भारतीय मानक
Indian Standard

IS 15883 (Part 12) : 2016

निर्माण परियोजना प्रबंधन — दिशानिर्देश

भाग 12 समायोजना प्रबंधन

Construction Project Management — Guidelines

Part 12 Integration Management

ICS 03.100.30

भारतीय मानक ब्यूरो
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FOREWORD

This Indian Standard (Part 12) was adopted by the Bureau of Indian Standards, after the draft finalized by the Construction Management (Including Safety in Construction) Sectional Committee had been approved by the Civil Engineering Division Council.

A construction project is an endeavour undertaken by a project team on behalf of owner/client to create a built facility suited to the defined functional objectives. From inception to commissioning, the project goes through various distinct stages leading to progressive achievement of project objectives. Each stage involves specific inputs, processes (both technical and managerial) and deliverables. Typically, the life cycle of a project from commencement to completion involves the following stages:

a) *Project appraisal* — Inception, feasibility and strategic planning;

b) *Project development* — Project brief development, planning and design, finalization of proposals, procurement strategy, construction documentation including tender drawings, construction drawings, specifications, cost estimates, bills of quantities, procurement documents;

c) *Planning for construction* — Sequencing of project components, planning tools, resource planning and time cost trade off;

d) *Tender action* — Open competitive bidding/pre-qualification of agencies, issue of tender documents, evaluation of bids, negotiation if required and award of work;

e) *Construction* — Execution, monitoring, control, work acceptance; and

f) *Commissioning and handing over* — Contractual closeout, financial closeout, defect liability commencement, facility handing over.

The distinct features of a construction project include the temporary nature of the project team involved, the evolutionary process of project deliverables during project development stages and the unique output as the built facility. As a result of these features, unless there is efficient and effective project management, a construction project is faced with challenges of uncertainties leading to time over-runs, cost over-runs, changes in project parameters, loss of quality and inability to meet the functional objectives. While technical soundness of a proposal is an important aspect of a construction project, the management aspects, which involve techno-legal, financial and other issues, have also a significant role in the success of a project. Therefore, management functions and technical processes in a construction project need to be integrated towards achieving project objectives. Top management commitment plays an important role in harmoniously achieving these project objectives. In some of the public domain projects, it may be necessary to share relevant information with public at large through appropriate means.

To provide necessary guidance on effective construction project management, a series of standards are being developed as part of IS 15883 ‘Guidelines for construction project management’ Part 1 General, of the standard since published as IS 15883 (Part 1) : 2009, covers general aspects of overall construction project management. This has been followed by publication of other parts as follows:

Part 2 : 2013 on Time management

Part 3 : 2015 on Cost management

Part 4 : 2015 on Quality management

Part 5 : 2013 on Health and safety management

Part 6 : 2015 on Scope management

Part 8 : 2015 on Risk management

(*Continued on third cover page*)

Indian Standard

CONSTRUCTION PROJECT MANAGEMENT — GUIDELINES

PART 12 INTEGRATION MANAGEMENT

1 SCOPE

1.1 This standard (Part 12) covers guidelines for integration of all the management functions of construction project.

1.2 The scope of this standard covers the stages subsequent to the stage of approval (when a decision to implement the project including its financing is taken) till commissioning and handing over of the project.

1.3 The provisions of this standard are to be read in conjunction with IS 15883 (Part 1).

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
7337 : 2010	Glossary of terms in project management (*second revision*)
10400 : 2013	Glossary of terms in inventory management (*second revision*)
15198 : 2014	Glossary of terms in human resource development (*first revision*)
15883 (Part 1) : 2009	Construction project management — Guidelines general
(Part 2) : 2013	Time management
(Part 3) : 2015	Cost management
(Part 4) : 2015	Quality management
(Part 5) : 2013	Health and safety management
(Part 6) : 2015	Scope management
(Part 7)	Procurement management (*under preparation*)
(Part 8) : 2015	Risk management
(Part 9)	Communication management (*under preparation*)
(Part 10)	Human resource management (*under preparation*)
(Part 11)	Sustainability management (*under preparation*)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 7337, IS 10400 and IS 15198 shall apply.

4 NEED FOR INTEGRATION MANAGEMENT AND BENEFITS

4.1 Need for Integration Management

The primary objective of integration management is to ensure conflict free performance conditions for various stakeholders towards achievement of objectives of the project with optimal utilization of resources. For achieving the project objectives efficiently, transparent information exchange and synchronization must take place between various disciplines along with integration of various project management functions like scope, time, cost, quality, safety, procurement, communication and risk management [*See* IS 15883 (Parts 1 to 11)]. A common platform for the project team to work as a single unit is provided in integration management.

The need for integration in a project is as listed below:

a) For providing technical and organizational interfaces.
b) For achieving the coordination between different disciplines in a project.
c) To facilitate timely availability and sharing of requisite information across the project team and stakeholders.
d) To avoid conflicts and dealing with competing interests amongst project team members in accordance to the agreed terms.
e) To facilitate optimal utilization of resources and to avoid rework.
f) To facilitate identification of potential problems and solutions early.
g) To leverage available expert knowledge and organization learnings from past for the project benefit.
h) For synchronization of the various management functions.

The need for project integration management is evident in situations where different disciplines and functions of the project interface (s*ee* Fig. 1). For example, a time

delay in performing a particular construction activity, may impact the cost aspects of not only that activity but other associated activities involving different functions and disciplines; any rescheduling may affect the succeeding activities and coordination amongst groups performing them. Similarly, any decision on a change in scope in a project will require due consideration of all the potential impact on various disciplines and functions of project in terms of quantum of works, cost, time, quality, safety, risks, etc. Project integration management is needed to manage the project in a well-documented and structured manner to ensure consistency and smooth project delivery.

4.2 Benefits of Integration Management

The integration management function facilitates the coordination amongst all the project stakeholders (particularly the different disciplines such as architecture, civil, electrical, services, etc) to successfully achieve the project objective. This coordination is essentially achieved through joint meetings and collaborations amongst the stakeholders. The project core team can systematically approach the task of coordination amongst the functions and disciplines during various stages of project like project development, planning for construction, tender action, construction, completion and handing over through an integrated project management plan.

Some of the generic benefits of integration management are as follows:

a) An integrated project management plan with input details from management functions like time, cost, quality, procurement, risk, etc, will bring in clarity and minimize ambiguity to the management approach to the project.

b) Stakeholders from different disciplines like civil, mechanical, electrical, architecture, etc, arrive at a common understanding about the required internal prioritization of their activities and their sequencing to support the successful project delivery.

c) Enhanced communication amongst project stakeholders with clarity, simplicity and uniformity.

d) Enhanced stakeholder engagement, mutual understanding and satisfaction.

e) Clearer forecast of quality/risk issues and effective conflict resolution and management.

f) Reliability and ownership in project planning and control.

g) Cost optimization through better handling of resources and resource levelling.

h) Integrated change control in the project to minimize changes and correct assessment of the consequence on associated cost, time, etc, by the affected stakeholders in case of introduction of an approved change.

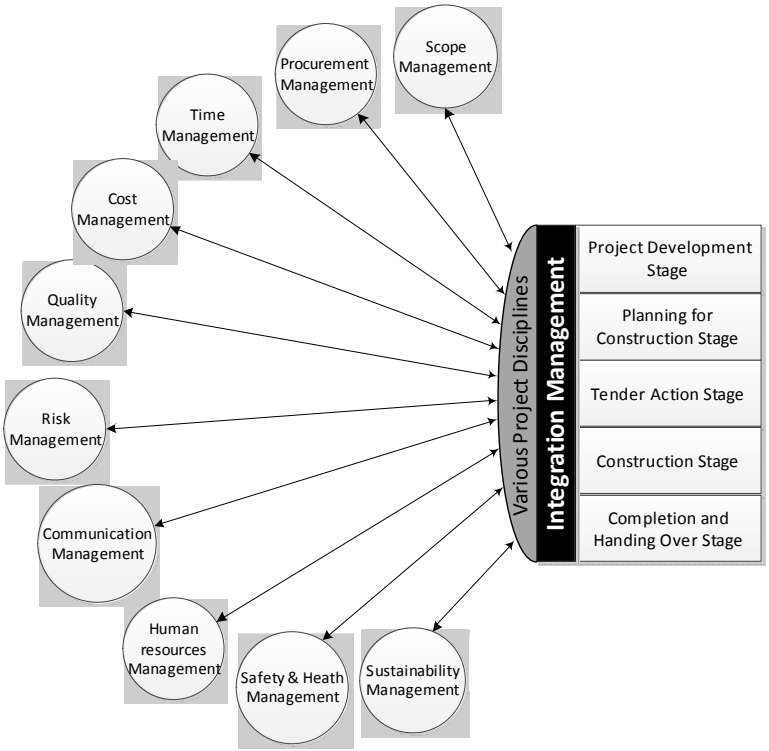

FIG. 1 INTEGRATION MANAGEMENT OVERVIEW

5 ORGANIZATIONAL STRUCTURE FOR INTEGRATION MANAGEMENT

The project integration management is an important function to be lead and controlled by a project manager supported by the team of competent and skilled personnel. This team may comprise of nodal persons identified from each disciplines of the project. They may have to interact across disciplines and with internal and external stake holders during different stages of project. They will use the expertise and knowledge available from the past to integrate and synergize the project activities.

5.1 During Preparation of Project Brief

At the beginning of the project, a project brief document is prepared and issued by the project initiator. The brief spells out the project purpose or justification, the assumptions and constraints, the macro level deliverable requirements, boundaries, risks, budget etc. During preparation of project brief, the organization structure predominantly comprises of project sponsor, contract experts, key stakeholders /consultants who will ensure integration of all the information compiled to include in the brief. Once the project manager is identified, he will take a lead in forth coming stages of the project.

5.2 During Pre-Construction Stage

During preparation of estimates and project details, the organization structure for integration may comprise of group of team members lead by project manager. The project integration team assisting the project manager may be a part of the planning team from different disciplines and functions who are competent to understand the complexities of interfaces in the project. The size of integration and control team shall depend on the criticality and complexity of the project.

5.3 During Stages of Project Construction up to Handing Over

At every stage of construction, the project manager and his integration team have to continuously interact with multiple disciplines, internal and external stakeholders. As the project goes through various stages, project participants' composition may dynamically change through introduction of new contractors, vendors and suppliers and exit of some of the existing ones. Therefore the integration management team will get accordingly restructured as per need of the project.

During construction stage when the physical progress happens in a project, the team members for collaboration and integration may include representatives from construction experts, change management team [*see* Table 1 of IS 15883 (Part 6)], quality control/ assurance, monitoring and control team, safety experts, etc. During closing stage of the project, the team members for integration and collaboration may include representatives from handing over team, sponsor and other stakeholders.

6 METHODS AND PROCESS FOR INTEGRATION MANAGEMENT

6.1 A project typically comprises of activities from various disciplines like civil, mechanical, architectural and electrical, etc, and in all these disciplines the functions like design, procurement, and quality control have to be carried out through teams from various contractors and consultants, etc, who are specialized in their respective areas. In order to plan and implement the various activities of the project, these teams would require many inputs. These inputs may be as listed below:

a) Design related input,
b) Procurement related input,
c) Size and specification details of various components,
d) Storage space availability,
e) As built dimensions and work space availability,
f) Inputs for shop drawing preparation,
g) Construction methodology of other activities going on in parallel,
h) Work front availability,
j) Sequence of dependent activities,
k) Safety and quality related interfaces, and
m) Change in scope.

Some of these inputs may be available at the time of planning or may be specified clearly in the project tender documents like conditions of contract or project specification, etc. However, there will also be other category of inputs or parameters which can only be estimated in a macro level during early stages of the project and the same may get elaborated during the subsequent stages. For example the exact construction methodology to be adopted by a specialist sub-contractor who will come on board on a future date. In such cases some parameters need to be considered based on experience and organizations historical data bank similar to analogous estimation [*see* **6.2.1** of IS 15883 (Part 3)] before proceeding with planning of these activities. As these activities or their dependent activities progresses, the considered parameters will get revalidated and the necessary arrangements have to be incorporated in the work plan of the activities as per the actual site conditions. This has been schematically represented in Fig. 2 for building projects and Fig. 3 for road projects.

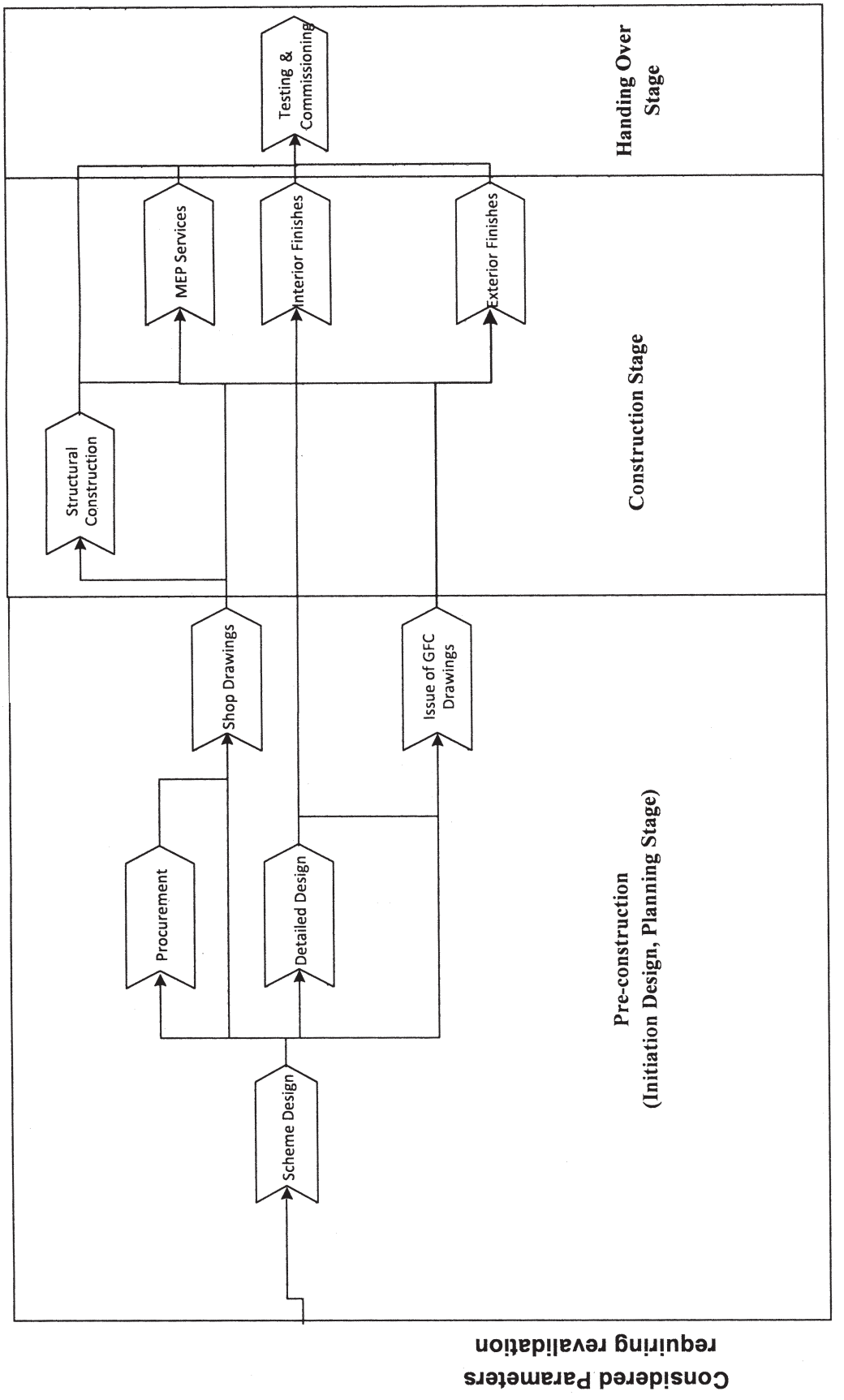

FIG. 2 PROJECT INTEGRATION MANAGEMENT - BUILDING PROJECT FLOW CHART

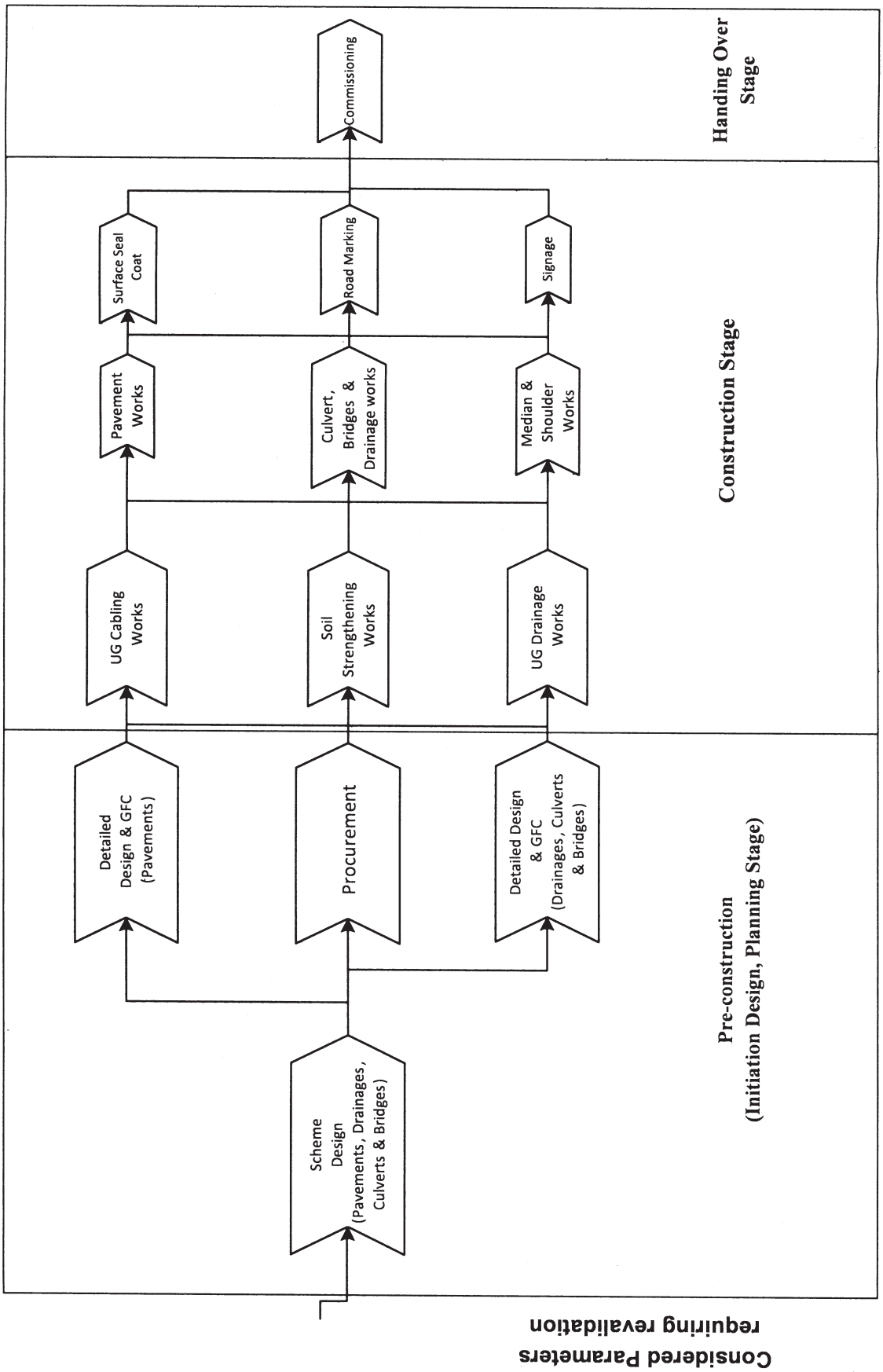

FIG. 3 PROJECT INTEGRATION MANAGEMENT — ROAD PROJECT FLOW CHART

6.2 The following table will depict the integration points across various functions in a project:

6.3 The project manager along with the integration team performs coordination of various functions like

Sl No.	*Process Group*	*Integration Points*	*Documents*
(1)	(2)	(3)	(4)
i)	Scope management	a) Project brief b) Stakeholder requirements c) Input from design	a) Scope statement b) WBS c) Bill of quantities d) GFC drawings
ii)	Procurement management	a) Scope statement b) Specifications c) Construction methodology d) Cost baseline e) Time baseline	a) Procurement plan b) Updated schedule c) Procurement management plan
iii)	Time management	a) Scope statement b) WBS c) Resource estimates d) Lead time e) Construction sequence and methodology	a) Time baseline b) Updated schedule c) Project resource plan
iv)	Cost management	a) Scope statement b) Bill of quantities c) Time baseline d) Resource estimates e) Construction methodology f) Schedule updates	a) Cost baseline b) Updated cost budget c) Cash-flow
v)	Quality management	a) Scope statement b) Design input c) Project resource plan d) Specifications e) Procurement of materials	a) Quality management plan b) Change request c) Quality assurance plan
vi)	Risk management	a) Scope statement b) Updated schedules c) Updated cost budget d) Stakeholder requirements e) Change requests	a) Risk register b) Updated risk list c) Risk mitigation strategy d) Hindrance register
vii)	Communication management	a) Organization structure b) Communication protocol c) Communication frequency d) Stakeholder matrix	a) Stakeholder register b) Monthly/weekly reports c) Organization chart
viii)	Human resource management	a) Resource estimates b) Organization structure	a) Resource deployment plan b) Updated schedule
ix)	Health, safety and environment management	a) Construction methodology b) Resource estimates c) Work front availability	a) Project safety manual b) Organizational safety records

design, procurement and construction in a progressive manner to achieve synergy. Coordination amongst various functions and disciplines would require exchange of different information between various project participants. For example, the design of air conditioning system in a building would require heat load information from other systems and building usage characteristics. Similarly, procurement activity needs to have input from design for specification, material required date from time schedule and quality specifications from quality plan. To achieve seamless information sharing across various stages of the project, tools and techniques like design basis reports, collection of vendor quotes, product brochures and material samples, work authorization methods, project planning methods, interface activity extraction from integrated project schedule etc, may be used. These methods for achieving integration may be through any of the following:

a) Issuing questionnaires and instructions to assimilate information and setting directions;
b) Structured design workshops and regular stakeholder meetings;
c) Using different techniques like interface matrix, 3D modelling, etc;
d) Site logistic and phasing plan;
e) Regular progress review meetings with updated work plan; and
f) Risk review meetings and risk workshops.

7 INTEGRATION DURING DIFFERENT STAGES OF PROJECT

See IS 15883 (Part 1) for various stages of construction projects.

7.1 Initiation, Planning and Design Stage

During the initiation phase, the project brief is prepared, which lists the initial scope of the project, resource requirements, initial assumptions and constraints and the other project elements such as deliverables, milestones, etc. The project brief preparation would require compilation of information, requirements and needs from different stakeholders which are then integrated and refined for consistency. Therefore the process of project integration management commence right at this stage where consistency of the project brief with assumptions in feasibility analysis will be ensured.

Next major step is to decide on the project delivery model and procedure to be adopted for integration of various project management functions in the project. In order to carry out the integration management in a structured manner, the procedure has to be documented for easy updating and reference. The procedure is finalized by thoroughly integrating various information from scope management, schedule management, cost management, quality management, etc. Further in the integration functions the construction methodologies are frozen, sequencing of activities are defined, interface points are identified and various progress milestones of the project are derived.

The approach for managing the project with seamless integration may be clearly documented as project management plan (PMP) (*see* Annex A). The project integration team will interact and communicate with all stakeholders, namely, contract experts, planning and scheduling professional, procurement specialist, quantity surveyor, technical and engineering experts, risk specialist, sponsor, etc, for finalizing this project management plan (PMP) to get it approved by the project manager.

The specifications and detailing of the various systems of the project shall be coordinated and integrated during the Engineering/Design stage of the project. Technical integration amongst the systems shall ensure consistency in the technical parameters and data inputs shared amongst the various systems. For example, specification of ventilation system in a tunnel project may be one of the inputs for electrical system load calculations. Integration in physical detailing would require space planning and coordination of various physical dimensions of the equipment or system components in the drawing preparation stage.

Integration during design stage may be achieved through methods like, prototype scaled model preparation, virtual three dimensional model (3D) preparation using different computer software, etc. These 3D models can be designed to illustrate important interfaces and physical dependencies between various disciplines like civil, architectural, mechanical and electrical services. Such 3D models and computer based analysis are effective method for preparing coordinated construction drawings. The computer based techniques can minimize design clashes and discrepancies in a project to reduce reworks and wastages. A brief description of 3D modelling and computer based analysis is included in Annex B.

7.2 Tendering Stage

During tendering stage of the project the role of Integration management function is to furnish upfront the interface data to the bidders in the request for proposal documents to ensure clear contractually binding inputs to the participants in the project. These interface data are collated from various disciplines and

functions by the project integration team. Request for proposal document may clearly specify the following indicative items but not limited to;

a) conditions of contract with key milestone dates/events.

b) available float from the baseline schedule attributed to the package being procured.

c) sequence of work and prioritization in the deliverables.

d) minimum quality and safety standards.

e) communication protocol across various stakeholders, etc.

7.3 Construction Stage

7.3.1 During the construction stage, actual product gets developed in the project with the start of physical works at site. If the actual conditions at site are in variance with the parameters considered originally during planning and engineering phase, the achieved progress of project may vary widely from expected plan. Therefore some of these critical originally considered parameters would require close monitoring during construction stage.

7.3.2 Following are some of the indicative parameters which are usually considered based on prior experience:

a) Timely availability of encumbrance free work front;

b) Availability of statutory clearances, if any;

c) Engineering drawings;

d) Resources planned like material, manpower, machinery, etc;

e) Weather conditions; and

f) Cash-flow and running-bill payments assumed, etc.

During this stage the project experiences many dynamic changes which need to be constantly monitored, analyzed and coordinated and integrated.

7.3.3 Integration management during construction stage involves constant compilation and analysis of the actual performance, compared against baselines of all project functions — time, cost and quality, etc. Any variance at this stage entails immediate re-sequencing, re-working of resource like equipment and skilled manpower and re-planning of methodology of succeeding construction activities. This stage requires the following:

a) General management skill to keep the project team motivated to the objectives,

b) Checklist for availability of adequate funds,

c) Quality and quantity of equipment and skilled resources,

d) Integrated permit authorization to take up work as per schedule sequence at site, and

e) System of continuous feedback and performance measurement.

7.3.4 During construction stage, the project manager is expected to continuously review and monitor the work progress with the project integration team and initiate corrective action and change control as necessary. During this stage it is essential for the project integration team to share the updated pertinent information with all relevant stakeholders in a timely manner.

7.4 Handing Over Stage

During handing over stage of the project the project integration team facilitates the scope verification and validation process like performance testing of various components/deliverables [*see* **6.4** of IS 15883 (Part 6)].

The completed services by various agencies gets tested and verified for their intended functional performance. The testing will be carried out on stand-alone and integrated basis with all allied systems in the project. In case of any deviation or variance in performance, the integration team will initiate corrective action and change control. Further, the project integration team shall coordinate the availability of the operation and maintenance manual of the project/product, as built drawings and all other documentation formalities of the project.

8 DOCUMENTATION AND UPDATES

During project closure stage the integration team prepares a detailed project completion report to record the formal closure of project along with all open procurement activities and accounts and administrative closure. The report may include performance of various project parameters throughout the project life cycle, resource and communication management documents, operation and maintenance manual, list of issues and risks mitigated. It may also carry lessons learned during the project, post project tasks, operational and maintenance details, if any and project closure recommendations.

ANNEX A

(*Clause* 6.1)

PROJECT MANAGEMENT PLAN — BRIEF

A-1 The project management plan (PMP) is necessary to guide the project through its life cycle. It will have compiled list of all the initial parameters, some of which will be considered based on prior experience in a similar project. It also provides the details of the procedure to be followed for any decision making during various stages of the project. The PMP facilitates the communication process throughout the life-cycle of the project. The PMP defines the role of key management personnel, provides details of intermediate progress milestones and baseline benchmarks for monitoring and control.

The effectiveness of a PMP depends on many factors including how well the plan embeds the organization's culture, policies, procedures, constraints and assumptions. The PMP needs to be grounded in a sound methodology, project execution skills and knowledge.

A project management plan (PMP) is a planning document, capturing the entire project end-to-end, covering all project phases, from initiation through planning, execution and closure.

A PMP covers the followings areas and components along with inter-disciplinary and inter functional interface points:

a) *Overview* — Why the project is being conducted and its primary objectives.

b) *Scope* — Business needs, requirements, deliverables, constraints and work breakdown structure [*see* IS 15883 (Part 6)].

c) *Schedule* — Activities schedule and project milestones [*see* IS 15883 (Part 2)].

d) *Costs* — Project budget and its funding approach [*see* IS 15883 (Part 3)].

e) *Quality* — Quality measurement and control approach [*see* IS 15883 (Part 4)].

f) *Safety* — Health and safety approach [*see* IS 15883 (Part 5)].

g) *Project team* — The people working on the project, their roles and responsibilities.

h) *Communication* — Communication type, channels and the reporting approach [*see* IS 15883 (Part 9)].

j) *Risks* — Risk index, methods to identify and evaluate risks, risk mitigation and contingency planning [*see* IS 15883 (Part 8)].

k) *Procurements* — Required procurements and purchase processes [*see* IS 15883 (Part 7)].

m) *Closure* — Closure approach, including the deliverables and handing-over protocol.

n) *Changes* — Procedures used to track changes in the project [*see* IS 15883 (Part 6)].

p) *Baselines* — Scope, schedule and budget baselines.

The project management plan content will vary depending upon the application area and complexity of the project. The project management plan is developed and kept updated through a series of integrated functions and disciplines until project closure. This results in a project management plan that is progressively elaborated by updates and controlled and approved through the integrated change control functions [*see* **6.2.2** of IS 15883 (Part 6)].

Due to changes in project plan and sequence of works resulting from dynamic nature of the project progress, the integration team alters the interface points keeping in mind the critical path, float availability and risk mitigation strategies. The project management plan needs to be updated and revised at regular intervals. Before every revision, the changes in interface points will be communicated to the appropriate stakeholders to adjust their execution strategy and resource leveling. The same will be shared back with the Integration team.

Once the revised plan is accepted by all stakeholders, the integration team will revise the project management plan to set up revised bench mark to enable monitoring the progress.

The project management plan consists the following:

a) *Three baselines* — Cost, schedule and scope.

b) *Nine management plans* — Scope, schedule, cost, quality, safety, risk, change, procurement, and communications.

An ideal project management plan will have the following table of contents:

1) Introduction.
2) Project management approach.
3) Project scope.
4) Milestone list.

5) Project scope management plan.
6) Schedule baseline and work breakdown structure.
7) Resource calendar.
8) Schedule management plan.
9) Cost baseline.
10) Cost management plan.
11) Procurement management plan.
12) Change management plan.
13) Risk management plan.
14) Communications management plan.
15) Quality baseline.
16) Quality management plan.
17) Safety management plan.
18) Staffing management plan.
19) Sponsor acceptance.

ANNEX B

(*Clause* 6.1)

BUILDING INFORMATION MODELLING (BIM)

B-1 3D MODELS AND BIM

Conventional CAD drawing is based on 2D drawing elements and has evolved to 3D whereas BIM involves modeling in 3D with intelligent data parameters being assigned to individual members. BIM encompasses more than a 3D computer-rendered model of a building. In addition to architectural information, the complete BIM contains all of the building's information, from wall systems, structural systems, electrical systems, HVAC equipment, plumbing fixtures, door and window schedules, and finishes, right down to the manufacturer, supplier, and square footage of every material specified on the project. In other words BIM is an 'Intelligent 3D Model'.

The principal difference between BIM technology and conventional 3D CAD is that the latter describes a building by independent 3D views such as plans, sections and elevations. Editing one of these views requires that all other views must be checked and updated, an error-prone process that is one of the major causes of poor documentation. In addition, data in these 3D drawings are graphical entities only, such as lines, arcs and circles, in contrast to the intelligent contextual semantic of BIM models, where objects are defined in terms of building elements and systems such as spaces, walls, beams and columns. A building information model carries all information related to the building, including its physical and functional characteristics and project life cycle information, in a series of 'smart objects'. For example, an air conditioning unit within a BIM would also contain data about its supplier, operation and maintenance procedures, flow rates and clearance requirements.

A BIM object is a combination of many things:

a) Information content that defines a product.
b) Product properties, such as thermal performance.
c) Geometry representing the product's physical characteristics.
d) Visualization data giving the object a recognizable appearance.
e) Functional data, such as detection zones, that enables the object to be positioned and behave in the same manner as the product itself.

The application of BIM extends beyond design coordination stage to construction and operations stage (*see* Fig. 4). It carries GFC and BIM data during design coordination stage, material and supplier data during procurement stage, WBS and work packages information during construction stage and as built models during facility management stage.

The as built information, construction pour sequence, quality conformances, cost and resources related information, etc, can be embedded in the BIM of the project to make it a powerful integration and project management tool.

Some of the key benefits of BIM include the following:

1) Improve coordination between architects, engineers, contractors and sub-contractors enabling quick decision making;
2) Check completeness of drawings before starting construction eliminating the subsequent request for information (RFI) and delays;

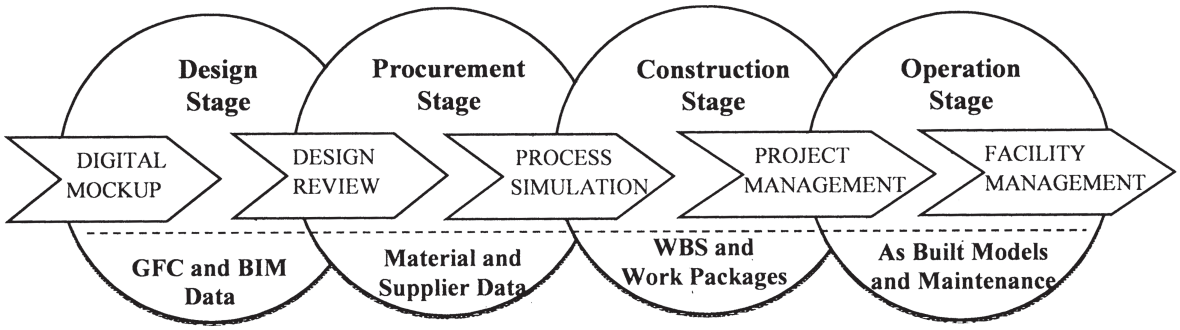

FIG. 4 BIM COLLABORATION DURING VARIOUS STAGES OF THE PROJECT

3) Coordination and interference checks between architectural, structural, MEP, fire protection and other services;
4) Production of accurate construction documents and shop drawings enabling the use of pre-fabricated material, thus improving quality and reducing costs and time;
5) Accurate material quantity take-offs. thus reducing waste;
6) Construction scheduling and monitoring of the project;
7) Create a field sequencing clash detection;
8) Add as built and in field model information;
9) Use of BIM for check/punch lists; and
10) Prepare the model for project close out.

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Construction Management (Including Safety in Construction) Sectional Committee, CED 29

Organization	*Representative(s)*
In Personal Capacity (*103, Charak Sadan, Vikaspuri, New Delhi*)	Shri P. Krishnan (***Chairman***)
AECOM India Private Limited, Noida	Shri Pawan Jaipuriyar Shri Arvind Agarwal (*Alternate*)
Airports Authority of India, New Delhi	Shri Pradeep Kumar Shri S. Sreekumar (*Alternate*)
Builders' Association of India, Mumbai	Shri H. S. Pasricha Shri Sanjay Soni (*Alternate*)
Building Materials and Technology Promotion Council, New Delhi	Dr Shailesh Kumar Agrawal Shri Pankaj Gupta (*Alternate*)
CSIR—Central Building Research Institute, Roorkee	Dr Achal K. Mittal Shri Ajay Chaurasia (*Alternate*)
Central Public Works Department, New Delhi	Chief Engineer (CSQ) Shri Sanjeev Rastogi (*Alternate*)
Construction Industry Development Council, New Delhi	Shri P. R. Swarup Shri O P Gupta (*Alternate*)
Construction Skill Development Council, New Delhi	Col Anil Kumar Pokhriyal
Creative Design Consultants and Engineers (P) Ltd, Ghaziabad	Shri Aman Deep
Cushman & Wakefield India Pvt Ltd, Gurgaon	Shri Harleen Oberoi
Delhi Development Authority, New Delhi	Engineer Member Chief Engineer (Design) (*Alternate*)
Delhi Metro Railway Corporation, New Delhi	Shri Daljeet Singh Shri Pramit Kumar Garg (*Alternate*)
Delhi Tourism and Transportation Development Corporation, New Delhi	Shri Vivek Bansal
EH and S Cares, New Delhi	Shri A. K. Tripathi
Engineers India Limited, New Delhi	Shri T. K. Sen Shri S. N. Bhatnagar (*Alternate*)
Hindustan Construction Company Limited, New Delhi	Shri Avinash Harde Shri Rajendra Sawhni (*Alternate*)
Hindustan Prefab Limited, New Delhi	Chairman and Managing Director Shri S. K. Jain (*Alternate*)
Indian Buildings Congress, New Delhi	Shri Deepak Narayan
Indian Institute of Technology, New Delhi	Dr K. C. Iyer Dr K. N. Jha (*Alternate* I) Dr J. Uma Maheshwari (*Alternate* II)
Kaleidoscope, New Delhi	Shri Amor Kool
Larsen and Toubro Limited, Chennai	Shri M. P. Naidu Shri R. Shankar Narayanan (*Alternate*)
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(*Continued from second cover page*)

The other parts of the standard are under formulation which will cover functions such as procurement management, communication management, human resource management and sustainability management.

In a construction project different teams or organizations come together to carryout various processes of the project and these teams may have competing interests. Integration management aims to provide processes necessary for coordination among all the project stakeholders. It ensures organizational teams perform in an integrated manner with their actions coordinated to the mutual interest towards the project goal.

This standard (Part 12) has been formulated to cover aspects on integration management function and aims to provide processes necessary for coordination among all the project stakeholders. This function facilitates coordination among various disciplines like civil, architecture, mechanical and electrical in the project and also amongst various other functions of the project like scope management, time management, cost management, quality management and procurement management.

The guidelines may be applicable in general to all construction projects. However, for smaller projects, the applicability of various provisions may be decided appropriately by the parties concerned.

The composition of the Committee responsible for formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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