

### 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 and Registered Specialist 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;

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- (f) Investigative focus on structural safety and integrity; and
- (g) Seeking and evaluation of customer feedback.

### **Scope of Audits**

4. The scope of auditing the foundation and superstructure works includes detailed monitoring of the items shown 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 structural 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.

9. As regards personnel assigned to site auditing work, 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 visited the site on the previous audit occasion. 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.

#### **Investigation of Anomalies**

10. 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.

#### **Customer Feedback**

11. BD would like to have regular feedback from the building industry on the effectiveness of the auditing system and the effects on the industry. Accordingly, the AP/RSE/RGE will be requested to complete a questionnaire after each site audit, where they will be able to record their comments on such things as the attitude of the auditing officer, the impact of the auditing process on site activities and the fairness of the auditing. BD will look into the feedback in every detail and make full use of it in improving its services.

#### **Impact on the Construction Industry**

12. 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

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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.

13. A similar practice note has been issued to all registered contractors.



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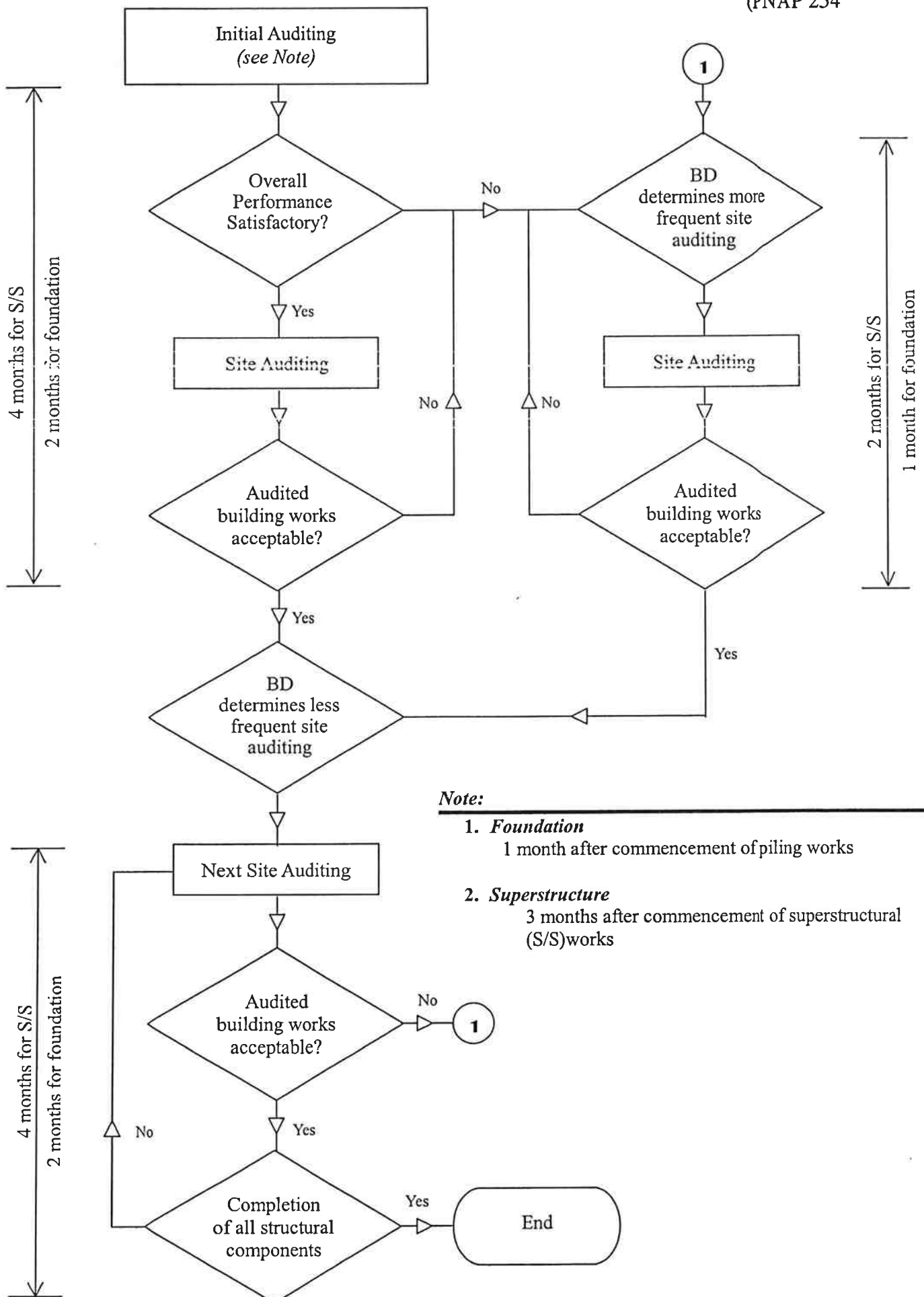
This revision February 2006 (AD/NB2) (Paras 2, 5, 8 & 11 and App I amended to include 'RGE')

Index under : Site Auditing

Foundation	Things to be audited	Objective/concern
<b>Driven piles</b>		
<u>(A)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
<u>(B)Supervision personnel</u>		
- RSE, RGE & RSC	Presence of qualified supervisory staff	Compliance with Site Supervision Plan
<u>(C)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-
<u>(D)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.
<b>Excavation piles</b>		
<u>(A)Materials</u>		
- Bored pile	Grade of concrete, mill certificate for reinforcement	Compliance with approved plans
- Mini-pile	Grade of grout, mill certificate of reinforcement, coupler	-ditto-
- Socket H-pile	Grade of grout and mill certificate of Steel section	-ditto-

(B) <u>Supervision personnel</u> - RSE, RGE & RC	Presence of qualified supervisory staff	Compliance with Site Supervision Plan
(C) <u>Completion of excavation</u> - Bored pile	Pile depth, diameter, bell-out size  Actual founding material and pre-drill records	Ensure bored piles are constructed in accordance with the approved plans.  Consistency of founding materials
- Mini-pile & socket H-pile	Pile depth, dip angle for raking pile	Ensure mini-piles are constructed in accordance with the approved plans
<b>Spread Footing</b> - Raft/spread footing	Bearing stratum  Physical dimensions	Ensure suitability of founding material  Compliance with approved plans

<b>Superstructure</b>	<b>Things to be audited</b>	<b>Objective/concern</b>
(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 &amp; Glass wall</u>	Member size, shape and grade  Cast-in anchors	Compliance with approved plans -ditto-



**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**