



STUDY OF BUILDING CONSTRUCTION AND FINISHING WORKS: A FIELD-BASED ASSESSMENT OF CONSTRUCTION PRACTICES AND QUALITY CONTROL

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Abstract

Building construction involves a sequence of activities, from site preparation and foundation construction to structural work, masonry, plastering, flooring, painting, and the installation of doors, windows, and building services. The quality of a completed building depends on the execution of each stage, the selection of suitable materials, workmanship, coordination among construction teams, and effective quality-control procedures. This study presents a field-based framework for examining building construction and finishing works at a selected building site. It focuses on construction sequences, material usage, workmanship, dimensional accuracy, surface quality, finishing defects, and compliance with approved drawings and project specifications. Data collection is proposed through site observations, measurements, photographs, review of construction records, and discussions with site personnel. Particular attention is given to plaster cracks, uneven flooring, paint peeling, tile misalignment, dampness, and poor joint finishing. The study also considers inspection procedures, material storage, curing, and coordination between structural, architectural, and building-service activities. The framework can help identify deficiencies, reduce rework, improve finishing quality, and enhance building durability. Actual field observations and measurements are required to establish site-specific findings.

Keywords: Building construction; finishing works; construction quality; workmanship; plastering; flooring; painting; defect assessment; field study.

1. Introduction

Building construction is a systematic process involving planning, execution, supervision, and quality assessment to produce a safe, functional, durable, and aesthetically satisfactory structure. It includes preliminary works, foundation construction, structural framing, masonry, roofing, building services, and finishing activities. Each stage contributes to overall building performance, and deficiencies in one stage can affect the quality and durability of subsequent work.

Construction generally begins with site clearance, setting out, excavation, and foundation work, followed by structural components such as columns, beams, slabs, and staircases. Masonry creates external walls, internal partitions, and openings. Finishing works then provide suitable surfaces, environmental protection, and the required appearance. These works commonly include plastering, waterproofing, flooring, tiling, doors and windows, false ceilings, painting, and final electrical and plumbing fixtures.

Finishing works influence appearance, usability, maintainability, and the perceived quality of a building. Although they may not form the primary load-bearing system, improper execution can lead to cracks, water leakage, uneven surfaces, tile debonding, paint deterioration, and poorly fitted components. Quality depends on material selection, surface preparation, mixing proportions, application methods, curing, environmental conditions, and worker skill. Coordination among civil engineers, architects, contractors, electricians, plumbers, and finishing teams is essential. A field study can compare actual practices with approved drawings and specifications, identify

recurring problems, and recommend improvements.

1.1 Need for the Study

Construction defects may result from inadequate supervision, inappropriate materials, poor surface preparation, improper application, insufficient curing, unsuitable environmental conditions, and failure to follow the approved sequence. Such deficiencies can increase costs, delay completion, reduce durability, and create maintenance problems after occupancy. A systematic investigation is needed to understand construction practices, quality verification, and the preventive or corrective measures required.

1.2 Aim and Objectives

The aim is to examine building construction and finishing practices at a selected site and evaluate quality through observation, measurement, documentation, and comparison with approved drawings, project specifications, and applicable standards. The objectives are to document construction sequences; examine materials and methods used for major finishing works; assess workmanship and dimensional accuracy; identify common defects; evaluate quality-control practices; and recommend measures to improve construction quality, durability, and project execution.

2. Review of Relevant Literature and Standards

Building quality is influenced by the interaction of design requirements, material characteristics, workmanship, construction sequencing, and inspection. Quality management should therefore be carried out throughout construction rather than relying only on the final appearance. Activities should be checked at appropriate stages so that deficiencies can be corrected before they are concealed or affect subsequent work.

Indian Standards provide technical guidance for different construction activities. IS 456 addresses plain and reinforced concrete, including concrete quality, workmanship, durability, and construction. IS 2212 provides guidance on brickwork, IS 1661 addresses cement and cement-lime plaster finishes, IS 2571 concerns in-situ cement concrete flooring, and IS 1200 contains measurement rules for building and civil engineering work. The applicable editions and amendments should be verified before using these standards in a project assessment.

Finishing quality also depends on material properties and substrate condition. Plastering requires suitable preparation, appropriate mortar, controlled thickness, and curing. Flooring requires a properly prepared base, suitable bedding or adhesive, correct levels, and joint treatment. Painting depends on surface dryness, cleaning, filling, priming, and application under suitable conditions. Waterproofing requires preparation, treatment of joints and penetrations, and testing before protective layers are installed. Acceptance criteria should come from project specifications, approved samples, manufacturer instructions, and relevant standards rather than assumed universal tolerances.

3. Materials and Methodology

3.1 Research Design and Study Area

The study is designed as a descriptive, observational investigation of a building under construction or nearing completion. It examines construction sequences, finishing materials, workmanship, visible defects, and quality-control practices. Permission should be obtained from site management, and the inspection must not interfere with work or compromise safety. The site description should record location, building use, number of storeys, approximate built-up area, structural system, construction stage, materials used, finishing activities underway, inspection date, and available project documentation. Verified records and actual observations should be used rather than assumed values.

3.2 Identification of Construction Activities

The main activities should be documented in the order observed. Preliminary work includes site clearance, setting out, excavation, and foundation preparation. Structural work includes reinforcement, formwork, concrete placement, and curing for foundations, columns, beams, slabs, and staircases. Masonry includes walls, partitions, lintels, and openings. Finishing includes plastering, waterproofing, flooring, tiling, doors and windows, false ceilings, painting, and final service installations. The actual sequence should be recorded because activities may overlap depending on the project and contractor's programme.

3.3 Data Collection and Instruments

Data should be collected through visual inspection, measurements, photographs, review of construction records, and discussions with the site engineer or supervisor. Measurements

may include wall thickness, plaster thickness where accessible, floor levels, tile-joint widths, and door and window dimensions. Photographs should be labelled with location, floor, room or surface identification, inspection date, and a brief description. The observations should be compared with approved architectural drawings, specifications, approved samples, and inspection records. Instruments may include a measuring tape, steel scale, spirit level, straightedge, suitable levelling instrument, measuring gauge, camera, and field sheet. Instrument limitations should be noted when they affect interpretation.

3.4 Data Analysis

Observations should be grouped by construction stage and finishing type. Each inspected item should be compared with its specified dimensions, material requirements, workmanship criteria, or approved sample. For a measurable parameter, deviation can be calculated as $D = M - S$, where M is the measured value and S is the specified value. If S is non-zero, percentage deviation can be calculated as $D_p = [(M - S) / S] \times 100$. These calculations describe differences but do not independently establish acceptability; the relevant specification and tolerance must be consulted. Compliance percentage may be calculated as the number of assessable items meeting defined criteria divided by the total number of assessable items, multiplied by 100. Items not inspected should be reported separately.

4. Study of Building Construction Activities

4.1 Site Preparation and Foundation Work

Site preparation establishes the conditions needed for safe and accurate construction. It includes clearing the site, setting out building lines, establishing reference levels, and preparing excavation areas. Observations should check whether the layout matches approved drawings and whether excavation dimensions, levels, and ground conditions are documented. Foundation work should be assessed against approved structural details, reinforcement arrangements, formwork, concrete placement, and curing procedures. Coordination with underground drainage and water-supply lines is also important because late service installation may damage completed work or require additional excavation. Suspected structural or geotechnical

deficiencies should be referred to the responsible engineer.

4.2 Structural Construction

Structural construction includes foundations, columns, beams, slabs, staircases, and other load-bearing components. Inspection should consider reinforcement placement, formwork alignment, concrete placement, compaction, curing, and compliance with approved details. Visible honeycombing, exposed reinforcement, unusual cracking, or major surface irregularities should be documented and referred for technical assessment where necessary. Visual inspection alone cannot establish a member's load-bearing capacity; structural adequacy requires relevant design information and, where appropriate, assessment by a qualified structural engineer.

4.3 Masonry Work

Masonry includes external walls, internal partitions, parapets, and other wall elements made from bricks, concrete blocks, or specified units. The field study should examine wall alignment, verticality, thickness, joint consistency, bonding, opening dimensions, and connections with adjoining elements. Material condition, mortar preparation, and protection during construction should also be recorded. Poor alignment, inconsistent joints, inadequate bonding, and poor detailing around openings can affect subsequent plastering. Acceptance should be based on project specifications and relevant standards rather than appearance alone.

5. Study of Building Finishing Works

5.1 Plastering Work

Plastering provides a protective and decorative surface over masonry and, where specified, concrete. It improves surface regularity and prepares walls and ceilings for painting or other finishes. Quality depends on substrate preparation, mortar composition, thickness, application, surface finishing, and curing. Before application, the substrate should be checked for loose material, dust, excessive irregularities, and conditions that may affect adhesion. Inspection should examine evenness, verticality, corners, junctions, openings, cracking, and debonding. Junctions between dissimilar materials deserve attention because movement or inadequate preparation may cause cracks. Defects should be documented before painting so that coatings do not merely conceal underlying problems.

5.2 Flooring and Tiling

Flooring affects appearance, maintenance, comfort, and, in some areas, slip resistance and drainage. Common finishes include ceramic and vitrified tiles, natural stone, terrazzo, and cement concrete. The study should assess base preparation, floor levels, required slopes, tile alignment, joint uniformity, edge finishing, and transitions. Wet areas should drain toward designated outlets. Lippage, cracked tiles, uneven joints, hollow-sounding areas, and poor skirting alignment should be documented. A hollow sound may indicate a bonding issue but is not conclusive proof of debonding without verification. Installation should follow the specified bedding or adhesive method and the manufacturer's instructions.

5.3 Waterproofing Work

Waterproofing is important in roofs, terraces, bathrooms, balconies, basements, and other moisture-exposed areas. Failure may lead to leakage, damp patches, deterioration of finishes, and increased corrosion risk in reinforced concrete. Performance depends on substrate preparation, treatment of joints and penetrations, correct application, required curing or setting, and protection of the completed layer. Inspection should record the system used, application sequence, corner and penetration treatment, and test records. Where specified, water-retention or other prescribed tests should be completed before the layer is covered. Leakage should be traced to its source rather than automatically attributed to one layer.

5.4 Doors and Windows

Doors and windows support access, ventilation, daylight, security, weather protection, and appearance. Performance depends on opening dimensions, frame alignment, secure fixing, hardware quality, and sealing. Inspection should examine frame alignment, smooth operation, hinges and locks, gap uniformity, perimeter sealing, and visible damage. Windows should also be checked for appropriate rainwater management. Poor fixing or inadequate sealing can cause operational problems and water ingress. The assessment should use approved specifications and the requirements of the installed system.

5.5 Painting and Surface Finishes

Painting improves appearance and may protect surfaces when the coating system is correctly selected and applied. Quality depends on substrate dryness, cleaning, filling, sanding,

primer selection, coating compatibility, and the specified number of coats. Inspection should consider colour uniformity, coverage, texture, brush or roller marks, patchiness, peeling, blistering, and contamination of adjoining surfaces. Peeling may result from moisture, poor preparation, incompatible coatings, or unsuitable application conditions. Corrective work should address the underlying cause rather than simply adding another coat.

5.6 False Ceilings and Building Services

False ceilings may accommodate services, improve appearance, or provide acoustic treatment. The installation should be checked for levelness, joint treatment, secure support, access panels, and coordination with lighting, ventilation, and fire-safety systems. Sagging, uneven joints, cracks, staining, loose panels, and restricted access should be recorded. Electrical and plumbing finishing includes switches, sockets, lighting, sanitary fittings, taps, drainage connections, and accessories. These works must be coordinated with plastering, tiling, waterproofing, and ceilings to avoid damage to completed surfaces. Electrical safety and plumbing tests should be performed by competent personnel; visual inspection alone cannot establish full system safety.

6. Quality Assessment and Field Observation

A structured inspection process ensures that construction and finishing works are assessed consistently. Each observation should be linked to a building level, room, wall, floor, ceiling, or external area and should record the specified requirement, observed condition, measurement where applicable, photograph reference, probable cause, and corrective action. Plastering can be assessed for surface regularity and cracking, flooring for levels and joint alignment, waterproofing for application details and test records, and painting for coverage and visible defects. An item should be classified as compliant, non-compliant, or requiring further verification only after the relevant criteria have been established.

Photographs provide a record of site conditions at the time of inspection and should be accompanied by location references and short descriptions. The number of rooms, surfaces, or components inspected should be reported so that readers can understand the scope of the assessment. Results can be presented using descriptive tables, defect-frequency summaries, and comparisons between specified and

measured values. Broad conclusions should not be drawn from isolated defects or a small, unrepresentative sample.

7. Common Defects and Their Possible Causes

Finishing defects may result from material deficiencies, unsuitable application methods, poor workmanship, inadequate curing, moisture, movement, or poor coordination. Plaster cracking may be associated with substrate movement, shrinkage, inadequate preparation, or detailing at material junctions. Uneven flooring may arise from an irregular base, incorrect setting-out, poor levelling, or inconsistent bedding. Tile debonding may be related to inadequate adhesive coverage or unsuitable installation conditions. Paint peeling may result from moisture, contamination, incompatible coatings, or insufficient preparation. These are possible causes rather than confirmed diagnoses, and each defect should be investigated in its actual context.

Water leakage may originate from waterproofing defects, poorly sealed joints, service penetrations, drainage problems, or other water sources. Door and window defects may include misalignment, poor fixing, damaged hardware, or inadequate sealing. False-ceiling defects may include sagging, uneven joints, staining, or poor coordination with services. Defects should be classified by type, location, frequency, extent, and likely effect on functionality or durability. Cosmetic imperfections should be distinguished from conditions affecting water tightness, safety, or serviceability.

8. Discussion

The field assessment demonstrates the importance of construction sequencing, workmanship, material quality, and coordination in achieving acceptable building finishes. Structural work establishes the load-bearing system, while masonry and finishing provide enclosure, protection, functional spaces, and architectural appearance. Inspections of plastering, flooring, waterproofing, painting, doors, windows, ceilings, and services can reveal recurring weaknesses in preparation, application, sequencing, and supervision. For example, inadequate surface preparation may affect plaster or paint performance, while poor coordination between plumbing and waterproofing may contribute to leakage.

Quantitative analysis can strengthen the study by reporting the number of inspected locations, the number and types of defects, the distribution of defects across activities, and the proportion of items meeting defined criteria. Results must be interpreted in light of the sample size, construction stage, and inspection method. A small or non-random sample may not represent the entire project. Visual inspection cannot verify concealed workmanship, material properties, structural safety, or long-term performance; these may require records, testing, or specialist assessment.

9. Recommendations

Construction quality can be improved by establishing a clear work sequence and ensuring that the latest approved drawings and specifications are available to the site team. Materials should be checked on receipt, stored appropriately, and used according to specifications and manufacturer instructions. Substrates should be inspected before plastering, tiling, waterproofing, or painting, and completed work should be protected from damage by subsequent trades. Inspection procedures should cover masonry alignment, plaster finish, floor levels, tile joints, waterproofing, painting, doors and windows, and service installations. Required tests should be completed and documented before work is concealed.

Nonconformities should be recorded with their location, probable cause, approved corrective action, and reinspection outcome. Photographs and inspection registers improve traceability. Coordination among civil, architectural, electrical, and plumbing teams should be strengthened through regular site meetings and advance planning of service routes and openings. Workers should receive guidance on material handling, surface preparation, application, curing, and defect prevention. Future studies may compare different building types and investigate relationships between inspection practices, defect frequency, rework, and completion time.

10. Limitations of the Study

The study is limited to activities, finishing works, and records accessible during the inspection period. Some defects may be concealed behind finishes or become visible only after occupancy or seasonal exposure. Results may be influenced by building type, construction stage, sample size, measurement

accuracy, and the availability of project documents. Unless additional tests are undertaken, visual inspection cannot independently establish concrete strength, material properties, waterproofing performance, electrical safety, or structural adequacy. Findings should be interpreted as a field-based assessment of observed practices rather than a comprehensive certification of building safety or long-term performance.

11. Conclusion

This study provides a systematic framework for examining building construction and finishing works through observation, measurement, photographic documentation, and comparison with approved drawings and specifications. It covers site preparation, structural work, masonry, plastering, flooring, waterproofing, doors and windows, painting, false ceilings, and building-service finishing. The quality of a completed building depends on correct execution, suitable materials, effective coordination, skilled workmanship, and systematic quality control. Early identification of defects can reduce rework, prevent damage to completed surfaces, and improve durability and serviceability. Final conclusions about workmanship quality, defect frequency, and compliance must be based on actual site observations and verified measurements.

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