

Site Auditing for Building Works

Introduction

This practice note provides details of the strategy on auditing building works by the Buildings Department (BD).

2. The Building Authority is empowered by section 22 of the Buildings Ordinance to enter building sites to ascertain whether the Buildings Ordinance and its subsidiary regulations are being complied with. It is BD's intention to exercise this power strategically so as to facilitate Authorized Persons (APs), Registered Structural Engineers (RSEs), Registered Geotechnical Engineers (RGEs), Registered General Building Contractors, Registered Specialist Contractors and Registered Minor Works Contractors in carrying out their statutory supervisory duties. The strategy on site auditing helps to bring to light structural safety-related irregularities or procedures and practices conducive to substandard building works before they become very costly or impossible to put right.

The Strategy

3. The strategy for auditing building works, which focuses on compliance with requirements of the Buildings Ordinance and regulations, includes surprise checks without prior notification and encompasses the following features -

- (a) Expansion of the scope of audits to include detailed checking of foundation and superstructure works;
- (b) A performance-based approach to frequency of audit checks;
- (c) Removal of predictability from timing of audit checks;
- (d) Separation of submission-checking and auditing functions;
- (e) Rotation of auditing staff; and
- (f) Investigative focus on structural safety and integrity.

Scope of Audits

4. The scope of auditing the foundation and superstructure works includes detailed monitoring of the items in Appendix I.

Frequency of Audits

5. A performance-based approach is adopted to determine the frequency and timing of audit checks. On the initial auditing visit to a building site, various factors including its conditions, complexity of development, on-site organization of the registered contractor (RC), qualified supervisory personnel in attendance by AP, RSE, RGE and RC, completeness of documentation kept on site and quality of the works completed to date will be rated accordingly. The rating will be used to determine the initial frequency of subsequent auditing inspections. The general principle will be that, as the works progress, the timing of the next auditing will be decided upon having regard to the standard of building works discovered in the last auditing. If the site is posing particular difficulties, or anomalies are discovered, or the quality of works has proved to be substandard, then the next auditing will be carried out earlier than it would otherwise have been.

6. The auditing officer will have the discretion to determine the proportion of works and items for inspection as appropriate in the circumstances of each site. That is, the percentage and building works components subject to auditing depend on the nature of the various stages of building works on a case-by-case basis. A flow chart for the performance-based site auditing approach is shown at Appendix II.

Timing of and Personnel Assigned to Audits

7. Site auditing is most effective as a deterrent to malpractice if it is unpredictable in terms of frequency and timing of inspections, the work to be inspected and the personnel assigned to the inspections.

8. Any construction sites that are in progress or have been completed are liable to be audited by BD. There will be no pre-determined percentage of structural units, or specific items, to be audited on each site. Generally, there will be no pre-arrangement with the AP/RSE/RGE/RC on the date and time of inspection.

8. As regards personnel assigned to site auditing work including quality and site safety, BD institutes arrangements to ensure that the officer assigned to audit a particular site is neither the officer who processes the documentary submissions in respect of that site nor the officer who carried out the previous inspection. Internal mechanism is in place within BD to ensure consistency and fairness of auditing and to monitor the overall progress of the site auditing programme.

Minor Works carried out in accordance with the Simplified Requirements

10. Minor works carried out in accordance with the simplified requirements (i.e. involving submitted plans instead of approved plans) are small scale with short construction period. Hence instead of a programme of systematic inspections for construction sites with approved plans, selected cases of minor works under construction will be subject to audit site safety inspections. Since minor works items may involve certain items in the first column of Appendix I, like spread footing, reinforced concrete, in-situ concrete and cantilever canopy, please also note the corresponding aspects subject to audit and objective/concern in the second and third columns thereof.

Audit Inspections for Two-Storey Warehouses

11. For proposals of two-storey warehouse satisfying the criteria for fast track processing in PNAP ADM-19, the BD undertakes to conduct inspection of the foundation bearing stratum within one working day (i.e. within 8 working hours) upon receipt of notification. The BD has also streamlined the audit inspections for such proposals. For the scheduled audit inspections on quality of superstructure works, the BD will combine the quality inspection to structural elements with the comprehensive inspection at superstructure construction stage into one joint site inspection. For proposals of small warehouses with gross floor area not exceeding 1,500m², the BD will carry out only one unscheduled audit inspection to such low risk type construction unless irregularities are revealed during the audit inspection that may warrant further unscheduled audit inspections.

Investigation of Anomalies

12. BD will examine carefully all anomalies found during site audits but investigation will focus on anomalies that affect structural safety and integrity or that occurring frequently. The overall effect and extent of seriousness of such anomalies will be examined and consideration will be given to whether the anomaly has occurred inadvertently or otherwise.

Impact on the Construction Industry

13. The strategy for auditing the building works entails more extensive and rigorous on-site checking by BD. This should not be interpreted as any intention of BD to impede construction works or interfere with project management. Normal site operations will not be interrupted if building works are carried out properly. BD intends to work closely with the industry in enhancing the built quality and safety of buildings.

14. A similar practice note is issued to all Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers.

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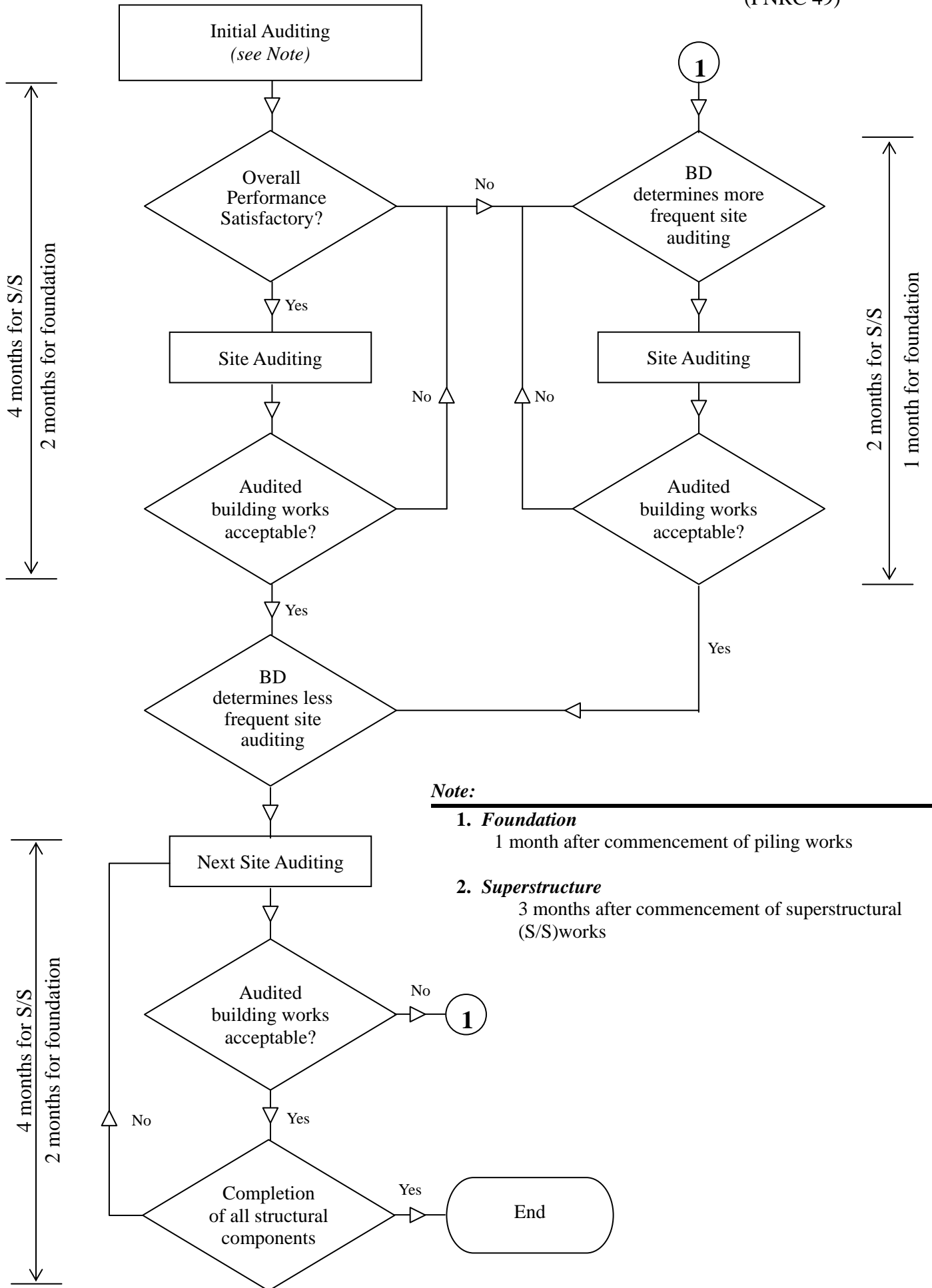
Appendix I
(PNRC 49)

Foundation	Things to be audited	Objective/concern
Driven piles		
(A) <u>Materials</u>		
- Steel H-pile	Mill certificates	Proof yield stress
- Precast prestressed Spun concrete pile	Origin	Recognized type
	Physical dimensions	Compliance with approved plans
- Welding electrode	Grade of electrode	Ensure splice joint strength
(B) <u>Supervision personnel</u>		
- RSE, RGE & RSC	Presence of qualified supervisory staff	Compliance with Site Supervision Plan
(C) <u>Final Stage of Piling operation</u>		
- Diesel hammer	Sufficient driving energy and final set	Ascertain piles are driven to suitable founding stratum, complying with approved plans
- Hydraulic hammer	-ditto-	-ditto-
- Drop hammer	-ditto-	-ditto-
(D) <u>Documentation</u>		
- Ground Investigation	Pile tip founding material	Ensure founding stratum is able to sustain the designed load.
- Piling record of completed works	Final set and founding level	Consistency of the as-built level and ground investigation borelog.

<p>Excavation piles</p> <p>(A) <u>Materials</u></p> <ul style="list-style-type: none"> - Bored pile - Mini-pile - Socket H-pile <p>(B) <u>Supervision personnel</u></p> <ul style="list-style-type: none"> - RSE, RGE & RC <p>(C) <u>Completion of excavation</u></p> <ul style="list-style-type: none"> - Bored pile - Mini-pile & socket H-pile 	<p>Grade of concrete, mill certificate for reinforcement</p> <p>Grade of grout, mill certificate of reinforcement, coupler</p> <p>Grade of grout and mill certificate of Steel section</p> <p>Presence of qualified supervisory staff</p> <p>Pile depth, diameter, bell-out size</p> <p>Actual founding material and pre-drill records</p> <p>Pile depth, dip angle for raking pile</p>	<p>Compliance with approved plans</p> <p>-ditto-</p> <p>-ditto-</p> <p>Compliance with Site Supervision Plan</p> <p>Ensure bored piles are constructed in accordance with the approved plans. Consistency of founding materials</p> <p>Ensure mini-piles are constructed in accordance with the approved plans</p>
<p>Spread Footing</p> <ul style="list-style-type: none"> - Raft/spread footing 	<p>Bearing stratum</p> <p>Physical dimensions</p>	<p>Ensure suitability of founding material</p> <p>Compliance with approved plans</p>

Superstructure	Things to be audited	Objective/concern
(A) <u>Reinforced concrete</u>	Hammer test to structural elements Select samples of reinforcing bars for tensile test	Concrete strength Tensile strength
(B) <u>In-situ concrete</u>	Coring tests	Strength of in-situ concrete
(C) <u>Critical elements</u> - Transfer plate	Document showing RSE's acceptance on falsework design by RGBC Concreting sequence	Ensure the stability of falsework Instability of falsework
- Prestressing member	Prestressing profile Grout vent	Compliance with the approved plans Ensure no air entrapped
- Cantilever canopy	Location of construction joint and cover	Ensure safety
(D) <u>Curtain wall & Glass wall</u>	Member size, shape and grade Cast-in anchors	Compliance with approved plans -ditto-

(Rev. 2/2001)



Note:

1. Foundation

1 month after commencement of piling works

2. Superstructure

3 months after commencement of superstructural (S/S) works

Performance-based Site Auditing