



Procedure for Ensuring Good Quality of Work

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Contents

1. Introduction.....	3
Objective	3
Scope	3
Responsibility	3
2. Procedure	3
Artisan-Landlord agreement	3
Demolition	4
Excavation	4
Concrete	4
Formwork	5
Reinforcement.....	6
Brick and Blockwork	6
Structural Steelwork.....	6
Carpentry and Joinery	7
Plumbing.....	7
Plastering.....	7
Painting.....	7
Site Clearing and landscaping.....	8
Routine Safety Supervision.....	8
3. References.....	9



1. Introduction

Objective

This procedure is aimed at ensuring good workmanship for all SafiSan infrastructures. It targets the artisans and construction supervisors who will be involved in construction works.

Scope

This procedure can be used on all new constructions and refurbishment works carried out by SafiSan. The document will cover the following topics;

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|-------------------------------|-----------------------------|
| i. Artisan-Landlord agreement | vii. Brick and Stonework |
| ii. Demolition | viii. Carpentry and Joinery |
| iii. Excavation | ix. Plumbing |
| iv. Concrete works | x. Plastering |
| v. Formwork | xi. Site clearing |
| vi. Reinforcement | xii. Routine Checks |

Responsibility

It is the responsibility of all in the **technical services departments** to ensure that these guidelines are available to all staff in building supervision roles within technical services.

2. Procedure

Artisan-Landlord agreement

An agreement between the artisan and the landlord will define the roles and obligations of each of the parties.

A written agreement binds the landlord to pay the artisan at an agreed interval and rate. On the other hand the artisan is bound to deliver quality work that will justify payments from the landlord.

The agreement should be done in a language understandable by both parties.

The basic elements that should be in the agreement are:

- i. Names and addresses of the parties in the agreement
- ii. Date of drafting and signing of the agreement
- iii. Scope of the task
- iv. Duration of task
- v. Payment interval and amount
- vi. Penalties for substandard works and remedial measures



When the agreement is made, and each of the parties sticks to its responsibilities, the artisans will be motivated and obliged to deliver good quality work.



Demolition

A majority of plots and households in the urban low incomes in Kenya are characterized by limited spaces for any additional developments.

Thus, for the construction of improved household and plot level sanitation infrastructure to take place in this areas, demolition of old structures have to be carried out.

When demolition work is being carried out, ensure that you and the people around you are safe in terms of safe working methods.

Care should also be taken to the adjacent properties.

Regularly check hoardings, gantries, screens and dust control. Ensure that all services are disconnected and temporary services are safe.

Excavation

Excavations will mainly be done for septic tanks, conservancy tanks and decentralised treatment facility components. Excavations when not done correctly can be very expensive. Therefore it is important to take into consideration the right dimensions and locations in reference to other related infrastructure components.

It is advisable to contact the architect and/or the engineer if in doubt of dimensions.

Safety bis also paramount during excavation because it is a potential source of work related accidents. Thus provide a safe means of access / exit via appropriate ladders / walkways being well secured. Keep excavated material away from excavation by a distance of not less than the excavated depth. Check that adjacent buildings / ground is not adversely affected. Check that props are well secured. Use personal protective equipment.

Concrete

Poor concrete works causes structural failures. These failures in a majority of cases can be catastrophic. Many disasters related to poor concrete mixes or non adherence to the specified have been reported in Kenya more than once. Many of these times the key players normally bear the burden of answering to the courts their contribution to these disasters.

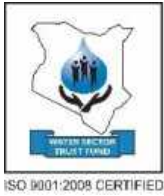
UBSUP will not want to head towards that direction, therefore all the players should take care and ensure that proper concrete are applied as specified.

The engineers responsible should also carry out the necessary concrete crushing tests and make sure the contractor adheres to crushing test schedules.

The concrete mix ratios should conform to what is specified in the drawing.

For toilet construction however the ratio in volume below can be applied.

Component of the structure	Ratio
Blinding of strip foundations	1:3:6
Floor slab	1:2:4
Joining Mortar	1:3
Plaster	1:3



The contractor should check the efficiency of concrete equipments to ensure efficiency and consistency of mixes. He/she should also ensure that the work areas to be concreted are ready to take the concrete by checking the parameters such as, cleanliness, safe scaffold access, waterbars, dowels, expansion joints, box outs are in correct position.

The addition of additives such as water-proofing cement should be checked where their use is required for example in the decentralized treatment facility components.

Verify slump before placing concrete and check time from batching to placing and ensure the right grade of concrete is used in the right location.

Ensure full compaction / vibration of concrete when air-bubbles cease during vibration. Protect the finished concrete from damage by rain with polythene covers and apply curing compound. When placing concrete in stairs, parapets, sills ensure surface finish is smooth and level.

Clean and clear away surplus concrete before it sets and remove latrine at construction / wall / column joints. Clean / wash off grout runs from walls and floors below. Clean skips, tools, equipment after concreting not the next day.

Formwork

The support structure that is used to give concrete the desired form is called formwork. It is also commonly referred to as shuttering as well.

Formwork can be of timber, shutter ply, or steel.

To achieve quality works ensure formwork is erected in accordance with the design drawings.

Formwork materials should be stored off the ground and protected. Where sole plates are used on the ground ensure they are adequate and are placed on solid compacted fill or binding.

Ensure support frames / props are undamaged, vertical, tied / braced, correct pins are used and head/base jacks are fully screwed down / up without gaps between frame / timber head / base support. This applied to table forms too.

Where the formwork is to be used for walling structures ensure forms / columns are perfectly vertical (plumb), aligned, correct heights, through bolts in the correct positions and fully tightened with no gaps. Where shutter plywood to be without delamination, with no gaps between panels and floors. Ensure column props are secure and fully engaged / extended / fixed to floor and column forms. Apply mould oil to all surfaces in contact with concrete before fixing reinforcement. Check level markings / nails for correct height of concrete pour. Check cast in services / conduits etc.

Formwork decks to be uniform and level. Check that cambers are correct and there is no warping or delamination. All gaps should be filled and mould oil applied before reinforcement fixing. Check position / size of all box outs, conduit boxes cast in services / sleeves, check height of decks, folding wedges under and support systems for gaps / spacing / bracing. Ensure stop ends are in the right position / level / secure. During concreting ensure at least one carpenter is below the deck to check for any movement, grout loss, wash off any grout observed and take any corrective action. Replace any deteriorated surfaces / timbers.



Clean all remaining waste after formwork erection, steel fixing and after concreting works.

Make good the construction joints on each floor.

Check supports' strengths.

Reinforcement

The construction team is supposed to ensure that there is no contamination by oil, mud, concrete, paint etc on the reinforcement bar surfaces. Before concreting, check that no reinforcing bars don't touch the formwork. When this happens, the bars will still be exposed when the formwork is removed. Generally the gap between bars and formwork should be at least the bar diameter and lap-lengths of 40 times the diameter. Ensure adequate steel support chairs and spacers are in place, generally for small bar diameters spacing should be on a one meter grid staggered. Feet of chairs must be fully coated with plastic. Concrete spacers must be of the same strength as the concrete used or greater. Adequately fix bars with binding wire.

Brick and Blockwork

During the pilot phase of the UBSUP program it was evident that most toilets were built from bricks and quarry or concrete blocks. Thus, it is appropriate its use is given a matching attention. To achieve proper quality of works when using blocks ensure that blockwork areas are ready for the block laying and clean.

Ensure proper dimensions are applied.

Special attention should also be given to the position of the windows, doors, vault vents and lintel.

Check blocks / bricks for damage upon delivery including substandard manufacturing process. Store cement off ground / slabs and prevent damage from water or rain and check regularly. Check lintel brackets are fixed.

Regularly check workmanship e.g. are blocks being laid according to setting out lines? Check plumbs of walls, is bonding correct? Are joints fully filled? Is reinforcement in the right position? Are built in items? Are services in the correct position? Check the expansion joints are in the correct position and formed correctly. Any block wall over 6 meters long requires expansion joints.

Ensure cavity walls are tied correctly and cavities clean.

Check if damp-proof courses are required. Is raking out of joints necessary? Is wall reinforcement specified?

Structural Steelwork

Ensure all welding / cutting is carried out in a safe manner e.g. screens provided, hot work permits observed, fire extinguishers in place, protective personal equipment being used. With arc welding check that the equipment used is safe and certified, also are cables properly connected, out of water and undamaged.

Check member sizes comply with drawings and surface treatments are properly carried out e.g. has all rust been removed prior to priming? Is the correct primer being used? Are the correct number of coats being applied? Does the work comply with approved samples?



Check priming, surface coatings are undamaged.

Ensure grouting is homogenous, fully compacted. Check that the grout being used has been approved and mixed correctly.

Spot check level, plumb and that positioning of openings are correct.

Carpentry and Joinery

Check timber sub-frames, doors, skirtings etc for woodborers, shakes (splits) surface finish, priming, preservative on back and base of frames, bracing, sizes of members and frames etc.

Check workmanship such as mitres, chamfers, plumb line, and level position relative to surrounding finishes. For structural timbers inspect spacing, adequacy of bearing, trimmers, braces, strutting, noggings. Ensure adequacy of fixing especially packers, wedges etc.

Check type of insulation used complies with specification and manufacturers fixing instructions, protect fibre glass insulation from water /dust contamination.

Spot check moisture content if flooring / parquet, doors and joinery.

Ensure flooring is colour matched, adequately fixed, cramped tight so no gaps exist. Inspect mitres, expansion joints, sanding / cleaning off dust before applying sealing and polishing. Protect after polishing.

Plumbing

The construction team should ensure that the sanitaryware delivered complies with approved samples, quantities and colours. The correctness of the accessories should be checked.

The ware should be stored and protected from damage.

The plumber should clearly understand how to fix the accessories and fix them correctly. If in doubt the plumber should ask the project engineer. Some fixing errors can cause serious.

The plumbing components that the plumber should take extreme care of are the squatting pan of the urine diverting toilets, vault ventilation piles, urine pipe and urine soak away pit.

For the decentralised treatment facilities attention should be given to intercomponent connection level anaerobic baffles reactor baffles and the biogas digester fittings.

Plastering

Check line / level of background materials and rectify prior to plastering. Ensure access panels, openings are in correct position, framed, aligned, plumb and that embedded items such as conduit boxes, windows, handrail brackets, lintels are in place and level, in line and bonding wires.

Ensure internal / external angles, and the like are plumb in line and spot levels adequately spaced. Ensure surfaces to be plastered / screeded are free from contamination / waterproofed where necessary and that expanded metal / mesh / is correctly fixed / placed / lapped.

Painting

Inspect painting materials for compliance with specification.



Ensure personal protective equipment is being used during painting.

Check preparation of areas to be painted, remove dust, oil contamination, filling, knotting, rubbing down before priming and between coats, check the number of coats. Ensure protection / masking of adjacent finishes has been correctly carried out.

Ensure ceilings and walls are ready for painting. Check on cleanliness, surface finish, evenness, making good around openings, services, joints between walls, floors, doors, windows etc.

Site Clearing and landscaping

An uncleared site may ruin the looks of a good structure. Therefore after the completion of construction work are complete the site must be cleared and proper landscaping done.

Proper draining of the area around the structure should also be well drained if it is prone to flooding.

Routine Safety Supervision

This part is mainly the task of the landlord. However the construction team should take some responsibility of following up to ensure user comfort.



3. References

Hanratty, C. Et al (2005). Procedure for Control of Building Workmanship, procedure no. 18: Health Services Executive



ANNEX 1: SAMPLE ARTISAN LANDLORD AGREEMENT

<p>{Name} , known as "Landlord," of {Address} agrees to enter into this contract with {Name}, known as "Artisan" of {Address} on {date}.</p>	
<p>This agreement is based on the task to construct {Number} toilets to completion in line with the designs given by the water service provider. The work should meet the quality desired by the water service provider and procedures for achieving good quality of works attached. The scope of the artisans work to include:</p>	
<p><u>THE ARTISAN AGREES:</u></p>	a) Construction of toilet/s according to the drawings provided by the water service provider. The dimensions MUST be as provided.
	b) Installation of handwashing facilities as provided in the drawings
	c) Installation of fittings proper and working condition (E.g. taps, basins, paper holders, door locks, toilet seats, mirrors, light switches etc.)
	d) For UDDTs, provide ash containers
	e) Instal waste receptacles for sanitary waste
	f) Clear doorways of any obstruction
	g) Properly finish the floor to have an even, unbroken, slip-resistant surface
	h) Ensuring wet areas are adequately drained
	i) Ensuring the toilet is well finished (plastered, well painted, site cleared and landscaping done)
	j) Ensuring that all cisterns are free of leaks and working satisfactorily
	k) Ensuring the urinal drains are clear
	l) Ensuring all posters fixed
	m) For the UDDT ensure the soak pit is done correctly
<p><u>AND THE LANDLORD AGREES</u></p>	a) Provide the artisan with the required drawings
	b) Avail the site for construction on time
	c) Provide all the materials required for the construction on time
	d) Make payments to the artisan on the agreed time and intervals
<p><u>PAYMENT:</u> The artisan will be paid after and the final payment will be made.....</p> <p><u>DURATION:</u> This is work is expected to takeday, startingto.....</p> <p><u>PENALTIES ON BREACH OF AGREEMENT</u></p>	
Signedthis day of..... Month.....20..... By(Landlord).....	Signedthis day of..... Month.....20..... By(Artisan).....