International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 10 Issue: 10 | Oct - 2026 SJIF Rating: 8.659 ISSN: 2582-3930

Field-Based Study of Residential RCC Construction, Material Quality Control and Site Safety During Industrial Training

Aditya Sunil Dhavan
Diploma Student, Department of Civil Engineering
Sau. Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, Maharashtra, India

Rahul Gorakh Bhambare
Diploma Student, Department of Civil Engineering
Sau. Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, Maharashtra, India

Prof. Pirmahamad Jamal Pathan ,Assistance Professor, Department of Civil Engineering
Department of Civil Engineering
Sau. Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, Maharashtra, India

Prof. Akanksha Anil Mhaske ,Head of Department, Department of Civil Engineering
Department of Civil Engineering
Sau. Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, Maharashtra, India

Dr. Ramesh Suryabhan Gadakh, Principal, Sau Sundarbai Manik Adsul Polytechnic
Department of Civil Engineering
Sau. Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, Maharashtra, India

Industrial Training Group, Diploma in Civil Engineering
A.M Construction Training Project, Ahilaynagar, Maharashtra, India

Abstract—Industrial training provides diploma civil engineering students with direct exposure to construction practices and helps connect classroom concepts with field execution. This paper presents a field-based study derived from an industrial training report covering residential construction activities undertaken with A.M Construction in Ahilaynagar. The study documents the observed sequence of site layout, excavation, foundation and RCC work, reinforcement, concreting, brick masonry, plastering, flooring and finishing. It also summarizes practical checks performed on cement, fine aggregate, coarse aggregate, bricks and reinforcement steel, together with an on-site slump cone test for fresh concrete workability. Particular attention is given to equipment usage, safety practices, personal protective equipment, reinforcement detailing, formwork alignment, curing, material handling and labour coordination. The observations show that practical site exposure strengthens understanding of RCC detailing, quality control, safety, time management and construction coordination. The report also identifies limitations, including the absence of several advanced laboratory demonstrations because of the scale of the residential projects and reliance on established suppliers. The findings demonstrate the educational value of structured industrial training in developing practical competence among civil engineering diploma students.

Keywords—industrial training, RCC construction, material quality control, slump cone test, reinforcement detailing, construction safety, residential building, civil engineering education.

I. INTRODUCTION

Industrial training is an essential component of diploma-level civil engineering because it exposes students to construction operations that cannot be fully reproduced in classroom teaching. The submitted training report describes practical exposure to residential building projects under A.M Construction in Ahilaynagar, including work carried out with experienced engineers, supervisors and labour teams. The training objective was to gain practical exposure to construction activities, understand industry operations, compare theoretical knowledge with field practice, and develop technical, problem-solving, site-management, safety and communication skills.

The field observations covered the complete construction sequence from site layout and excavation to RCC work, masonry, plastering and finishing. Additional visits with an RCC designer provided exposure to reinforcement checking, bar spacing, cover, hooks, bends, lap lengths and comparison of drawings with actual site conditions. The report therefore provides a useful field-learning record linking civil engineering theory with construction execution.

II. OBJECTIVES AND STUDY SCOPE

- To observe the sequence and organization of residential construction activities.
- To understand the use of hand tools and construction equipment at site.
- To examine practical quality checks for cement, sand, aggregates, bricks and reinforcement steel.
- To observe concrete workability assessment through the slump cone test.
- To study reinforcement detailing, formwork alignment, curing and material handling.
- To understand construction safety practices and use of personal protective equipment.
- To identify practical challenges and the role of engineers, contractors and labourers in project execution.

III. ORGANIZATION AND SITE CONTEXT

The training report describes A.M Construction as a local construction firm based in Ahmednagar/Ahilaynagar and engaged in residential and small commercial building projects. The organizational structure observed at site consisted of a project manager, site engineer, supervisor, and skilled and unskilled workers. Site facilities included material-storage areas, a site office, labour-rest space and temporary water and electricity connections.

The principal training site was a residential building project, while additional sites were visited with the mentor for RCC checking. The report identifies experienced professionals including Er. Atul More and RCC designer/mentor Er. Devendra Potdar as sources of practical guidance.



Fig. 1. Residential construction site showing RCC frame and masonry activities.

IV. CONSTRUCTION ACTIVITIES OBSERVED

The observed construction sequence included site layout marking, excavation, plain and reinforced concrete work, reinforcement fixing, formwork, slab casting, brick masonry, plastering, flooring and painting. The training emphasized that each activity must follow an appropriate sequence and that practical execution may require site-level adjustments while maintaining structural safety and stability.

A. Site Layout and Excavation

Site layout marking was followed by excavation for foundations. The students observed the use of measuring tape and excavation equipment such as a JCB/excavator. Murum filling and compaction were also observed, with a compactor used to achieve the required field condition.

B. Reinforcement and RCC Work

Reinforcement checking was a major learning activity. The trainees observed bar diameters, spacing, cover, hooks, bends and lap lengths and compared reinforcement arrangements for columns, beams and slabs with structural drawings. Formwork and shuttering supports were checked for alignment and stability before concreting.

C. Concreting, Masonry and Finishing

Ready-Mix Concrete supplied by Tirupati RMC was observed being transported to the site and placed using chutes and wheelbarrows. Needle vibrators were used by trained workers for compaction. Brick masonry used 4-inch and 6-inch bricks, while cement mortar and lime plaster were prepared and applied on site. Curing of slabs, beams and columns was performed by sprinkling or ponding, with the report noting periods of approximately 14–21 days.



Fig. 2. Residential RCC and masonry work observed during industrial training.

V. EQUIPMENT AND TOOLS

The report records a range of hand tools, including measuring tape, trowel, plumb bob, hoe, wooden float, digging bar, wheelbarrow, hammer, chisel, hand saw, line level, water level and putty knife. Major equipment included bulldozer, excavator, needle vibrator, crane, tile saw, concrete mixer, granite cutter, wood cutter, drilling machine, vibrator and plate compactor.

These tools and machines served measurement, alignment, excavation, material handling, concrete compaction, cutting, lifting and surface-finishing functions. The practical exposure helped students understand that equipment selection and correct operation influence productivity and quality.

TABLE I. SELECTED SITE ACTIVITIES AND PRACTICAL LEARNING

Activity	Observed practice	Learning outcome
Excavation	Layout, excavation and murum filling	Understanding site sequence and equipment use
Reinforcement	Spacing, cover, hooks, bends and laps	Practical RCC detailing
Concreting	RMC placement and needle vibration	Placement and compaction awareness
Masonry	4-inch/6-inch brickwork and mortar	Bond, alignment and workmanship
Plastering	Mortar/lime plaster and surface leveling	Finishing techniques
Curing	Sprinkling/ponding	Durability and crack prevention

VI. MATERIAL QUALITY CONTROL AND FIELD TESTING

Quality control was considered essential for strength, durability and safety. The report states that materials were procured from established suppliers, including Borude Company, Sumangal Suppliers, Tirupati RMC, M. Suntilal Traders and Sanket Steel. Because of supplier reliability and the small scale of the projects, several standard laboratory tests were not demonstrated. Instead, the trainees performed or observed simple field-level checks.

A. Cement

Visual inspection was used to check uniform grey colour and absence of lumps. A hand-feel test was used to assess smoothness, while a float test and simple setting observation were also recorded.

B. Fine and Coarse Aggregate

Fine aggregate was checked by hand feel and visual inspection for excessive silt, clay or mica. Coarse aggregate was visually checked for angularity, surface cleanliness and absence of undesirable flaky or elongated particles; a manual impact check was also described.

C. Bricks and Reinforcement Steel

Bricks were checked for size, shape, colour, soundness and resistance to a drop from approximately 1 m. Reinforcement steel

was visually inspected for rust, subjected to a simple bend check, and examined for manufacturer markings such as RUPAM/Gajkesari.



Fig. 3. Field-level observation of fine aggregate during material quality checking.

D. Slump Cone Test

The slump cone test was performed on site to assess the workability of fresh concrete. Fresh concrete was placed in the cone in three layers, with each layer tamped 25 times. The cone was then lifted vertically and the subsidence was measured. The test provided a practical indication of the consistency and suitability of concrete for placing and compaction.



Fig. 4. Slump cone test observed/performed during the training.

VII. SAFETY PRACTICES

Construction activities involved risks associated with heavy machinery, reinforcement steel, cement and aggregates, vibration equipment, scaffolding and work at height. The report records the use of safety shoes, gloves and dust masks and notes that basic safety practices were maintained at the residential sites.

During reinforcement and formwork operations, steel bars were stacked in designated areas, bar cutting/bending was handled by skilled workers, and formwork supports were checked before concrete placement. During concreting, trained workers operated needle vibrators and access to freshly poured slabs was restricted. Scaffolding was checked regularly, tools were controlled to reduce falling hazards, and helmets were used in relevant work areas.



Fig. 5. Construction-site activity illustrating the working environment and safety considerations.

VIII. PRACTICAL LEARNING AND CHALLENGES

A major learning outcome was the difference between theoretical drawings and actual site execution. Students initially found reinforcement detailing challenging, particularly identification of bar diameters and understanding the placement of top and bottom reinforcement in different slab and beam conditions. Repeated checking of drawings and measurements under supervision improved their ability to verify spacing and alignment.

Formwork alignment was another challenge. The students learned to use measuring tape, plumb bob and level to check verticality and support conditions. During concreting, they observed that inadequate vibration may leave voids, whereas excessive vibration may cause segregation. They also recognized the importance of curing in preventing cracks and supporting strength development.

The report also records practical delays due to rainfall and a longer project interruption associated with owner-related reasons. These observations demonstrated that construction schedules are influenced not only by technical operations but also by environmental and project-management conditions.



Fig. 6. Site layout marking observed as part of construction preparation.

IX. DISCUSSION

The industrial training demonstrates a strong connection between civil engineering curriculum topics and field practice. Surveying and measurement concepts were applied during site layout and dimensional checks; Building Materials and Construction concepts were applied to masonry, plastering and material inspection; Concrete Technology concepts were reinforced through RMC placement, compaction, curing and slump testing; and RCC concepts were applied through reinforcement and formwork checking.

The experience also highlighted the integrated nature of construction management. Quality depends on material selection, storage, equipment, workmanship and supervision. Schedule performance depends on labour deployment, material availability, weather and coordination among project participants. Safety is similarly integrated with every construction operation rather than being a separate activity.

A limitation of the training was that several advanced laboratory tests were not demonstrated at the sites. The report explicitly notes that the projects were relatively small and that established suppliers were relied upon. Consequently, the observations in this paper should be interpreted as field-training findings rather than as a controlled experimental investigation with statistically measured material properties.

X. CONCLUSION

The industrial training at A.M Construction provided practical exposure to residential RCC construction and helped bridge the gap between theoretical learning and field execution. Students observed construction from site layout and excavation through reinforcement, concreting, masonry, plastering, finishing and curing. They also gained experience with material quality checks, the slump cone test, equipment operation, safety practices and structural drawing interpretation.

The training strengthened technical understanding, problem-solving ability, professional confidence, teamwork and awareness of construction quality and safety. The documented challenges—especially reinforcement detailing, formwork alignment, vibration, curing, weather delays and material estimation—show how classroom principles are applied under real site conditions. For diploma civil engineering education, such structured field exposure provides valuable practical learning and supports readiness for professional construction environments.

XI. REFERENCES

[1] A.M Construction Industrial Training Report, “Building Material & Construction (BMC),” Nirali Prakashan and Tech Knowledge Publications, source material cited in the submitted training report.

[2] A.M Construction Industrial Training Report, “Concrete Technology (CTE),” Nirali Prakashan and Tech Knowledge Publications, source material cited in the submitted training report.

[3] Direct practical guidance and site observations from Er. Atul More, site engineer/mentor, and Er. Devendra Potdar, RCC designer and mentor, as documented in the submitted industrial training report.

[4] Structural and architectural drawings supplied during the training for residential construction projects, as documented in the submitted report.

[5] Daily site diary observations, demonstrations by skilled labourers, and field-learning records documented in the submitted industrial training report.