated provisions of the Works Manual.

d) **Selective enforcement of the Works Manual:** Lastly, there is an issue of selective enforcement of the Manual, even where the provisions have been made. Some specific examples of enforcement issues are:

   i. A concept of Enabling Estimate has been introduced in the Manual to ensure that clients are charged for the preliminary design and planning phase. However, in practice, it is not followed by the project teams as it is not mandatory in nature. Moreover, the Works Manual doesn't lay down the detailed procedure for putting the same in practice.

   ii. As an industry standard, all approvals are required before construction commences. Accordingly, the Works Manual stipulates the same i.e. all approvals to be taken before the work is awarded for construction. However, in practice, work is sometimes awarded to a bidder even when local body approvals and other clearances are not

lined up. This leads to project delays through a "paid no-work" period since work is already awarded to contractors and cannot be started without all clearances.

iii. According to the provisions of the Manual, the approvals are the responsibility of the party that is responsible for preparation of detailed drawings. However, in practice, more often than not, the responsibility for getting the approvals rests on the Architecture or the Engineering wing of CPWD irrespective of the fact that the detailed drawings are being prepared by the consultants. This is incorrect practice.

Outdated, undifferentiated SOPs for all project types

The Works Manual prescribes certain steps i.e. the SOP to be followed for all project related activities. Some of the key issues pertaining to the SOP are as follows:

a. **Uniform SOPs for all type of work:** The Works Manual of CPWD suggests a single format for executing Original works, repair and specialized maintenance work and does not account for variation because of the differential nature of work. Some of the problems caused by one SOPs with no differentiation are:

   i. Open tenders need to be floated under all circumstances irrespective of the project value or nature. For e.g. a project of lower value (like breakdown of a pumping station) can be done on non-tendering mode.

   ii. No separate SOP for projects >100 crores which need to be carried out on EPC mode, as per the latest order by GOI.

   iii. For maintenance works, provisions like spot quotations and rate based quotations are required. This is not addressed by the single SOP.

   iv. Projects irrespective of type and value follow the same procedure i.e. requisition, planning, tendering etc. leading to delays.

b. **SOPs lack in ensuring accountability and are not comprehensive:** SOPs need to be continuously revised to improve overall functioning and accountability and stay relevant to the general market trends. Moreover, the SOPs are not comprehensive in that they leave out steps to be followed in case of several contingencies. Some specific issues with the SOPs are :

   i. No streamlined mechanism to set the client expectations, buy-in and/or revise the scope (and thereby cost) while ensuring that mutual agreement between CPWD and the client without affecting project timelines. More often than not, projects get stuck in the disagreement between the client and CPWD on scope and related issues

   ii. No provision for client getting their own consultant for a part of the project, although the same happens in practice,

   iii. No provision for change in client's/client nodal person's will to take over the asset.

   iv. No provision for deviation in contractor rates thereby impacting overall project cost due to project delays.

   v. No provision for submission of bills at the time of billing (for contractors),

   vi. Performance guarantee (from the bidders) should be not taken on fixed charge basis, as is the current practice.

vii. Projects are identified in the system the day a requisition for PE is received instead of the date of project sanctioning. This give out a false and exaggerated impression of delays on CPWDs part.

viii. The latest order by MoUD (GOI) stipulating usage of new and emerging technologies in construction work of value not less than 100 crores has not been integrated into the SOP.

Unnecessary variation in delegated financial powers

The Works Manual defines the financial powers delegated to the CPWD officials based on the activities they have to execute and the project cost. This unnecessary variation in financial powers according to each activity leads to extensive circulation of documents and consequently delaying projects. For e.g. the financial limit of an EE to accord Technical Sanction (TS) is different from the limit within which he can accept tenders. Hence, for each activity, the Competent Authority varies.

Lack of client accountability

Since CPWD is a nodal body for execution, the client's engagement in decision making is crucial for successful project execution. However, there are several issues that come due to lack of accountability on part of the client and have not been sufficiently addressed in the SOPs. These are:

a. **Consultants appointed separately by clients:** The client may appoint its own consultants to take care of work on their behalf at any stage of the project. Quite often, these drawings are not available in time and are sometimes incomplete. Moreover, while the client is responsible for providing an encumbrance free site, the same is not practiced. Hence, CPWD is forced to put in extra time and effort in order to push construction activity and keep in line with the overall project timelines.

b. **Change in will to pursue the project further:** The client may change its will to get the project executed at any stage of the project. It can control the execution through disbursement of funds which are in its control. In some situations, the project gets stuck due to no fund available from the client side, due to no fault of CPWD. Moreover, some of these projects go into arbitration wherein CPWD has to fight on behalf of the client, for no fault of theirs.

c. **Lack of client participation during execution:** During execution, the client tends to show no responsibility of even passively assuring quality of material or processes. This attitude is an outcome of aversion of getting into arbitration or litigation of any kind. The lack of client engagement throughout the project lifecycle has disrupted overall coordination. Many decisions or change in quantum of work or expenditure happens due to client's change of expectation but since there is no recording of this change, CPWD is held responsible in case variations of more than 10% occurs in TS.

d. **Change in client's intent to take handover of completed projects:** In some of the projects, there is a change in the client's/client nodal person's will to take over the asset once built.

Inconsistent flow of funds

Some of the key problems related to fund flow management are as under:

a. **Budgetary vs. Deposit Works:** Almost 60-80% of the work received by CPWD are budgetary or authorisation works, wherein works are undertaken under an outlay that is provided wholly from the financial estimates and accounts of the Union of India for every financial year. A

common challenge in such works is the delay in receiving of funds on a year on year basis. Moreover, the entire procedure of assigning the budget and giving the LOC (Letter of Credit) is very tedious and gets delayed leading to expenditure cuts that in turn affects the project timelines. In many cases, the projects are stalled since they have only received part of the money from the client and interests have shifted to some other project for that current year.

b. **No control over fund flow even post-sanctioning:** Irrespective of the type of fund (authorization/budgetary or deposit), the laid down SOPs do not guarantee a continuous flow of fund. There are no mandatory provisions to guarantee a consistent flow of funds from the client. As a result, the projects undergo slowdowns and lag periods during execution, again resulting in overall delays.

c. **No charge for preliminary design & planning:** The preliminary planning phases are completely conducted out of goodwill and not charged for. Many projects have been stalled because clients have approached other executive bodies after receiving preliminary drawings and estimate from CPWD. In many cases, work has been stalled even after work has been awarded due to lack of funds. As a result, the entire preliminary planning process (which lasts at least 6-8 months) and many a times Detailed Estimate (DE) planning gets executed without any charge, even though major amount of resources (both in terms of time and effort) go into this process. This format of funding projects often lead to huge losses in terms of time and human resource. Also, it shadows the worth of the Department and creates a negative image that the Department is incapable of providing efficient services.

d. **Low budget for maintenance work:** Low budget allocation for maintenance and repair leads to lower grade specifications of materials leading to unsatisfactory product delivery. This further leads to the creation of a poor image of CPWD on the whole.

Low use of IT

Some of the key problems related to fund flow management are as under:

a. **Disintegrated existing IT portals:** The available e-gov portals (KMS, PMS, PFMS, CPWD Sewa and PIMS) are all working in isolation with no integration to each other. These are largely outdated in terms of technology and are not user friendly. Moreover, these portals are only used as ad-hoc data capturing media rather than as an official record and enforcement of projects.

b. **Partial uptake of IT tools:** There is no mandate to update the existing portals as per specific timelines. This leads to the portals having a lack of credible information since there is no up-gradation of information at the relevant stages of the project. Resultantly, the portals end up being only moderately useful as adhoc data capturing platforms.

c. **Need for additional IT modules related to project management:** There continues to be a need for a credible and integrated IT systems related to vendors, clients, Works Manual, specifications etc. which can be used by the project team to fast-track the delivery.

Others

a. **Lack of physical IT assets:** There is a huge shortage in terms of basic physical (IT related) infrastructure especially at vulnerable areas of projects. This also leads to an apprehension to shift to IT platforms for project planning and monitoring.

b. **Low use of latest design & engineering software:** The training activities of the Department fail to capture the need to train official's w.r.t. IT tools and modes of project planning such as new software (BIM) and hardware. The Department seems to be in a technological standstill.

c. **Lack of regular revision of Specifications and Schedule of Rates:** The change in market trends fail to be addressed comprehensively since the Specifications and Schedule of Rates are not regularly updated. Additionally, the process of revising them is a time taking process as the Department waits for the products' market review rather than studying its utility in-house before using it. Real-time changes in rates are also not registered leading to controversial estimate preparations.

d. **Inadequate vendor management:** The procurement process does not ensure competitiveness amongst the vendors. Moreover, there are limited means to ensure quality vendor performance and management.

3. Summary of Recommendations from previous Reports

The functioning and structure of CPWD has been under review in the past. There have been a number of committees / studies constituted by the Ministry to study the processes and structure of CPWD. Some of the studies made are:

- **MDI, Gurgaon, 1998** - Management Study of Internal systems and processes of CPWD with the objective of improving effectiveness in successfully executive construction and maintenance activities within the stipulated time, cost and quality standards
- **Economic Reforms Commission (2001 - 2002)** - Rationalization of the functions, activities and structure of the Ministry of Urban Development and Poverty Alleviation
- **Sh. Nitin Gadkari Committee (2002 - 2004)** - To review the functioning of CPWD and suggest measures for reforms in the working of the organization
- **ICRA 2004 - Management Consulting Services** - To undertake a process improvement study of CPWD with a view to improve client satisfaction with specific focus on - Project Management, Maintenance Management and Cash Flow Management

3.1 MDI, Gurgaon Report

Gist of Recommendations	Status of Implementation
Organization Structure :	
Constitution of Central Public Works Board	Not accepted by Ministry
CPWD to be headed by a Civil Engineer with at least one year left for his retirement	Not accepted
Creation of post of Executive Director (Public Relations)	Consequent to Cadre review, the post of Director (Tech and PR) has been created which is directly attached with the DG - Not effective
Unified Command at zonal level	Implemented consequent to cadre review in the year 2012
Business development cell to be created	Implemented consequent to cadre review in the year 2012 - Not effective
Quality Assurance :	
ED (Quality Assurance in each region)	Post of Director (Works cum QA) exists in all sub regions headed by Additional DGs
Testing laboratory to be set up at circle level	Implemented
Comprehensive Training to employees	Implemented
Training of CPWD workers and contractors employees	Implemented / RTIs were created
Maintenance :	
Maintenance to be under Director (Maintenance) responsible for civil, electrical, mechanical, horticulture maintenance under their jurisdiction having officers of	Civil, Electrical, Mechanical, Horticulture Maintenance is under unified command system at the zonal level

Gist of Recommendations	Status of Implementation
respective streams	
Rate contracts to be done fixed with contractors for each group of works	Not Implemented
Service centre for each cluster of buildings	Implemented
Work Charged Staff to be made the part of regular establishment	Not Implemented
Regular customer satisfaction survey to be undertaken by an independent agency to measure the performance of maintenance unit	Impartial Survey without interface of field staff conducted by the department thrice in the past
Outsourcing for Maintenance	Implemented in selected colonies
Reward for best service centre, best sub - division, best division	Implemented
Human Resource Management :	
Corporate strategy needs to be evolved	Not Implemented effectively
Manpower and career planning to be integrated with the organizational growth	Not Implemented effectively
Comprehensive review of recruitment and promotion rules	Not Implemented effectively
Transfer and posting up to ED level to be decided within CPWD	Implemented up to SE Levels
Court cases to be reviewed by a higher powered committee and settled bilaterally through trust building exercises	Not Implemented
Introduction of award to best performers	Implemented
Performance linked incentive scheme to be started	Not Implemented
Seminars to be conducted for CPWD employees, suppliers, contractors, clients and users	Implemented
5% of total salary budget for training	Not Implemented
New Technologies Adoption :	
Director (TAD) to organize product	Implemented

Gist of Recommendations	Status of Implementation
demonstrators	
To encourage contractors for procuring modern equipment	Made part of the contract document
Management Control System:	
To completely computerized all HR data	Implemented – but PIMS is not completely reliable

3.2 Economic Reforms Commission

Gist of Recommendations	Status of Implementation
Director General of the department may be delegated substantial powers for day-to-day administration	Higher Financial powers have been delegated to CPWD officers from time to time
Director General of the department may work on a single file system with the Ministry	Implemented
To enable Director General of the department to perform effectively, he may be given a full time financial assistance	The post of Director (Finance) from ICAS cadre already encadred with CPWD
ADGs in the field, who have not been delegated any authority and have merely become an additional channel of communication causing delay in decision making. This undermines the role of a Chief Engineer	Not implemented. The functions of the Additional DGs in the sub - regions are very crucial for successful execution of the projects
At the zone level, all officers of different disciplines should report to the Chief Engineer of the zone. Posts of CE maybe held from both disciplines (civil and electrical) in the ratio of their cadre strength	Implemented
There are too many levels in CPWD. It is recommended that the level of Junior Engineer and Assistant Engineer maybe amalgamated. Chain of JE/AE-EE-SE-CE and ADG is too long and a committee maybe appointed to reduce at least one level	Not implemented. After cadre review, the strength of AEs and JEs is in the ratio of 1:1. Primarily in maintenance alone, JEs and AEs work in a chain which is required.
Budgetary control and accounting system needs to be re-designed and	Implemented

Gist of Recommendations	Status of Implementation
strengthened using computers	
Establishment cost should be brought down and the productivity increased by 20% per annum	The strength of CPWD is about 32,000 as against 46,000 in the year 2000.
Creation of separate PWD for Government of NCT Delhi	Not implemented
Introducing the use of computers for improving the efficiency of the department and time bound plan may be put in place for computerization of billing, accounting	Not Implemented effectively though E - Governance unit under CE level officer is working for implementing e- governance in CPWD
Work charged staff receive salary and all facilities like regular government employees. They are also governed under the Minimum Wages Act. It is recommended that an urgent view maybe taken on treating them as either government employees or industrial employees	Not implemented
Automation maybe introduced on the electrical side for various operations and this will reduce the requirement of staff	Not Implemented completely
Outsourcing for jobs should be explored for maintenance	Maintenance of selected colonies outsourced
Outsourcing for jobs should be explored for projects	Wherever required, outsourcing is done
Directorate of Horticulture may also improve its productivity	The highest post in the Horticulture wing has been upgraded to CE level officer i.e. DDG(H)
Directorate of Horticulture may outsource different jobs	The Horticulture works are being carried out both departmentally as well as through contract

3.3 Sh. Nitin Gadkari Committee Recommendations

Gist of Recommendations	Status of Implementation
Amendment in provisions of contract documents and procedures to reduce time and cost on projects	
Enhancement of Earnest money, to be submitted with tender forms	Implemented
Changing rate of security deposit for works	Implemented
Introduction of performance	Implemented

Gist of Recommendations	Status of Implementation
security	
Mobilization advance	Implemented
Equipment advance	Implemented
Price adjustment	Implemented
Fixing milestones	Implemented
Incentive clause	Implemented
Other Issues :	
Unified command at zonal level	Implemented
Setting up of project teams	Implemented
Signing of Memorandum of Understanding with the clients	Implemented
Third party quality audit	Implemented
Relaxation in provisions of GFR 136	Implemented
Exemption of local body approval of drawings prepared by CPWD Architect	Not accepted - Matter has been taken up by the Ministry with the State Governments for grant of the exemption
Authorizing DG to make transfer / posting of CEs	Not accepted - A proposal for delegation of transfer / posting powers of SE/CE is under submission to the Ministry
Issue of delegation of LOC to SEs	Not accepted

3.4 ICRA 2004 - Management Consulting Services

ICRA 2004 – Management Consulting Services

Gist of Recommendations	Status of Implementation
Project Management :	
Alternative 1: In the first model a new hierarchy of project manager in between CE & SE, to be manned by senior SEs having multidisciplinary skills is proposed.	It is not a workable solution since hierarchies are required to be reduced. Having an SE overseeing the work of another SE is not advisable.
The second model envisages separate managers for preconstruction and construction stage. The planning unit will be in-charge of preconstruction stage and will hand over the project to the construction unit for actual execution.	This will lead to situations where authority, duties and responsibilities are not with the same authority and is not likely to give desired results
Devising a focused and regular skill up-gradation (training) programme	Not implemented effectively

Gist of Recommendations	Status of Implementation
Rationalisation of Command Chain - There is need to remove the anomaly of duplicity of chain of command (in terms of different functional administrative reporting structure) the zonal head should be the final authority in a zone and be responsible for overall management of works	At present zonal head is responsible for overall management of works and is responsible for writing APARs of officers subordinate to him
Adherence to procedures and the role of vigilance cell	Not implemented effectively
Establishment of a Knowledge Management System Absence if credible Knowledge Management System needs to repetition of designing activity, eliminating the opportunities of implementing projects on fast track	Regional Design centres recently created, have been entrusted with the job of Knowledge Management. Not implemented effectively.
Developing a Comprehensive Project Management Information System	Not implemented effectively
Scope Change Control system CPWD should implement scope change control system which should be linked and synchronized	Not implemented
Maintenance Management :	
Ensure better customer interface and service delivery	Implemented
Strengthen monitoring of compliant redressal mechanism	Implemented
Outsourcing of maintenance activity	Implemented in selected colonies
Cash - Flow Management :	
Creation of revolving fund	Not implemented
Funding in phases in an Escrow account	Not implemented
Synchronising the budgetary process with the flow of cash	Not implemented

4. Study of Leading Practices

In order to enhance our understanding w.r.t. organization restructuring of Central Public Works Department, we have studied similar departments / organizations in India and abroad. We have studied the working of MES, BRO, NBCC and Railway Development Authority and internationally, we have also studied structure of Public Works Department of Singapore and Malaysia.

4.1 Military Engineering Services (MES)

Military Engineering Services (MES), is the premier construction agency and one of the pillars of Corps of Engineers of the Indian Army which was set up over 200 years ago to execute both civil and military infrastructure. It is one of the largest construction and maintenance agencies in India responsible for creating strategic and the operational infrastructure, major roads and administrative habitat for all three services and the associated organizations of the Ministry of Defence.

Military Engineering Services carries out construction of residential and office buildings, hospitals, military roads and runways, marine structure like docks and harbours across the country including border areas. It contributes significantly towards building and disaster mitigation.

Organization set up of MES:

MES has a pan India reach and provides engineering support to various formations of Army, Air Force, Navy and DRDO. It has over 600 stations across the country including the island territories of India.

Administratively, MES functions under the overall control of the Engineer - in Chief, who is the advisor to the Ministry of Defence and the three services on operational and peace time construction activities. It has a multi-disciplinary team which comprises of the following:

1 Architects
2 Civil, Electrical and Mechanical Engineer
3 Structural designers
4 Quantity Surveyors
5 Contract specialists for planning, designing and supervision of works

The civilian cadre consists of 4 main cadres which are as follows:

1 Engineering
2 Surveyor Cadre
3 Architect
4 BSO (Qualified Engineers)
5 Administrative Cadre

All human resource issues such as - recruitment, training, posting and promotion are dealt through different headquarters under the guidelines of Engineers in Chiefs Branch/ IHQ Ministry of Defence.

4.2 Border Roads Organization (BRO)

Border Roads Organization (BRO), under the Ministry of Defence, is one of the nation's most reputed modern construction organization responsible for developing and maintaining road networks in India's border areas and neighbouring countries. The projects undertaken by BRO typically include developing roads, bridges and airfields in hostile environments.

Some of the projects also include the development initiatives of the Indian Government in foreign territories like Tajikistan, Afghanistan, Myanmar and Bhutan. For example - the Delaram Zaranj

Highway in Afghanistan, completed and handed over to the Afghan Government in 2008, restoration of the Farkhor and Ayni air bases in Tajikistan.

Organization Structure of BRO

Structurally, BRO comprises of the Border Roads Wing in the Ministry of Defence and the General Reserve Engineer Force (GREF).

Administratively, BRO is headed by DG Border Roads and operates via HQ and Directorates and is divided into Eastern Region and North Western Region headed by ADGs.

The Headquarter includes the following:

- Technical Administration
- East Directorate
- West Directorate and Contracts
- Technical Planning
- Personnel
- Discipline and Vigilance
- Medical
- Boring and Tunnel

The BRO includes 18 Projects, which are divided into Task Forces, Road Construction Companies (RCCs), Bridge Construction Companies (BCCs), Drain Maintenance Companies (DMCs), and other functional platoons. The organization also includes base workshops, store divisions, training and recruitment centers, and other staff. The organization employs labourers locally. No local labourer is deployed in the GREF on casual employment.

4.3 National Building Construction Corporation (NBCC)

National Building Construction Corporation (NBCC), is a blue-chip Government of India Navratna Enterprise under the Ministry of Urban Development. It was set up in 1960 with a mandate to undertake Real Estate Development and Construction business, and provide Project Management Consultancy Services. The area covered under NBCC includes - Roads, Hospitals and Medical Colleges, Institutions, Offices, Airports, Bridges, Industrial and Environmental Structures.

NBCC offers services via 3 segments - Project Management Consultancy, Engineering Procurement and Real Estate. However, the current areas of operations are: PMC, Real Estate Development, EPC Contracting and Redevelopment of Government colonies.

It has a pan India presence as well as global presence. Some of the recent projects of NBCC includes the New Moti Bagh- Green Complex (Delhi) under General Pool Residential Accommodation (GPRA) Scheme. The project today is certified largest Green Home Complex of its kind in the country. Internationally, NBCC ventured into overseas operation by executing projects of diverse nature in countries like Libya, Iraq, Yemen, Nepal, Maldives, Mauritius, Turkey and Botswana.

Currently, the Company has its presence in Maldives, Turkey and Botswana implementing various projects. Of late, NBCC has opened an office in Oman and also signed a MoU with Al Naba Services LLC in Oman in order to jointly explore and secure infrastructure projects in Sultanate of Oman & neighbouring countries. To further its prospects overseas, the Company has also entered into MoUs with Construction Industry Development Board Holdings, Malaysia and Form Yapi Malzemeleri Insaat Samayi Ticaret Ltd., Turkey.

Organization Structure of NBCC

NBCC is headed by a Chairman / Managing Director. Under the Chairman, the Management cadre consists of 1 Senior Executive Director and 5 Executive Directors.

To summarize, following is a comparative analysis of the organizations discussed above.

Table 8: Comparative analysis

Parameter	Central Public Works Department (CPWD)	Military Engineering Services (MES)	Border Road Organization (BRO)	National Building Construction Corporation (NBCC)
Ministry	Department under Ministry of Urban Development	Ministry of Defence	Ministry of Defence	A Navratna CPSU in category I under Ministry of Urban Development
Established in Year	1854	1851 (in the current form since 1899)	1960	1960
Mandate	To create and maintain Central Government assets, with exception of Defence, Railways & Telecommunications	To undertake construction of new infrastructure works and their subsequent maintenance for Army, Navy, Air Force, Coast Guards, Ordnance Factories, DRDO and other organizations associated with the defence establishments	To develop and maintains road networks in India's border areas and friendly neighbouring countries	To undertake Real Estate Development & Construction business, and provide Project Management Consultancy services
Organization Division	Subdivided into 7 Regions, Sub-Regions and Zones	Works distributed in 6 Commands • Northern • Eastern • Western • Southern • South Western • Admin	Operates via HQ and Directorates HQ (includes Technical Administration, East Directorate, West Directorate and Contracts) Technical Planning Personnel Discipline and Vigilance	Offers services via three divisions: • Project Management Consultancy • Engineering Procurement • Real Estate

Parameter	Central Public Works Department (CPWD)	Military Engineering Services (MES)	Border Road Organization (BRO)	National Building Construction Corporation (NBCC)
			Medical Boring and Tunnel	
Headed By	DG who is also Principal Advisor to Government of India	Engineer-In-Chief (advisor to the Ministry of Defence and the three Services on operational and peace time construction activities)	Director General - Border Road	Chairman - Cum - Managing Director
Regions headed by	Special Director General	Commands Headed by: Director Works (DW) DW & CE (Army) DW & CE (Navy) DW & CE (Air) The civilian cadres consists of four main cadre i.e. Engineering, Surveyor cadre, Architect & BSO and an Administrative cadre (Six Command Chief Engineers are co-located under the operational Army Commands, ADGs at Pune and Secunderabad. Zonal Chief Engineers of 31 MES zones)	ADG (North West) and ADG (East)	Management cadre below Board: 1 Senior Executive Director - 1 2. Executive Directors - 5
Sub Regions headed by	Additional Director General			
Zones headed by	Chief Engineer			
Cadres	Three Cadres namely Group A controlled by MoUD, Group B and Group C controlled by DG-CPWD		Two cadres at Officers levels- ADM and Medical 63 Ranks/ Trades under Group B and C	
Total Strength	Group A - 8440	A Large construction and	40112	Regular Employees - 2344

Parameter	Central Public Works Department (CPWD)	Military Engineering Services (MES)	Border Road Organization (BRO)	National Building Construction Corporation (NBCC)
	CPWD Cadre - 9100 Also supported by Ministerial Staff of Central Secretariat - 550 Workers - 15500	maintenance agency in India (Over 1.1 lakh strong across 8 cadres) - refer Annexure 3		

4.4 Singapore – CGP Corporation

CPG Corporation (CPG Corp) is the corporatized entity of the former Singapore Public Works Department (PWD). It employs more than 2000 people across the Asia – Pacific region and provides a full spectrum of infrastructure & building development and management services. It is one of the leading development professionals in the Asia-Pacific region providing building and infrastructure development and management services which comprise master planning and urban design, green design, architectural and engineering design and consultancy, landscape urbanism, project management, construction management to facilities management services. Currently, CPG Corp has expanded its portfolio to over 25 countries outside Singapore, with China, India and ASEAN being their key markets.

CPG became a corporatized entity in 1999 having realized that there was a huge demand in the market for the quality of work they do. Post the process of corporatization, they started providing consulting to the works department in various countries across Asia Pacific region. As a part of their growth process, they later ventured into structural design management & later started bidding independently for construction projects. The whole organization has its head office in Singapore led by the Chief Executive Officer.

Organizational Structure of CGP:

The organization structure of CPG is headed by the CEO in Singapore. Next, is the Business Development Vice President & Managing Director who operates from Singapore Office. After these 2, the organization takes a departmental structure with each department having its own support function. The departments have been divided based on the work done by each of them. These departments work independently or in unison, as the need may be. The departments are as follows:

- Design & Engineering Consultancy
- Facilities Management
- Project Management
- Construction Management

Except for Design & Engineering Consultancy, all the departments are headed by a Managing Director. Design & Engineering, being the key portfolio of the organization, has 11 leaders for the 11 wings, divided on the basis of the work they do. Some important wings are Airport Development,

Structural Design, Infrastructure, etc.

4.5 Malaysia - Public Works Department of Malaysia

Kementarian Kerja Raya (or The Ministry of Works) is a Ministry under the Malaysian Government responsible for infrastructure development. It is primarily responsible for the construction of roads and industrial infrastructure development within the state of Malaysia. It is led by a Minister appointed by the Prime Minister of Malaysia and envisions to be 'the organization pioneer in the development of infrastructure and spur industrial development to be more competitive in the global market'.

Key Objectives

- Provide federal road network that can develop economy and enhance the quality of life
- Ensure that the development of industrial projects in on schedule, monitor the cost & specifications and ensure high quality work is done
- Provide the construction industry with an environment and professional services that is conducive in order to contribute to industrial growth and international competitiveness
- Build and strengthen the entrepreneurs in the construction industry

Following are the key departments that lie under the Ministry of Works:

- Public Works Department
- Construction Industry Development Board
- Malaysian Highway Authority

Public Works Department - Malaysia

The Public Works Department of Malaysia, PWD (Malaysia) works under the aegis of Ministry of Works Malaysia. They are primarily responsible for:

- Planning, design & construction of Planning, design and construction of infrastructure ventures such as roads, government buildings, airports, harbours, piers and related engineering works.
- Maintenance of roads and selected government buildings; and
- Technical advisory services to the Federal Government, as well as states and district

Organization Structure of PWD, Malaysia

Public Works Department, Malaysia is leaded by a Chief Director of Public Works, assisted by three Deputy Chief Director of Public Works. Administration of the Public Works Department obscures the whole country except for 2 regions. The key aspect of their organization structure is that it is a completely functional organizational structure. All the key functions have been separated and have their own organization trees. The key functions have been listed as follows:

- Infrastructure
- Buildings
- Technical Consultancy
- Strategic Planning & Innovation
- Khas Province Management

There is Managing Director who heads all these 5 sections. One secretary each has been appointed for Infrastructure, Buildings and Consultancy. There is a team of 3 directors to take care of strategic planning & innovation team. Each of these director has a portfolio assigned to them. All the secretaries and directors report directly to the Managing Director.

Key Findings:

It was found that Military Engineering Service and Border Road Organization takes projects like CPWD of national interest and take projects which may be critical, strategic and at times may not be economically viable for a corporate entity / PSU to consider, therefore entities like NBCC and the CGP of Singapore may not be a tenable option for CPWD to follow.

Given the nature of work and the organization set up of Malaysian PWD seems to be relevant for CPWD and the Malaysian set up was taken into consideration while recommending to CPWD. Specific detail about these organization are included in the various recommendations mentioned in Section 5 of the report.

5. Recommendations

5.1 Overview

We envision CPWD as a leading design and engineering firm in the country undertaking marquee public projects in India and across the globe with a separate facility management (maintenance) function. Our vision for change is based on three key pillars. These are:

Figure 23: Drivers for change

While Business Process Improvement (BPR) allows for streamlining of project execution and reduction in overall delays, organizational restructuring and cadre management is necessary to ensure better efficiency of the organization. Our detailed recommendations to achieve the vision for change are as given below:

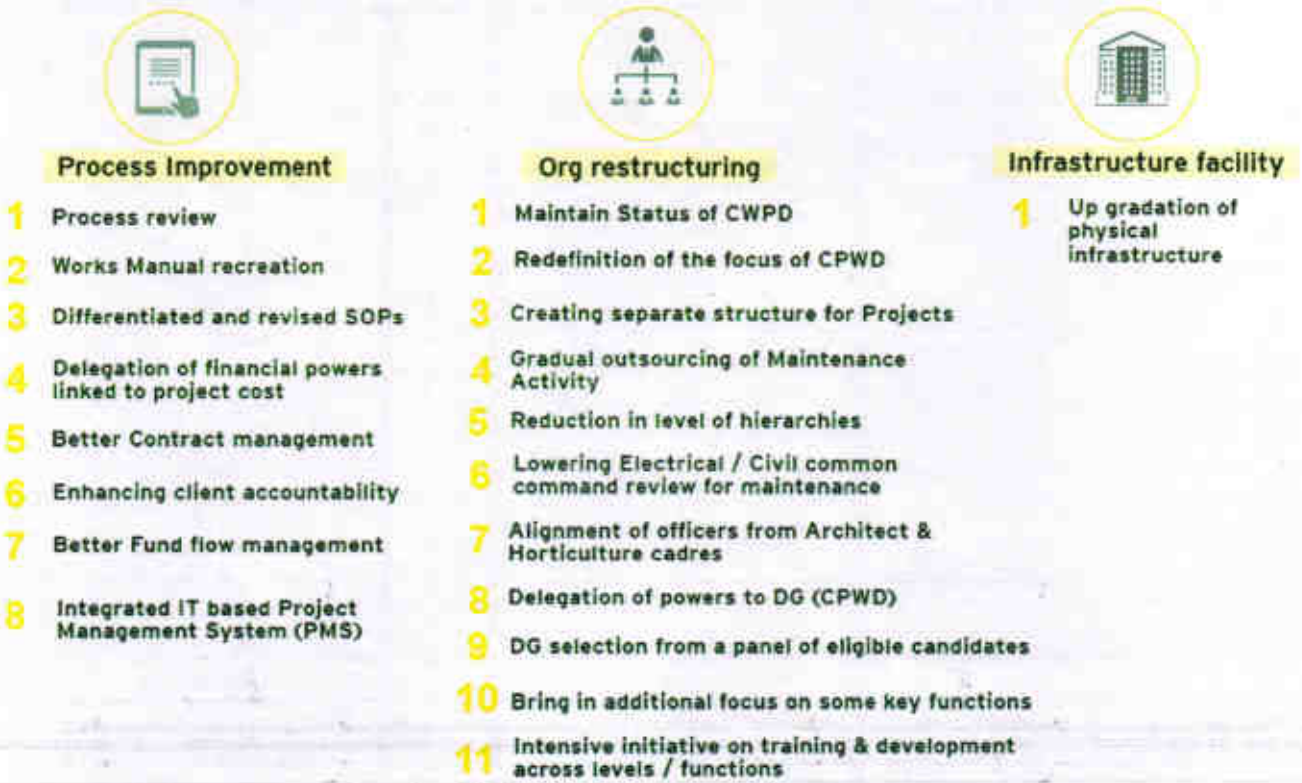


Figure 24: List of detailed Recommendations

These have been elaborated along with details of key problems, suggested recommendations, potential gains, implementation approach and reference to previous studies or case studies below.

5.2 Detailed Recommendations

5.2.1 Works Manual 2.0

Key problem/ opportunity:

The Works Manual lays down the basic framework for designing, planning and execution of construction works by CPWD. Currently, the issues with the Works Manual are as follows:

a) Overlapping 'Project' definitions

b) No differentiation between mandatory and recommended provisions

c) Ad-hoc revisions to the Manual

d) Selective enforcement of the Works Manual

e) No enforcement of Maintenance Manual

The same have been detailed in the 'Challenges' section above.

Recommendation:

Considering the complexity and multiplicity of challenges related to Works Manual it is suggested that the Manual be redrafted in line with latest trends in the construction sector and global best practices. Some key areas of revision are identified below however extensive stakeholder consultations, analysis and research is required to finalize the changes and draft the Works Manual 2.0. The suggestions are as follows:

a) **Redefining 'Works':** Manual should clearly define 'Construction and Maintenance Works' omitting all overlaps

b) **Simplified Manual with differentiated mandatory & recommended provisions:** Manual should be simplified, with clearly identified sections/volumes for each identified topic for e.g. Definition, Delegation of powers, SOPs etc. Within each section/volume, the mandatory and recommended provisions should be stated with clarity

c) **Regular revision of the Manual:** Define a periodic cycle, which should be well known to all stakeholder, for revision of the Manual. We recommend that the Manual should be revised on an annual basis with the help of an independent review committee of experts. It is essential that the Manual is revised in line with the latest market trends in terms of materials, design, specifications, processes and systems as well as changing government regulations.

d) **E-Manual:** An online and digitized version of the Manual to be made available. This E-Manual should be search enabled wherein the 'Search' provision will be both tag and key-word enabled. For the same, it is to be ensured that metadata for the page like title, keywords, description and language is appropriately included.

e) **Enforcement of Manual & related provisions:** Some provisions of the Manual which have to be enforced are:

   a. Enabling Estimate

   b. Tender documents/ packages shall be considered valid only when approvals and clearances are in hand.

c. Entire process of getting approvals is the responsibility to the party preparing the detailed drawings. For e.g. in case of rate contracts the architecture wing will be responsible to get the approvals and in case of EPC contracts the approvals are the responsibility of the contractor.

Potential gains:

a) Ease of access and reference

b) Lesser delays due to reduction in regulatory steps and greater flexibility of working

c) Optimum utilization of the existing provisions of the framework

Implementation approach:

A consultant should be appointed for the preparation of the new Works Manual for CPWD. This exercise should roughly take 6-8 months to complete. The indicative list of activities to be undertaken by the consultant are as follows:

- Review the current Manual
- Study the processes followed for execution of projects
- Undertake stakeholder consultation
- Undertake study of global examples
- Define the new structure for Manual and seek wider approval on the same
- Draft the new Manual

For this task the activities to be undertaken by CPWD are as follows:

- Appointment of a committee with representation from internal staff and external experts
- Draft and finalize the TOR for selection of consultants
- Undertake the Bid Process Management for appointment of consultant
- Review and oversee the work of consultant
- Organize workshops for discussion on Manual, inviting people from the field and relevant ministries
- Get approvals and publish the Manual
- Organize trainings for staff

References:

Report by Nitin Gadkari Committee: CPWD should implement scope change control system which should be linked and synchronized

Report by Nitin Gadkari Committee: Exemption of local body approval of drawings prepared by CPWD Architect

Malaysia's Public Works Authority KEMENTERIAN KERJA RAYA (KKR) has a digital Works Process Manual which includes all project related SOPs

5.2.2 Differentiated & revised SOPs

Key problem/ opportunity:

The Works Manual prescribes certain steps (SOPs) to be followed for all project related activities. Some of the key issues pertaining to the SOPs are as follows:

a. Single format of work execution irrespective of types and scale

b. SOPs fail to address change in trends of technologies, materials and implementation processes (mode of execution).

c. SOPs are not comprehensive in that they leave out steps to be followed in case of several contingencies.

The same have been detailed in the 'Challenges' section above.

Recommendation:

In context to the challenges highlighted above the following recommendations have been suggested:

a. **SOPs specific to type and scale of work:** Separate SOPs for both construction and maintenance projects. Additionally, further bifurcations shall be done in context to the scale of project and the mode of execution. For e.g. SOP for projects>100 crore, under EPC mode, shall have its own SOP.

b. **Clear demarcation of roles and responsibilities, timelines:** These should clearly demarcate the roles & responsibilities of the various CPWD wings vis-à-vis the step by step timelines.

Potential gains:

a) Execution of work would become faster depending on nature of work

b) SOPs would be in line with the changing market trends of processes

Implementation approach:

As mentioned in the previous section the Works Manual must be reviewed and revised where in SOPs shall also be considered to be revised. Thus SOP revision would also be a part of the 6-8 months process of Manual change.

The indicative list of activities to be undertaken by the consultant are as follows:

- Review the current processes followed for execution of projects
- Study the teams involved in each stages of the process as well as individual responsibility share in regards to execution
- Study of legal frameworks which regulate public works execution
- Undertake case studies of SOPs used in the construction industry
- Define the new structure for SOPs which vary as per project cost and mode of execution
- Draft the new SOPs
- Stakeholder consultation

For this task the activities to be undertaken by CPWD are as follows:

- Appointment of a committee with representation from internal staff and external experts for

revising the SOPs as a part of the Manual revision

- Draft and finalize the TOR for selection of consultants
- Undertake the Bid Process Management for appointment of consultant
- Review and oversee the work of consultant
- Organize workshops for discussion on Manual inviting people from the field and relevant ministries
- Get approvals and publish the SOPs as a part of the revised Manual
- Organize trainings for staff

5.2.3 Delegation of financial powers linked to project cost

Key problem/ opportunity:

As detailed in the 'Challenges' section above, the variation in financial powers according to project cost and activities lead to unnecessary circulations of documents and delay of projects.

Recommendation:

Absolute financial powers basis project cost: The financial powers delegated to a CPWD officer should be based on project cost and not differ according to activities as per the current delegation norm. The same should be revised under the new Works Manual 2.0. It was suggested during stakeholder interaction that that EE's power should be 10 crores, SE power should be 50 crore and CE should be 100 crores. However, a detailed exercise may be undertaken to carry out appropriate delegation.

Potential gains:

Fast tracked execution of projects

Implementation approach:

The financial powers must be reviewed and revised as a part of revision of the Works Manual. This would take 6-8 months' time excluding ministry level clearances that would be required to implement these changes.

The indicative list of activities to be undertaken by the consultant are as follows:

- Review the current financial delegation plan
- Study the rules of GFR and other documents regulating delegation of financial powers to government officials
- Study of projects in terms of scales and officials involved along with the responsibilities they are given
- Define the new basis of defining the powers i.e. project cost, hierarchy, etc.
- Draft the new list of delegated financial powers

For this task the activities to be undertaken by CPWD are as follows:

- Appointed 'Works Manual Reviewing Committee' shall review and revise of financial powers
- Draft and finalize the TOR for selection of consultants

- Undertake the Bid Process Management for appointment of consultant
- Review and oversee the work of consultant
- Organize workshops for discussion on the Manual inviting people from the field and relevant ministries
- Get approvals and publish the "List of Delegated Financial Powers" as a part of the revised Manual

5.2.4 Ensuring client accountability

Key problem/ opportunity:

Since CPWD is a nodal body for execution, the client's engagement in decision making is crucial for successful project execution. However, there are several issues that come due to lack of accountability on part of the client and have not been sufficiently addressed. These are:

a. Appointment of private consultants at any stage of the project
b. Encumbrance free site is not made available
c. Refusal to continue execution of project midway without assigning reasons
d. Timely and sometimes total non-payment of dues
e. Change of expectation
f. Refusal to takeover completed assets

The same have been detailed in the 'Challenges' section above.

Recommendation:

Addressing the problems mentioned above, some of the key recommendations are:

a. **Enforcement of SOPs:** SOPs to make provision for all such contingencies, as has been discussed in recommendation 'Works Manual 2.0' above.
b. **Contractual binding for clients:** Ensure client accountability via contractual binding. This can be achieved in any of the two manners suggested below:
    a) Tri-party agreements
    b) Back to back agreements clearly defining the responsibility/liabilities of each party
c. **Limitation on scope and design changes:** Cap on variations requested by the client by value of anticipated changes
d. **Formal request to incorporate scope and design changes:** All variation requests to be received formally (letter/e-mail/online) irrespective of value and recorded in orderly manner
e. **Ensuring timely hand over of completed projects:** All completed constructions (i.e. a project with finished and serviced properties, finished and serviced site, completion and occupancy certificates issued along with all clearances, final bills and payments cleared) to be handed over to client within 6 months by CPWD. If the client does not sign handover note within the stipulated time, the project will be deemed as completed and closed at the end of this period, with no legal binding on the executing agency to maintain the warranty period clause and immediate release of performance guarantee to the contractor.

Potential gains:

a. Accountability on part of the client towards the project.

b. Limiting project delays due to the fault of the client.

c. Lower rate of projects going to arbitration.

Implementation approach:

The approach is two-fold, with a vision to bring immediate changes in the execution process, to be implemented in a month's time as well as a long term strategy to assure clients participation by automation in 8 to 12 months. Also, the SOPs in the Manual would have to be revised accordingly.

The indicative list of activities to be undertaken by the consultant are as follows:

- Review the current MoU documents and address the shortcomings in terms of assuring client accountability
- Draft standard MoU document formats specific to the modes of execution of projects
- Study the potential stages of processes where in client's participation is absolutely necessary and accordingly revise SOPs and stakeholder responsibility sections of the Manual
- Define the basis of IT architecture of the Client Management Module so that it can be linked to the Project Management System

For this task the activities to be undertaken by CPWD are as follows:

- Circulate an office order mandating that an MOU may be signed between the client and CPWD for all projects >10 crores (to start with) which is to accompanied with a sample MoU document defining responsibilities/liabilities of both parties
- Following this the appointed Works Manual Reviewing Committee shall review and revise SOPs and stakeholder responsibilities as a part of the Manual
- Draft and finalize the TOR for selection of consultants for transaction advisory and client management portal developers
- Undertake the Bid Process Management for appointment of consultant and portal developers
- Review and oversee the work of consultant and portal developers
- Organize workshops for discussion inviting representatives of various stakeholder groups
- Get approvals and publish the standard MoU formats
- Launch the Client Management Module of the ERP along with a short training explaining its functions

References:

Report by Nitin Gadkari Committee: CPWD should implement scope change control system which should be linked and synchronized

5.2.5 Fund flow management

Key problem/ opportunity:

Some of the key problems related to fund flow management are as under:

a. Inconsistent fund flow, especially for Budgetary works

b. No control over fund flow even post-sanctioning

c. No charge for preliminary design & planning

The same have been detailed in the 'Challenges' section above.

Recommendation:

Since efficient execution of projects is largely dependent on the fund flow, the following suggestions would ensure the same:

a. **IT based expenditure management:** Payment scheduling, billing and transactions should be done over an e-portal designed for expenditure management. The same is also currently being planned for but would have to be reviewed for its comprehensiveness and integration with other existing IT portals.

b. **Escrow Accounts for large projects:** Execution of large budgetary projects may be streamlined through the use of Escrow Accounts in which funds shall be deposited in the account as the projects proceed based on pre-fixed payment schedules.

c. **Enabling Estimate to be charged mandatorily:** Concept of Enabling Estimate should be enforced mandatorily for all projects as mentioned in recommendation 'Works Manual 2.0' above.

Potential gains:

a. This would ensure that the project will come to a successful closure as the client will be bound by the deposits made.

b. Ensure consistent fund flow and availability such that delays are avoided.

c. Enabling Estimate would prevent the Department's services and resources from being misused.

Implementation approach:

Implementation of the changes with regards to fund flow management requires high level deliberation and consensus. It is estimated that a complete BPR & automation exercise can be completed within 6 to 24 months.

The indicative list of activities to be undertaken by the consultant are as follows:

- Define projects as large or small based on the scale of projects considering all mode of execution
- Define the usage pattern for the Escrow Accounts
- Draft standard LoA and MoU document formats specific to the modes of execution and scale of projects, ensuring timely release of fund
- Define the basis of IT architecture of the Expenditure Management Module so that it can be linked to the Project Management System

For this task the activities to be undertaken by CPWD are as follows:

- Hold discussions with CCA and other ministerial representatives to review the feasibility of these

- Circulate an office order mandating execution through Escrow Accounts for larger projects (more than 10 crores) along with responsibilities of all involved parties. Charging Enabling Estimate, without which the project commencement shall not be considered, must also be mandated in the same order.
- Following this the appointed Works Manual Reviewing Committee shall review and revise SOPs in order to introduce the new fund management system
- Organize workshops for discussion inviting representatives of various stakeholder groups
- Get approvals and publish the standard MoU formats

References:

Report by Economics Reforms Commission: Budgetary control and accounting system needs to be re-designed and strengthened using computers

Report by Nitin Gadkari Committee: Funding in phases in an Escrow account

Report by Nitin Gadkari Committee: Synchronising the budgetary process with the flow of cash

5.2.6 Integrated IT based Enterprise Resource Planning (ERP) system

Key problem/ opportunity:

Some of the key problems related to fund flow management are as under:

a. Disintegrated existing IT portals
b. No enforcement through IT
c. Need for additional IT modules related to project management

The same have been detailed in the 'Challenges' section above.

Recommendation:

The following recommendations would address the above mentioned challenges of the IT infrastructure:

a. **Integrated EMS:** There is need for a new interlinked ERP system that allows for streamlined management, monitoring and reporting of projects, resources, budgets, expenditure, clients, vendors etc. The ERP system should be established basis a detailed Business Process Re-engineering (BPR) exercise that will re-look at the entire CPWD functioning as well as the revision of the Works and Maintenance Manual as suggested above.

   The ERP system that will be established should anchor the complete gamut of services and actions along central theme of a Project wherein Project is clearly defined by nature of work *(new Works Manual)*. This will allow CPWD to move from a function driven to a project driven approach, as has been illustrated below

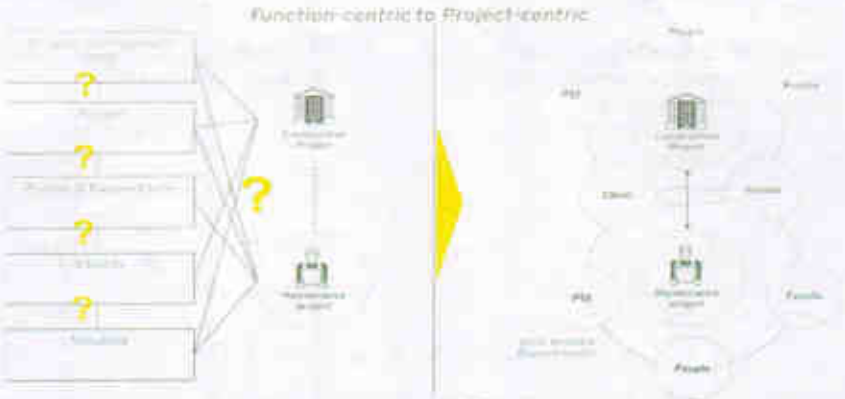
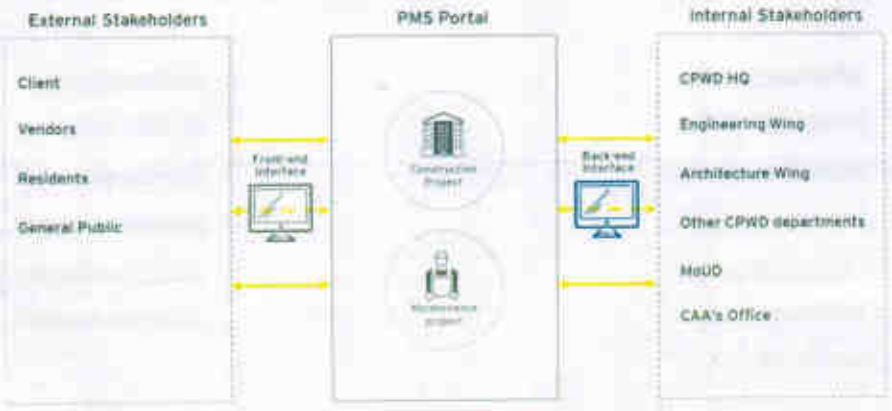


Figure 25: Approach for BPR Improvement



Data would be stored as either linked to a Construction or a Maintenance project.

Figure 26: ERP portal concept

The stakeholders, both external and internal (as listed below) will interact with the portal through a front-end and a back-end interface respectively. Once, this system has been put into place, it will be possible to carry out the entire project execution lifecycle on the ERP platform itself. Some of the key functional features of the automated project execution lifecycle could be:

i. A **unique alphanumeric project ID along with a dedicated project dashboard** shall be automatically generated as soon as a requisition is submitted. This shall be a SLA provisional ID till sanction (AA&ES stage) and first instalment of payment is received. This project ID would follow a set format with some inbuilt differentiation for the nature and type of projects

ii. **Employee log-in ID** and password to carry out various activities the official is allowed to perform on the basis of his financial powers, over the project dashboard

iii. Similarly, the clients shall also create a **client user profile** on the system with specific log in ID and password for access to the requisition portal and reviewing and approval giving activities over the project dashboard

iv. **Project dashboard** shall not just be a stock house of data related to the project but also be used for managing it, too. Successful completion of one stage of work

with all required documents submitted and payments cleared shall activate the next stage of work. Therefore, all related components of the project like funds, expenditure, knowledge, vendors, people etc. shall be linked to the project ID

v. The **project status in details shall be under public forum** notifying all involved stakeholders of the project's progress. The ERP shall allow access to latest news, circulars, office orders & notifications, feedback portals, Code of Conduct, FAQ's and directories. The 'Help' option would make the ERP more user friendly

To do the same, the new platform will have interlinked modules which will all be used to streamline the project execution efficiency. Some of these are:

i. **Monitoring and management module** with automated measurement books, Works Manual, estimate developers and digital schedule of rates and specifications

ii. **Personnel Information Management System** for all CPWD employee details including promotions, transfers, ACRs, leaves, etc.

iii. **Client management** for requisition, sanctioning, status tracking, fund flow and other enforcement measures

iv. **Vendor management System** for registration, rating, feedback, bill submission, etc.

v. **Knowledge Management system** for record keeping of organizational and research data, knowledge and experience sharing platform and as an extension of the project management system (with customized report generators etc.)

vi. **Expenditure Management System** for all fund flow management issues

An illustrative process flowchart of the revised process has been attempted below:

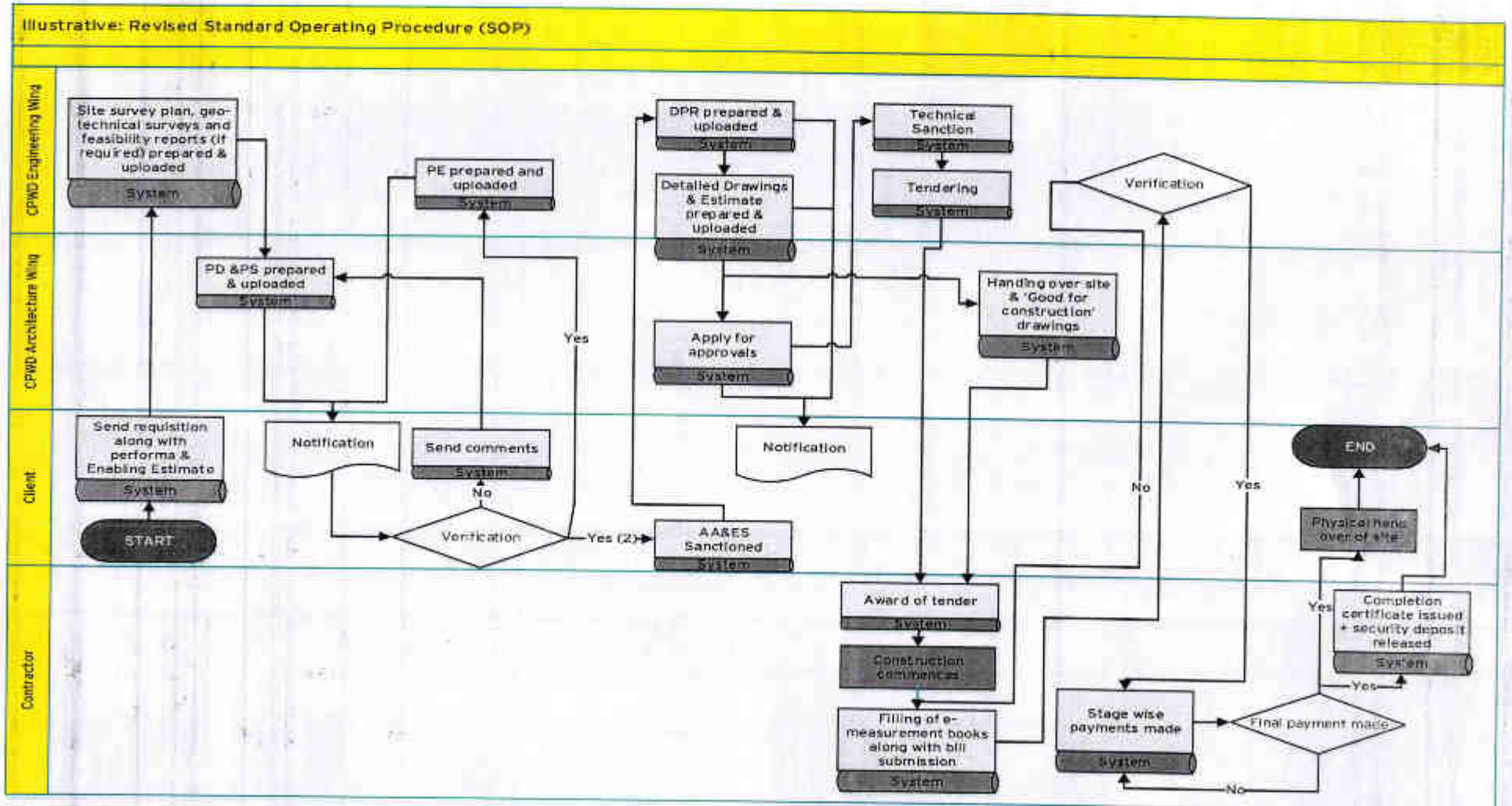


Figure 27: Illustrative - Revised SOP

b. **IT based record keeping:** All record keeping must also shift to the IT enabled platforms such that progress of work is tracked online and there is no fall back mechanism. The same should be included in the revised SOPs, as is covered in recommendation 1.2.1 and 1.2.2 above. However, archiving of data must be done both in soft and hard copies at the headquarters.

c. **Dashboards:** Since the implementation of an Enterprise wide system is a long term endeavour, as a short term measure, dashboards may be developed that will keep track of the CPWD progress against targets and set KPIs.

Potential gains:

a. Streamlined project execution reducing coordination efforts and thereby overall delays. For e.g. currently it takes 9 steps to comes to the site survey stage, however the same may to streamlined to only 3 steps. The same would lead to reduction in timelines as well.

Table 9: Illustrative reduction & streamlining of process steps

#	Steps of the existing process	#	Steps of the proposed process
1	Sending requisition letter	1	Submission of requisition along with filled in proforma and Enabling Estimate
2	Receiving and forwarding requisition letter		
3	Requisition letter received by architecture wing		
4	Proforma sent to client		
5	Proforma received and completed by client		
6	Vetting and reviewing of Performa by competent authority	2	Architecture and Engineering wing team assignment
7	Filled proforma forwarded to Architecture wing		
8	Forwarded proforma sent to and received by Engineering wing		
9	Site survey plan, geotechnical survey and feasibility report to be prepared	3	Site survey plan, geotechnical survey and feasibility report to be prepared and uploaded

b. Ensuring transparency in the system

c. Efficient and collaborative knowledge/experience sharing and processing set up

d. Ensuring correct assessment of the workload and resource distribution

Implementation approach:

We recommend outsourcing a Business Process Re-engineering (BPR) study to an independent third party consultant who would carry out a detailed exercise for redesigning the current functioning of CPWD. We recommend this approach over directly going for an off-the-shelf ERP as the latter would simply be an automation exercise and will not help in streamlining the existing processes and minimizing redundancies. We estimate a time period of 12-18 months to launch the proposed ERP platform.

The indicative list of activities to be undertaken by the consultant are as follows:

- Dashboard related:

- Appointment of vendor to develop the MIS dashboards for tracking of set KPIs

- Business Process Reengineering (BPR)
  - Study the as-is conditions of the existing portals in order to record the shortfalls and work to be done
  - Study and list down requirements of the processes of the revised Manual and SOPs
  - Define the IT architecture, including all recommended key features of the system, along with feasibility and efficiency assessment and forecasts
  - Help in appointment of a full-time IT team to ensure uninterrupted service of the portal

- ERP system
  - Design the new ERP portal along with a review and up-gradation plan
  - Conduct trials before final approval of the portal
  - Facilitate capacity building classes and training program for the staff

For this task the activities to be undertaken by CPWD are as follows:

- Internally decide on various aspects that need to be covered under the re-engineering program basis stakeholders to be involved, mandates regulating the design of the portal and overall efficiency to be achieved. This has to be backed with a portal review and up-gradation plan
- Draft and finalize the TOR for selection of dashboard developers and ERP portal developers
- Undertake the bid process management of dashboard & portal developers/System Integrator (SI)
- Review and oversee the work of dashboard & portal developers ensuring that the portal is in line with the new Works Manual and SOPs
- Organize workshops for discussion inviting representatives of various stakeholder groups
- Get necessary approvals
- Launch the ERP along with a short training explaining its functions
- Scheduled training to the staff to ensure ease of use

References:

Report by Nitin Gadkari Committee: Developing a Comprehensive Project Management Information System

Report by Nitin Gadkari Committee: Establishment of a Knowledge Management System

Report by Nitin Gadkari Committee: Ensure better customer interface and service delivery

Report by Economics Reforms Commission: Budgetary control and accounting system needs to be re-designed and strengthened using computers

Report by Economics Reforms Commission: Introducing the use of computers for improving the efficiency of the Department and time bound plan may be put in place for computerization of billing.

accounting

The Public Works Authority (Ashghal) launched its new mobile application 'Ashghal 24/7 in May, 2017. This provides customers with an additional communication channel, apart from its e-services (Projects, Suggestions, Enquiry, and Complaints) through which they access important e-services easily and quickly, anywhere and anytime.

5.2.7 Maintain status of CPWD

Background:

CPWD is currently an attached office of the MOUD. At different stages, employee groups and other stakeholders have perceived and discussed multiple options for structural nature and position of CPWD as, among others,

a) A Corporate / PSU like NBCC;

b) A board like the Railway Board;

c) A regulators/ authority;

d) No change

Key problem/ opportunity:

What is the best positioning of CPWD in the overall context to enable efficiency/ quality/ better client service/ autonomy/ accountability and long term success?

Recommended Solution:

- Considering the pros and cons of each of the structural options above (refer to Annexure 4 for comparative analysis), the objectives of efficiency/ quality/ better client service/ autonomy/ accountability and long term success are best achieved by retaining the current setting (as an attached office of the MOUD) and implementing other structural changes.
- For the analysis of most appropriate positioning of CPWD, PSU structures (like NBCC), board structures (like the Railway Board- Annexure 2), objectives and structures of a regulator/ authority (like the Rail Development Authority- Annexure 3) were studied.

Potential gains:

Achieving the goals of efficiency/ quality/ better client service/ autonomy/ accountability and long term success with minimal resistance

Implementation approach:

Stakeholder based approach by involving key stakeholders

References:

Annexure 4 – Placement Options for CPWD

5.2.8 Redefinition of the focus of CPWD

Background:

Over its 164 year history, CPWD has been called up and has undertaken several kinds of work. Today, the context has changed.

Key problem/ opportunity:

There is a need to have a shared understanding of what the organisation stands for in the current context.

Recommended Solution:

An agreed organisation purpose, viz.

- Government residential & office construction and redevelopment
- Government residential and office maintenance
- Border Infrastructure
- Inland Waterways
- Urban infrastructure
- Technical services, specifications, schedule of rates, work manuals, advisory, etc.
- Any other project as per MoUD requirement

Potential gains:

- Building specialization and expertise in the core areas
- Common and shared understanding of the organisation goal

Implementation approach:

- MOUD and CPWD management participative process to discuss and agree on a shared purpose and focus areas for the organisation;
- Once agreed, the organisation purpose could be communicated organisation wide

5.2.9 Creating a Separate Structure for Projects

Background:

Construction of Projects is a separate activity from maintenance and small works. The former calls for competencies like project management, technical skills, team/ time / contract/ cost management among other things. The latter has a stronger importance of customer service/ interpersonal skills.

In the current system, with the exception of PM/ CPM structure for large projects, the geographical structure manages both maintenance and projects.

Key problem/ opportunity:

This creates a situation of the same officers/ teams/ offices having to focus on both projects as well as maintenance. It also creates negative perception from one activity affecting the perception about the team's ability to take up the other activity. This also encourages development of generic skills rather than specialized project management or maintenance management skills.

Recommended Solution:

- Creating a flexible, separate, self-sufficient and lean structure for large projects (From >50 Cr and increasingly reducing the size) for the duration of the project
- Maintenance and allied works* (generally up to 5 Cr in the same division) will be undertaken by the regional structure

(*At the discretion of the DG)

Potential gains:

- Better focus on both maintenance and small works & on projects
- Opportunity to build organisation competence in a specialized manner in maintenance and small works area and in projects area
- An opportunity to create flexible and lean project teams as per the requirements of the

projects without getting affected by the traditional geographical structure that exists for maintenance

- Avoid negative perception from projects and maintenance affecting the entire set of organisational activities

Implementation approach:

- It is an extension of the current PM/CPM structure
- The projects will be led for different level of officers and will have different sizes / levels in the team depending on project size
- The project sizes for which the approach will be adopted could get increasingly smaller
- Generally have skip level structure to enhance operational levels and reduce supervisory levels
- The project teams, especially for large projects, will be attempted to be made self-sufficient by including officers for Architecture, Horticulture and Planning/ Clearances.
- Officers - especially the senior team members will be generally deployed for the project period to ensure continuity on the project. In case of promotions, in the project duration, they will continue to play the role with the newer designation.
- Once the project is over, the team will be dismantled and the team members will be allocated to project teams being created then. If there are no such opportunity, they will be temporarily part of the project maintenance team till project opportunities arise and they are replaced by the geographical team members (maintenance and small works teams) or they may be deployed on other maintenance. (The deployment post completion of the project will be as per the discretion of the DG)

5.2.10 Gradual outsourcing of Maintenance activity

Background:

Maintenance workload of CPWD has been increasing steadily over the years and currently constitutes nearly 44% of the total work load. It is a very significant activity as a large percentage of workforce is deployed in this activity.

While contractors are deployed / engaged for maintenance works of different nature, outsourcing of end to end maintenance for a particular set of residential / office buildings has not been attempted.

Key problem/ opportunity:

- It is difficult to ascertain the right amount of resources (teams, consumables or services) required for maintenance of certain quantum of residential/ office area.
- Moreover, in spite of large number of officers and Engineer deployed in the function, and large allocation of budget for maintenance; there is large number of complaints and dissatisfaction among beneficiaries.
- Increasingly, there is a perceived shortage of officers and workmen who could be deployed for maintenance.
- Is there a smart solution to managing maintenance activities, efficiently with accountability?

Recommended Solution:

- On a pilot basis, maintenance of a certain amount of office / residential area may be outsourced to a reputed building management company (BMC) with
    - CPWD staff withdrawn except for a few officers for outsourcee management
    - Pre-agreed SLAs (response times, rate contracts or lump sum per square foot maintenance value)
    - Pre agreed time frame- say 3 years
- It is expected that
    - Beneficiary satisfaction will be higher
    - The outsourcee agency will bring in efficient work methods and technologies
    - CPWD will be able to understand overall monetary cost of maintenance for a certain types of office/ residential areas

Potential gains:

- Depending on the success of this pilot, more areas could be outsourced for maintenance
- This would ensure speedy and quality work and successful closure as per the client satisfaction

Implementation approach:

For the implementation of outsourcing exercise, following activities should be undertaken by CPWD:

- Identification of a unit for the pilot project
- Allocation of budget for the unit for the period in which the pilot study would be carried out
- Contracting arrangement
- Identification of 2 -3 competent and reputed agencies to whom maintenance work can be outsourced
- Evaluation of performance and price benchmarking
- Roll-out of the pilot plan and continuous monitoring
- Improving the outsourcing plan and gradual roll-out for more / larger units

5.2.11 Reduction in level of hierarchies

Background:

The decision / reporting hierarchy is currently tall. Between the JE and DG, there are 6 levels. Above the executing building block i.e. division headed by an EE, there are still 5 levels.

There is also a 'passing the buck' tendency in large chain approach in many cases without the officers taking the responsibility.

For the maintenance/ geographical structure (other than CPM/ PM led project structure and HQ or other unit office functions), the following is the current structure

Table 10: Current Structure in CPWD

Level (Actual/ sanctioned)	Unit	Number of units (Approx.)
DG (1)	CPWD	1
SDG (6) + 1	Region	5
ADG (15)	Sub-region	9
CE (67)	Zone	50
SE (182)	Circle	~160
EE (667= 440 + 220)	Division	~400
AE (Civil 1768/2200 + Electrical 638/890)	Sub- Division	~ 1100
JE (Civil 1570 /2200 + Electrical 733/890)	Sections	~ 2000

AEE (Civil 95/102 + Electrical 25/27). Numbers are other than CPWD. Numbers are approximate and indicative.

Key problem/ opportunity:

This creates a situation of few working levels and large number of supervisor levels. This also leads to slower decision making and distributed accountability leading to delays and impacts quality.

Recommended Solution:

- Reducing the number of reporting levels for quick decision making and execution
  - Phase 1: No inter-reporting between SDG and ADG (No sub-regions)
  - Phase 2: No inter-reporting between SE and EE (No Circles)
- This will be accompanied by maintaining a 1: 4 AE: JE ratio with the remaining AEs in projects
- For projects, necessary teams led by ADG/ CE/SE/EE will be created depending on the project size and will generally have only skip levels
- CE (Medium Project Head) and SE / EE (Small Project Head) will report to SDG Project
- Maintenance and small works structure in the regions should change and will be as follows

Table 11: Recommended structure for Maintenance and Small Works

Current	Phase 1	Phase 2
DG (CPWD)	DG (CPWD)	DG (CPWD)
SDG (Region)	SDG/ ADG (Region)	SDG/ ADG (Region)
ADG (Sub-region)		
CE (Zone)	ADG/CE (Zone)	ADG/CE (Zone)
SE (Circle)	SE (Circle)	
EE (Division)	EE (Division)	SE/EE (Division)
AE (Sub- Division)	AE (Sub- Division)	AE (Sub- Division)
JE (Sections)	JE (Sections)	JE (Sections)

- It is proposed to keep the project structure with skip levels and as per the size

Table 12: Recommended structure for Projects

Project Structure: large	Project Structure: Medium	Project Structure: Small
ADG		
	CE	
SE		
	EE	SE/EE
AE /AEE	AE /AEE	AE /AEE

Potential gains:

- More officers in execution roles
- Faster decision making
- Better accountability and ownership for work leading to better quality, timeliness, job satisfaction and client satisfaction

Implementation approach:

- It should be implemented in a phased manner
- In some cases, for maintenance structure, exception may be required to the above, in which case, skill level reporting will be used.
- Generally, an overall endeavour to only have skip level structure to enhance operational levels and reduce supervisory levels
- Currently EE is the contracting/ executing authority. This will put ADG/ CE/ SE in executing roles for the larger projects thereby leveraging their experience and making them more accountable

References:

- *Report by Economic Reforms Commission - Recommendation: There are too many levels in CPWD. It is recommended that the level of Junior Engineer and Assistant Engineer maybe amalgamated. Chain of JE/AE-EE-SE-CE and ADG is too long and a committee maybe appointed to reduce at least one level*
- *Report by ICRA - Recommendation: Rationalisation of Command Chain*

5.2.12 Lowering Electrical / Civil Common command for maintenance

Background:

Currently, the common command is at the level of CE (zonal level)

Key problem/ opportunity:

The current command structure leads to duplication of units below the level of CE.

Recommended Solution:

If the command is lowered to SE in the first phase and to EE level in the next phase with necessary cross-training, the need for separate Electrical circles and divisions will not be there

Potential gains:

- The clients/ GPRA residents or GPOA occupants will need to work with one interface rather than two in their Circles and Divisions.
- Inter-functional co-ordination shall be better between the electrical and civil teams.
- There will be no need for separate Electrical Circles and divisions
- Partially address the issue shortage of officers vis-a-vis sanctioned strength/ requirement

Implementation approach:

- Detail the exact procedural modifications required post changes
- Start with a region and mature the approach
- Implement in other regions
- On- the- job Cross- functional training will be required for SEs and EEs

5.2.13 Alignment of officers from Architecture cadre

Background:

Chief Architects in regions do not have any reporting relationship with the senior most architecture officer - Head (Arch). Further, Sr. Architects /Architect work at the zonal level. Architects integration in the projects also is not consistent.

Key problem/ opportunity:

Currently, the full potential of architect's competence is not leveraged.

Recommended Solution:

- Chief Architects in regions may have a dotted line functional reporting to ADG (Arch) with ACR inputs sought from ADG (Arch)
- Chief Architect/ Sr. Architects /Architect (depending on project size) may be attached in projects with reporting to the CPM/ PM and a dotted line functional reporting to ADG (Arch)
- ADG (Arch) to be enabled to contribute to management of the repository of drawings/ designs

Potential gains:

- Better integration and leverage of the architecture function

Implementation approach:

- Appropriate facilities as required for field officers will be required for architects also in projects;
- Appropriate facilities as required for design/planning officers will be required for architects in regional/ HQ;
- Detailing of joint ACR working mechanism

5.2.14 Delegation of powers to DG

Background:

CPWD with its structure as an attached office of MOUD, while empowered to take large number of decisions at the DG level, in practice has not been able to do so.

Key problem/ opportunity:

A large delegation of financial, administrative and operational powers to DG, CPWD from the ministry.

Recommended Solution:

- Financial, operational and administrative powers with the DG
- Reference to the Ministry to be restricted to only in matters involving major policy issues requiring Government approval, Parliamentary matters, approvals beyond the financial/ administrative competence of the proposed body, etc.
- All establishment matter, study leave, deputation, transfer posting, ACRs to conclude at DG
- Reducing the ACR structures to 2 levels and approval system also to be reduced to 2 levels with joint accountability

Potential gains:

- Faster decision making
- Reduction of administrative load at the ministry
- Higher accountability and ownership at the level of DG

Implementation approach:

- Changes in AAR reporting levels that go beyond DG level
- Identification of regular areas where decisions are consistently not taken at the DG level

References:

- *Report by Economic Reforms Commission - Recommendation: Director General of the department may be delegated substantial powers for day-to-day administration*

5.2.15 Bring in additional focus on some key functions

Background:

Some of the important core and enabling functions need to be strengthened at CPWD for greater effectiveness and efficiency in the organisation.

Key problem/ opportunity:

There is a need to provide additional focus to some of the functions.

Recommended Solution:

Core functions to be constituted/ strengthened at the HQ level with execution capability/ representation in regions and in projects

- Integrated HRM (Training, Transfer, posting, PMS, Rewards and recognition)
- PR and BD (only HQ)
- Legal (execution through empanelment)
- Technical Services (QA; KM- to be outsourced; New technology/ R&D- interface with R&D organisations like CRRI, CBRI, Advisory; Works manual, schedules of rates, model designs and work methods)
- IT as a backbone for HR/projects/KM/ performance tracking (To be outsourced)
- Design, planning and approvals/ Clearances
- Customer Service (Not required in projects)
- Vendor management (Vendor registration, development, rating, Vendor feedback)

Potential gains:

This provides the organisation with all the necessary functions and capabilities to be able to deliver on its mandate

Implementation approach:

Some of the functions may not have internal people capabilities with relevant experience and will call for appropriate external contract hiring or outsourcing

References:

- *Section 4 - Study of Leading Practices: Malaysia - Malaysia works has a functional organizational structure*
- *Section 4 - Study of Leading Practices: NBCC*

5.2.16 Training and Development initiatives across levels and functions

Key Problem / opportunity:

Lack of adequate exposure and training has resulted in stagnation of knowledge of many of the CPWD technical personnel. This is preventing innovation in the construction technology and systems and in

effectively dealing with cost and time over-runs in new projects.

Recommendation:

- Systemic efforts for overall Training and Development
- On – the - job training in basics of Civil/ Electrical and Architecture area for all AEs/ EEs/SEs/ CEs & exposure visits/ trainings at all levels;
- Trainings at specialised organisations and academic institutes;
- To facilitate proper training and building capacity, the head of the training institute should report to DG CPWD
- Mandatory trainings for mid/senior level promotions

Potential gains:

- Improved employee performance
- Capacity building
- Enhancement in reputation and profile of CPWD
- Increased job satisfaction and morale among employees
- Facilitating lowering the command from CE to SE level and subsequently to EE level
- Facilitating the implementation of other recommendations from this study/ other initiatives

Implementation approach:

- Identifying and shortlisting of training partners
- Identifying the key areas for training
- Assessing the training gaps of individuals
- Creating and execution of training plans

5.2.17 Miscellaneous process related recommendations

Key problem/ opportunity:

a. Lack of physical IT assets
b. Low dependency on latest design & engineering software
c. Lack of regular revision of Specifications and Schedule of Rates
d. Inadequate vendor management

The same have been detailed in the 'Challenges' section above.

Recommendation:

The key recommendations are as follows:

a. **Up-gradation of physical infrastructure:** There needs to be an up-gradation in physical infrastructure across all CPWD offices, especially at vulnerable locations. Assets including computers, printers, software's etc. need to be made available. This will enable CPWD's shift to IT dependent platforms.
b. **Regularized capacity building endeavours:** Capacity building programmes are required to train CPWD employees in the latest software as well as handling of physical assets such as

computers, printers etc. The same needs to be carried out across levels, departments and geographies.

c. **Regular reviewing and revision of Specifications and Rates:** The Specifications as well as Schedule of Rates need to be revisited and updated on a regular basis as per prevalent norms. Further, these should be automated to ensure streamlined project execution. Some additional measures that could be taken up are:

   a) A system of live updating of rates need to be developed along with a current rate addressing policy.

   b) The system needs to be automated and linked to the government's e-market place scheme. This will also enable the dealers and vendors to upload information of new products being launched in the market.

d. **IT based vendor management:** The same will be ensured through the Vendor Management module that will be a part of the integrated ERP platform.

Potential gains:

a. Knowledge base under constant review and up-gradation thereby ensuring efficient product delivery.

b. Enhanced client engagement and enhanced probability of meeting client expectation

Implementation approach:

For implementation of the above recommendations the CPWD would have to undertake the following activities:

- Collaborate with facility management consultants to set minimum service level standards for its offices depending on the locations and remodel the offices accordingly such that access to basic physical and IT infrastructure is facilitated. This task should take 12-18 months to be implemented
- In a time frame of 3 months, CPWD should design training schedules and programs in collaboration with relevant experts and organizations.
- Ensure trainings are backed with knowledge check papers and feedback forms which along with the training schedules shall be circulated amongst all staff through the Personnel Information Management System Portal. This shall be accessed using the employee ID. This task should be completed in 12-18 months
- In-house team must be formulated bi-annually for revision of specifications and rates. Vendors' workshops shall also be conducted to receive feedbacks and reviews of materials, products and processes in the market. The changes shall initiate up-gradation of the e-schedule of rates and specifications which shall be a part of the ERP portal. This shall run in parallel to the ERP review and up-gradation schedule
- Review and incorporate changes in empanelment after scrutiny, enlistment rules, contractor's project bank, in to the Vendor Management System on a bi-annual basis. This shall run in parallel to the ERP review and up-gradation schedule

References:

- *Report by MDI Gurgaon: Comprehensive training to employees, training of CPWD workers and*

contractors employees

- *Report by MDI Gurgaon: Rate contracts to be done fixed with contractors for each group of works*
- *Malaysia's Public Works Authority KEMENTERIAN KERJA RAYA (KKR) has a comprehensive e-vendors platform as well as a Human Capital Development Program.*

5.2.18 Miscellaneous restructuring related recommendations

1 **Broader pool of candidates for selection for the post of DG / DG selection from a panel of eligible candidates**

Selection from a wider pool of 5 eligible candidates, including eligible and senior most SDGs/ ADGs with a criteria of minimum one year of service; Selection committee could include MOUD/ DoPT/ current DG and selection could be based on certain pre-defined criteria. All officers at seniority more than the promoted officer will carry the next pay scale and designation in the earlier role

2 **IT based Vendor/ Contractor management system for quality and commitment:**

There is a need to set up a vendor management function at regional, projects and HQ level. This will cover projects and maintenance (through rate contract for a longer term period); Punitive clauses should be included in contracts for wrong MB entries, over invoicing and long term QA issues with personal liability of the companies' directors and impact on contractor rating.

(Currently all accountability and fear of Vigilance is with CPWD officers and contractors go scot free). This system The Vendor/ Contractor management function should be IT enabled.

3 **Performance and Continuity**

Review of ACR system: Bringing transparency and accountability in the performance of officers every year starting with the level of CE and above (and for all project Heads at the level of SEs) where their performance in the area of maintenance and construction is publicly available at the end of each year. All officers on projects to have a minimum tenure of 2 years/ completion and the promoted officer will carry the next pay scale and designation in the earlier role

4 **Horticulture function**

Currently the 182 officers and approximately 3000 work charge staff are deployed in different regions. One of the Dy. Directors with 2-3 ADs may be brought in the HQ level Planning, design and Architecture cell under an ADG, ADG (Arch) for technical advice on Planning, design and Architecture

5 **Simplifying designations to reflect easily understandable meaning of their role for general public**

6 **Employee recognition, engagement and motivation**

Current vicious cycle of negativity (from fear of vigilance, delayed promotions and little recognition or appreciation needs to be replaced by a virtuous cycle that includes recognition, welfare programmes (Yoga, meditation, counselling, senior officer interactions etc.)

6 Proposed Organisation Structure

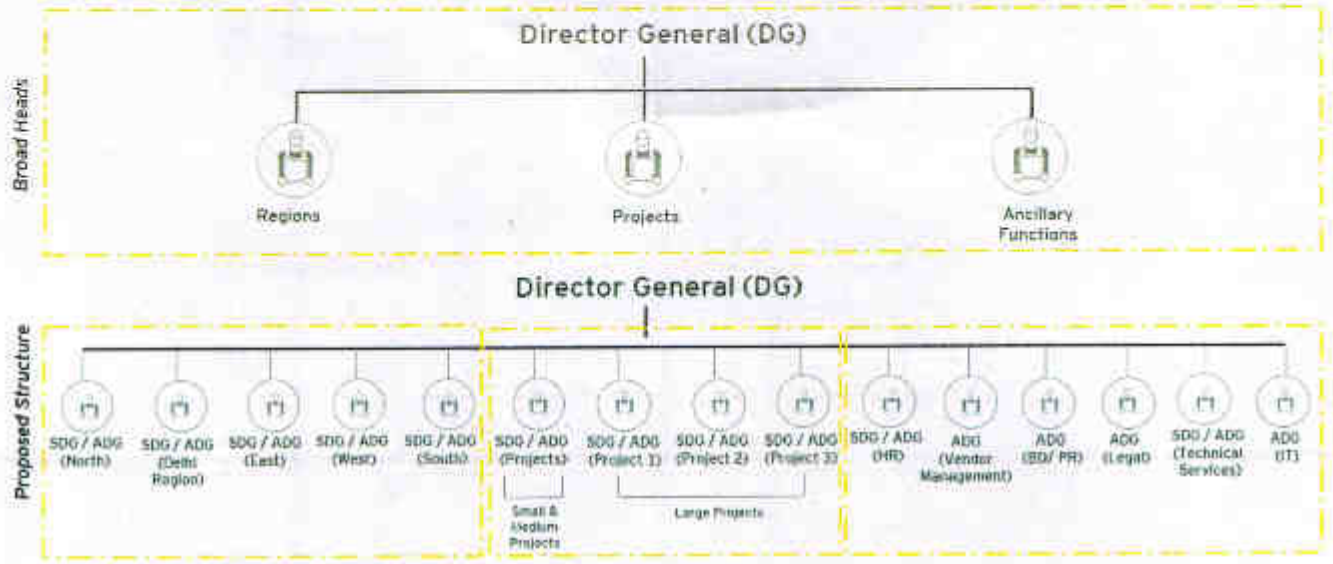


Figure 28: Proposed broad Organization Structure

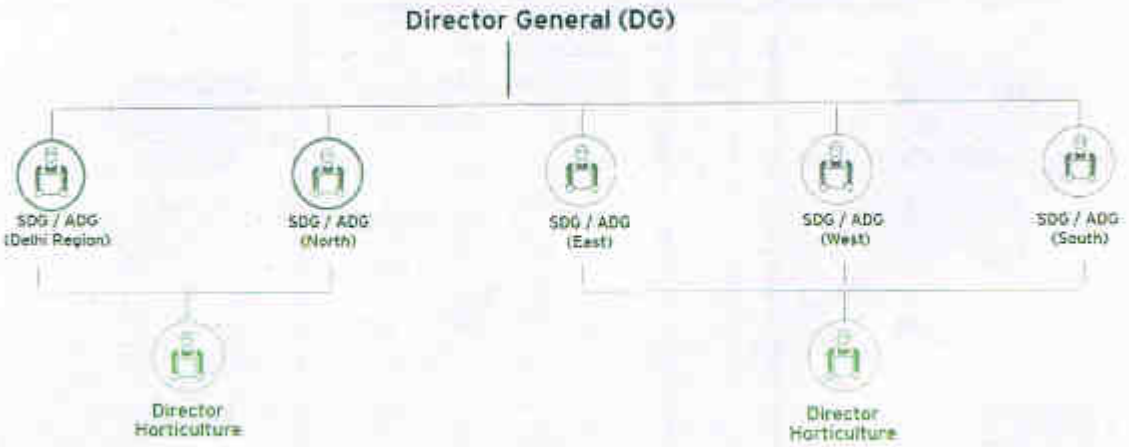


Figure 29: Proposed Regional Organization set up

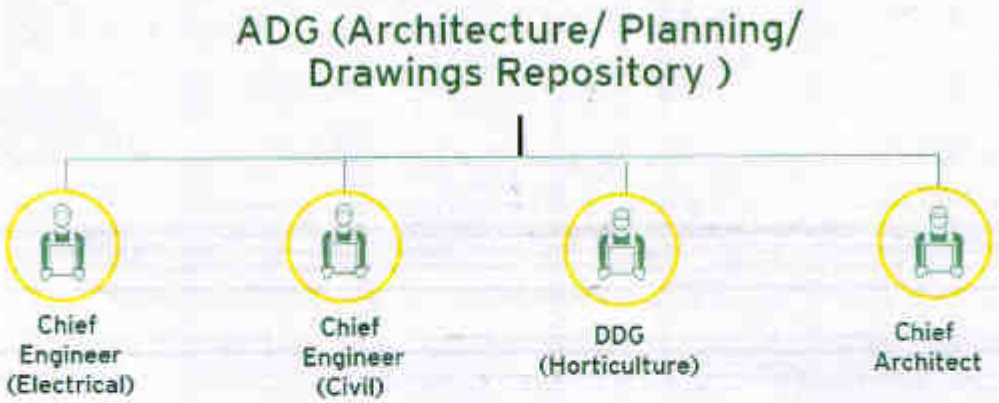


Figure 30: Proposed Organization set up - Architecture Cadre

7 Implementation and Way Forward

These are some of the initiatives which can be carried out at CPWD over the next few months. These will enable bringing in more efficiency in the organization.

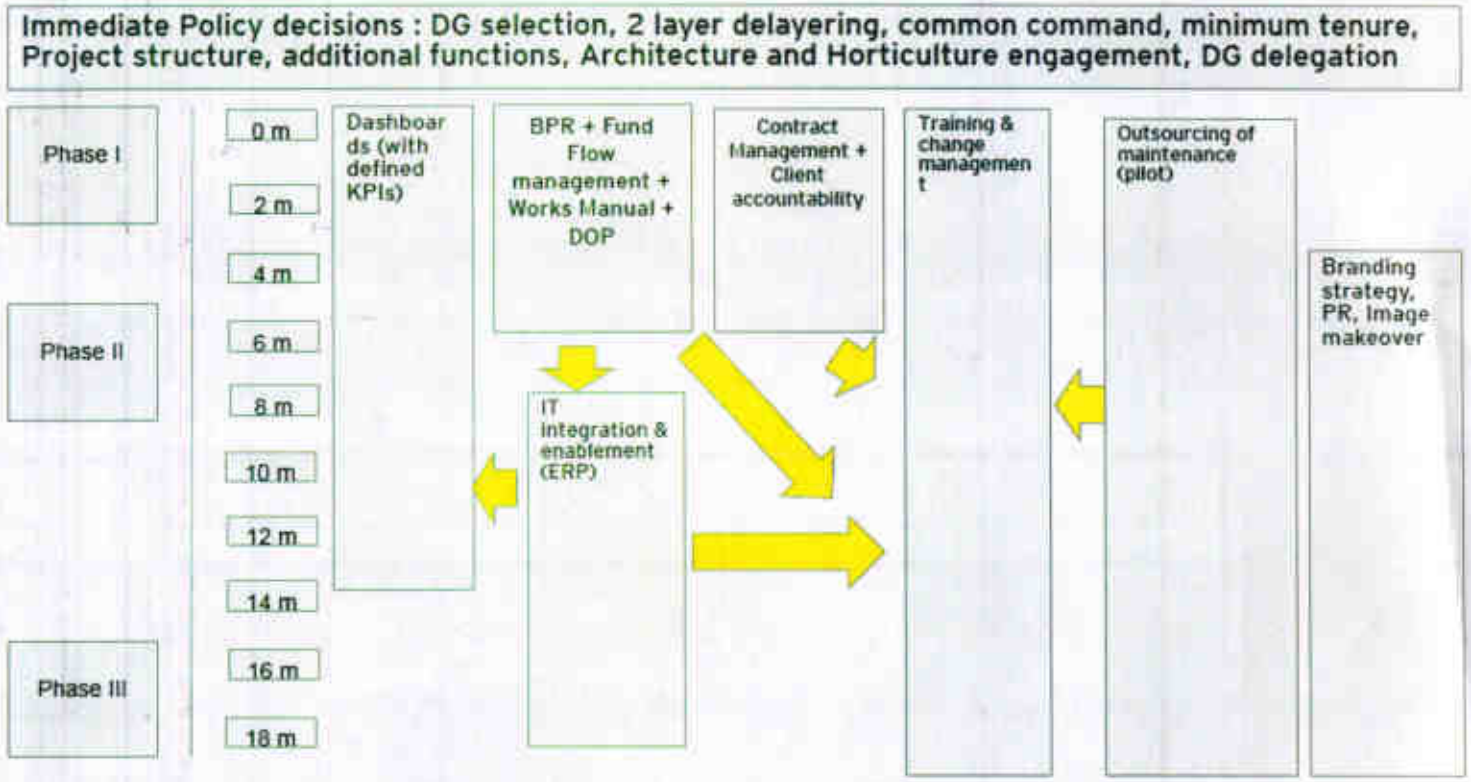
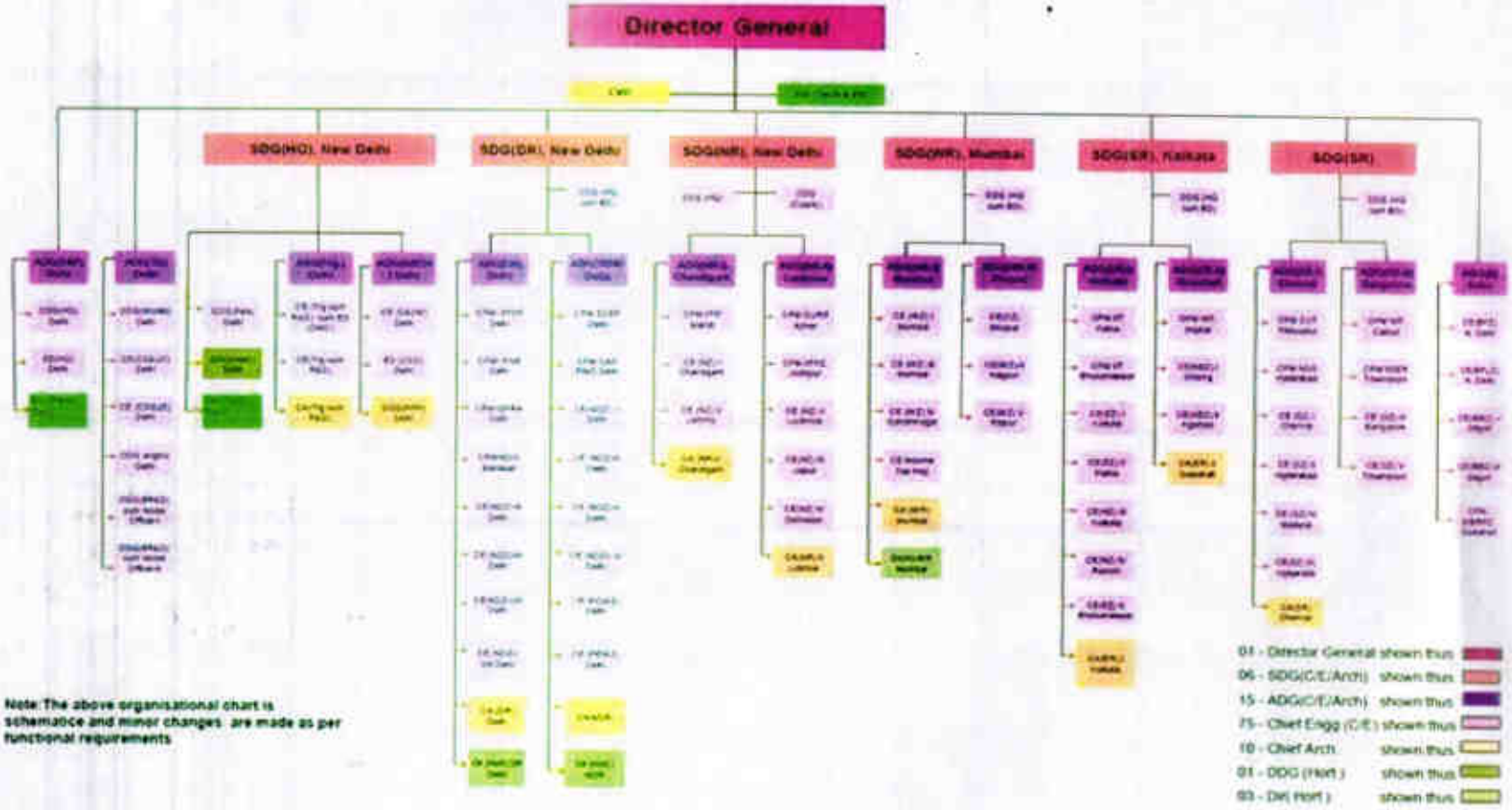


Figure 31: Implementation Roadmap

8 Annexure

Annexure 1 - Current Organization Structure of CPWD

Figure 32 : Organization Chart of CPWD



Annexure 2 - Detailed review of sample projects

The details of the case studies discussed above are as follows

a) **Additional office complex for Supreme Court**

#	Parameters	Information	Remarks
Project details:			
1	Name of project	Additional office complex for Supreme Court of India	-
2	Client	Supreme Court of India	-
3	Current status	**Work in progress (70% completed) and delayed by 24 months**	-
4	Project cost	884.3 Crores	-
Project milestones:			
1	Requisition date	11.03.2008	*Project was supposed to be completed in 42 months as agreed during requisition. However, due to its complex nature, it was agreed that project will be completed in 5 years.*
2	PD & PE submission date	05.10.2011	-
3	Sanctioning date	11.07.2012	*4 crores have been charged as Enabling Estimate. It took 4.5 years to sanction due to lack of responsiveness of the client. Team deployment happened right after sanctioning.*
4	Funds received date (first instalment)	September 2012	-
5	DE submission date	05.10.2011	-
6	Technical sanction date	24.07.2012	*For the first package only.*

#	Parameters	Information	Remarks
7	Receipt of all approvals	November 2012	-
8	Tendering (packaging, NIT, selection)	Package 1 - Terminated on 24.07.2014 Package 2 - October 2014 Package 3 + balance work of Package 1 - January 2015 Package 4 (services) - June 2015 Package 5 and 6 (Finishing and horticulture) - Estimate being prepared	*Work against first package was awarded in 2012 but had to be terminated due to issues with the contractor. Thus it was finally re-awarded 2 years later.*
9	Handing over site/ drawings ready for construction	October 2012 - Drawings were ready	*Site underwent changes as the work proceeded with changes in boundaries, presence of defunct utilities, trees to be retained and realigning of building to incorporate setbacks*
10	Construction starts	October 2012	-
11	Completion certificate issued	Not yet since work has been completed only till 70%. Finishing and horticulture work remains. Tentative completion date is Dec, 2017.	*Considering the sanctioning date, work is delayed only by 6 months. However from the requisition date, work is delayed by 4.5 years.*
Project team			
1	Project mode (Y/N)	Yes	-
2	Total no. of people involved throughout the project	17 CPM - 1, PM (C) - 1, PM (E) - 1, EE (C) - 3, EE (E) - 1, AEE and AE (C) - 7, AEE and AE (E) - 3	*Architecture was outsourced to consultants*

#	Parameters	Information	Remarks
Outsourcing			
1	What all services were outsourced through the lifecycle	• Consultancy services for comprehensive planning and designing (Arch) • Data entry operators, steno-cum-PS to senior offices • MTS, inspection vehicle drivers, security guards	-

b) PNB Headquarter, Sector 10, Dwarka:

#	Parameters	Information	Remarks
Project details:			
1	Name of project	PNB Headquarters	-
2	Client	Punjab National Bank	-
3	Current Status	**Work in progress (98% completed) and delayed by 36 months**	-
4	Project cost	INR 405.01 Crores	-
Project milestones:			
1	Requisition date	13.01.2011	*Consultants were hired just after requisition*
2	PD & PE submission date	29.02.2012	*Deliberations regarding design approval took time*
3	Sanctioning date	14.05.2012	-
4	Funds received date (first	May 2012	-

#	Parameters	Information	Remarks
	instalment)		
5	DE submission date	05.10.2011	-
6	Technical sanction date	Three level basement - Feb 2012 Superstructure including all services - September 2013 Water supply and sewerage connection - July 2016 Lighting fixtures - august 2016 Furniture - November 2016 Interior finishes of some specific areas - May 2017 Horticulture	*Basement work was separately started even before receiving sanctions anticipating that internal approvals of drawings will be easy available*
7	Receipt of all approvals	December 2012 applied received in 2014	*2.5 years delay due to getting approvals*
8	Progress of work according to packages	Three level basement - July 2012 to November 2013 Superstructure including all services - august 2014 till date Water supply and sewerage connection - October 2016 till date Lighting fixtures - September 2016 till date	*Work for basement could be started only after local body approvals were received* *Tender had to be recalled due to limited entries for superstructure there by delaying work by 1 years*

#	Parameters	Information	Remarks
		Furniture - January 2017 till date Interior finishes of some specific areas - November 2016 till date Horticulture - December 2016 till date	
9	Handing over site/ drawings ready for construction	December 2012 for basement August 2014 (for super structure)	-
10	Construction starts	December 2012 for basement August 2014 (for super structure)	-
11	Completion certificate issued	To be received by July-August 2017	-
Project team			
1	Project mode (Y/N)	Yes	-
2	Total no. of people involved throughout the project	15 CPM - 1, EE (C) - 2, EE (E) - 1, AEE and AE (C) - 4, AEE and AE (E) - 1, Clerical staff - 6	*Architecture was outsourced to consultants*
Outsourcing			
1	What all services were outsourced through the lifecycle	• Architectural services • DPR preparation	-

c) Residential quarters for AIIMS:

#	Parameters	Information	Remarks
Project details:			
1	Name of project	Residential quarters for AIIMS	-
2	Client	All India Institute of Medical Science	-
3	Current status	**Discontinued after 9 years**	*Was terminated before calling for tenders by client*
4	Project cost	Approximately 300 Crores	-
Project milestones:			
1	Requisition date	09.03.2006	-
2	PD & PE submission date	19.05.2006 - as per first scope 27.12.2013 - after 5th revision of scope of work which was essentially a design idea which was scrapped earlier	*Consultants were appointed at this stage only for all consultancy services* *The client revised the scope of work almost 5 times in 7 years and then re-submitted the sanction after another 2 years*
3	Sanctioning date	26.09.2006 - as per first scope 13.05.15 - after 5th revision of scope of work which was essentially a design idea which was scrapped earlier	*-do-*
4	Funds received date (first instalment)	Not received	-
5	DE submission date	October 2008	*-do-*
6	Technical sanction date	13.05.15 - after fifth revision	*-do-*
7	Receipt of all approvals	Initiated on 06.10.2008 and received all clearances by 12.03.2015	*The approval process took around 7 years partly due to delays by external authorities and partly due to change in scope of*

#	Parameters	Information	Remarks
			work from clients end
8	Tendering (packaging, NIT, selection)	01.08.15 - Tenders floated September 2015 - CPWD was asked to hold the tender	*Since the client now wished the work to be executed by NBCC*
Project team			
1	Project mode (Y/N)	Yes	-
2	Total no. of people involved throughout the project	Was not constant due to no surety in terms of future of the project, hence cannot be determined	-
Outsourcing			
1	What all services were outsourced through the lifecycle	Architectural Services	-

Annexure 3 - MES Sanctioned Strength

Table 13: MES Sanctioned Strength

S No.	Cadre	level	Sanctioned Strength	Cadre Total
1	Engineering cadre			
		DG	1	
		ADG	3	
		CE	45	
		Additional CE	32	
		SE	281	
		EE	480	
		AEE	478	
		AE	678	
		JE	3343	
				5341
2	Surveyor cadre (Quantity Surveying and Contracts)			
		CE	6	
		SE	40	
		EE	140	
		AEE	126	
		AE	121	
		JE	1672	

S No.	Cadre	level	Sanctioned Strength	Cadre Total
				2105
3	Architect cadre			
		CA	6	
		SA	42	
		Architect	66	
		DA	22	
		Technical Officer	325	
		AA	66	
		Sr. Draughtsman	381	
		Draughtsman	1349	
		Tracer	314	
		Ferro Printers	433	
				3004
4	BSO cadre (Barrack and Stores Officers)			
		Principal BSO	2	
		Sr. BSO	78	
		BSO	212	
		Supervisor BS-II	1203	
		Supervisor BS-I	351	
		Storekeeper-II	336	
		Storekeeper-I	416	

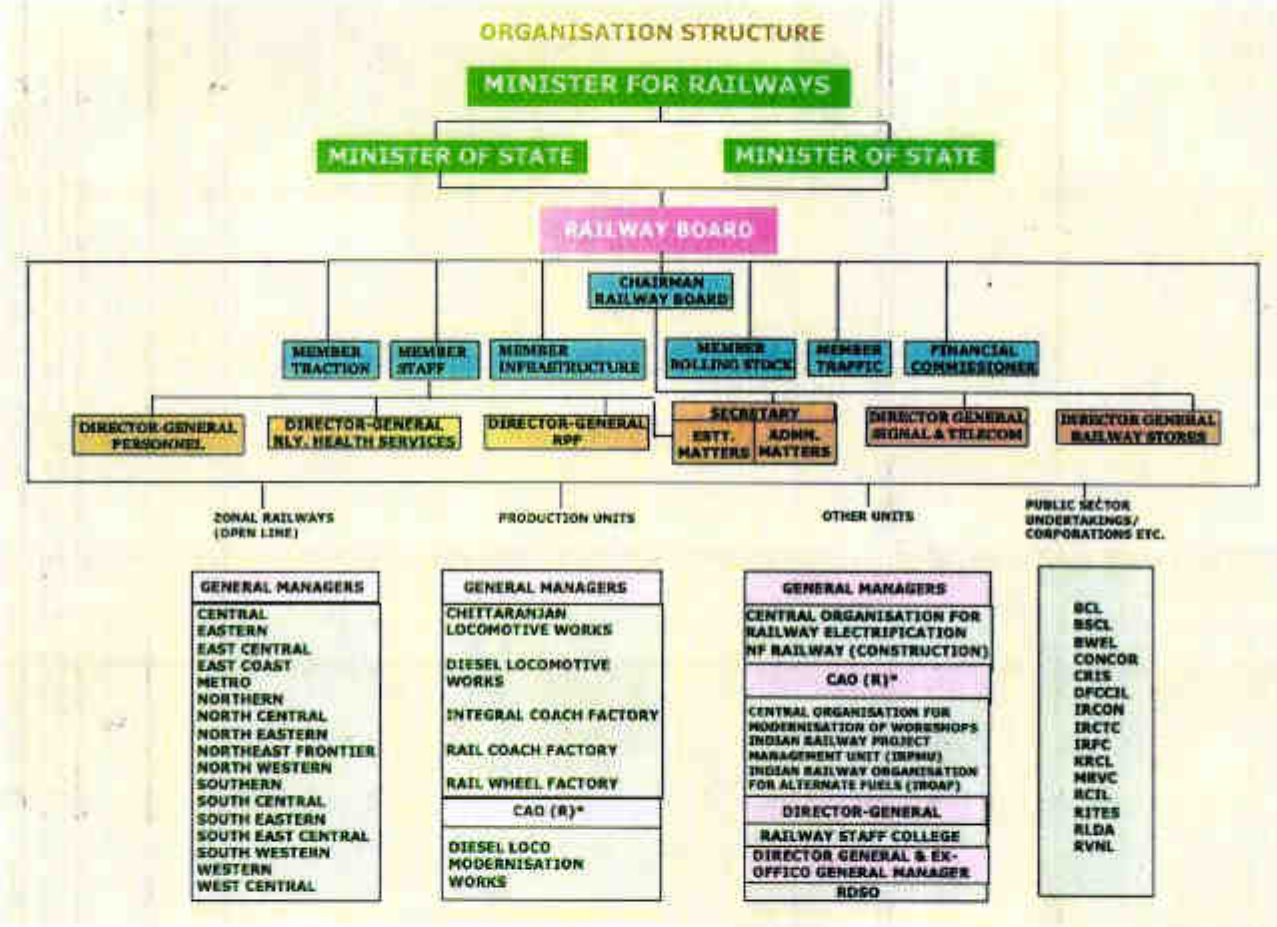
S No.	Cadre	level	Sanctioned Strength	Cadre Total
		Meter Reader	69	
				2667
5	Admin cadre			
		Principal AO	2	
		Sr AO	17	
		AO-I	35	
		Office Superintendent	149	
		UDC	3286	
		LDC	3011	
				6500
6	Stenographer cadre			
		Sr. Personal secretary (PS)	2	
		PS	18	
		Steno- I	107	
		Steno- II	213	
				340
7	Industrial cadre			
		Sr. Mechanic- I (Ref)	177	
		Sr. Electrician- I	1724	
		Sr. Mechanic -I (HVAC)	730	
		Carpenter- I	509	
		Fitter- I	574	

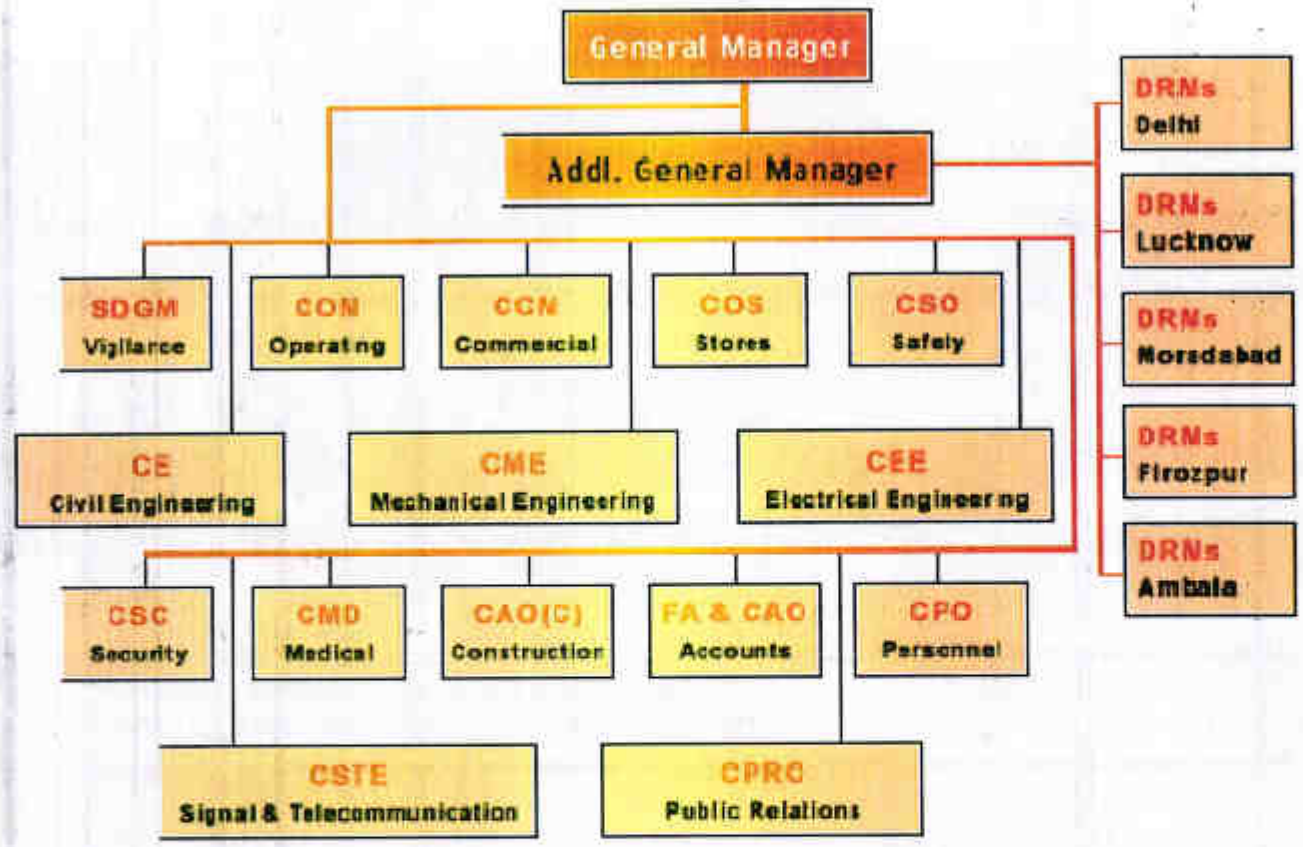
S No.	Cadre	level	Sanctioned Strength	Cadre Total
		Blacksmith- I	86	
		Mason -I	316	
		Painter- I	154	
		Cable Jointer- I	163	
		Mechanist/Welder/Moulder-I	41	
		Sr. Mechanic- II (Ref)	972	
		Mechanist/Welder/Moulder-II	55	
		Fitter- II	767	
		Carpenter- II	677	
		Blacksmith- II	119	
		Mason -II	421	
		Painter- II	206	
		Cable Jointer- II	243	
		Mechanic (Ref)	3160	
		Electrician	7469	
		Mechanist	57	
		Carpenter	2200	
		Fitter	2492	
		Blacksmith	153	
		Mason	1259	
		Painter	1048	
		Lift Mechanic	20	

S No.	Cadre	level	Sanctioned Strength	Cadre Total
		Welder	127	
		Boiler attendant	34	
		Moulder	38	
		Pump House Operator	8388	
		Upholsterer	251	
		Packer	20	
		Diesel mechanic (C&I)	358	
		Tradesmen mate	37689	
		Master Craftsman	794	
				73491
8	Non Industrial cadre			
		Jr. Chowkidar	12699	
		Civilian Motor Driver	1392	
		Civilian Motor Driver - I	1392	
		Civilian Motor Driver - II	1623	
		Civilian Motor Driver - Spl	232	
		Khansama Chowkidar	141	
		Safaiwala	8	
				17487
			Grand Total	110935

Annexure 4 - Illustration: Working of a Board (Railway Board)

Figure 33: Organization Chart of RDA




General Manager
Addl. General Manager
DRMs Delhi
DRMs Lucknow
DRMs Moradabad
DRMs Firozpur
DRMs Ambala
SDGM Vigilance
CON Operating
CCN Commercial
COS Stores
CSO Safety
CE Civil Engineering
CME Mechanical Engineering
CEE Electrical Engineering
CSC Security
CMD Medical
CAO(C) Construction
FA & CAO Accounts
CPO Personnel
CSTE Signal & Telecommunication
CPRO Public Relations

Rail Development Authority (RDA) - Objectives of setting a Rail Regulator:

An independent Rail Regulator will help to achieve the following objectives:

i. Pricing of services commensurate with costs
ii. Suggest measures for enhancement of Non Fare Revenue
iii. Protection of consumer interests, by ensuring quality of service and cost optimization
iv. Promoting competition, efficiency and economy
v. Encouraging market development and participation of stakeholders in the rail sector and for ensuring a fair deal to the stakeholders and customers
vi. Creating positive environment for investment
vii. Promoting efficient allocation of resources in the sector.
viii. Benchmarking of service standards against international norms and specify and enforce standards with respect to the quality, continuity and reliability of services provided by them.
ix. Providing framework for non-discriminatory open access to the Dedicated Freight Corridor (DFC) infrastructure and others in future.
x. Suggesting measures to absorb new technologies for achieving desired efficiency and performance standards
xi. Suggesting measures for human resource development to achieve any of its stated objectives

Composition of Railway Development Authority:

- It consists of a Chairman who is responsible for overall functioning of RDA and three Members;
- Member (Tariff) shall be responsible for function pertaining tariff determination and track access charges;
- Member (PPP) shall be responsible for dealing with all issues of stakeholders investments including concession agreement; and
- Member (Efficiency, Standards & Benchmarking) shall be responsible for dealing with all issues of setting efficiency, performance standards, and benchmarking and information dissemination;

Functions of RDA: RDA will undertake the following functions:

1. **Tariff determination functions**
2. **Ensuring fair play and level playing field for stakeholder investment in Railways:** RDA shall perform the following functions to ensure level playing

field:

- Propose modifications and send suggestions / Advisory Notes to Ministry of Railways on reference made by Ministry of Railways.
- Make suggestions regarding policies of Ministry of Railways for infrastructure creation through private investments/PPP and to ensure reasonable safeguards to PPP investors.
- Dispute resolution regarding future Concession Agreements subject to a specific clause in the Concession Agreement for referring of such disputes to RDA in compliance with the Arbitration and Conciliation Act, 1996 and Amendments thereto including the Arbitration and Conciliation Act, 2015

3. **Setting efficiency and performance standard**

   It shall also be the Authority's mandate to suggest measures for absorbing new technologies for achieving desired efficiency and performance standards.

4. **Dissemination of Information** - The Authority will suggest a framework / guidelines for dissemination of information relating to best practices for the assistance and awareness of consumers.

5. RDA shall have below-mentioned specific exclusions while performing the functions listed at point (1) to (4) above:-
   - Policy making regarding Railways as a sector or any of its facets;
   - Tariff determination and classification/reclassification of commodities save as provided in Clause (4), Sub-Clause (i) (1) to (3);
   - Operations & Maintenance of the Rail system;
   - Financial/ expenditure management save and except suggesting benchmarks that can guide decision making;
   - Setting of technical standards;
   - Compliance of safety standards and practices;
   - Such functions which are statutorily provided under any of the statutes for the time being in force;
   - Authority may suggest measures for Human Resource Development to achieve any of its stated objectives and functions.

RDA shall submit periodical reports to the Central Government on various aspects relating to the functions prescribed for the RDA and on such other specific matters as may be called for by the Central Government from time to time.

Annexure 5 - Comparative Analysis of CPWD Placement options

Table 14: Placement Options for CPWD

S No.	Options for CPWD	Pros	Cons
1	A Corporate / PSU like NBCC;	• Autonomy and delegation from the MOUD • Enables growth through projects based on commercial principles	• Creates an NBCC-II • CPWD currently also works on Projects/ works of national importance; technical advisor to the Govt. and for national standards/ price benchmarks/ specifications. These functions be untenable for a PSU among many • Anticipated resistance from employees on losing a 'government' job status
2	A board like the Railway Board	Autonomy and accountability	• Normally the boards are set-up within a ministry where the works of the board are for the concerned ministry only • No specific advantage over the 'attached office' structure along with the systemic change recommendations
3	A regulator/ authority	None	Construction/ maintenance functions are untenable for a regulator
4	No change (Continues to be an attached office of MOUD)	• Objectives of efficiency/ quality/ better client service/ autonomy/ accountability and long term success achievable through other systemic changes in the current setting • Minimal Resistance from employees	None

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