

**TECHNICAL EDUCATION  
QUALITY IMPROVEMENT PROGRAMME  
OF  
MINISTRY OF HUMAN RESOURCE DEPARTMENT  
GOVERNMENT OF INDIA**

**CIVIL WORKS MANUAL**  
**(INCLUSIVE OF ENVIRONMENT MANAGEMENT MEASURES)**

**PROJECT TEQIP – II**

**December 2009**

The contents of this document are subjected to change

## ABBREVIATIONS

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AMC	Annual Maintenance Contract
BOQ	Bill of Quantities
COE	Center of Excellence
CPWD	Central Public Works Department
CSS	Centrally Sponsored Scheme
DEA	Department of Economic Affairs
DSR	Delhi Schedule of Rates
EHS	Environment, Health & Safety
Goi	Government of India
IBRD	International Bank for Rehabilitation and Development
IDA	International Development Association
IDP	Institutional Development Plan
IPMU	Institution Project Monitoring Unit
INR	Indian National Rupee
LOI	Letter of Invitation/ Letter of Intent
MHRD	Ministry of Human Resource Development
MOU	Memorandum of Understanding
NBC	National Building Code
NGO	Non-Governmental Organization
NPD	National Project Director
NPIU	National Project Implementation Unit
PIP	Project Implementation Plan
QCBS	Quality and Cost Based Selection
SBD	Standard Bidding Document
SPFU	State Project Facilitation Unit
TOR	Terms of Reference
UT	Union Territory

## **PREFACE**

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This “Civil Works Manual” is intended to guide the State Project Facilitation Unit’s, the project institutions and the implementing agencies about the procedures to be followed during any construction activity to be undertaken under the Project TEQIP II. This manual also provides guidance on the various environment management measures that need to be integrated into the design and construction of civil works under the project.

The objective of this manual is to provide guidelines for proper planning, designing and construction of civil works. It also intends to sensitize the institutions on environmental management issues, including those related to maintenance aspects to help in improving the over-all learning, working and living environment in the campus.

This manual has been developed in conjunction with the “Procurement Manual” developed for the Project. For the processes to be followed, SBDs (Standard Bidding Documents) to be used for procurement of works, the ‘Procurement Manual’ only should be referred.

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**SECTION I**  
**PROJECT DESCRIPTION**

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**BACKGROUND**

The Ministry of Human Resources Development (MHRD), Government of India (GOI) is focusing on expanding access and improving quality of higher education in the country through Technical Education Quality Improvement Programme (TEQIP).

TEQIP was conceived and designed as a long term Project to be implemented in 10 to 12 years in 3 phases to support excellence and transformation of Technical Education in the country. The whole Project has been designed in different phases, which provides the opportunity to utilize the lessons learnt of one phase in the subsequent phases for better results. The first Phase of the Project had become effective from March 2003 and ended in March 2009. It is envisaged that the Second Phase of Project (TEQIP-II) shall commence from April 2010.

**CIVIL WORKS**

It is envisaged that the civil works to be carried under TEQIP – II shall be prioritized as under,

- a) Repairs to existing buildings
- b) Modification of buildings (including laboratories to improve teaching – learning process)
- c) Extension to existing buildings

The salient features of Works under the Project are:

- Allocation for Civil Works will be restricted to 5% of the overall allocation of the State.
- Joint funding (combining the State funds and Project funds) for the Works will not be permissible.
- Institutions themselves will be responsible for obtaining all the requisite approvals for carrying out any civil works from concerned authorities like Municipal Corporation and other Local Agencies/Departments.
- Institutions and SPFUs must ensure supervision mechanisms to achieve quality construction and timely completion.

## SECTION II

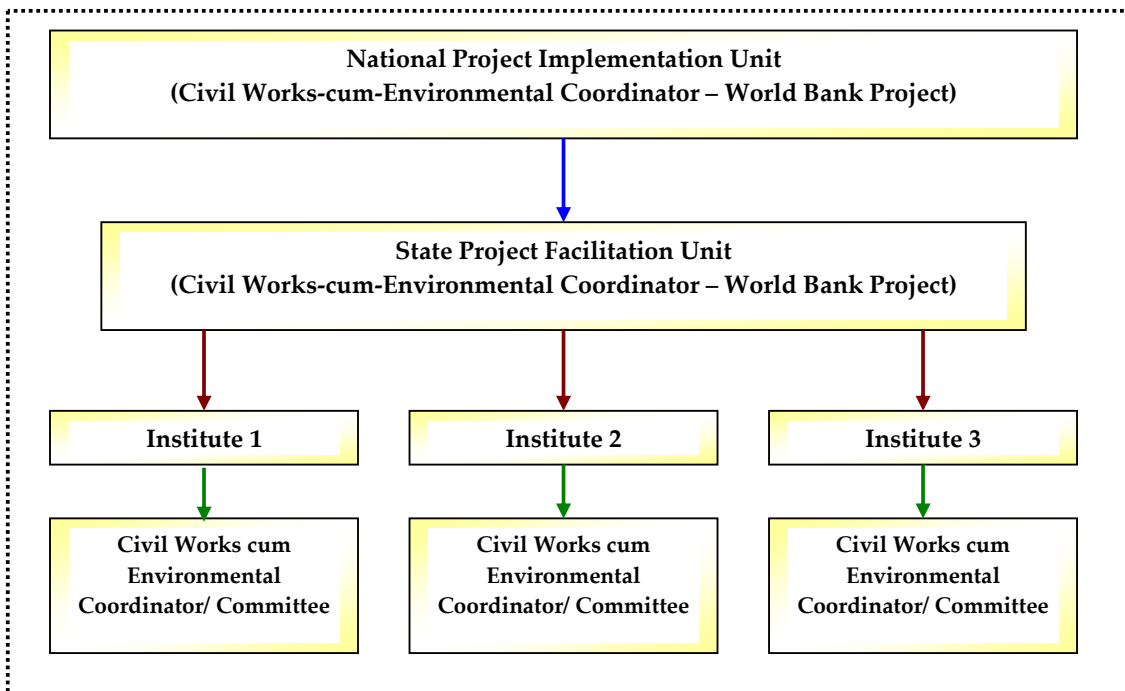
### PLANNING, DESIGNING AND IMPLEMENTATION OF CIVIL WORKS

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#### 1. INSTITUTIONAL ARRANGEMENTS FOR CIVIL WORKS

The National Project Implementation Unit (NPIU) is the coordinating agency at the national level for the project on behalf of the Government of India. The State Project Facilitation Units (SPFU's) will be formed in the each of the participating States to implement and monitor the various components of the project.

Works is included in the project TEQIP II as a separate category of disbursement. The diagram given below shows the hierarchy of responsibility for implementation of civil works:



The responsibility with regard to civil works primarily comprises of preparation of drawings, technical specifications and post-contract award management. This includes the responsibility to ensure integration of environmental requirements in the drawings and technical specifications. The contracting, whether for works, goods or services will be handled by the Procurement Coordinator and the Procurement Committee, the process and details for which have been provided in the Procurement Manual prepared for the project.

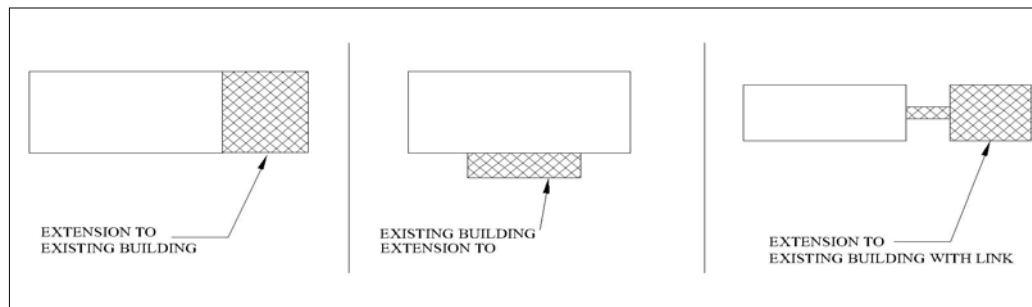
#### CIVIL WORKS CUM ENVIRONMENTAL COORDINATOR

- a. **At SPFU level:** An officer should be appointed on full time basis for co-ordination of civil works to be executed at various Institutes. It is desirable to have a civil engineer or an architect designated for this job. A qualification or experience in environmental management, particularly with regard to building design and/or construction works will be of advantage. In case such an expertise is not available, the designated officer needs to undergo specific training on the need, process and requirements on environmental management.

- b. **At Institute level:** For co-ordination of civil works, either a civil engineering / architecture faculty member should be designated and / or a committee should be formed. In case a committee is formed, a faculty member should be designated for day-to-day co-ordination while the committee, could meet as and when required. The designated coordinator or the faculty member should be made the one point of responsibility for the civil works. The designated faculty member and/or the committee need/s to be familiar with the need, process and specific requirements for environmental management as well.

## 2. TYPES OF CIVIL WORKS ENVISAGED UNDER THE PROJECT

- a. **Repair works:** These are the works associated with repair of dilapidated and/ or non-functional components of the existing building. These may include replacement of leaking pipes or broken toilet fittings and repair of damaged flooring or plaster.
- b. **Refurbishment works:** Under this category, the works that are usually executed relate to changing the existing function of a room/ space to a new proposed function. For example: Provision of electrical, water supply and/or waste disposal arrangements in an existing room which is proposed to be used as a laboratory is considered refurbishment. Any requirement of goods and furniture to make the refurbished space functional will be covered under procurement of goods and not under this head
- c. **Extension to Existing Buildings:** Under this category, an additional area will be constructed in continuation of an existing building, both physically and functionally.



**Fig 2: Sketches Showing Possible Extensions to Existing Building**

## 3. STATUS OF SITE / LAND

- a. **Ownership of Land:** The project will permit extensions to existing buildings only on land that is owned and fully in the possession of the Institution, the State Government or the Central Government. Further, this land must not be occupied by any person/s, including squatters or encroachers, who may be using it for residential, commercial/livelihood or any other purposes. The availability of land free from any encroachers and/or squatters must be ensured before a site is selected for construction.

The Land Site Assessment process needs to be completed as per Annex 1 and a Certificate must be prepared following the format given in Annex 2. Documentation on the process followed and the certificate prepared need to be archived and made available to Joint Review Missions, comprising of World Bank and NPIU officials. It must be ensured that the ownership of the land is clearly with the Institute on which the civil works are proposed.

- b. **Pre-construction Activities:** The selected sites should be free from encumbrances. However, any encumbrances on the selected site/land such as trees, electrical and water utilities, hand pumps, water taps, parking sheds and temples/shrines (or any other) will be clearly identified and documented using the format provided in Annex 3. The documentation will cover details of type, number, size/area of the impacted structure, species (in case of trees), as applicable. Relocation/replacement of such structures and utilities needs to be planned and executed prior to initiation of civil works. The cost estimates for such pre-construction activities will be shown under a separate head in the civil works estimates.

#### 4. APPOINTMENT OF CONSULTANT

- a. There are two types of services required for construction related works: (i) building design and partial supervision; and (ii) construction management which includes quality, cost and time management. Various combinations of these services are possible for completing a construction activity. Some of these are listed below:
  - i. The civil engineering and the architectural departments of the Institute jointly handle works with each department providing its expertise; or
  - ii. Two consultants are appointed using Bank's norms (for details refer Procurement Manual), one each for design and construction supervision; or
  - iii. An implementing agency is appointed using Bank's norms (for details refer Procurement Manual) for comprehensive services viz. design and construction management; or
  - iv. An existing implementing agency (like State PWD / CPWD or any other government/ semi government agency) is appointed for the comprehensive service viz. design and construction management etc. (Please refer to the Procurement Manual to understand the conditions applicable for using state agencies for contracted services).
- b. The professional fee will be reimbursed from the project only when the services are procured as mentioned under (ii) and (iii) above. These services should be procured as per Bank's procurement norms.
- c. The percentage charges or the fee of the government agencies and government owned agencies like PWD, RITES etc. shall not be paid from the project unless these agencies have been selected on competitive basis as per Bank's procurement guidelines.
- d. The scope of services of the Institute/ Consultant/ Govt. Department or agency (as applicable in a particular case) will include integration of environmental aspects in the design and construction of civil works. The requirements to this effect have been elaborated under section III of this manual.

#### 5. DATA TO BE PROVIDED BY THE INSTITUTE

The information/data mentioned below is required for extensions to the existing buildings:

- a. **Detailed Land Survey:** This plan should show all details of existing land levels at suitable intervals, location and sizes of existing sewer and water supply lines, electric cables, roads, foot paths, trees and other fixed elements.
- b. **Investigation Reports:** Soil investigation report, water test reports, spare capacities available in the existing electrical transformers, sewage systems, water tanks or any other information about the existing systems that may be required or useful for planning should be provided.



- c. As an alternative, the Institute may include the activities mentioned in (i) and (ii) above in the scope of work of the consultant / to be appointed.
- d. **Design brief:** The space requirements such as the hierarchy of staff to be housed in the building, number of computers in case of a computer center, number of library volumes in case of library, or other similar relevant information for the architect to plan the building should be provided to the consultant.

## **6. PRELIMINARY DRAWINGS**

- a. The Institute (internal team) / Consultant / Govt. Department / Hired Agency should prepare preliminary designs based on site visits and data/design brief provided by the Institute.
- b. The Institute (internal team) / Consultant / Govt. Department / Hired Agency should prepare at-least the following for review:
  - i. Plans, elevations and sections including the existing buildings as may be required to explain the scheme;
  - ii. Where an extension to an existing building is proposed, the report / drawings should also explain how the existing spaces are being optimally utilized, justifying the need for the extension.
  - iii. A brief report explaining the concept of architectural planning with a brief description of intended structural, electrical, Public Health and other works.
- c. If the estimated cost of the work is above the prior-review limit, the preliminary drawings need to be reviewed and approved by the civil works-cum-environment coordinator/ committee and the user department. These drawings and reports should be submitted to the Bank for its review. This review at this stage of the design is offered by the Bank to obviate extra work, which may result from the observations on the final drawings when submitted along with the bid document for Bank's no objection before inviting bids.
- d. If the estimated cost of the proposed works is below the prior-review limit, the drawings may be reviewed / approved by the civil works-cum-environment coordinator / committee and the user department at the Institute.
- e. The approved drawings need to be signed by the concerned department so that they have a sense of ownership of the design.
- f. The architect should then be instructed to proceed with the next stage of work and a copy of the signed approved drawings should be given to him.

## **7. DRAWINGS FOR APPROVALS FROM LOCAL APPROVING AGENCIES**

Where required, the Institute should submit drawings and documents for approval from local agencies (such as the municipality, the fire department, environment department, health department, department of civil aviation etc.). Only approved and legal buildings will be funded from the project. All approval drawings, documents and certificates must be readily available for review.

## **8. DETAILED CONSTRUCTION DRAWINGS**

### **a. Repair Works**

Room-wise drawings and bill of quantities should be prepared indicating the envisaged works including all services such as electrical and air-conditioning.

**b. Refurbishment Works**

As above in 8 a.

**c. Extension to Existing Buildings**

The consultant will prepare final working designs/drawings and details for various services so that the extensions are integrated with the existing buildings/ infrastructure, and functional in all respects after completion. All these drawings shall be 'Good for Execution' so that accurate bill of quantities can be prepared from them. Some of the key drawing requirements are listed below:

• **Architectural Drawings**

- Site plan showing existing and proposed buildings and road networks, land levels etc.
- All floor plans, elevations and sections
- Details of toilets, staircases, railings, flooring pattern and false-ceiling
- Schedules for doors and windows and flooring in different rooms
- Integrated service drawings showing electrical, air-conditioning, fire-detection systems
- Details of built-in furniture
- Any other detail required for proper completion of the works.

• **Structural Drawings**

- Design basis report including Soil test report
- Detailed design with calculations
- All detailed drawings like floor plans, structural profiles, column schedule, beam elevations, reinforcement details or others as required;
- Structural safety certificate for all works.

• **Water Supply, Sewerage Disposal, Sanitary Installations and Storm Water Drainage**

- Design basis report including the recycling of resources like rain water harvesting, sewage treatment plants etc.
- Detailed design with calculations
- Detailed drawings for Internal and External Water Supply and Disposal
- Sewerage disposal including Sewage Treatment Plant and recycling of treated effluent
- Overhead tank and under ground reservoirs.
- Storm water drainage including rainwater harvesting.
- Bore-well details, as and if required
- Schematic drawings including details of how the proposed system will be integrated with the existing services
- Any other details/drawings required for proper functioning and operation of utilities including element/s for re-cycling of resources.

• **Electrical Drawings**

- Design basis report including the energy saving steps included in the scheme
- Detailed design with calculations
- Internal and external electrical layout showing the distribution systems, emergency circuits etc. The internal electrical layout should be integrated with both the structural and furniture

layouts. Where the building is centrally air-conditioned, this layout should be integrated with the air conditioning system also.

- Design of sub-station and electrical back up (diesel generator sets).
- Provision of telephone, broadband conduits, T.V. conduits and connections/conduits for other electronic equipment.
- Schematic drawings/design and details of how the proposed system will be integrated with the existing systems.
- Any other elements that is necessary for efficient and safe electrical utility functioning including energy conservation elements.

- **Air Conditioning**

- Design basis report including the energy saving steps included in the scheme
- Detailed design with calculations;
- Internal and external layouts showing the entire air circulation system, ducts, ventilation grills etc. Where the building is centrally air-conditioned, the layout of ducts and grills should be integrated with both the structural and electrical layouts.
- Building management system to optimally utilize all the installation in the building and monitor their functioning.
- Any other element/s that is necessary including energy conservation.

- **Fire Detection and Fire Fighting Drawings**

- Design basis report
- Provision for the fire safety as per relevant codes
- Details of how the proposed system will be integrated with the existing services.

- **PA System Drawings**

- Design basis report
- Provision for the PA / recording systems in the conference halls
- Details of how the proposed system will be integrated with the existing services.

- **Campus Development and Landscaping Drawings**

All drawings showing areas to be landscaped such as water bodies, roads, parking areas, parks, boundary walls, open spaces, footpaths etc. with complete details on horticulture, plantation, signage, street lights, gates and other hard/soft landscaping elements. Care should be taken to integrate these with the existing systems.

- Any other drawings or details required for proper and satisfactory completion of the Project.

## **9. BILL OF QUANTITIES AND DETAILED ESTIMATES**

### **a. Extensions to existing buildings**

The bill of quantities will be prepared from the 'Good for Execution' drawings in the Central Public Works Division format. Detailed estimates shall be prepared as per the Delhi Schedule of Rates (DSR)/ CPWD/ PWD updated up to the latest cost-index for the city where the work is proposed, and the rates for the non-DSR/ CPWD/ PWD items will be supported with market rate analysis. The detailed estimate

shall be compiled along with necessary reports and drawings, as required by Institute to grant technical sanction.

**b. For repairs and refurbishment works**

While it is likely that variations in quantities will occur during repairs, it is critical that a schedule of quantities for the items to be executed is as accurate as possible.

- c. Supply of all materials like cement and steel should be included in the bid document. No material will be supplied by the Institute or the implementing agency.

**10. SPECIFICATIONS**

- a. The specifications don't have to be written for the items, which are already included in the CPWD specification document. The relevant item number from the CPWD specification document should be mentioned for each item in the bill of quantities and it should be clearly stated that the specifications as mentioned in the CPWD document will be followed for these items.
- b. Detailed specifications shall be prepared for all the items not covered under CPWD document.
- c. A list of 'approved makes' for various materials should be included. At least three equivalent makes should be included with a caveat "or similar" in this list.

**11. PROOF CHECKING OF STRUCTURAL AND OTHER DESIGNS**

- a. The Institute may decide to get any of the designs proof checked by another consultant. The proof-checking consultant shall be appointed by the Institute following Bank's procurement norms and paid from the project funds.
- b. The design consultant shall be required to submit all the design calculations and provide all necessary technical assistance in getting the designs proof checked.

**12. BID DOCUMENTS**

- a. Bid documents will consist of the following volumes:
- Volume I – This will be the approved Standard Bid Document, duly filled in
  - Volume II – Specifications of items of execution
  - Volume III – Bill of Quantities
  - Volume IV – Drawings (these should be 'Good for Execution' drawings)
- (Please refer to the Procurement Manual for detailed procurement procedures and information on bid documents).
- b. As per the value-based thresholds defined in the Procurement Manual, the SPFU should submit all documentation that require prior review including the complete bid document to the Bank for its no-objection.
- c. Where the cost is estimated to be below the prior-review limit, the bid document should be cleared by the coordinator / committee and submitted to the Procurement Coordinator for initiating bidding and selection.
- d. All detailed drawings for construction should be ready when the bids are invited including all the structural drawings.

### 13. BIDDING PROCESS

Please refer to the Procurement Manual developed by NPIU & World Bank for detailed procurement norms for bid invitation, bid opening, bid evaluation and award of contract.

### 14. CONSTRUCTION SUPERVISION

- a. For constant supervision, the implementing agency should place engineer/s depending on the value and type of construction. These engineers will be responsible for quality and quantity checks and verification of the work at site. They will also certify the contractor's bills for payment.
- b. The design architect should be kept involved in construction supervision through periodic site visits. The frequency of these visits may vary between 1-8 weeks depending on the value and type of civil works and need at the site to be decided by the site supervisor and / or the civil works coordinator.
- c. **Construction Quality and Reviews for Timely Completion**
  - i. The SPFU/NPIU respectively may consider appointing an independent consultant (using Bank's procurement norms) for a third party audit of the quality of construction during construction. The Terms of Reference (TOR) for such consultants are attached as Annex 6.
  - ii. To monitor the quality of construction, the implementing agency shall conduct all the material tests as specified in the applicable Indian or other applicable codes.
  - iii. While the manufacturer's test reports from authorized labs can be accepted for some of the materials, there are some mandatory tests to be conducted by the contractor at site. Some of these tests are mentioned below:

S. No	MATERIAL	TEST TO BE CONDUCTED
1.	Cement	To be conducted by the contractor for each lot of cement if the cement is bought from shops / agents. If the cement is bought from the railway hoarding, the test reports of the manufacturer will be acceptable.
2.	Steel	Same as above
3.	Sand	To be conducted by the contractor
4.	Aggregate	To be conducted by the contractor
5.	Bricks	To be conducted by the contractor
6.	Concrete	To be conducted by the contractor

- iv. Since repair and refurbishment works are likely to be minor in nature, the type and frequency of material tests may be decided by the supervising engineer in consultation with the civil works coordinator.
- v. As far as possible, the material should be bought directly from the manufacturers. Such purchases may be routed through an agent but the material should be dispatched directly from manufacturer's factory. In case the material can not be purchased directly from the manufacturer, all relevant tests as prescribed in the relevant codes should be conducted/obtained and the records should be maintained in the format.

- vi. The material specifications should be strictly adhered to. The materials should be selected only from the list of 'approved makes'.
- vii. The civil works coordinator / committee should review the works periodically at site. The frequency of these review meetings may vary between 4-8 weeks depending on the value of the work. The implementing agency should prepare progress reports for these meetings. These progress reports should include at-least the following:
  - Organization chart of contractor's supervising staff with names.
  - Organization chart of the implementing agency's supervising staff with names.
  - Manpower deployed by the contractor.
  - Physical progress in comparison to the time schedule agreed with the contractor.
  - Financial progress.
  - Adequacy and quality of implementation of environment and safety measures during construction.
  - Bottlenecks if any and suggestions for mitigation of the same.
  - Delays if any and reasons thereof.
  - Pictures of the building/s.

**d. Implementation of Conditions of Contract**

It has been noticed in many projects that the borrowers do not implement all the clauses in the contract strictly. Some of the contagious ones are listed below:

- Delays: The reasons of delay should be clearly recorded. Timely decision should be taken to impose the liquidated damages if the delays are attributable to the contractor or grant the time extension to the contractor if the reasons are attributable to the Institute. Simultaneously, the civil works coordinator should be intimated about the time extension and its contractual implications.
- Extra items: The rates of the extra items should be calculated as per the stipulations in the bid document and approved by the civil works coordinator/ committee, in time, to avoid subsequent disputes.
- Changes in specifications: The changes in specifications, if any, should be approved by the civil works coordinator/ committee before these are implemented and appropriate contract amendments should be issued prior to carrying out the additional works. Please refer to the Procurement Manual for detailed conditions on contractual amendments.
- Enhancement of Contract Value: The implementing agency should not wait until the original contract amount is spent but, should apply for enhancement of contract amount as soon as it becomes evident. This will alert the civil works coordinator / committee about extra cost and they can suggest curtailment if any required.
- Bank's no objection to enhanced cost: If the enhanced cost is likely to exceed 15% of the original contract value, Bank's no-objection should be sought as soon as it is evident rather than wait till later stages of completion. The application should be made in the prescribed format.
- Contractors' bills: The contractors should be asked to submit bills regularly as defined in the bid document and these bills should be cleared with in the time frame defined in the document.
- Deposit works: If it is unavoidable to get the work executed as 'deposit works' through some government agency: (a) all the steps and the reviews mentioned above should be followed strictly.

These should be clarified to the implementing agencies at the initial stage itself for compliance; and (b) the Utilization Certificates issued by the implementing agency should be supported with relevant running bills and the measurement books.

- Environment, Health & Safety (EHS) measures: All the legal norms on environmental management, worksite safety and labor regulations should be strictly adhered to.

## **15. POST CONSTRUCTION**

### **a. Handing over/ taking over of completed building**

- Before the building is taken over, the civil works cum environmental coordinator / committee should inspect the building jointly with the supervising engineers and contractors. A detailed list of defects should be prepared and issued for rectification.
- The number and type of all the fittings and fixtures should be matched with the bid documents.
- The implementing agency should hand over a detailed inventory of all the fittings, fixtures and equipment being handed over. It should be ensured that each and every item mentioned in this inventory is properly commissioned and tested and is in a working condition.
- The brochures, warranties, guarantees, circuit diagrams etc. of each equipment used should be handed over to the Institute.
- The site should be cleared of any unused materials and construction debris/wastes. All sites, even those used temporarily for worker's camp or for storage of construction material should be restored to the original condition by the contractor.
- The Institute should designate engineer/s for maintenance of the building, which should be trained by the contractors.
- As-built drawings should be handed over to the Institute.
- The architect or the implementing agency should obtain the completion certificate and clearances from other departments (like fire, environment etc) and give the relevant papers to the Institute at the time of handing over the building.

### **b. Information to be submitted to NPIU after handing over/ taking over of completed building**

- After the building has been taken over, the Institute will be required to fill in the information sought in the Annex 5 attached with this manual for all the NCB works.
- The duly filled in Annex shall be submitted to the SPFU within 7 working days of taking over of the building.

## SECTION III

### ENVIRONMENT MANAGEMENT FRAMEWORK

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The section here lists out the various elements/aspects/measures that will help in creating and maintaining good and safer campus environment. The list provided under the various sub-heads is a comprehensive one to ensure that various possibilities that often exist in a national level project can be addressed effectively.

#### I. Building Design and Related Aspects for Extensions

During the designing ensure the following mandatory activities:

- Water Supply arrangement/s, as per applicable norms
- Sanitation arrangement/s, as per applicable norms including separate arrangements for men, women and physically challenged
- Waste water discharge or disposal arrangement/s
- Adequate storm water discharge arrangement
- Floor height and window area, as per National Building Code (NBC) norms.
- Promote wood substitutes and use of materials like fly ash and unleaded paint.
- Adoption of relevant construction code/s, applicable for earthquake, cyclone, flood and/or landslides.
- Barrier free access for the physically challenged.

Clear and comprehensive drawings for various utility services such as wiring, water supply, waste collection and disposal, plumbing, drainage and sewage disposal diagrams will be made (as explained in Section 8).

Additionally, the following suggestive measures shall be considered and provided in the design:

- Building or block orientation, keeping in mind the solar and wind direction and also the existing layout (as explained in the earlier sections to the extent possible).
- Natural Light and Ventilation in Classrooms, Laboratories, Canteen and Toilets
- Appropriate shading devices (*chajjas* and louvers)
- Signage inside and outside the building
- Display/notice boards for display of information in the classrooms and at other required locations.
- Fire and electrical safety arrangements
- Provision of alarms or hooters to alert building occupiers in case of emergency.
- Clear demarcation of escape routes and assembly points for emergency situations.
- Provision of parking (segregated for two and four wheelers)
- Preserve existing trees, to the extent possible.

Many of these measures can be given effect even when there is no new construction involved.

#### II. Environment Augmentative Measures

The following suggestive environment augmentative measures should be encouraged in the institutes:

- Rain water harvesting.
  - Promotion of energy efficient lighting.
  - Provision of acoustic measures.
  - Use of heat reflecting glass.
-



- Promotion of water conservation measures.
- Promoting use of solar energy.
- Minimization of paved area: Eg: Loose aggregate and paving stones can be used for pedestrian movement areas in place of a hard concrete surface.
- Appropriate use of colors for buildings and walkways. Eg: Colors that absorb less heat can be chosen.
- Vermi-composting for biodegradable waste.
- Landscaping (such as of roads, parking areas, water bodies, entry and exit gates, boundary walls, open spaces and footpaths)
- Tree plantation (including use of drip irrigation system to reduce wastage of water)
- Use of locally available materials, as possible.

### **III. Environment and Safety Management Measures for the Construction Stage**

The institute will ensure that the implementing agency (such as CPWD or State PWD) and/or its contractor fully abide by the required legal requirements, including adherence to labour laws such as Building & Other Construction Act, Minimum Wages Act, Child Labour Act, Equal Remuneration Act, etc. Some key environment and safety requirements that need to be enforced and monitored include the following:

- Provision and enforcement of Personal Protective Equipment (PPE), as relevant to the needs of the work.
- Ensuring proper safety precautions during erection, use and dismantling of temporary structures such as scaffoldings.
- Ensuring proper barricading and delineation of worksites.
- Ensuring that the required electrical, fire and mechanical safety practices are followed during various construction operations.
- Ensuring provision of safe access and working platforms for workers and supervisors.
- Display of information on Minimum Wages.
- Provision of accommodation for workers as per norms.
- Provision of proper potable water supply arrangements for workers.
- Provision of sanitation arrangements (toilets, urinals, bathrooms) for workers (including separate ones for women workers, as required).
- Provision of first aid and emergency response arrangement.
- Minimization of wastage including reuse and recycle of materials, as possible.
- Proper stacking and disposal of waste materials (including proper segregation, storage and disposal of any toxic and hazardous wastes).
- Use of acoustic jacket for generators to be used during construction work.
- Ensure proper and safe storing/stacking of construction material.
- Provide for silt control measures, if there are any streams/water bodies in the vicinity.
- Proper planning and sequencing of construction activities to reduce/minimize disturbance to students.

These requirements should be clearly mentioned in the Bidding Documents.

### **IV. Integration of Environment Management Aspects**

The key steps that will guide the integration of environment management measures into civil works are as follows:

- Step 1: A reference to the environment management elements/measures (planning or design stage related) listed in the section above needs to be made. Then, a clear list of elements that will 'apply' to the particular civil work being proposed needs to be identified/ made.
- Step 2: The identified environment management elements/measures need to be clearly reflected/marked in the Detailed Project Reports including Design Drawings.
- Step 3: The construction stage environment management requirements need to be integrated into Bidding Documents.

The civil works cum environment coordinators both at the institute and the state level will cross-check and ascertain the integration of environment management aspects into civil works. Format provided in Annex 4 should be used for this purpose.

#### **V. Over-all Maintenance/Management of the Campus**

All institutes participating in the project (even in cases where no new construction is proposed) need to ensure over-all cleanliness and hygiene in the campus. This includes:

- Adequate provision of waste collection bins including arrangements for segregation of solid wastes and their regular disposal.
- Separate collection and disposal of toxic, inflammable wastes, specifically from laboratories.
- Hygiene in kitchen, mess, canteen and toilets
- Proper storage of materials (whether in kitchen/mess, workshops and stores)
- Provision and maintenance of first aid boxes, particularly in laboratories and workshops.
- Posters with safety and cleanliness messages, as applicable.

# ANNEXES

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## LAND/ SITE ASSESSMENT

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For each site proposed to be used for the project, the following information should be gathered from official documents and through actual site visits.

- ❖ **Ownership status** of the land (e.g., private/ community/ panchayat/ government with clear title) – complete details should be provided. Is there any litigation related to the land or are there any claimants? If the answer is ‘no’ or ‘none’, the relevant institution/state government would need to certify this.

*If there is any litigation/claimant, the site shall not be selected for construction.*

- ❖ **Occupation status:** Are there any occupants, tenants, encroachers or squatters on the site? This will need to be checked and certified, even if the land is government, panchayat, community or privately owned.

*If there are occupants (of any category), the site shall not be selected for construction.*

- ❖ **Use status:** Is the site being used by anyone (legally or illegally) for shelter/residence or work/business/livelihood? This includes even activities such as grazing of cattle, spreading of clothes by dhobis and use of space for any informal work.

If there are no occupants or users, the relevant institution/state government would need to certify this.

- ❖ **Encumbrance Status:** Site assessment needs physical verification of elements such as electric sub-stations, poles or lines; telephone poles; trees, water supply pump-houses or lines; water sources such as wells, taps, hand pumps and bore wells; water bodies; OFC cables; shrines/temples etc. Use format provided in Annex 3 for documenting such information. If there are any such encumbrances on the site, due process will be adopted for relocation/reconstruction. Bank’s policies and existing regulatory framework (such as for tree cutting) will be adopted, as necessary.

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**FORMAT TO CERTIFY LAND OWNERSHIP AND STATUS**

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**CERTIFICATE**

This is to certify that the land at \_\_\_\_\_

\_\_\_\_\_ (Address of plot) measuring

\_\_\_\_\_ (Area of plot) on which the

\_\_\_\_\_

\_\_\_\_\_ (Name of facility, e.g., laboratory building of XXX College of Engineering at ----- YYY

(name of place, etc.) will be constructed under the World Bank-assisted Second Technical

Education/Engineering Quality Improvement Project is registered in the name of

\_\_\_\_\_ (Name of Institution or Government Department, if relevant) and is

fully in its possession and control.

It does not have any claimants, nor is it the subject of any judicial proceedings.

It is not occupied by any person(s), tenants, encroachers or squatters for residential or livelihood/work/business purposes.

It is not being used for any public purpose, which would be denied by construction of the facility, nor does it have any encumbrances whose removal would cause inconvenience to anyone.

Signed by Appropriate Authority

**FORMAT FOR SITE ASSESSMENT**  
**– Documentation of Encumbrances**

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- ❖ Name of the State:
- ❖ Name of the Institute:
- ❖ Name of the Work:

S. No.	TYPE OF ENCUMBRANCE	REMARKS
a.		
b.		
c.		
d.		
e.		

**Note:** Information in form of number/units and whether it will be relocated/reconstructed or shifted or compensated or any other information relevant should be provided in the remarks column.

**ENVIRONMENT MANAGEMENT MEASURES**  
**Checklists for Design, Construction and Operation Stages**

**Note:** Information in form of number/units, norms/standards used, reasons, remarks on applicability (for example, one can say 'not applicable' in situations where acoustic measures are not required or in a case where already a rain water harvesting system is in place, one could say 'it already exists') or any other information relevant should be provided in the remarks column.

**A. CHECKLIST FOR DESIGN STAGE**

**1. BUILDING DESIGN & RELATED ASPECTS FOR EXTENSION**

S. No.	ASPECT	YES/ NO	REMARKS
a.	Have the relevant construction code/s, applicable for earthquake, cyclone, flood and/or landslides, been adopted during building/ block design?		
b.	Have adequate fire safety measures been put into place?		
c.	Has the water supply arrangement been made as per norms?		
d.	Is the provision of potable water arrangement sufficient?		
e.	Has the sanitation arrangement been made as per norms?		
f.	Are there specific arrangements for the physically challenged in the toilets/urinals?		
g.	Does the building/block provide for barrier free access for the physically challenged?		
h.	Is there any unhygienic area within the campus? Eg: Open clogged drains carrying waste water		
i.	Is there any water logging in the campus?		
j.	Have adequate numbers of dust bins/garbage collection facilities been provided?		
k.	Were any trees cut for the construction?		
l.	Has signage (internal as well as external) been provided?		
m.	Have sufficient number of display/notice boards been provided?		
n.	Is there any provision for alarm/s or hooter/s?		
o.	Is there a proper and sufficient provision for parking?		
p.	Is there any proposal to undertake tree plantation?		
q.	Is there any landscaping proposal?		

## 2. ENVIRONMENT AUGMENTATIVE MEASURES

S. No.	ASPECT	YES/NO	REMARKS
a.	Are wood substitutes being proposed?		
b.	Is the use of fly ash (brick, block or in any other form) being proposed?		
c.	Is rainwater harvesting arrangement proposed?		
d.	Is energy efficient lighting being provided?		
e.	Is there any requirement to provide for acoustic measures?		
	If yes, have such provisions been made in the design?		
f.	Are there any provision/measures to support water conservation?		
g.	Does the proposed colour scheme take into account heat absorption factor?		
h.	Is there any initiative on vermi-composting?		
i.	Is there any proposition to use locally available material?		



## B. CHECKLIST FOR CONSTRUCTION STAGE

S. No.	ASPECT	YES/NO	REMARKS
a.	Is the required Personal Protective Equipment (PPE) (as relevant to the needs of the work) being provided to the workers?		
	Is the PPE being used by engineers and supervisors?		
	Is the PPE being used by the labour?		
b.	Have any enforcement mechanism/s been put into place towards ensuring use of PPE provide?		
c.	Are proper safety precautions/practices being taken during erection and use of temporary structures such as scaffoldings?		
d.	Are proper safety precautions/practices in place for working platforms and ladders?		
e.	Does the worksite have restricted access?		
f.	Is/are the worksite/s barricading properly?		
g.	Have proper precautions been taken to ensure fire safety during construction?		
h.	Are the required measures in place to ensure electrical safety during construction?		
i.	Is there a mechanism in place to check the safety of various mechanical equipment and machinery that is being used for construction?		
j.	Has the information on Minimum Wages been displayed in the local language?		
k.	Is the worker accommodation in line with legal provisions?		
l.	Is there a proper potable water supply arrangement for workers?		
m.	Has proper sanitation arrangement (toilets, urinals, bathrooms) for workers (including separate ones for women workers, as required) been made?		
n.	Has the contractor made first aid and emergency response arrangement on the worksite?		
o.	Has the storage/stacking of materials been appropriately (safely) done?		
p.	Are there adequate and proper waste collection and disposal arrangements on the worksite?		
q.	Are acoustic generators being used for construction?		
r.	Is the construction work causing any inconvenience to any of the campus residents/users?		
s.	Has the worksite been cleared off all debris, wastes and left over materials?		
t.	Has the worksite or area used temporarily during construction been restored?		

### C. CHECKLIST FOR POST-CONSTRUCTION/OPERATION STAGE

S. No.	ASPECT	YES/ NO	REMARKS
a.	Are the required numbers of first aid boxes available?		
	Is the provision in the first aid boxes as per the norms?		
b.	Are the following utilities/services/facilities functioning properly and are these being maintained properly?		
	Water Supply Arrangements		
	Potable Water Arrangement		
	Sanitation Arrangements		
	Solid Waste Collection and Disposal Arrangements		
	Waste water collection and disposal system		
	Storm water collection and disposal system		
c.	Are the landscaping works being maintained properly?		
d.	Is the survival rate of plantation more than 80 percent?		
e.	Is there a clear demarcation of escape routes and assembly points for emergency situations?		
f.	Are the fire safety arrangements being regularly checked regularly?		
g.	Is the follow-up action (such as refilling of fire extinguishers) action on fire safety issues being taken in time?		
h.	Are the hooters/alarms in working order?		
i.	Does the institute conduct/arrange safety drills from time to time?		

**STATUS OF CIVIL WORKS (FOR NCB ONLY)**

**PART 1: CONSTRUCTION AND RELATED ASPECTS**

1.	Name of the State	
2.	Name of the Institute	
3.	Total Allocation for Civil Works in Rs. Million for the Institute	
4.	Actual Expenditure as on in Rs. Million	
5.	Name of the Work (NCB)	
6.	NCB Document approved date and approved by	
7.	Bid Evaluation approved date and approved by	
8.	WBR No. if applicable	
9.	Name of Contractor	
10.	Value of Contract in Rs. Million	
11.	Date of Contract signing	
12.	Actual completion cost in Rs. Million	
13.	Contracted date of Completion	
14.	Actual completion date	
15.	Name of the consultant architect and/ or Name of the construction supervision consultant and / or implementation agency	
16.	Description of work. Describe the following in brief:	
	a. If it was a renovation work / or refurbishment work/ or extension to an existing building.	
	b. For renovations / refurbishment: broad building specifications like flooring, electrical work etc.	
	c. For extensions to existing buildings: type of building (computer center or library or.....) with a description of covered areas on each floor.	
<b>Approval of Drawings from Local Municipality/Authorities</b>		
17.	Were the necessary municipal approvals obtained, where required? Enclose a copy of the approval letter where applicable.	
18.	Were the drawings available in time for construction? If not, at stage/s the work at site was held up?	
<b>Quality of Construction and Related Issues</b>		
19.	Was any committee formed by the institute for reviewing the quality of the construction? If yes, who were its members? If no, why not?	
20.	If a committee was formed, how frequently did it review the works? Provide minutes / inspection notes of these reviews.	
21.	Were any reviews conducted by SPFU during construction? If yes, how many times did they visit and what were the qualifications of the visiting	

	person? Provide minutes / inspection notes of these reviews.			
22.	Was any third party audit of construction quality conducted either by the institute or the SPFU?			
23.	Were any deviations made from the drawings during construction? If yes, what types of deviations were made and who authorized them?			
24.	Copies of the material test reports should be submitted. The minimum materials to be included are: concrete, cement, steel, electric wires, flooring tiles, wall tiles etc. Manufacturer's test reports (where applicable) could also be made available.			
25.	Have all the materials been supplied as per the list of approved makes or are there any deviations. Please fill in the following table:			
	Material	Names in the list of approved makes	Make provided in the bid document	
a.	Reinforcement bars			
b.	Cement			
c.	Cladding tiles			
d.	Electrical wires			
e.	Electrical switches			
f.	Electrical fittings			
g.	Water supply pipes			
h.	Water disposal pipes			
i.	Toilet fittings (WC's, basins, urinals etc.)			
j.	Toilet fixtures (taps, mirrors etc.)			
k.	Hardware fittings on doors and windows			
26.	Do the number of fittings and fixtures provided match with the drawings? Please fill the following table:			
	Type of fitting	Number in BOQ	Number in Drawing	Number provided
a.	Tube lights			
b.	Electrical Sockets			
c.	WC's			
d.	Wash Basins			
e.	Urinals			

## PART 2: POST CONSTRUCTION ISSUES

1.	Is the building being put to the planned use? If not, why?	
2.	Are there any arbitration proceedings moved by either the contractor or the Institute?	
3.	Have any deformities / cracks (structural or non-structural) occurred after completion of construction?	
4.	Was the building ready for occupation when it was handed-over? If not – was a list of defects prepared and were all the defects rectified by the contractor before the building was finally taken over?	
5.	Were the permanent water and electricity supplies and sewer connections available when the building was handed over?	
6.	Are there any installations like diesel generators and/ or central air-conditioning and / or fire detection and/or fire fighting systems etc. If yes – was any training of the personnel conducted before the building was taken over?	
7.	Have the 'as-built drawings' been handed over to the Institute?	
8.	Has an inventory of all the installations been handed over to the Institute?	

**PART 3: CONTRACT IMPLEMENTATION AND RELATED ISSUES**

1.	Was the Bank's Standard Bid Document used for bids?	
2.	How many running bills were submitted by the contractor?	
3.	How much was the time taken between submission and clearance of running bills? Quote minimum and the maximum time taken for clearance and the reasons for delay if the time taken was more than the stipulations in the document.	
4.	Provide reasons for cost over runs, if any with justification. This should be provided for the over-all cost and the items where the variation is more than 15%.	
5.	Mention reasons delays in completion of work. If the delays were:	
	a. Attributable to contractor: were the liquidated damages imposed – if yes what was the amount?	
	b. Attributable to the Institute: the reasons and was the time extension granted in time?	

## PART 4: INFORMATION ABOUT COMPLETED BUILDING

<b>4.1</b>	<b>FUNCTIONARY ITEMS</b>	
a.	Whether the shape and size of the classrooms appropriate for planned use?	Yes/No
b.	Whether the size and shape of the laboratories/ workshops was sufficient for the machines / equipment?	Yes/No
c.	Whether the tube lights and fans provided are properly located and sufficient for the size of the room?	Yes/No
d.	Whether the proper number of electrical sockets provided for the intended machines / equipment / audio visual equipment?	Yes/No
e.	Whether the provision for the fire fighting equipments was made?	Yes/No
f.	Whether the water points, wash basins/sinks etc. are suitable provided to cater the expected number of users (in case of Workshop/Laboratories)?	Yes/No
g.	Whether the gas burners are provided are suitable and the connections to burners of gas pipelines and storage of gas cylinders are proper and secure to void any accidents and are as per approved plan (in case of Laboratories)?	Yes/No
h.	Whether proper drains and drain pipes has been provided for the disposal of acid water, effluents and other wastes as per the standard practice and as per approved plan (in case of Laboratories)?	Yes/No
<b>4.2</b>	<b>INSIDE BUILDING</b>	
<b>WALLS</b>		
a.	Are there any cracks in walls? Is yes, indicate the location, nature i.e. vertical, horizontal/inclined and action to be taken).	Yes/No
b.	Are there any signs of dampness/leakage on walls? If yes, indicate the location magnitude and action to be taken).	Yes/No
<b>FLOORS</b>		
a.	Are there any cracks in floors, skirting and dado? (If yes, indicate location and action to be taken).	Yes/No
b.	Are the floors laid to proper slopes? Is there a stagnation of water in WC, bath and verandahs? (Indicate location and action to be taken).	Yes/No
<b>ROOFS</b>		
a.	Are there any leakages in roofs? (If yes, indicate location, nature and action to be taken).	Yes/No
<b>DOORS, WINDOWS AND VENTILATORS</b>		
a.	Are all the fittings viz locking arrangement, tower bolts, pull bolts, door stoppers, hooks, stays and hinges etc. working smoothly? (If no, indicate location, number to set right).	Yes/No
<b>FINISHING</b>		
a.	Is the plastering of walls and ceiling satisfactory, smooth and free from cracks and other defects?	Yes/No
b.	Is the painting of walls / doors and windows proper? (If no, indicate location, number to be attended).	Yes/No
<b>WATER SUPPLY AND SANITATION</b>		
a.	Is there any leakage in the sewer lines, drainage pipes etc.? (If yes, indicate location, number and action to be taken).	Yes/No
b.	Are flushing cisterns, wash basins etc correctly fitted and working properly? (If no, indicate number, location and action to be taken to set right).	Yes/No
c.	Are the covers of manholes, gully traps and floor traps etc. provided?	Yes/No
<b>4.3</b>	<b>OUTSIDE BUILDING</b>	
a.	Is the outside building finish complete?	Yes/No

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**TERMS OF REFERENCE FOR EMPLOYMENT OF CIVIL WORKS CONSULTANT**

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**SCOPE OF WORK**

The prime objective of the consultant is to function as the auditor for the civil works undertaken by the project institutions under TEQIP II and to ensure the construction is as per the drawings, conforms to quality standards and serves the necessary objective.

The broad outline of the tasks of consultant are listed below, however the base document for the consultant will be the "Civil Works Manual" and all the reviews must be in alignment with it.

The review includes, but is not limited to, the following:

1. The consultant will verify that:
  - a. the works carried out are as mentioned in the procurement plan of the institution;
  - b. The procurement method is as per the World Bank norms and guidelines by reviewing the bid documents (SBD, specifications, BOQs, etc.);
  - c. all relevant approvals have been obtained from the local agencies like municipality etc.;
  - d. All the drawings are available for construction at site; etc..
2. To assess if the works will be completed in time;
3. The consultant will check the following:
  - a. the quality of construction;
  - b. frequency of laboratory and field tests, their reports and if the records are maintained properly;
  - c. seepages, cracks, etc. if any.
4. The consultant will review the following:
  - a. if any defects were noticed by the internal supervision team, and remedial actions taken on them by the contractor;
  - b. the institutional supervision arrangements to check quality of work.
  - c. the construction completion reports and handing over documents.
  - d. the submitted by the contractor to ensure that the payment released is timely and after due verification.
  - e. the compliance with the environmental management suggestion made in Civil Works Manual, wherever applicable.

**DELIVERABLES**

The consultant will submit institution wise a comprehensive report as per the Terms of Reference (ToR).

**QUALIFICATION REQUIREMENT**

Postgraduate degree in Civil Engineering with 15 years of experience in construction and supervision.