



**REPUBLIC OF GHANA**

**MINISTRY OF LOCAL GOVERNMENT AND RURAL DEVELOPMENT**

**ACCRA METROPOLITAN ASSEMBLY (AMA)**

**GREATER ACCRA METROPOLITAN AREA (GAMA) SANITATION AND  
WATER PROJECT**

**CONSULTING SERVICES FOR PROVISION OF IMPROVED  
INSTITUTIONAL SANITATION AND WATER SUPPLY FACILITIES,  
INCLUDING PREPARATION AND IMPLEMENTATION OF  
INSTITUTIONAL FACILITY MANAGEMENT AND HYGIENE EDUCATION  
PLANS FOR ACCRA METROPOLITAN ASSEMBLY**



**FINAL DETAILED DESIGN REPORT**



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# **1 INTRODUCTION**

## **1.1 Background**

The Government of Ghana acting through the Ministry of Local Government and Rural Development is implementing the Greater Accra Metropolitan Area (GAMA) Sanitation and Water Project (SWP) with International Development Association (IDA) grant support. The project seeks to increase access to improved environmental sanitation and water supply, with emphasis on low income communities; and to strengthen management of environmental sanitation in GAMA.

As part of the strategy for achieving the above objective, the project is promoting the provision of improved sanitation and water supply facilities in schools in low income communities in the eleven Metropolitan and Municipal Assemblies (MMAs) in GAMA, including hygiene education and campaigns for awareness raising and behavioural change.

In view of this, the Accra Metropolitan Assembly (AMA) engaged WasteCare Associates to provide consulting services for provision of improved sanitation and water supply facilities, including preparation and implementation of institutional facility management and hygiene education plans for selected schools within AMA's jurisdiction.

## **1.2 Objectives**

The objectives of this assignment is to provide consulting services to support the preparation, design, and construction supervision of improved toilet and water facilities in the selected institutions within the AMA, as well as facilitate the development and implementation of appropriate management systems and a hygiene education program among beneficiaries, aimed at achieving the following impacts:

- i. Availability of safe drinking water and good sanitary facilities, and establishment of appropriate hygiene habits
- ii. Good hygiene and environmental health conditions in the target institutions and reduced risk of faeco-oral and water-borne diseases
- iii. Improved health, cognitive development and primary school attendance
- iv. Greater girls' participation in school
- v. Continued impact through sustained and effective management of institutional toilets and water supply facilities.

## **1.3 Scope of Services**

The assignment is to be carried out in two phases. Phase one (I) involves undertaking a thorough WASH needs assessment in the selected schools, identify the highest priorities, recommend and prepare works packaging for the most viable toilet and water facility type suitable for each institution. The phase two (II) on the other hand includes construction supervision of the institutional sanitation facilities and providing support to the implementation of Facility Management and Operation Plans (FOMPs) and School Hygiene Education Programmes (SHEP).

The expected services for both phases are as follows:

### **Phase I:**

- a. Based on the technical guide for WASH in Schools Facilities in Ghana, and in consultation with key stakeholders in the institutions, including school authorities and key members of AMA,

undertake assessment of specific needs of the proposed schools and, considering the site specific conditions, propose a viable toilet type suitable for each selected institution.

- b. Based on engineering considerations, assess and make provision for the installation or upgrading of the water supply to the proposed facility under (a), to a level capable of supporting adequate hygiene at each selected institution.
- c. Based on gender considerations, assess and make provision for the preferences and tastes of boys and girls in the design, site location, operation and maintenance of WASH facilities, documenting and recording the feedback of children users by sex and broad age categories – pre adolescent and adolescent. Show how and where this feedback has been incorporated in the final proposed designs and the long term management arrangements for AMA.
- d. Assess the knowledge, attitude and practice of the target users (girls and boys in schools) to establish a baseline of indicators of current hygiene behaviour including hand washing and menstrual hygiene practices, disaggregated by sex and age for later impact measurement. The consultant will work in partnership with key stakeholders to coordinate an action learning initiative on improving hygiene practices among students and others in the schools.
- e. Using existing/available designs or through an update of existing/available designs, prepare tender documents for works contracts for the construction of the institutional sanitation facilities, including preparation of facility management and hygiene education plans for each of the selected institutions.
- f. Based on the Consultant's technical proposal, prepare draft HEP and FOMPs for implementation for schools with existing facilities to enable monitoring and evaluation prior to use of the new facilities.
- g. Assisting the client AMA in invitation of bids, evaluation of bids, and preparation of contract documents for the construction of the institutional sanitation facilities.

## **Phase II:**

This will involve construction supervision of the institutional sanitation facilities, and providing support for the implementation of hygiene education programs and Facility Management Plans (FMPs) in the selected institutions, as prescribed by the Ghana Education Service (GES) Water, Sanitation and Hygiene (WASH) in Schools Facilities Planning and Management Guide.

Further details on the expected services and outputs are indicated in below.

**Phase I Assignment** – *Assessment of specific needs of each proposed school and recommendation of the most viable toilet facility suitable for the institution, Preparation of Facility Management and Hygiene Education Plans, Preparation of Tender Documents, Evaluation of Bids, and Preparation of Contract Documents for Works Contract.*

The assignment will include:

- i. Compiling baseline data and information on the existing environmental sanitation situation each institution, including: school population (based on gender), general school attendance, school attendance by gender (boys and girls), school attendance by girls and teachers during menstruation, availability of girls-appropriate toilets and water supplies, number of existing toilets, condition of toilets, water supply situation, etc.

- ii. Based on GES technical guideline for WASH in Schools Facilities in Ghana, assess and propose a toilet facility suitable for each institution, taking into consideration the environmental, social and economic factors necessary, and the future management of the facility as well as the ease of emptying.
- iii. Assess the availability and suitability of the proposed sites for each selected institution by conducting the necessary engineering/geotechnical/environmental and socio-economic analysis and recommend the most viable toilet facility for each site of the selected institutions.
- iv. Based on (ii) and (iii) above, prepare Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan/Abbreviated Resettlement Action Plans where required.
- v. Ensure continuous water supply to each of the institutions by a) connecting to an existing water main supply network where feasible or b) providing a mechanised borehole and overhead water tank combination (using the most suitable water pump systems), or other non-networked facility. This is necessary whether the toilets to be provided are water-based or not.
- vi. Provide for a hand washing facility for hygiene purposes, whilst ensuring the provision of adequate drainage as far as possible.
- vii. Make a recommendation for contract packaging of the works (i.e. no. and scope of lots) that would achieve economy and efficiency, and prepare tender documents (including assembling existing/available design and construction materials and construction drawings) to allow for National Competitive bidding under World Bank guidelines.
- viii. Prepare cost estimates based on a priced bill of quantities and submit a single confidential copy of the priced bill of quantities, separately bound, direct to the Client. The cost estimates must clearly indicate the design assumptions, unit costs, and investment costs. The Consultant shall be guided by the least cost principles and estimate cost of all designs to within 10% accuracy.
- ix. Prepare an implementable effective Facility Management Plan for each of the designed institutional toilet facilities.
- x. Provide a plan and a methodology for monitoring the performance of the facilities and for assessing their impact.
- xi. Prepare appropriate educational material for school hygiene education and propose a plan for the School Hygiene Education Program.
- xii. Propose an implementation schedule for the entire works.
- xiii. Liaise with the various service organisations (ECG, GWCL, GT, MRT, etc) to identify and assess the cost of any necessary service diversions/relocations and determine the most appropriate means of implementing these relocations and/or diversions. If significant diversions/relocations are necessary, consideration should be given to awarding separate contracts.
- xiv. The Consultant shall assist the Client to undertake procurement of the works and support to the implementation of hygiene education and FMPs (i.e. invite contractors to submit bids, including pre-bid meetings if any, and other activities related to the procurement).
- xv. The Consultant shall prepare evaluation report of bids received and, on confirmation of awards, prepare contract documents.



## **Phase II Assignment - *Construction Supervision and Support to Implementation of Facility Management Plans and Hygiene Education***

Activities to undertaken in this phase will include, inter alia:

- i. Providing contractors with the necessary data points and bench marks for setting out the works, and subsequently checking and approving the detailed setting out;
- ii. Checking and approving the contractors' work plans and implementation schedules for the most efficient and expeditious methods of carrying out the works;
- iii. Issuing all necessary instructions to contractors, and continuously supervising the works to ensure that they are carried out in accordance with the contract documents;
- iv. Carrying out, during the execution of the works, inspection of all working areas and installations;
- v. Checking and approving materials used and examining contractors' installations, accommodation, construction equipment and laboratories to ensure that these conform to agreed specifications and proposals;
- vi. Checking and approving all working drawings prepared by contractors;
- vii. Checking contractors' work measurements and certifying payment claims;
- viii. Negotiating with contractors any contractually permissible changes in price or rate for which the need may arise and making recommendations on these to the Client;
- ix. Informing the Client (Assembly) of any problems which arise or might arise in connection with civil work contracts and making recommendations for their solution;
- x. Evaluating all claims during the contract periods for additional payments and time extensions submitted by contractors and making recommendations on these to the Client;
- xi. Assisting the Client in any dispute during contract period that may arise with contractors and giving clear opinions on any of these claims, drawing up reports giving all the elements on which the judgments are based;
- xii. Prepare and submit monthly reports for the use of the Assembly and the World Bank (IDA) on the progress of work, indicating the number and type of facilities constructed and Contractor's performance, quality of work and the project's financial status and forecasts;
- xiii. Propose and present for the approval of the Assembly and the World Bank any changes in the contract documents necessary for the completion of works, including information on any effects the changes may have on the contract amount and the time of completion of the project, and prepare all necessary change or variation orders including alteration of plans, specifications and other details;
- xiv. Maintain representatives at the site in such a manner that adequate supervision of construction works is ascertained at all times and to ensure that all works are executed in accordance with the drawings and specifications;
- xv. Furnish timely assistance and direction to Contractor(s) in all matters related to the interpretation of the contract documents, ground survey controls, quality control testing and other matter related to contract compliance and progress of the project;

- xvi. Organize the supervision of the works with proper allocation of responsibilities to the Individual inspectors and supervise their work to ensure effective execution;
- xvii. Prepare and maintain inspection and engineering reports and records to adequately document the progress and performance of the works;
- xviii. Review and approve all of the Contractor's working drawings and drawings for temporary works;
- xix. Arrange and preside at periodic coordination and progress meetings on site as agreed with the client;
- xx. Perform all measurements of completed or partially completed works where required for the determination of quantities for payment;
- xxi. Review all laboratory and field testing of materials and products needed to assure that the quality as specified in the contract documents is obtained;
- xxii. Inspect the security and safety aspects of construction and temporary works to ensure that every reasonable measure has been taken to protect life and property;
- xxiii. Before the issuance of the Certificate of Substantial Completion, the Consultant shall carry out the necessary inspection with Assembly officials, specifying and supervising all remedial works to be carried out and propose to the Assembly upon completion of the project, the final inspection together with representatives of the Assembly and assist in issuing the Certificate of Substantial Completion and Certificate of Final Completion;
- xxiv. Perform all other tasks not specifically mentioned above, but which are necessary and essential to successfully supervise and control all construction activities in accordance with the terms of the construction contract. The Consultant's responsibility for the works shall expire upon the issuance of the Final Completion Certificate by the Assembly and prepared by the Consultant;
- xxv. Based on GES WASH in Schools Facilities Planning and Management Guide, facilitate the implementation of the facility management plan (FMP) and the institutional hygiene education program during the construction and defect liability period of the completed institutional sanitation facilities;
- xxvi. Make training materials for the hygiene education available to hygiene teachers (School Health Coordinators and Head Teachers) in the selected schools. The materials shall be adequately pretested and acceptable to the GES;
- xxvii. As part of the Consultant facilitation for hygiene education in the schools/ institutions, they shall arrange visits to the schools by the hygiene specialists of the Consultant team to assist the School Health Coordinators, to ensure that adequate skills are transferred for effecting the desired attitudinal change in the children during the maintenance period, and in a manner that promotes sustained change over the long term;
- xxviii. Consultant will be required to consult and work closely with the Metropolitan/Municipal Environmental Health Department, SHEP as well as the Municipal Education Office in implementing this assignment.

Table 1.1 below shows the selected schools for intervention



**Table 1.1: List of Selected Schools and Respective Sub-Metro**

No.1	Name of School	Sub-Metro
1	Abossey Okai 1&2 Cluster	Ablekuma Central
2	Kaneshie West 1&2 Cluster	
3	Mataheko R/C Cluster	
4	Korle Gonno R/C Boys	Ablekuma South
5	Owusu Mills Primary/JHS	
6	Socco/M1 Cluster of Schools	
7	Sempe 8/12 JHS	
8	Dr F.V. Nanka Bruce JHS	
9	ANT 4&11 Primary	Ayawaso Central
10	ANT 6&8 Primary	
11	Kwame Nkrumah JHS	
12	Ayalolo Cluster of Schools	Ashiedu Keteke
13	Independence 1&2 Cluster	
14	Osu Presby Cluster	Osu Klottey
15	Farisco Cluster of Schools	
16	Osu St. Barnabas Anglican Schools	
17	Osu Salem 1 Primary School	
18	Osu Salem 5 Primary School	
19	Unity Cluster	Ayawaso East
20	Kanda Cluster Schools	
21	Anumle Cluster of Schools	Okaikoi North
22	Shiyennor 1&2 Primary	
23	Shiyennor A&B JHS	
24	Kaneshie 6 Primary /Kaneshie Kingsway 1 JHS A&B	Okaikoi South
25	Kaneshie 8 Primary /Kaneshie Kingsway 2 JHS A&B	
26	La Bawaleshie Presby Cluster	Ayawso West
27	Maamobi Prisons Cluster	
28	Dzorwulu JHS	
29	Kwashieman Cluster	Ablekuma North
30	Darkuman 1 JHS	

## 1.4 Stages of the Consultancy Assignment

The consultancy services to be carried out in phase 1 thus pre construction services comprise the following:

- i) **Inception Report** which had already been prepared submitted and approved by the Client.
- ii) **Draft Final Report** which is the subject matter of this report.
- iii) **Final Report and Draft Tender Documents**
- iv) **Final Tender Documents and Facility Management and Hygiene Education Plans**
- v) **Bid Evaluation Reports and Contract Documents**

## 1.5 Structure of Draft Detailed Design Report

The Consultant has provided as required by the Client six hard copies and a softcopy of the draft final report for review and approval. The report includes the following;

- *Assessment results of the choice of improved institutional sanitation facilities, including design and construction drawings.*
- *Baseline report, outlining details of existing situation in the institution to enable performance indicators to be measured after completion of the project.*
- *Recommended approach to the development of facilities management plans and the hygiene education materials and program.*
- *Preliminary cost estimates.*
- *Preliminary Environmental and Social Screening report*
- *Draft Facility Management plans and cost for implementing the plans*
- *Draft hygiene education materials and schematic plan, including cost for implementing hygiene education*

In order to achieve the above outputs the Consultant will prepare four separate reports which when taken together will provide comprehensive assessment and viable socio-cultural, environmental, technical and cost-effective options for improving school sanitation.

The reports to be prepared include the following:

- ***School WASH Infrastructure Assessment and Facilities' Design Report*** (draft detailed design report)
- *Draft Facility Operation and Maintenance Handbook and Cost for Implementation*
- *Preliminary Environmental and Social Screening Report*
- *Draft Hygiene Education Materials and Schematic Plan, Including Cost for Implementing Hygiene Education*

This report (School WASH Infrastructure Assessment and Facilities' Design Report), covers the assessment of existing WASH facilities and services (baseline situation), proposed WASH infrastructure upgrade, preliminary designs and engineering drawings for proposed facility interventions and their respective cost estimates.

The report is structured as follows:

- ❖ Introduction
- ❖ Field and Engineering Studies
- ❖ Description of the Project Area (Accra Metropolitan Area)
- ❖ Findings, Conclusion and Recommendation of Design Studies
- ❖ Technological Choice
- ❖ Design Standards
- ❖ Design Analysis
- ❖ Summarized List of Intervention
- ❖ Sources of Construction Materials
- ❖ Availability of Space for New Facilities
- ❖ Master Plan of Project Site, Location Maps, Block Plans and Standard Drawings
- ❖ Approximate estimates of recommended Interventions and Cost Summary
- ❖ Project Loting and Tender Documents
- ❖ Operation and Maintenance (O&M) Management
- ❖ Conclusion

## **2 FIELD AND ENGINEERING STUDIES**

### **2.1 General**

The Consultant has carried out field investigations and engineering studies at selected projects sites in order to obtain design information. Draft detailed designs/working drawings of recommended improvements and their approximate estimates were obtained from information from field investigation and engineering studies.

### **2.2 Desk Study and Design Reviews**

#### **2.2.1 Desk Study**

Relevant reports/documentation reviewed by the Consultant include:

- Ghana Education Service (GES) WASH in Schools Facilities Planning and Management Guide
- Model school toilet designs used under the Ghana Netherlands-WASH Programme
- Sanitation for Primary Schools in Africa by Water, Engineering and Development Centre (WEDC), Loughborough University
- Water and Sanitation for Urban Poor (WSUP) project design documents
- Designs for Institutional Sanitation under the UN-Habitat/WaterAid Water for African Cities Project (WAC II)-Component 2

#### **2.2.2 Design Reviews**

The Consultant has studied in great detail designs/working drawings and costs of similar projects. The following important aspects of the project designs have been identified for consideration and incorporation the project.

- ❖ Studies show that non robust components such as Plastic WC suites with low level cisterns gets easily damaged due to inability to withstand high patronage and robust use. Plastic suites are proposed to be replaced with more robust components such as ceramic WC squat suites with high level cisterns (for pupils) firmly and robustly fixed unto privy room walls.
- ❖ Earlier designs also had small privy rooms which could not accommodate small waste paper baskets therefore the privy rooms become filled with lots of litter. Some of the litter found their way into suites and squat holes blocking them and reducing effective functioning of the toilets. The recommended solution will lead to an increase of the privy room size. This satisfies recommended minimum dimension of privy rooms of 1.2m<sup>2</sup>.
- ❖ Most of the designs reviewed did not consider issues of menstrual hygiene. Changing rooms for female pupils and facilities such as changing rooms and used sanitary pad collection containers were not provided. Also, little or no attention is given to the safe/proper disposal of Menstrual Hygiene Wastes (MHW). This issue has been addressed by including in the design for school WASH facilities, changing rooms for female pupils and the designs for an furnace fitted with smoke stack for the disposal of MHW.
- ❖ In most of the designs reviewed, the toilet seats provided did not take into consideration use by children or pupils of lower classes or ages. It is proposed that additional devices/fixtures are fitted to ensure that smaller children are comfortable and feel safe in the use of facilities.
- ❖ Most designs reviewed did not consider privy rooms for persons with disability. This is addressed with the provision larger privy rooms and support-fixtures for pupils with disability.

## 2.3 Field Consultations

### 2.3.1 School Representatives

Detailed site surveys and consultations with heads and circuit supervisors of selected schools were carried out. These initial consultations have brought awareness of the project to key members of the school management committees. The direct beneficiaries (pupils, teaching staff, and School Hygiene Education Programme (SHEP) coordinators) were engaged in participatory learning and information sharing sessions in order to identify specific sanitation problems. Further consultations with the schools' management committees will be organized as part of finalization of designs and hygiene promotion plans. Inputs and concerns raised by the school authorities will also be considered in finalization of designs.

### 2.3.2 Community Members

As part of finalization of designs the larger community will be engaged to identify specific sanitation problems within the community and how these will potentially affect the operation and maintenance (O&M) management of the school facilities when completed.

## 2.4 Field Investigations and Engineering Studies

Detailed field investigations and engineering studies have been carried out at relevant project sites to obtain data for finalization of designs and working drawings.

### 2.4.1 Field Geo-technical Survey

The project catchment area was categorized according to their geological formations (i.e. schools located in the Accraian/Mid-Devonian series, Dahomeyan series and Togo series). The map attached in Appendix E shows locations of basic school sites within the three (3) geological formations of Accra.

Essence of the grouping was to pick critical school toilet sites that required special attention to the design of their underground sanitation facilities due to high water table conditions identified during field surveys.

The Table 2.1 below shows the selected school sites where geo-technical investigations were carried out, their sub-metros and geological formations.

**Table 2.1: Selected school locations for Geo-technical Analysis**

Sub-Metro	Accraian	Dahomeyan	Togo Series
Ablekuma South	Korle Gonno RC Boys Sempe Cluster	n/a	n/a
Ayawaso East	Kanda Cluster	n/a	n/a
Ayawaso Central	n/a	Unity Cluster	n/a
Ayawaso West	n/a	Dzorwulu JHS	n/a
Okaikoi North	n/a	Apenkwa Presby Cluster	n/a
Osu Klottey	Farisco Cluster Osu Presby Cluster	n/a	n/a

## Pitting

The following field activities were carried out:

- Trial pits (1.5m x 1.5m) were sunk to a minimum depth of 1.0m below the existing ground level, at each site.
- Disturbed samples for each layer of soil material encountered in soil profile of the pits were sampled for further visual examination and soil classification in accordance with the approved conventional standards.
- Possible ground water present in the pit due to high water table was observed and the level of ground water table referenced to the existing ground level was recorded.
- Probe/DCP test at the bottom of each trial pit was carried out, using Dynamic Cone Penetrometer (DIN4094) and the test was terminated at the point where the DCP equipment recorded inability to penetrate further referred to as refusal (i.e. technically when the number of blows (N) recorded per the 10cm layer mark on the penetration bar was greater than 50 blows). The DCP test provided the bearing capacities of the layers underneath the trial pits for evaluation of the types and depths of foundations of designed underground sanitation facilities (i.e. skip pads, septic tanks and soakage/drain fields) of toilets.

Appendix E contains the geological map of the AMA and results obtained and conclusions made after the test carried out in the selected schools

### 2.4.2 *Water Supply Assessment*

An assessment of access to water supply in the various schools were undertaken. Most of the schools had access to GWCL water supply although majority of schools had been disconnected due to non-payment of water charges. Current status of water supply in the various schools is provided in Table 4.1 below. Table 2.2 below indicates the schools without access to water supply and the identified connection/tapping points from the GWCL supply lines. The field survey was undertaken with staff of the respective local district offices of the GWCL.

**Table 2.2: Details of GWCL Water Connection Points**

School	Distance of Nearest GWCL Pipe to School (m)	GPS Location of GWCL Pipeline	Pipe Size
Socco/M1 Cluster of Schools	26.9	Latitude: 5°3'53.4"N: Longitude: 0°14'38.71"W	3"
Shiayennor A&B JHS	243	Latitude: 5°36'38.07"N: Longitude: 0°13'45.08"W	2"

### 2.4.3 *Detailed Engineering Studies*

The following detailed engineering studies were carried out to complete the collection of field design data:



### Architectural Design Studies

The following are the architectural design studies carried out in the field to determine the quality of architectural design of sanitation facilities:

- ❖ Functional relationship between any (2) or more toilet facilities at the project sites was determined by investigating the proper arrangements of existing facilities through physical inspection and observation.
  - a) Adequacy of spaces between facilities for free movements (i.e. lengths between adjacent and opposite facilities)
  - b) Adequacy of ventilation and daylight effect in toilets. This was assessed by checking the positioning of existing building blocks and observing the effects on adequate ventilation and/or maximum daylight.
  - c) Ease of mass evacuation (presence/absence of emergency exits)
  - d) Presence/absence of segregated entrance for males and females
- ❖ Assessment of functional sufficiency in terms of:
  - a) Adequacy of privy room space
  - b) Adequacy of toilet room corridors
  - c) Presence of store rooms and adequacy of storage space
  - d) Wideness of entrance of single entrance toilet facilities
  - e) Easy access by children/adults and the physically challenged
  - f) Availability of changing room for females
- ❖ Comfort of use looking at:
  - a) Amount of darkness or brightness in toilet rooms and effect of maximum daylight
  - b) Amount of heat or adequacy of ventilation in toilet rooms (measured by total area of superstructure covered with windows and distributed fairly on the superstructure to promote cross ventilation)
  - c) Level of mal-odour in the toilet rooms measured by the total area of window spaces and distribution and position of the toilet strategically to receive the maximum flow of air/wind at the various sites

### Structural Condition Survey

The structural conditions of existing facilities were assessed to determine the need for rehabilitation or demolition and complete replacement of existing facilities due to their physical state.

The key areas of concern were:

- ❖ Evidence of wide and visible cracks in walls and floors
- ❖ State of roof and roof members (i.e. evidence of holes in roofing sheets and ruined state of roof members)
- ❖ State of windows and doors
- ❖ State of internal and external painting of walls
- ❖ State of septic tanks

### Water Availability, Supply and Reliability Studies

Various toilet technologies require certain minimum amounts of water for effective and efficient operation.

Water availability studies were therefore crucial in the selection of the appropriate toilet technology for each project site. The following design parameters were determined as indicators of availability, supply status and reliability of water supply services in the project sites.

❖ On availability, the following were considered:

- a) Absence or presence of pipe borne water source
- b) Where water was found to be available a determination of the distance to the source from the sites
- c) Absence or presence boreholes with functional pumps

❖ On reliability, consideration was given to:

- a) Number of days in a week of constant/uninterrupted flow and
- b) Adequacy of flow pressure (Good flow pressures were assessed by visual inspection of the pressure of flow from stand taps or taps in houses close to the toilet sites)

At sites where water was available but interrupted by specific events we investigated further three scenarios:

- a) The first case was to look at the situation where water flows every day of the week but not every hour of the day
- b) The second case where water flows every hour of the day but not every day of the week and
- c) The third case where water is not continuous every hour of the day and also not on every day of the week

Each of the cases in (a), (b) or (c) required additional information on the possibility of water storage for regular operation.

### Assessment of Sanitation Situation

The Consultant assessed the sanitation situation of the project sites by looking at:

❖ Liquid waste management situation:

- a) Availability and unavailability of sanitation facilities and where toilets were available, the type(s) and physical and structural conditions
- b) Whether there is open defecation in and around the school sites
- c) Any noticeable poor environmental sanitation situation (i.e. exposure of faecal matter from weep holes in septic tanks, effluent pipe joints and holding tanks and associated stench and environmental/health implication)

❖ Refuse management situation:

- a) Presence or absence of open dump or refuse burning sites
- b) Availability of refuse collection bins and types/number

- c) Availability waste collection service providers
- d) Frequency of refuse disposal
- e) Presence or absence of refuse holding bays and dimensions

### Site Drainage Condition

Erosion and the presence of high water table resulting in regular site ponding are potential threats to durability of foundations of buildings/civil works in any environment without good drainage. In this regard, the presence or absence and condition if present, of adequate drainage facilities and erosion control measures were investigated at the various project sites.

The site drainage studies carried out by the Consultant entailed the collection of the following drainage management data for improvement of the drainage conditions at the various project sites:

- ❖ Presence/absence of drains for collection of sullage and surface runoff
- ❖ Where drains are available, the types, sizes and physical conditions
- ❖ Evidence of erosion of site grounds
- ❖ Measure of site slopes, direction and catchment area.

### Assessment of School ECG Power Needs and Electrical Design Studies

The main essence of the provision of lighting in and around toilets is to ensure the facility and its immediate are well lit. Lighting also enhances security of the facility at night. In cases where boreholes are to be considered as an alternate water supply source, power is needed for the operation of the water pumps. The ECG power needs for lighting in each project site was determined by:

- ❖ Availability of ECG power at the schools
- ❖ Where ECG power and ancillary installations for power delivery and lighting gadgets were available, the types, sizes, age and state/condition of internal and external lighting provisions at the school toilet facilities were considered. This enabled the Consultant ascertain problems with existing internal and external electrical installations for provision of improved/modified electrical design installations in the new schemes
- ❖ Number of days in a week of power outage in the area and
- ❖ Present consumption in terms of average monthly bills

### Mechanical/Plumbing Design Studies:

Mechanical/Plumbing design studies were carried out to determine plumbing improvement needs of existing and new toilets. Studies entailed the collection of data for the design of internal and external plumbing fixings/installations.

Plumbing studies comprised investigations on:

- ❖ Type of cisterns and squat systems and present state and age,
- ❖ Ditto hand washing basins
- ❖ Physical conditions of effluent chambers
- ❖ Size, type and present state of water storage tanks, age and functional condition

## **2.5 Constraints to Field Studies**

The Consultant encountered initial challenges in accessing current school enrollment figures, as most school authorities indicated admissions were still in progress until closure of admission in mid-October. Some enrollment data provided were therefore estimated. Final enrollment figures will be determined as part of participatory consultations towards finalization of designs.

### 3 THE PROJECT AREA

The project areas (school sites) cover the ten (10) sub-metropolitan of the Accra Metropolitan Assembly with each sub-metro having at least two (2) schools selected for intervention. Refer to Table 1.1 above.

Plate 1 below shows the location of the selected schools in Accra Metropolitan Area.

#### 3.1 General Sanitation Management Situation

After reconnaissance survey of all the selected schools, consultants have had a general overview of the pertaining conditions in the schools. Issues considered during the visit include:

- Condition of existing toilet facilities (if any)
- Water Supply
- Refuse collection and disposal mechanisms
- Drainage

Initial discussions were held with the School Heads and Circuit Supervisors to ascertain the general sanitation management situation.

##### 3.1.1 Toilet Facilities in Schools

Most of the schools do not have adequate toilet facilities for pupils and staff. In most of the schools, no provision was made for pupils with disability and changing rooms for female pupils. In some cases the lack of adequate sanitation facilities have resulted in the depreciation of school enrollment due to parents redrawing their wards. In the case of the female pupils, school attendance is often interrupted. In some, pupils had to resort to leaving the school premises to access public toilets. This posed major security concerns for most of the school heads. In some cases pupils do not return to class after seeking permission to access sanitation facilities outside the school premises. Table 4.2 below presents assessment of the gender sensitivity and disability-friendliness of the existing toilet facilities.

##### 3.1.2 Refuse Management Situation

Most schools did not have proper waste management systems in place. In most of the schools refuse are disposed of in dug-out pits and burnt. However, a few schools had refuse skips/bins and had engaged private waste collection service providers. For example, in Abossey Okai 1&2 Cluster, tri-cycle operator has been engaged for refuse collection while in Korle Gonno RC Boys, the existing 5m<sup>3</sup> (see table 4.1 below) refuse container was serviced by refuse collection trucks. The collection service was in some case irregular.

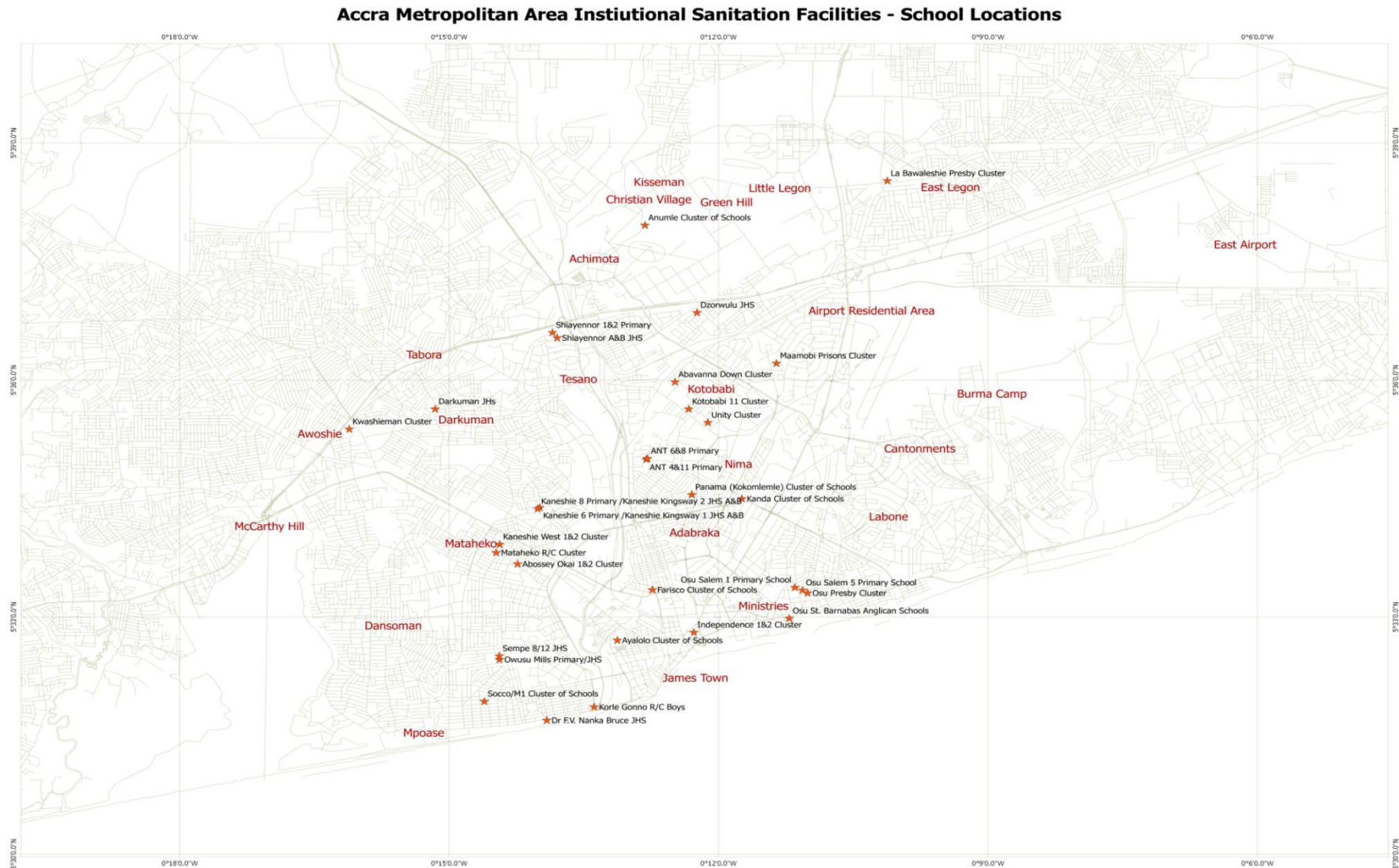




Plate 1: Location of selected schools in AMA








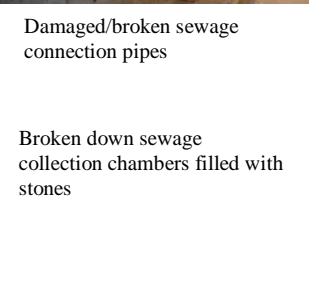


## 4 FINDINGS OF FIELD STUDIES AND RECOMMENDATIONS






Table 4.1 highlights the recommendations made as a result of the findings from field studies.

Table 4.1: Recommendations made for the selected schools

S/N	Sub-Metro	School	Pictures		Observations	Initial Recommended Interventions												
1	Ablekuma Central	Abossey Okai 1 & 2 Cluster	 Septic tank for uncompleted toilet block	 Existing 10-seater WC with damaged septic tank	<ul style="list-style-type: none"><li>Existing 10-seater WC not in use due to damaged septic tank system. Cluster currently without any facility.</li><li>Uncompleted 10-seater 2-storey toilet block (without any fixtures) with septic tank.</li><li>Tri-cycle operators engaged once in a while to dispose of refuse.</li><li>No water supply from mains due to non-payment of GWCL bills.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>506</td><td>Staff Male:</td><td>13</td></tr><tr><td>Pupils Female:</td><td>544</td><td>Staff Female:</td><td>32</td></tr><tr><td>Total:</td><td>1046</td><td>Total:</td><td>45</td></tr></table>	Pupils Male:	506	Staff Male:	13	Pupils Female:	544	Staff Female:	32	Total:	1046	Total:	45	<ul style="list-style-type: none"><li>Provision of refuse holding bay</li><li>Provision of mechanised borehole</li><li>Rehabilitation and remodelling of dilapidated 10-Seater WC. Completion and remodelling of existing 8-seater WC into 16-seater WC (8 per floor)</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	506	Staff Male:	13															
Pupils Female:	544	Staff Female:	32															
Total:	1046	Total:	45															






2	Kaneshie West 1&2 Cluster	 Poor refuse management at school site to water storage tank	 Broken down cistern	<ul style="list-style-type: none"><li>Existing 16-seater WC toilet with fixtures broken down.</li><li>Have a borehole.</li><li>Crude dumping and open burning of waste.</li><li>Kindergarten block has room for toilet facilities but without any fixtures.</li><li>Mechanised borehole water supply</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>490</td><td>Staff Male:</td><td>8</td></tr><tr><td>Pupils Female:</td><td>556</td><td>Staff Female:</td><td>27</td></tr><tr><td>Total:</td><td>1046</td><td>Total:</td><td>35</td></tr></table>	Pupils Male:	490	Staff Male:	8	Pupils Female:	556	Staff Female:	27	Total:	1046	Total:	35	<ul style="list-style-type: none"><li>Provision of a refuse holding bay with required ancillary facilities and assist school to make arrangements for collection.</li><li>Rehabilitation and remodeling of dilapidated 16-Seater WC into 20-seater.</li><li>Provision of additional 10-seater WC.</li><li>3-Seater and a shower for KG</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	490	Staff Male:	8														
Pupils Female:	556	Staff Female:	27														
Total:	1046	Total:	35														
3	Mataheko R/C Cluster	 External view of existing 20-seater aqua privy toilet	 Internal view of the aqua privy showing filthy floor	<ul style="list-style-type: none"><li>Existing 20-seater aqua privy toilet facility in a deplorable state-floor of facility littered and soiled with excreta, defective pipe connections and fixtures.</li><li>Refuse is crudely dumped and burnt in a in a dug-out pit near the toilet facility.</li><li>GWCL water connection and mechanised borehole available.</li><li>Uncompleted 20-seater WC toilet.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>586</td><td>Staff Male:</td><td>11</td></tr><tr><td>Pupils Female:</td><td>627</td><td>Staff Female:</td><td>29</td></tr><tr><td>Total:</td><td>1213</td><td>Total:</td><td>40</td></tr></table>	Pupils Male:	586	Staff Male:	11	Pupils Female:	627	Staff Female:	29	Total:	1213	Total:	40	<ul style="list-style-type: none"><li>Provision of a refuse holding bay with ancillary facilities and assist school to make arrangements for collection</li><li>Rehabilitation and remodeling of 16-seater Aqua privy into 24-seater WC</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	586	Staff Male:	11														
Pupils Female:	627	Staff Female:	29														
Total:	1213	Total:	40														
		 New 20-seater WC toilet under-construction	 Crude dumping of refuse behind the 20-seater aqua privy														

4	Ablekuma South	Korle Gonno R/C Boys	 <p>Uncompleted-12 seater WC toilet in use</p>  <p>Defective cistern with floor littered with anal cleansing material</p>  <p>External urinal</p>  <p>5m<sup>2</sup> refuse collection container at the school</p>	<ul style="list-style-type: none"> <li>Existing 12-Seater WC is uncompleted and in a deplorable condition (plastering and external works outstanding) but in use.</li> <li>Existing septic tank is connected to a soakaway.</li> <li>The school has an external urinal.</li> <li>School has a refuse skip and has engaged private waste collection service provider</li> <li>GWCL water supply available.</li> </ul> <p><u>Enrolment Details</u></p> <p>Pupils : 407</p> <p>Staff Male: 9</p> <p>Staff Female: 10</p> <p>Total: 19</p>	<ul style="list-style-type: none"> <li>Provision of mechanised borehole as an alternative source of water supply (if feasible)</li> <li>Demolishing existing 12-seater toilet and construction of new 14-seater WC toilet.</li> </ul>
5		Owusu Mills Primary/ JHS	 <p>Damaged/broken sewage connection pipes</p>  <p>Broken down sewage collection chambers filled with stones</p>  <p>External urinal</p> 	<ul style="list-style-type: none"> <li>Dilapidated 16-seater WC toilet on a 2-storey school block (8-seats per floor).</li> <li>Internal fixtures e.g. cisterns, WC seats, hand wash basins, etc. of the facility have been removed, pipelines broken/damaged.</li> <li>Existing septic tank is dilapidated.</li> <li>No water supply.</li> <li>Crude dumping of refuse within the school compound</li> <li>External urinal for pupils</li> </ul> <p><u>Enrolment Details</u></p> <p>Pupils Male: 65      Staff Male: 6</p> <p>Pupils Female: 91      Staff Female: 12</p> <p>Total: 156      Total: 18</p>	<ul style="list-style-type: none"> <li>Demolishing and reconstruction of entire sewage system.</li> <li>Provision of water supply to school- GWCL and mechanised borehole water supply options will be considered.</li> <li>Provision of a refuse holding bay with required ancillary facilities and assist school to make arrangements for collection.</li> <li>Rehabilitation of existing 16 seater into 12-seater WC toilet (6 per floor)</li> <li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li> </ul>






			 <p>Refuse dumping/burning site</p>													
6	Socco/M1 Cluster of Schools	 <p>Dilapidated and abandoned 10-seater WC with urinal</p>  <p>Internal view of the 10-seater facility showing damaged WC cistern</p>  <p>Attached urinal filled with solid waste</p>  <p>Refuse burning pit dug close to the dilapidated toilet</p>	<ul style="list-style-type: none"><li>Existing 10-Seater WC (with urinals) dilapidated and abandoned- roofing of the facility ripped off, weathering of superstructure coating/plastering, visible cracks in walls and in inspection chambers. Some fixtures- e.g. cistern, taps and pipelines have been removed.</li><li>Pupils rely on a 20-seater WC facility built as part of the Millennium School project. Additional facility required to meet school population.</li><li>Mechanised borehole available with 2 water storage tanks.</li><li>Refuse is openly burnt in pit dug close to the facility abandoned 10-seater facility.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>142</td><td>Staff Male:</td><td>6</td></tr><tr><td>Pupils Female:</td><td>143</td><td>Staff Female:</td><td>7</td></tr><tr><td>Total:</td><td>285</td><td>Total:</td><td>13</td></tr></table>	Pupils Male:	142	Staff Male:	6	Pupils Female:	143	Staff Female:	7	Total:	285	Total:	13	<ul style="list-style-type: none"><li>Provide school with waste collection equipment and holding bay.</li><li>Assist school to make arrangements for collection by waste collection service providers.</li><li>Demolishing of existing 10-seater facility and provision a new 20-Seater WC</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	142	Staff Male:	6													
Pupils Female:	143	Staff Female:	7													
Total:	285	Total:	13													













7	Sempe '8' & '12' JHS	 <p>External view of the toilet facility showing both damaged and rehabilitated sewage connection pipes.</p>  <p>Cubicle being used as store</p>  <p>Rehabilitated cubicle for use of teachers</p>  <p>Crude dumping of refuse</p>	<ul style="list-style-type: none"><li>• Dilapidated 16-seater WC toilet on a 2-storey school block (8-seats per floor).</li><li>• Internal fixtures e.g. cisterns, WC seats, hand wash basins, etc. of the facility have been removed, pipelines broken/damaged.</li><li>• 2 of the cubicles rehabilitated for use of staff</li><li>• Existing septic tank is defective</li><li>• No water supply.</li><li>• Crude dumping of refuse within the school compound.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>107</td><td>Staff Male:</td><td>4</td></tr><tr><td>Pupils Female:</td><td>125</td><td>Staff Female:</td><td>8</td></tr><tr><td>Total:</td><td>232</td><td>Total:</td><td>12</td></tr></table>	Pupils Male:	107	Staff Male:	4	Pupils Female:	125	Staff Female:	8	Total:	232	Total:	12	<ul style="list-style-type: none"><li>• Demolish and reconstruct entire sewage system.</li><li>• Provision of water supply to school-GWCL and mechanised borehole water supply options will be considered.</li><li>• Provision of a refuse holding bay with required ancillary facilities and assist school to make arrangements for collection.</li><li>• Rehabilitation of existing 16 seater into 12-seater WC toilet (6 per floor)</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	107	Staff Male:	4													
Pupils Female:	125	Staff Female:	8													
Total:	232	Total:	12													
8	Dr F.V. Nanka Bruce JHS	 <p>New KVIP toilet under construction</p>  <p>Some cubicles of the dilapidated converted into store rooms</p>	<ul style="list-style-type: none"><li>• New 4-seater KVIP and urinal currently under construction for Library. Currently no facility for the JHS.</li><li>• GWCL and mechanised borehole water supply available.</li><li>• Crude dumping and open-burning of refuse.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>228</td><td>Staff Male:</td><td>4</td></tr><tr><td>Pupils Female:</td><td>177</td><td>Staff Female:</td><td>10</td></tr><tr><td>Total:</td><td>405</td><td>Total:</td><td>14</td></tr></table>	Pupils Male:	228	Staff Male:	4	Pupils Female:	177	Staff Female:	10	Total:	405	Total:	14	<ul style="list-style-type: none"><li>• Provide school with refuse collection bins and holding bay.</li><li>• Assist school to make arrangements for collection.</li><li>• New 10-seater WC toilet</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	228	Staff Male:	4													
Pupils Female:	177	Staff Female:	10													
Total:	405	Total:	14													





					
9	Ayawaso Central	Accra Newtown 6&8 Primary Classroom Block			<ul style="list-style-type: none"> <li>• 16-Seater (in-built) WC toilets for 2-storey school block (8 per floor). Privy rooms have been converted and being used as staff room, store room, etc. Similar situation was observed in both schools (<i>i.e. Accra Newtown '6&amp;8' and Accra Newtown '4&amp;11'-both located in the same compound</i>).</li> <li>• Existing 8 and 7-seater WC toilets.</li> <li>• 8-seater WC not handed over to the school but teachers' cubicle is however in use</li> <li>• Compound open to public and littered with waste.</li> <li>• Open burning of refuse.</li> <li>• GWCL water connection available but supply not regular</li> </ul> <p>Enrolment Details: Pupils:397 Staff: 29</p>
10		Accra Newtown 4&11 Primary Classroom Block			









11		Kwame Nkrumah JHS	 <p>Existing 4-seater biofilm toilet</p>	<ul style="list-style-type: none"> <li>Existing 4-seater biofilm toilet.</li> <li>Need for securing facility from use by outsiders</li> <li>Open burning of refuse.</li> </ul>	<ul style="list-style-type: none"> <li>Rehabilitation and fencing of existing facility to secure from public use.</li> <li>Assist school in making arrangements for collection of refuse.</li> <li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li> </ul>
12	Ashiedu Keteke	Ayalolo Cluster of Schools	 <p>Abandoned 8-seater WC toilet</p>  <p>Defective septic tank with cover slabs removed and filled with refuse</p>  <p>Abandoned 12-seater WC toilet</p>  <p>Refuse dumping and burning site</p>	<ul style="list-style-type: none"> <li>Existing 8 and 12- Seater WC toilet with urinals has been abandoned. Defects-damaged/broken inspection chambers, septic tank cover slabs removed and filled with solid waste.</li> <li>Existing 20-seater in use has a defective roofing, plumbing system, inspection chambers and septic tank.</li> <li>GWCL water supply available although water supply is not regular.</li> <li>Refuse sometimes collected by tri-cycle service providers and openly burnt other times.</li> </ul> <p><u>Enrolment Details</u></p> <p>Pupils Male: 1060 Pupils Female: 1145 Total: 2205</p>	<ul style="list-style-type: none"> <li>Provision of a refuse holding bay with required ancillary facilities and assist school to make arrangements for collection.</li> <li>Provision of mechanised borehole water supply (if feasible)</li> <li>Rehabilitation of 8,12 &amp; 20-seater toilet</li> <li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li> </ul>





13		Independence 1&2 Cluster	 Uncompleted school block showing sewage pipe connections	 Refuse burning site	<ul style="list-style-type: none"><li>Currently no available toilet facility for use by pupils. Pupils rely on public toilets.</li><li>Works on the installation of water supply and sanitation facilities in the new/uncompleted school block have stalled (after installation plumbing) due to lack of funds.</li><li>Refuse openly burnt.</li><li>GWCL water connection available.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>845</td><td>Staff Male:</td><td>16</td></tr><tr><td>Pupils Female:</td><td>551</td><td>Staff Female:</td><td>31</td></tr><tr><td>Total:</td><td>1396</td><td>Total:</td><td>47</td></tr></table>	Pupils Male:	845	Staff Male:	16	Pupils Female:	551	Staff Female:	31	Total:	1396	Total:	47	<ul style="list-style-type: none"><li>Provide additional 2No.10-seater.</li><li>Provision of a refuse holding bay with required ancillary facilities and assist school to make arrangements for collection.</li><li>Provision of mechanised borehole (if feasible) as an alternative water supply</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	845	Staff Male:	16															
Pupils Female:	551	Staff Female:	31															
Total:	1396	Total:	47															
14	Osu Klottey	Osu Presby Cluster	 Dilapidated and abandoned 2-seater WC	 Visible cracks in superstructure showing re-enforcements	<ul style="list-style-type: none"><li>Dilapidated 20-seater WC facility with visible cracks and breakdown of portions of the wall. Re-enforcements are exposed in some portions of the building. There is an existing septic tank</li><li>Refuse burnt within the school compound.</li><li>High water table</li><li>Seepage of groundwater into septic tank of existing 4-seater WC at boys section. Some cisterns of the existing 4-seater are defective</li><li>Mechanised borehole water supply</li><li>Poor drainage</li><li>Ponding as a result of high water table</li><li>Existing 2No. 6-seater biofil toilet</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>567</td><td>Staff Male:</td><td>10</td></tr><tr><td>Pupils Female:</td><td>248</td><td>Staff Female:</td><td>28</td></tr><tr><td>Total:</td><td>815</td><td>Total:</td><td>38</td></tr></table>	Pupils Male:	567	Staff Male:	10	Pupils Female:	248	Staff Female:	28	Total:	815	Total:	38	<ul style="list-style-type: none"><li>Demolishing of existing facility and provision of a new 20 seater WC facility with adequate ancillaries to meet GES standards.</li><li>Provision of a refuse holding bay with ancillary facilities and provide assistance in making arrangements for collection.</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	567	Staff Male:	10															
Pupils Female:	248	Staff Female:	28															
Total:	815	Total:	38															

15	Farisco Cluster of Schools	 <p>Existing 20-seater WC toilet facility</p>	 <p>Refuse burning site within school compound</p>	<ul style="list-style-type: none"><li>Existing 20-seater WC toilet in use but with some defects (with the plumbing systems, cisterns, ceilings, windows inspection chambers, etc.</li><li>No pipe water connection.</li><li>Urinal close to the Liberty School Block.</li><li>Refuse is burnt on the compound.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>310</td><td>Staff Male:</td><td>2</td></tr><tr><td>Pupils Female:</td><td>346</td><td>Staff Female:</td><td>26</td></tr><tr><td>Total:</td><td>656</td><td>Total:</td><td>28</td></tr></table>	Pupils Male:	310	Staff Male:	2	Pupils Female:	346	Staff Female:	26	Total:	656	Total:	28	<ul style="list-style-type: none"><li>Rehabilitation (retrofitting of fixtures, plumbing works, reconstruction of inspection chambers and septic tank, etc.) and remodelling of existing 20-seater facility to meet GES standards.</li><li>Connection to GWCL water supply or alternatively provision of mechanised borehole with water storage tanks.</li><li>Provision of refuse holding bay with ancillary facilities and provide assistance in making arrangements for collection.</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	310	Staff Male:	2														
Pupils Female:	346	Staff Female:	26														
Total:	656	Total:	28														
16	Osu St. Barnabas Anglican Schools	 <p>Internal vial of existing 10-seater WC showing some defects</p>	 <p>External urinal</p>  <p>External urinal</p>  <p>Water from mechanized borehole pumped into overhead tank</p>	<ul style="list-style-type: none"><li>Existing 10-seater WC with some defects in fixtures and plumbing works</li><li>External urinal.</li><li>Open burning of refuse in school backyard.</li><li>Mechanised borehole water supply- however not connected to the toilet facility.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>269</td><td>Staff Male:</td><td>7</td></tr><tr><td>Pupils Female:</td><td>275</td><td>Staff Female:</td><td>12</td></tr><tr><td>Total:</td><td>544</td><td>Total:</td><td>19</td></tr></table>	Pupils Male:	269	Staff Male:	7	Pupils Female:	275	Staff Female:	12	Total:	544	Total:	19	<ul style="list-style-type: none"><li>Rehabilitation (retrofitting of fixtures, electrical works, tiling, replacement of cisterns, rehab of septic tank and inspection chambers, plumbing works, etc.) and remodelling of existing 10-seater facility into 14-seater to meet GES standards.</li><li>Reticulation of water supply to the toilet facility.</li><li>Provision of a refuse holding bay with ancillary facilities and provide assistance in making arrangements for collection.</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	269	Staff Male:	7														
Pupils Female:	275	Staff Female:	12														
Total:	544	Total:	19														

17	Osu Klottey	Osu Salem 1 Primary Schools		 Septic for the WC facility	<ul style="list-style-type: none"><li>• 16-Seater WC toilet on a 2-storey school block (8 per floor). Privy rooms on one-side of the block have been converted into classrooms leaving 8 privy rooms (4 per floor) which are also not in use.</li><li>• Defective sewage network system</li><li>• No water supply-each student is required to bring 1 bottle of water to school each day for management of the toilet facilities. School provides drinking water.</li><li>• Noble Chinese assists the school with refuse management by collecting refuse for them.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>151</td><td>Staff Male:</td><td>3</td></tr><tr><td>Pupils Female:</td><td>205</td><td>Staff Female:</td><td>12</td></tr><tr><td>Total:</td><td>356</td><td>Total:</td><td>15</td></tr></table>	Pupils Male:	151	Staff Male:	3	Pupils Female:	205	Staff Female:	12	Total:	356	Total:	15	<ul style="list-style-type: none"><li>• Rehabilitation of inspection chambers and septic tank.</li><li>• Provision of refuse holding bay with ancillary facilities and provide assistance in making arrangements for collection.</li><li>• Provision of mechanised borehole (if feasible) and/or GWCL water supply connection.</li><li>• Rehabilitation and remodelling of existing 8-privy rooms</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:		151	Staff Male:	3														
Pupils Female:	205	Staff Female:	12															
Total:	356	Total:	15															
18	Osu Salem 5 Primary School		 Septic tank for the toilet already constructed	<ul style="list-style-type: none"><li>• There is space available for installing toilets and other ancillaries within the new/uncompleted 2-storey school block. School block in use without facilities.</li><li>• Evidence of flooding and erosion.</li><li>• Located in Osu Presby Cluster</li></ul> <p><u>Enrolment Details:</u></p> <p>Students: 349</p>	<ul style="list-style-type: none"><li>• New 10-seater WC facility</li><li>• Provision of stormwater and sullage conveyance drains.</li><li>• Provision of refuse holding bay and provide assistance in making arrangements for collection.</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>													





19	Ayawaso East	Unity Cluster	 External view of the 8-seater showing only the sewage pipe connection from the rehabilitated privy room in	 Open burning of refuse within school compound	<ul style="list-style-type: none"><li>• Dilapidated 8-Seater (in-built) WC toilets for 2-storey school block (4 per floor).</li><li>• Only 2 privy rooms rehabilitated for use by staff.</li><li>• No facilities currently available for use by pupils.</li><li>• School is without water supply-pupils fetch water outside school from private individuals.</li><li>• Open burning of refuse within compound.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>151</td><td>Staff Male:</td><td>3</td></tr><tr><td>Pupils Female:</td><td>205</td><td>Staff Female:</td><td>12</td></tr><tr><td>Total:</td><td>356</td><td>Total:</td><td>15</td></tr></table>	Pupils Male:	151	Staff Male:	3	Pupils Female:	205	Staff Female:	12	Total:	356	Total:	15	<ul style="list-style-type: none"><li>• New 10 &amp; 20 -seater WC facility and rehabilitation of existing 8-seater WC facility</li><li>• Provide water supply.</li><li>• Provide school with refuse collection bins, refuse holding bay and provide assistance in making arrangements for collection.</li><li>• Provision of mechanised borehole water supply (if feasible)</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>	
Pupils Male:		151	Staff Male:	3															
Pupils Female:	205	Staff Female:	12																
Total:	356	Total:	15																
20	Kanda Cluster	 Existing 20-seater WC toilet	 New 20-seater WC under construction	 Damaged sewage pipe connections at Ringroad East Block	 School premise often wet or ponded due to poor drainage	<ul style="list-style-type: none"><li>• Superstructure of existing 20-Seater WC toilet facility in a good condition however the internal fixtures require replacement and retrofitting as well as some plumbing works.</li><li>• Dilapidated and non-functional 16-seater WC toilet facility (on 2 floor storey building-8 facilities per floor)- for Kanda 1 Primary &amp; JHS block and Kanda 3&amp;5 Primary &amp; JHS block.</li><li>• New 20-seater WC under construction</li><li>• Ring road East 1 Primary &amp; JHS 2-storey classroom block (including toilet facilities) recently rehabilitated. Portions of external pipes connections are however damaged/broken.</li><li>• Septic tanks for Kanda 1 Primary &amp; JHS toilets and existing 20-seater WC defective – visible cracks.</li><li>• Poor site/compound drainage.</li><li>• Have both borehole and pipe water connection.</li><li>• Refuse collected by tri-cycle operators but sometimes burnt.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>627</td><td>Staff Male:</td><td>28</td></tr><tr><td>Pupils Female:</td><td>602</td><td>Staff Female:</td><td>69</td></tr><tr><td>Total:</td><td>1229</td><td>Total:</td><td>97</td></tr></table>	Pupils Male:	627	Staff Male:	28	Pupils Female:	602	Staff Female:	69	Total:	1229	Total:	97	<ul style="list-style-type: none"><li>• Provision of interceptor drains for sullage and stormwater collection.</li><li>• Rehabilitation and remodelling of existing 20-seater WC into 24-seater WC toilet</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	627	Staff Male:	28																
Pupils Female:	602	Staff Female:	69																
Total:	1229	Total:	97																





21	Okaikoi North	Anumle Cluster of Schools	 <p>Existing 20-seater WC toilet with overhead water storage tank</p>	 <p>Defective internal fixtures- broken pot of a WC</p>	<ul style="list-style-type: none"><li>Existing 1No. 20-seater WC, 2No. 10-Seater WC (<i>for teaching staff</i>), and 2No. uncompleted 6-seater WC facilities.</li><li>The 20 &amp; 10-seater facilities have overhead water tanks.</li><li>Visible cracks in some inspection chambers and around the base of the 10-seater facilities.</li><li>Only block works and roofing has been completed for the 2No. 6-seater facilities.</li><li>The septic tank for one of the uncompleted facilities had been constructed.</li><li>Weathering in the block work as well as exposure of re-enforcement in the one of the 6-seater uncompleted facility due to poor quality of material used.</li><li>Crude dumping and burning of refuse within</li><li>Have water connection but water is irregular.</li><li>Defective plumbing works resulting in leakages.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>705</td><td>Staff Male:</td><td>27</td></tr><tr><td>Pupils Female:</td><td>776</td><td>Staff Female:</td><td>52</td></tr><tr><td>Total:</td><td>1481</td><td>Total:</td><td>79</td></tr></table>	Pupils Male:	705	Staff Male:	27	Pupils Female:	776	Staff Female:	52	Total:	1481	Total:	79	<ul style="list-style-type: none"><li>Provide waste collection bins/skips and bay and assist school in making arrangements collection.</li><li>Repair of water plumbing works for water supply.</li><li>Fencing of school compound to prevent encroachment and use/vandalism of facilities of by neighbouring residents/intruders.</li><li>Provision of mechanised borehole water supply (if feasible)</li><li>Rehabilitation and remodeling of existing 20-seater and 2No. 10-seater WC toilets.</li><li>Provision of new 3-seater WC toilet for KG</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:		705	Staff Male:	27														
Pupils Female:	776	Staff Female:	52															
Total:	1481	Total:	79															
22	Shiayennor 1&2 Primary	 <p>10-seater WC toilet with defective inspection chambers and internal fixtures</p>	 <p>Uncompleted 4-seater WC – with plumbing works outstanding</p>	<ul style="list-style-type: none"><li>10-seater WC is in deplorable state</li><li>Cubicles are in use by teachers. The inspection chambers of the 10-seater WC are broken and filled with refuse.</li><li>Internal fixtures are broken</li><li>Uncompleted 4-Seater WC</li><li>New 20-seater WC yet to be handed over</li><li>Crude dumping and open-burning of waste within school premises.</li><li>GWCL water supply available but not regular</li></ul>	<ul style="list-style-type: none"><li>Rehabilitation and remodeling of existing 10-seater WC toilet</li><li>Provision of refuse holding bay with ancillary facilities and assist school in making arrangements for refuse collection.</li><li>Provision of mechanised borehole water supply (if feasible)</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>													




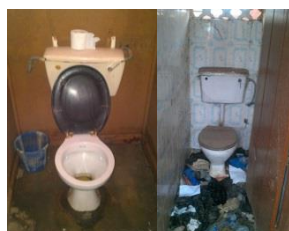




			  <p>Newly constructed 20-seater WC yet to be handed over</p> <p>Poor waste management-crude dumping of waste</p>	<p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>209</td><td>Staff Male:</td><td>0</td></tr><tr><td>Pupils Female:</td><td>237</td><td>Staff Female:</td><td>17</td></tr><tr><td>Total:</td><td>446</td><td>Total:</td><td>17</td></tr></table>	Pupils Male:	209	Staff Male:	0	Pupils Female:	237	Staff Female:	17	Total:	446	Total:	17	
Pupils Male:	209	Staff Male:	0														
Pupils Female:	237	Staff Female:	17														
Total:	446	Total:	17														
23	Shiayennor A&B JHS	   <p>Abandoned 10-seater WC toilet</p> <p>Uncompleted septic tank</p> <p>Abandoned KVIP, external urinal and refuse dumpsite</p>	<ul style="list-style-type: none"><li>• Currently no available facility for use-pupils visit public toilet.</li><li>• Uncompleted but abandoned 10-seater WC toilet facility</li><li>• Septic tank and sewage pipe connection also uncompleted.</li><li>• Abandoned KVIP and external urinal</li><li>• No water supply.</li><li>• Crude dumping and open burning of refuse.</li><li>• Portion of the school compound being encroached by squatters</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>137</td><td>Staff Male:</td><td>5</td></tr><tr><td>Pupils Female:</td><td>140</td><td>Staff Female:</td><td>8</td></tr><tr><td>Total:</td><td>277</td><td>Total:</td><td>13</td></tr></table>	Pupils Male:	137	Staff Male:	5	Pupils Female:	140	Staff Female:	8	Total:	277	Total:	13	<ul style="list-style-type: none"><li>• Completion of existing 10-seater WC facility- construction of septic tank, plumbing works and provision of ancillary facilities to meet GES standards.</li><li>• Construction of a urinal.</li><li>• Provide school with waste bins and refuse holding bay with ancillary facilities.</li><li>• Assist school in making arrangements for refuse collection.</li><li>• Connection to GWCL mains or provision of borehole water (if feasible) supply.</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>	
Pupils Male:	137	Staff Male:	5														
Pupils Female:	140	Staff Female:	8														
Total:	277	Total:	13														





24	Okaikoi South	Kaneshie 6 Primary/ Kanshie Kingsway 1 JHS A&B			<ul style="list-style-type: none"><li>• There is a 20-seater WC serving both Kaneshie 6 Primary/ Kingsway 1 JHS and Kaneshie 8 Primary/Kingsway 2 JHS A&amp;B (both schools are located within the same compound).</li><li>• The facility however has doors to privy rooms unfixed and with defects in the plumbing works.</li><li>• 16-seater WC toilet facility (on 2 floor storey building-8 facilities per floor) with some internal fixtures e.g. cisterns, WC seats, handwash basins, etc. removed</li><li>• Some privy rooms have been converted into offices or used as store rooms</li><li>• Existing 10-seater</li><li>• Septic tank and inspection chambers defective.</li><li>• No water supply to the compound.</li><li>• Crude dumping and open burning of refuse.</li></ul>	<ul style="list-style-type: none"><li>• Rehabilitation and remodeling of existing 12-seater WC toilet. Rehabilitation and conversion of existing 16-seater WC into 24-seater</li><li>• Provision of GWCL or mechanised borehole (if feasible) water supply.</li><li>• Provision of refuse collection containers/skips and assist school in making arrangements for collection.</li><li>• Provision of drainage (drains) for sullage conveyance.</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>										
				<p>Enrolment Details</p> <table><tr><td>Pupils Male:</td><td>101</td><td>Staff Male:</td><td>6</td></tr><tr><td>Pupils Female:</td><td>138</td><td>Staff Female:</td><td>8</td></tr><tr><td>Total:</td><td>239</td><td>Total:</td><td>14</td></tr></table>	Pupils Male:	101	Staff Male:	6	Pupils Female:	138	Staff Female:	8	Total:	239	Total:	14
Pupils Male:	101	Staff Male:	6													
Pupils Female:	138	Staff Female:	8													
Total:	239	Total:	14													
25		Kaneshie 8 Primary/ Kanshie Kingsway 2 JHS A&B			<ul style="list-style-type: none"><li>• Dilapidated 16-seater WC toilet facility (on 2 floor storey building-8 facilities per floor) – internal fixtures e.g. cisterns, WC seats, etc. have been removed, pipelines broken/damaged.</li><li>• 2 privy rooms for the top floor have been rehabilitated and in use by teachers.</li><li>• Some privy rooms have been converted into offices and store rooms</li><li>• Septic tank and inspection chambers defective.</li><li>• Crude dumping and open burning of refuse (same dumpsite as Kaneshie 6 Primary/ Kingsway 1 JHS A&amp;B).</li></ul>	<ul style="list-style-type: none"><li>• Rehabilitation and remodelling of existing 12-seater WC toilet. Rehabilitation and conversion of existing 16-seater WC into 24-seater</li><li>• Provision of GWCL or mechanised borehole (if feasible) water supply.</li><li>• Provision of refuse collection containers/skips and assist school in making arrangements for collection.</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>										

				<p><u>Enrolment Details</u></p> <p>Pupils Male: 262      Staff Male: 11</p> <p>Pupils Female: 343      Staff Female: 25</p> <p>Total: 605      Total: 36</p>	
26	Ayawaso West	La Bawaleshi e Presby Cluster	 <p>Existing 10-seater WC toilet facility</p>  <p>Uncompleted 20-seater WC toilet facility</p>	<ul style="list-style-type: none"> <li>Existing 10-seater WC facility with overhead tank. Weathering of the superstructure observed.</li> <li>Uncompleted 20-seater WC-works has been abandoned.</li> <li>GWCL water connection available.</li> </ul> <p><u>Enrolment Details</u></p> <p>Pupils: 364</p> <p>Staff Male: 8</p> <p>Staff Female: 8</p>	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 10-seater facility – replacement of fixtures, plumbing works and provision of ancillary facilities to meet GES standards.</li> <li>Provide mechanised borehole (if feasible) as an alternative water supply source.</li> <li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li> </ul>

27		Maamobi Prisons Cluster	 <p>Dilapidated 10-seater WC toilet facility</p>  <p>Inside view of 20-seater WC toilet in use</p>	 <p>20-seater WC toilet facility in use</p>  <p>Crude dumping of refuse</p>	<ul style="list-style-type: none"> <li>Existing 10-seater WC toilet facility but not in use due to its dilapidated state. Facility has no water supply connection</li> <li>20-seater WC toilet facility in use with overhead and ground water storage tanks</li> <li>Damaged roofing and internal fixtures.</li> <li>Currently no water supply to the school due to damaged GWCL pipeline mains as a result of construction works down-stream (construction of AMA's Millennium School block).</li> <li>Existing borehole but not connected to any of the facilities.</li> <li>Crude dumping of refuse</li> <li>Visible erosion</li> </ul> <p><u>Enrolment Details</u></p> <p>Pupils : 551</p> <p>Staff Male: 9</p> <p>Staff Female: 26</p>	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 10-seater facility – replacement of fixtures, plumbing works, replacement of roofing, tiling of floors, painting and provision of ancillary facilities to meet GES standards.</li> <li>Reconstruction of external sewage system.</li> <li>Mechanisation of borehole (reticulation into toilet facility) as an alternative water source.</li> <li>Construction of drains-interceptor drain at the school entrance.</li> <li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li> </ul>
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28		Dzorwulu JHS	<div><p>External view of 11-seater WC toilet showing deteriorated external wooden wall</p></div> <div><p>Example of privy rooms in use and abandoned</p></div> <div><p>Defective septic tank of 11-seater WC</p></div> <div><p>10-seater WC toilet never been used</p></div>	<ul style="list-style-type: none"><li>Existing 11-seater WC toilet with in-built urinals in a deplorable state- broken cisterns and squat bowls, warped wooden partitions, dilapidated ceiling and broken wooden windows. Broken down sewage connections widespread floor cracks.</li><li>Some privy rooms are however still in use</li><li>Visible cracks in septic tank</li><li>Existing 10-seater WC toilet has never been used due to lack of water supply and high water table around the septic tank area resulting in it often filled with water.</li><li>Available GWCL water supply but storage tank not adequate and defective.</li><li>Refuse collected by tri-cycle service providers.</li></ul> <p><u>Enrolment Details</u></p> <table><tr><td>Pupils Male:</td><td>200</td><td>Staff Male:</td><td>7</td></tr><tr><td>Pupils Female:</td><td>220</td><td>Staff Female:</td><td>18</td></tr><tr><td>Total:</td><td>420</td><td>Total:</td><td>25</td></tr></table>	Pupils Male:	200	Staff Male:	7	Pupils Female:	220	Staff Female:	18	Total:	420	Total:	25	<ul style="list-style-type: none"><li>Rehabilitation and remodelling of existing 11- seater WC facility to 10-seater and replacement of fixtures, plumbing works and provision of ancillary facilities to meet GES standards. External walls will be cladded.</li><li>Demolishing and reconstruction of all external inspection chambers connecting the existing septic tank.</li><li>The existing 10-seater will also be rehabilitated and water supply provided.</li><li>Cladding of external wall area up to window level and tiling of internal floor.</li><li>A new water tight septic tank will be constructed.</li><li>Provision of additional water storage tank and correction of defects with the existing tank.</li><li>Provision of mechanised borehole (if feasible) as an alternative water supply source.</li><li>Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
Pupils Male:	200	Staff Male:	7														
Pupils Female:	220	Staff Female:	18														
Total:	420	Total:	25														
29	Ablekuma North	Kwashiem-an Cluster	<div><p>External view of abandoned 20-seater WC toilet</p></div> <div><p>Internal view of the 20-seater showing damaged cisterns</p></div>	<ul style="list-style-type: none"><li>Dilapidated and abandoned 16-seater WC facility with defective plumbing works. Superstructure however in a good condition.</li><li>Existing 12-seater WC with damaged roofing/ceiling with overhead tank for water storage.</li><li>Existing 4-seater KVIP in an insanitary condition.</li><li>Tri-cycle refuse collection services engaged fortnightly to collect waste however not much bins are available.</li><li>GWCL water supply.</li></ul>	<ul style="list-style-type: none"><li>Rehabilitation and remodelling of existing 16-WC seater facility – replacement of fixtures, plumbing works, tiling and provision of ancillary facilities to meet GES standards.</li><li>Rehabilitation of existing 12-seater WC facility – replacement of fixtures, roofing, scraping and cladding of walls and provision of ancillary facilities to meet GES standards.</li><li>Demolish 4-seater KVIP.</li><li>Provide an additional water tank for water storage.</li><li>Fencing of school site to secure</li></ul>												

			 12-seater WC toilet with overhead tank	 4-seater KVIP	<u>Enrolment Details</u> Pupils Male: 1229      Staff Male: 25 Pupils Female: 1383      Staff Female: 92 Total: 2612      Total: 117	facilities from vandalism and encroachment. <ul style="list-style-type: none"><li>• Provision of refuse collection bins and a holding bay.</li><li>• Provision of mechanised borehole (if feasible) as an alternative water source.</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>
30	Darkuman 1 JHS	 3-seater WC toilet with an external urinal	 Refuse collection bins	<ul style="list-style-type: none"><li>• 3 seater WC toilet.</li><li>• GWCL water supply.</li><li>• Refuse collected by waste collection service providers.</li></ul> <u>Enrolment Details:</u> Pupils Male: 96 Pupils Female: 81 Total: 177	<ul style="list-style-type: none"><li>• Provision of new 10-seater WC</li><li>• Provision of mechanised borehole (if feasible) as an alternative water supply source.</li><li>• Provision of furnace fitted with smoke stack for managing menstrual hygiene waste</li></ul>	





WASTECARE

Assessment of Gender Disability Friendliness of School WASH Facilities										
			Gender Sensitivity							Disability Friendliness
Name	Facility	Operational Status	Separate Sections for Male & Female (Pupils)	Separate Sections for Male & Female (Teachers)	Urinals	Availability of Changing Rooms				Specially Designed Cubicles for Disabled/Physically Challenged
						Menstrual Hygiene Waste	Mirror	Hangers	Handwashing basins	
Abossey Okai 1& 2 Cluster	10-Seater WC	Not operational	X	X	X	X	X	X	X	X
	10-seater	uncompleted	NA	NA	NA	NA	NA	NA	NA	NA
Kaneshie West 1&2 Cluster	16-seater WC	Operational	√	X	X	X	X	X	X	X
Mataheko R/C Cluster	20-seater aqua privy	operational	√	X	X	X	X	X	X	X
Korle Gonno R/C Boys	12-seater WC	Not operational	√	X	X	X	X	X	X	X
Owusu Mills Primary/JHS	16-seater WC	Not operational	√	X	X	X	X	X	X	X
Socco/M1 Cluster of Schools	10-seater WC	not operational	√	X	X	X	X	X	X	X
	20-seater WC	operational	√	X	X	X				
Sempe '8' & '12' JHS	16-seater WC	Not operational	√	X	X	X	X	X	X	X
Dr F.V. Nanka Bruce JHS	4-seater KVIP	Not operational	√	X	X	X	X	X	X	X
Accra Newtown 6&8 Primary Classroom Block & Accra Newtown 4&11 Primary Classroom Block	16-seater WC	Not operational	√	X	X	X	X	X	X	X
	8-seater WC	Not operational	√	X	X	X	X	X	X	X
	7-seater WC	Not operational	√	X	X	X	X	X	X	X
Kwame Nkrumah JHS	4-seater biofil	Not operational	√	X	X	X	X	X	X	X
Ayalolo Cluster of Schools	8-seater WC	Not operational	√	X	X	X	X	X	X	X
	12-seater WC	Not operational	√	X	X	X	X	X	X	X
	20-seater WC	Operational but defective	√	X	X	X	X	X	X	X
Independence 1&2 Cluster	No facility	NA	√	X	X	X	X	X	X	X
Osu Presby Cluster	20-seater WC	Operational but defective	√	X	X	X	X	X	X	X
	4-seater WC	Not operational	√	X	X	X	X	X	X	X
	2 No. 6-seater biofil	operational	√	X	X	X	X	X	X	X
Farisco Cluster of Schools	20-seater WC	Operational but defective	√	X	X	X	X	X	X	X
Osu St. Barnabas Anglican Schools	10-seater WC	Operational but defective	√	X	X	X	X	X	X	X
Osu Salem 1 Primary Schools	16-seater WC	Operational but defective	√	X	X	X	X	X	X	X



Assessment of Gender Disability Friendliness of School WASH Facilities										
Name	Facility	Operational Status	Gender Sensitivity							Disability Friendliness
			Separate Sections for Male & Female (Pupils)	Separate Sections for Male & Female (Teachers)	Urinals	Availability of Changing Rooms				Specially Designed Cubicles for Disabled/Physically Challenged
						Menstrual Hygiene Waste	Mirror	Hangers	Handwashing basins	
Osu Salem 5 Primary School	No facility	NA	NA	NA	NA	NA	NA	NA	NA	NA
Unity Cluster	8-seater WC	Operational but defective	√	X	X	X	X	X	X	X
Kanda Cluster	20-seater WC	Not operational	√	X	X	X	X	X	X	X
	16-seater WC	Not operational		X	X	X	X	X	X	X
	20-seater WC	uncompleted	NA	NA	NA	NA	NA	NA	NA	NA
Anumle Cluster of Schools	20-seater WC	Not operational	√	X	X	X	X	X	X	X
	2 No 6-seater WC	uncompleted	NA	NA	NA	NA	NA	NA	NA	NA
	2 No 10-seater WC	Not operational	√	X	X	X	X	X	X	X
Shiayennor 1&2 Primary	10-seater WC	Not operational	√	X	X	X	X	X	X	X
	4-seater WC	uncompleted	NA	NA	NA	NA	NA	NA	NA	NA
	20-seater WC	operational	√	X	X	X				X
Shiayennor A&B JHS	10-seater WC	Not operational	√	X	X	X	X	X	X	X
	KVIP	Not operational	√	X	X	X	X	X	X	X
Kaneshie 6 Primary/ Kaneshie Kingsway 1 JHS A&B and Kaneshie 8 primary/Kaneshie Kingsway 2 JHS A&B	20-seater WC	Operational but defective	√	X	X	X	X	X	X	X
	16-seater WC	Not operational	√	X	X	X	X	X	X	X
	10-seater WC	Not operational	√	X	X	X	X	X	X	X
La Bawaleshie Presby Cluster	10-seater WC	Operational	√	X	X	X	X	X	X	X
	20-seater WC	uncompleted	NA	NA	NA	NA	NA	NA	NA	NA
Maamobi Prisons Cluster	10-seater WC	Not operational	√	X	X	X	X	X	X	X
	20-seater WC	Operational	√	X	X	X	X	X	X	X
Dzorwulu JHS	11-seater WC	Not operational	√	X	X	X	X	X	X	X
	10-seater WC	Not operational	√	X	X	X	X	X	X	X
Kwashieman Cluster	20-seater WC	Not operational	√	X	X	X	X	X	X	X
	12-seater WC	Not operational	√	X	X	X	X	X	X	X
	4-seater KVIP	Not operational	√	X	X	X	X	X	X	X
Darkuman 1 JHS	3-seater WC	Operational	√	X	X	X	X	X	X	X

## 5 DESIGN STANDARDS

### 5.1 General

Good engineering designs of WC toilets and ancillary facilities must incorporate sound design principles. The following general and specific standards of WC toilet designs have been adopted for use and incorporated in the production of architectural/structural designs and working drawings.

- a) **Designs are cost effective.** This means that the schools should be able to bear the maintenance cost of the facility to ensure sustainability.
- b) **Designs are technically sound and therefore meet the technical criteria below:**
  - ❖ Privy rooms are adequately sized, well ventilated and have squatting/sitting arrangements selected according to the school's preference.
  - ❖ Locally available building materials will be used during construction of the facilities.
  - ❖ Designs are simple and easy to construct and therefore local persons/artisans in the project area with no special skills would be engaged in the construction as a means of job creation.
  - ❖ Designs are simple therefore will be easy to use and maintain.
  - ❖ Designs have adequately sized and functionally well designed septic tanks to efficiently handle wastewater hence prevent environmental pollution and associated health problems.
- c) **Designs are “child-friendly”, gender sensitive and safe for use.** Toilet seats have been carefully selected to offer the desired convenience to both male and female pupils. Additional devices/fixtures are fitted to ensure that smaller children are comfortable and feel safe in the use of facilities. Ramps and sizes of cubicles are designed to provide access to disabled pupils
- d) **Installations that ensure good hygiene have been considered.** The facilities prevent contact with faeces, by humans and flies.
- e) **Designs are environmentally friendly.** The operation and use of the recommended sanitation facilities will not create any adverse effect on the natural environment (i.e. air, surface water and ground water pollution).

### 5.2 Lighting

Thoughtful selection of fixtures and lamps coupled with careful replacements is very crucial in lighting design. The following are the lighting design standards adopted:

- ❖ Energy saving bulbs will be used
- ❖ The minimum general lighting level is 300 lux
- ❖ Warm-colour lighting will be used in the general lighting scheme because it creates better ambience in the toilets, which in turn encourages more care and responsibility from the users
- ❖ Adequate number of windows with a good spread around the building will be incorporated to:
  - a) Provide maximum daylight effect and
  - b) help create a softer and friendlier environment

### 5.3 Materials for Internal Finishes

Materials that will be used for internal walls, floors and ceiling finishes will be durable and resistant to vandalism and neglect. The following are the good examples of finishes that have been adopted:

- ❖ Floors of the toilet rooms will be tiled with non-slip ceramic tiles. Non-slip floor tiles have been selected because they are durable and relatively easy to clean and maintain as well as friendly
- ❖ Internal walls of toilets will be ceramic wall tiled
- ❖ The minimum size of tile will be (100mm x 200mm)

Ceiling works should be made with the following materials depending on their availability on the market, cost and ease of maintenance:

- ❖ mineral fibre board,
- ❖ fibrous plaster board,
- ❖ ½ “ plywood boards
- ❖ aluminium panels or strips

The Consultant has opted for the use of ½ inch plywood boards based on availability and cost of materials on the local market. Ceilings will be painted white to brighten the toilet rooms, create the interest and produce conducive environment during use.

### 5.4 Water Closets (WCs)

- ❖ All WC cisterns will be wall hung and robustly fitted against the cubicle wall
- ❖ All plumbing fixtures connecting the WC suites will be concealed for easy maintenance and to deter vandalism

### 5.5 Hand Washing Basins

- ❖ Minimum size of handwash basins should be 500mm length x 400mm width
- ❖ Minimum spacing between any two (2) wash hand basins should be 800mm
- ❖ Minimum space between center of the basin and any end wall should be 500mm
- ❖ Minimum room dimension for hand-washing area with one wash hand basin should be 1800mm length X 1000mm width
- ❖ Water pressure and tap/wash basin will be positioned such that water splash is avoided.

### 5.6 Services Installation

- ❖ All pipe works will be concealed, except for final connections to fixtures.
- ❖ All electrical cables will be fully concealed
- ❖ Coved tiles or PVC strips should be provided along edges as far as possible
- ❖ Panels to pipe ducts will be located as far as possible in inconspicuous areas

## 6 DESIGN ANALYSIS AND FINDINGS

### 6.1 Assessment of the Quality of Architectural Designs of Toilet Facilities

The Consultant's assessment of the quality of sanitation facilities architectural design followed three basic principles, level of function, user comfort and aesthetics. The following empirical methods were adopted for the assessment.

#### 6.1.1 *Assessment of Functional Quality*

Architectural design of toilet met the following international design criteria:

- Provision of adequate spaces between adjacent facilities for free movements. Space between any two adjacent or opposite facilities must not be less than **3.0m**,
- Provision of honey combed and design block on external walls of toilets to serve as windows for adequate ventilation and daylight effect in toilets. Unit window area should not be less than (**1.5m x 0.6m or 0.9m<sup>2</sup>**),
- Provision of adequate number and sizes of entrances and privy rooms doors to ease mass evacuation, minimum door size is (**0.7m x 2.0m**),
- Provision of segregated entrances for males and females to allow full privacy and non-mixing of opposite sex,
- Provision of external ramp facility to ease access into toilets by the physically challenged, **ramp widths of not less than 1.5m**,
- Provision of toilet privy rooms/cubicles with adequate floor areas of (**minimum 0.9m x 1.7m for all types of people excluding disables**) and (**minimum 1.5m x 1.7m for disables**),
- Provision of toilet room corridors with adequate widths (i.e. not less than the **1.5m**),
- Inclusion of store rooms with adequate floor storage space
- Inclusion of provision for special privy rooms to cater for the physically changed,
- Number of privy rooms required was calculated as 50 pupils to a cubicle.
- Slope of exterior paths and ramps to toilets must not exceed 1:20
- Two (2) exits must be provided in toilets
- Fix grab-rails in front and inside disable cubicles
- Grab rails shall be a minimum 450mm long, constructed from 32mm outside diameter stainless steel, with concealed fixings or white powder coated rippled finished aluminium with powder coated screws. (Typically lengths are 450mm, 600mm and 900mm)

- Fix grab-rails to walls with No. 12 (5.5mm diameter) galvanised steel screws with two screws per fixing point. The screws should penetrate 30mm into the base timber/wall plug.
- Use a timber wall plate when the studs are not in the locations where the grab rail fixing is required. Fix the wall plate to the studs with No. 12 (5.5mm diameter) screws with minimum two screws per crossing. The screws should penetrate 30mm into the studs.

### 6.1.2 *Criteria for Provision of Sanitary Wares*

The following for installation of sanitary wares in school toilet cubicles has been provided in accordance with the internationally accepted standard which meet desirables for disables:

- WC pans should be located 800mm from the front of the pan to the rear wall
- Raised toilet pans, with a rim 460mm above the finished or tiled floor level for disable cubicles. Otherwise an ordinary toilet pan with a rim 400mm above floor level is acceptable.
- The centre of the pan should preferably be located 450mm from the sidewall.
- Toilet roll holders shall be located a maximum of 700mm above the finished or tiled floor level and within 330mm from the front of the pan.
- WC cisterns shall be located at a maximum of 1000mm to the top from the finished or tiled floor level.
- All WCs cisterns must be hung and robustly fitted against the cubicle rear wall, volumetric capacity **must not exceed 9 litres**
- All plumbing fixtures connecting the WC suites must be concealed for easy maintenance and to deter vandalism
- Minimum size of handwash basins should be **500mm length x 400mm width or 0.2m<sup>2</sup>**
- Minimum spacing between any two (2) handwash basins should be **800mm**
- Minimum space between center of the basin and any end wall should be **500mm**
- Water pressure and tap/wash basin will be positioned such that water will not splash

### 6.1.3 *Criteria for Provision of Good Finishes*

Materials used for walls, floors and ceiling finishes must be durable and resistant to vandalism and neglect. The following good examples of internal and external finishes have been adopted:

- Floors of the toilet rooms must be tiled with non-slip ceramic tiles.
- Selected non-slip tiles for floors must be durable and relatively easy to clean and maintain and also child friendly
- Minimum size of floor tiles must be 400mm x 400mm
- Internal walls of toilets must be ceramic wall tiled



- Minimum size of wall tiles must be 150mm x 150mm

Materials for ceiling works must be selected from the following and choice must be based on availability on the local market, moderate cost and ease of maintenance:

- Mineral fibre board or fibrous plaster board,
- ½ “ plywood boards
- Aluminium panels or strips

Consultant has opted for the use of ½ inch plywood boards due to availability and cost on the local market. All ceilings will be painted white to brighten the toilet rooms, create the interest and pleasant environment.

#### **6.1.4 *Criteria for Provision of Internal and External Lighting***

The following lighting design standards have been adopted:

- Energy saving bulbs will be used
- The minimum general lighting level is 300 lumens
- Warm-colour lighting will be used in the general lighting scheme because it creates better ambience in the toilets, which in turn encourages more care and responsibility from the users
- Adequate number of windows with a good spread around the building will be incorporated to provide maximum daylight effect and help create a softer and friendlier environment.

#### **6.1.5 *Assessment of Comfort of Use***

The following are the methods were used to measure/check presence or absence of installations that ensure comfort of use.

- ❖ Effect of maximum daylight or brightness/adequacy of windows was determined by the total area windows and how well the windows/openings have been spread on the superstructure to allow adequate daylight to enter the toilet no matter the position of the sun
- ❖ Proper ventilation of a toilet is one of the highest priorities. Ineffective ventilation can make a toilet unbearable in terms of heat and stench levels, even if it is well designed. Adequate window provisions and how well the toilet building has been located to receive maximum effect of the prevailing wind improve ventilation and ensure that vitiated air is quickly extracted. Ventilation also helps to avoid dampness and subsequent growth of mould on floors and walls.

#### **6.1.6 *Thresholds for Satisfactory Level of Function and User Comfort***

The following conditions have been set as thresholds and were used to draw conclusions on quality of toilet facilities architectural design

- ❖ Between (50% and 75%) satisfactory mark of functional quality and comfort of use will signify good/satisfactory toilet building architecture.
- ❖ Less than 50% mark of functional quality and comfort will signify unsatisfactory quality
- ❖ Greater than 75% mark of functional quality and comfort of use will signify very good quality

Finally if an assessment reveals good or very good status then architectural modifications will not be required. Any assessment that shows less than 50% quality will be recommended for appropriate architectural design modifications by the Consultant. The same assessment criteria were considered in designing the new facilities.

## 6.2 Architectural Analysis (New Toilets)

### 6.2.1 *Functional Sections and Floor Areas*

The Consultant has adopted the full range of architectural design standards in Chapter 5 to develop architectural designs for toilet facilities. The following are the functional provisions and floor areas that formed the architectural designs of the toilet facilities recommended:

- ❖ Dual entrance with separate verandahs for males and females.
- ❖ Separate hand-washing areas in male and female sections.
- ❖ Separate store rooms in male and female sections.
- ❖ The same number of privy rooms for male and female sections.
- ❖ Separate corridors in male and female sections.
- ❖ Changing rooms for female pupils.
- ❖ Separate urinals for male and female pupils.
- ❖ Separate privy rooms for pupils with disability.
- ❖ Separate privy rooms for teachers.

The number of seaters for each school was calculated based on the design population of the school. Based on the design population, the following types of WC blocks were used;

- 24-seater WC
- 20-seater WC
- 16-seater WC (8 per floor)
- 14-seater WC
- 12-seater WC
- 10-seater WC
- 8-seater WC
- 4-seater WC
- 3-seater WC

Table 6.1 shows the facility type and number to be provided each school.

Table 6.1: Toilet facility type and number per school

	TYPE OF TOILET FACILITY									TOTAL No.
	24-SEATER WC	20-SEATER WC	16-SEATER WC	14-SEATER WC	12-SEATER WC	10-SEATER WC	8-SEATER WC	4-SEATER WC	3-SEATER WC	
<b>NAME OF SCHOOL</b>										
Abossey Okai 1& 2 Cluster			1			1				2
Kaneshie West 1&2 Cluster		1				1			1	3
Mataheko R/C Cluster	1									1
Korle Gonno R/C Boys				1						1
Owusu Mills Primary/JHS					1					1
Socco/M1 Cluster of Schools						1				1
Sempe '8' & '12' JHS					1					1
Dr F.V. Nanka Bruce JHS						1				1
Accra Newtown 6&8 Primary Classroom Block						1	1			2
Accra Newtown 4&11 Primary Classroom Block										
Kwame Nkrumah JHS								1		1
Ayalolo Cluster of Schools		1			1		1			3
Independence 1&2 Cluster						2				2
Osu Presby Cluster		1								1
Farisco Cluster of Schools		1								1
Osu St. Barnabas Anglican Schools				1						1
Osu Salem 1 Primary Schools							1			1
Osu Salem 5 Primary School						1				1
Unity Cluster		1				1				2
Kanda Cluster	1									1
Anumle Cluster of Schools		1				2			1	4
Shiayennor 1&2 Primary						1				1
Shiayennor A&B JHS						1				1
Kaneshie 6 Primary/ Kaneshie Kingsway 1 JHS A&B		1			1	1				3
Kaneshie 8 Primary/ Kaneshie Kingsway 2 JHS A&B										
La Bawaleshie Presby Cluster						1				1
Maamobi Prisons Cluster						1				1
Dzorwulu JHS						2				2
Kwashieman Cluster	2				1					3
Darkuman 1 JHS						1				1
<b>Total</b>	<b>4</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>19</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>44</b>
<b>% of Total No. of Facilities</b>	<b>9%</b>	<b>16%</b>	<b>2%</b>	<b>5%</b>	<b>11%</b>	<b>43%</b>	<b>7%</b>	<b>2%</b>	<b>5%</b>	<b>100%</b>

### 6.2.2 Assessment of Functional Sufficiency

The following minimum toilet design standards proposed by were applied in the assessment of sufficiency of functional sections in the new toilets:

- ❖ Minimum privy room space measured by minimum length x minimum width of privy room should not be less than **1.50m length x 0.85m width or 1.28m<sup>2</sup>**.
- ❖ Toilets must have store room as a requirement for storage of cleaning materials (i.e. brooms, mops, buckets, gloves, nose masks, disinfectants etc.)
- ❖ Toilets must have hand-washing area separate for male and female sections as a requirement to maintain hygienic use. Minimum area is **(1.8m x 1.0m) or 1.80m<sup>2</sup>**.
- ❖ Toilet building must have separate toilet compartments for males and females with separate corridors of minimum width of **1.2m** for segregated flow.
- ❖ Toilets must have segregated entrances to maintain needed privy

Each of the proposed designs meets specified minimum functional areas. Table 6.2 to Table 6.9 show the functional areas categorized under the recommended facility types used during design process. The functional areas exclude areas taken up by internal partition walls and floor areas for steps and external ramps provisions (where applicable).

Table 6.2: Functional Floor Areas of Typical Facilities (24-Seater WC toilet)

Description		Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students rooms	privy	18	1.40	1.20	25.11	Adequate
Teachers rooms	privy	4	2.75	2.25	10.98	Adequate
Disables rooms	privy	2	2.18	2.55	4.35	Adequate
Internal corridors		2	17.19	N/A	34.39	Adequate
Entrance lobby		2	2.88	N/A	5.77	Adequate
Urinal-Male		1	2.68	N/A	2.68	Adequate
Urinal-Female		1	2.68	N/A	2.68	Adequate
Female	changing room	1	2.78	N/A	2.78	Adequate
Janitor/Store		2	2.85	2.25	5.70	Adequate
<b>TOTAL</b>					<b>94.44</b>	

Table 6.3: Functional Floor Areas of Typical Facilities (Rehabilitated 20-Seater WC toilet)

Description	Design Provision (No.)	Unit Provision (m2)	Minimum Criteria (m2)	Floor Area (m2)	Remarks
Students privy rooms	16	1.49	1.20	23.76	Adequate
Teachers privy rooms	2	1.49	2.25	2.97	Adequate
Disables privy rooms	2	2.33	2.55	4.65	Adequate
Internal corridors	2	25.00	N/A	50.00	Adequate
Entrance lobby	1	17.44	N/A	17.44	Adequate
Urinal-Male	1	3.61	N/A	3.61	Adequate
Urinal-Female	1	3.61	N/A	3.24	Adequate
Female changing room	1	3.13	N/A	3.13	Adequate
Janitor/Store	2	3.24	2.25	6.47	Adequate
<b>TOTAL</b>				<b>97.83</b>	

Table 6.4: Functional Floor Areas of Typical Facilities (New 20-Seater WC toilet)

Description	Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	16	1.68	1.20	26.88	Adequate
Teachers privy rooms	2	4.58	2.25	9.15	Adequate
Disables privy rooms	2	2.10	2.55	4.20	Adequate
Internal corridors	2	20.48	N/A	40.95	Adequate
Entrance lobby	1	17.44	N/A	17.44	Adequate
Urinal-Male	1	7.06	N/A	7.06	Adequate
Urinal-Female	1	4.59	N/A	4.59	Adequate
Female changing room	1	4.79	N/A	4.79	Adequate
Janitor/Store	2	1.68	2.25	3.36	Adequate
<b>TOTAL</b>				<b>115.51</b>	

Table 6.5: Functional Floor Areas of Typical Facilities (Rehabilitated 16-Seater WC -8 per floor  
Abossey Okai 1&2)

Description	Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	8	1.35	1.20	10.8	Adequate
Teachers privy rooms	4	2.61	2.25	10.44	Adequate
Disables privy rooms	4	2.55	2.55	10.20	Adequate
Female's Internal corridors	2	5.39	N/A	10.78	Adequate
Male's Internal corridors	2	3.92	N/A	7.84	Adequate
Entrance lobby	0	0.00	N/A	0.00	
Urinal-Male	2	2.61	N/A	5.22	Adequate
Urinal-Female	2	2.38	N/A	4.75	Adequate
Female changing room	2	2.56	N/A	5.12	Adequate
Janitor/Store	0	1.40	2.25	0.00	Adequate
<b>TOTAL</b>				<b>65.15</b>	

Table 6.6: Functional Floor Areas of Typical Facilities (Rehabilitated 14-Seater WC toilet at St.  
Barnabas)

Description	Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	10	1.35	1.20	13.5	Adequate
Teachers privy rooms	2	4.02	2.25	8.04	Adequate
Disables privy rooms	2	2.40	2.55	4.80	Adequate
Internal corridors for pupils	2	12.82	N/A	25.64	Adequate
Entrance lobby	0	0.00	N/A	0.00	
Urinal-Male	1	2.49	N/A	2.49	Adequate
Urinal-Female	1	2.49	N/A	2.49	Adequate
Female changing room	1	4.37	N/A	4.37	Adequate
Janitor/Store	1	8.57	2.25	8.57	Adequate
<b>TOTAL</b>				<b>69.90</b>	



Table 6.7: Functional Floor Areas of Typical Facilities (New 14-Seater WC toilet)

Description	Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	10	1.68	1.20	16.8	Adequate
Teachers privy rooms	2	4.43	2.25	8.85	Adequate
Disables privy rooms	2	2.10	2.55	4.20	Adequate
Internal corridors	2	20.48	2.00	40.95	Adequate
Entrance lobby	1	16.93	N/A	16.93-	Adequate
Urinal-Male	2	4.62	N/A	9.23	Adequate
Urinal-Female	0	0.00	N/A	0.00	
Changing room	1	4.59	N/A	4.59	Adequate
Janitor/Store	2	1.68	2.25	3.36	Adequate
<b>TOTAL</b>				<b>104.91</b>	

Table 6.8: Functional Floor Areas of Typical Facilities (Rehabilitated 12-Seater WC toilet-single block type)

Description	Unit Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	8	1.68	1.20	13.44	Adequate
Teachers privy rooms	2	4.58	2.25	9.15	Adequate
Disables privy rooms	2	2.10	2.55	4.20	Adequate
Internal corridors	2	12.38	N/A	24.75	Adequate
Entrance lobby	1	13.13	N/A	13.13	Adequate
Urinal-Male	1	4.59	N/A	4.59	Adequate
Urinal-Female	1	4.59	N/A	4.59	Adequate
Female changing room	1	4.62	N/A	4.62	Adequate
Janitor/Store	2	1.68	2.25	3.36	Adequate
<b>TOTAL</b>				<b>81.83</b>	

Table 6.9: Functional Floor Areas of Typical Facilities (Rehabilitated 12 Seater WC toilet-6 per floor)

Description	Unit Provision (No.)	Design Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	8	1.44	1.20	11.52	Adequate
Teachers privy rooms	4	1.44	2.25	5.76	Adequate
Disables privy rooms	0	0.00	2.55	0.00	
Internal corridors	2	12.15	N/A	24.30	Adequate
Entrance lobby	0	0.00	N/A	0.00	
Urinal-Male	1	1.44	N/A	1.44	Adequate
Urinal-Female	1	2.41	N/A	2.41	Adequate
Female changing room	1	2.41	N/A	2.41	Adequate
Janitor/Store	0	0.00	2.25	0.00	
<b>TOTAL</b>				<b>47.84</b>	

Table 6.10: Functional Floor Areas of Typical Facilities (Rehabilitated 10-Seater WC toilet)

Description	Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	6	1.26	1.20	7.56	Adequate
Teachers privy rooms	2	2.78	2.25	5.55	Adequate
Disables privy rooms	2	2.57	2.55	5.13	Adequate
Internal corridors	2	6.96	2.00	13.92	Adequate
Entrance lobby	0	-	N/A	-	
Urinal-Male	1	2.63	N/A	2.63	Adequate
Urinal-Female	1	2.64	N/A	2.64	Adequate
Female changing room	1	3.00	N/A	3.00	Adequate
Janitor/Store	2	1.377	2.25	2.754	Adequate
<b>TOTAL</b>				<b>43.17</b>	

Table 6.11: Functional Floor Areas of Typical Facilities (Rehabilitated 8-Seater WC toilet)

Description	Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Students privy rooms	4	1.40	1.20	5.6	Adequate
Teachers privy rooms	2	4.58	2.25	9.15	Adequate
Disables privy rooms	2	2.10	2.55	4.20	Adequate
Internal corridors	2	5.40	N/A	10.80	Adequate
Entrance lobby	0	0.00	N/A	0.00	
Urinal-Male	1	3.66	N/A	3.66	Adequate
Urinal-Female	1	3.66	N/A	3.66	Adequate
Female changing room	1	4.58	N/A	4.58	Adequate
Janitor/Store	2	1.40	2.25	2.80	Adequate
<b>TOTAL</b>				<b>44.45</b>	

Table 6.12: Functional Floor Areas of Typical Facilities (New 3-Seater WC toilet with a shower for kindergartens (KG))

Description	Design Provision (No.)	Unit Provision (m <sup>2</sup> )	Minimum Criteria (m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Remarks
Shower rooms	1	2.10	NA	2.1	Adequate
1st Toilet	1	1.35	1.2	1.35	Adequate
2nd Toilet	1	1.44	1.2	1.44	Adequate
3rd Toilet	1	1.35	1.2	1.35	Adequate
Handwashing	1	5.53	N/A	5.53	Adequate
<b>TOTAL</b>				<b>11.77</b>	

### 6.3 Architectural Design of School Toilet

Design comprised the following:

- Calculation of total number of cubicles and type of toilet in the beneficiary schools
- Preparation of functional design of the school toilet and estimation of total floor area. Details of functional design will entail design of functional spaces for privy rooms, disable cubicle, toilet corridors, hand-washing, store/janitor etc. using the design guidelines proposed above.

#### 6.3.1 Calculation of Design Population

Table 6.13 below presents a summary of how the design populations/enrolment for the various schools was calculated. The design growth rate of 2%<sup>1</sup> was used over a ten (10) year design life.

Population growth formula is  $P_N = P_O (1+r)^N$ :

Where:  $P_N$  is the projected/design population  
 $P_O$  is the current population  
 $N$  is design life  
 $r$  is the growth rate

Table 6.13: shows the calculation of design population for beneficiary schools.

No.	School	Current Population (Po)	Design Population (P <sub>N</sub> )
1	Abossey Okai 1& 2 Cluster	1095	1335
2	Kaneshie West 1&2 Cluster	1081	1318
3	Mataheko R/C Cluster	1253	1527
4	Korle Gonno R/C Boys	426	519
5	Owusu Mills Primary/JHS	174	212
6	Socco/M1 Cluster of Schools	298	363
7	Sempe '8' & '12' JHS	244	297
8	Dr F.V. Nanka Bruce JHS	419	511
9	Accra Newtown 6&8 Primary Classroom Block	192	234
10	Accra Newtown 4&11 Primary Classroom Block	234	285
11	Kwame Nkrumah JHS	150	183
12	Ayalolo Cluster of Schools	2205	2688
13	Independence 1&2 Cluster	1443	1759
14	Osu Presby Cluster	853	1040
15	Farisco Cluster of Schools	684	834
16	Osu St. Barnabas Anglican Schools	563	686
17	Osu Salem 1 Primary Schools	371	452
18	Osu Salem 5 Primary School	349	425
19	Unity Cluster	1307	1593
20	Kanda Cluster	1326	1616
21	Anumle Cluster of Schools	1560	1902

<sup>1</sup>Historical data school enrolment were not readily accessible hence the growth rate used under the UN-Habitat/WaterAid WAC II assignment in Ablekuma Central Sub-metro was adopted

No.	School	Current Population (Po)	Design Population (P <sub>N</sub> )
22	Shiayennor 1&2 Primary	463	564
23	Shiayennor A&B JHS	290	354
24	Kaneshie 6 Primary/Kaneshie Kingsway 1 JHS A&B	253	308
25	Kaneshie 8 Primary/Kaneshie Kingsway 2 JHS A&B	641	781
26	La Bawaleshie Presby Cluster	380	463
27	Mamobi Prisons Cluster	586	714
28	Dzorwulu JHS	445	542
29	Kwashieman Cluster	2729	3327
30	Darkuman 1 JHS	189	230

### 6.3.2 *Calculation of Total Number of Cubicles*

The capacity (number of privy rooms) of toilet facilities to be provided were calculated taking into consideration existing facilities as well as new facilities which are near-completion. Total number of privy rooms and selection of type of toilet were done based on 1 WC suites complete with all other ancillaries for **every 50 pupils**. Table 6.14 below presents a summary of the demand and proposed interventions in terms of number of privy rooms.



Table 6.14: Assessment of facility requirements

No.	School	Design Population	Privy room (facility capacity ) Requirement	Existing Facilities	Recommended Facility Capacity/Intervention	Total Capacity of Existing and Proposed Facility Interventions	Remarks
1	Abossey Okai 1& 2 Cluster	1335	28.0	Dilapidated 10-seater WC with defective septic tank system. Uncompleted 8-seater WC toilet (4 per floor)	Rehabilitation and remodeling of dilapidated 10-Seater WC. Completion and remodeling of existing 8-seater WC into 16-seater WC (8 per floor)	26	Limited space for provision of new facilities
2	Kaneshie West 1&2 Cluster	1318	28.0	16-seater WC toilet with broken down fixtures.	Rehabilitation and remodeling of dilapidated 16-Seater WC into 20 seater. Provision of additional 10-seater WC. 3-Seater and a shower for KG.	33	Provision adequate
3	Mataheko R/C Cluster	1527	30.5	Uncompleted New 20-Seater WC toilet. Dilapidated 16-seater aqua privy toilet	Rehabilitation and remodeling of 16-seater Aqua privy into 24-seater WC	44	New 20-seater WC at 85% completion. Provision adequate
4	Korle Gonno R/C Boys	519	10.4	Uncompleted 12-Seater WC toilet	Demolishing existing 12-seater toilet and construction of new 14-seater WC toilet	14	Provision adequate
5	Owusu Mills Primary/JHS	212	4.2	Dilapidated 16-seater WC toilet on a 2-storey school block (8-seats per floor).	Rehabilitation of existing 16 seater into 12-seater WC toilet (6 per floor)	12	Provision adequate
6	Socco/M1 Cluster of Schools	363	7.3	Dilapidated 10-seater WC toilet. Existing 20-seater WC facility built as part of the AMA Millennium School project	Demolishing and replacement of existing 10-seater WC facility	10	Provision adequate
7	Sempe '8' & '12' JHS	297	5.9	Dilapidated 16-seater WC toilet on a 2-storey school block (8-seats per floor).	Rehabilitation of existing 16 seater into 12-seater WC toilet (6 per floor)	12	Provision adequate
8	Dr F.V. Nanka Bruce JHS	511	10.2	New 4-seater KVIP and urinal currently under construction for Library	New 10-seater WC toilet	10	Provision adequate

No.	School	Design Population	Privy room (facility capacity ) Requirement	Existing Facilities	Recommended Facility Capacity/Intervention	Total Capacity of Existing and Proposed Facility Interventions	Remarks
9	Accra Newtown 6&8 Primary Classroom Block	234	4.7	16-Seater (in-built) WC toilets for 2-storey school block (8 per floor). Similar situation was observed in both schools (i.e. Accra Newtown '6&8' and Accra Newtown '4&11'-both located in the same compound). Existing 8 and 7-seater WC toilets.	Rehabilitate existing 8-seater WC. Demolish and replace 7-seater WC with 10-seater WC toilet	18	Provision adequate
10	Accra Newtown 4&11 Primary Classroom Block	285	5.7				
11	Kwame Nkrumah JHS	183	3.7	Existing 4-seater biofil toilet	Rehabilitate biofil toilet	4	Provision adequate
12	Ayalolo Cluster of Schools	2688	54.0	Dilapidated 8 and 12- Seater WC toilet. 20-seater in use but with defective roofing, plumbing system, inspection chambers and septic tank.	Rehabilitate existing 8,12 & 20-seater WC toilet	40	Millenium school construction project on going
13	Independence 1&2 Cluster	1759	35.2	Currently no available toilet facility for use by pupils. Pupils rely on public toilets.	New 2 10-seater WC toilet facilities	20	Limited space for provision of new facilities
14	Osu Presby Cluster	1040	20.8	Dilapidated 20-seater WC facility with visible cracks and breakdown of portions of the wall. Re-enforcements are exposed in some portions of the building. There is an existing septic tank. Existing 2No. 6-seater biofil toilets	Rehabilitation of existing 20-seater	30	Provision adequate
15	Farisco Cluster of Schools	834	16.7	Existing 20-seater WC toilet in use but with some defects (with the plumbing systems, cisterns, ceilings, windows inspection chambers, etc.	Rehabilitation of existing 20 seater WC	20	Provision adequate
16	Osu St. Barnabas Anglican Schools	686	13.7	Existing 10-seater WC with some defects in fixtures and plumbing works	Rehabilitation of existing 10 seater into 14 seater	14	Provision adequate

No.	School	Design Population	Privy room (facility capacity ) Requirement	Existing Facilities	Recommended Facility Capacity/Intervention	Total Capacity of Existing and Proposed Facility Interventions	Remarks
17	Osu Salem 1 Primary Schools	452	9.0	16-Seater WC toilet on a 2-storey school block (8 per floor). Privy rooms on one-side of the block have been converted into classrooms leaving 8 privy rooms (4 per floor) which are also not in use.	Rehab and remodeling of existing 8-privy rooms	8	Limited space for provision of additional facilities
18	Osu Salem 5 Primary School	425	8.5	There is space available for installing toilets and other ancillaries within the new/uncompleted 2-storey school block. School block in use without facilities	New 10-seater WC facility	10	Provision adequate
19	Unity Cluster	1593	31.9	Dilapidated 8-seater and 2 privy rooms functional	New 10 & 20 -seater WC facility	30	Provision adequate
20	Kanda Cluster	1616	32.3	Superstructure of existing 20-Seater WC toilet facility in a good condition however the internal fixtures require replacement and retrofitting as well as some plumbing works. Dilapidated and non-functional 16-seater WC toilet facility (on 2 floor storey building-8 facilities per floor)-for Kanda 1 Primary & JHS block and Kanda 3&5 Primary & JHS block. New 20-seater WC under construction Ring road East 1 Primary & JHS 2-storey classroom block (including toilet facilities) recently rehabilitated. Portions of external pipes connections are however damaged/broken.	Rehabilitation and remodeling of existing 20-seater WC into 24-seater WC toilet	44	Provision adequate

No.	School	Design Population	Privy room (facility capacity ) Requirement	Existing Facilities	Recommended Facility Capacity/Intervention	Total Capacity of Existing and Proposed Facility Interventions	Remarks
21	Anumle Cluster of Schools	1902	38.0	Existing 1No. 20-seater WC, 2No. 10-Seater WC (for teaching staff), and 2No. Uncompleted 6-seater WC facilities. The 20 & 2No.10-seater facilities have overhead water tanks.	Rehabilitation and remodeling of existing 20-seater and 2No. 10-seater WC toilets. Provision of new 3-seater WC toilet for KG	43	Provision adequate
22	Shiayennor 1&2 Primary	564	11.3	10-seater WC is in deplorable state Cubicles are in use by teachers. The inspection chambers of the 10-seater WC are broken and filled with refuse. Internal fixtures are broken Uncompleted 4-Seater WC New 20-seater WC yet to be handed over	Rehabilitation and remodeling of existing 10-seater WC toilet	30	Provision adequate
23	Shiayennor A&B JHS	354	7.1	Currently no available facility for use-pupils visit public toilet. Uncompleted but abandoned 10-seater WC toilet facility Septic tank and sewage pipe connection also uncompleted. Abandoned KVIP and external urinal	Rehabilitation and remodeling of existing 10-seater WC toilet	10	Provision adequate
24	Kaneshie 6 Primary/ Kaneshie Kingsway 1 JHS A&B	308	6.2	There is a 20-seater WC &16-seater WC toilet facility (on 2 floor storey building-8 facilities per floor) with some internal fixtures for both schools	Rehabilitation and remodeling of existing 20 & 10 seater WC toilets and remodeling of 16 seater into 12- seater facility	42	Provision adequate
25	Kaneshie 8 Primary/ Kaneshie Kingsway 2 JHS A&B	781	15.6	Dilapidated 16-seater WC toilet 2 privy rooms for teachers			

No.	School	Design Population	Privy room (facility capacity ) Requirement	Existing Facilities	Recommended Facility Capacity/Intervention	Total Capacity of Existing and Proposed Facility Interventions	Remarks
26	La Bawaleshie Presby Cluster	463	9.3	Existing 10-seater WC facility with overhead tank & Uncompleted 20-seater WC-works has been abandoned	Rehabilitation and remodeling of existing 10 seater WC toilet	30	Provision adequate
27	Mamobi Prisons Cluster	714	14.3	Existing 10-seater WC toilet facility but not in use due to its dilapidated state. Facility has no water supply connection 20-seater WC toilet facility in use with overhead and ground water storage tanks.	Rehabilitation and remodeling of existing 10 seater WC toilet	30	Provision adequate
28	Dzorwulu JHS	542	10.8	Existing 11-seater WC toilet with in-built urinals in a deplorable state- broken cisterns and squat bowls, warped wooden partitions, dilapidated ceiling and broken wooden windows Existing 10-seater WC toilet has never been used due to lack of water supply and high water table around the septic tank area resulting in it often filled with water	Rehabilitation and remodeling of existing 11-seater into 10-seater & 10 seater WC toilets	20	Provision adequate
29	Kwashieman Cluster	3327	66.5	Dilapidated and abandoned 20-seater WC facility with defective plumbing works. Superstructure however in a good condition. Existing 12-seater WC with damaged roofing/ceiling with overhead tank for water storage. Existing 4-seater KVIP in an insanitary condition.	Rehabilitation and remodeling of existing 12-seater WC toilet. Rehabilitation and conversion of existing 16-seater WC into 24-seater. Provision of new 24-seater WC toilet	60	Millennium school construction project in progress hence additional facilities will be provided. Provision adequate
30	Darkuman 1 JHS	230	4.6	Existing 3-seater WC toilet	Provision of new 10-seater WC	10	Provision adequate

Detailed design drawings of the recommended toilet facility interventions for the respective school is attached as Appendix B of this report



## 6.4 Estimation of Water Supply and Storage Needs

Findings of water availability and reliability studies showed positive results in some schools but continuous flow and storage of water remain a challenge. Hence the necessary stopgap measures have to be put in place to maintain constant water supply service. A few schools had mechanized borehole water supply systems and as such do not rely of GWCL supply. Based on the reports of difficulties faced by most of the selected schools in payment of water bills as well as irregular supply of water by GWCL, mechanized boreholes have been recommended for all schools.

The recommendation is to store and maintain a 24hr constant flow in the school. The recommended means of storage should be overhead and/or ground polytank water storage system and the amount of water needed to be stored is calculated by the formula below.

$V_w = (\text{Design User population } P \times \text{drinking, flushing, handwashing and bathing water volumes of WC toilet } Q_f)$ .  $V_w$  is the volume of water required to be stored.

Table 6.15 below sets out the calculation of the amount of water that has to be stored and the minimum yield (for borehole water supply) for each school.

Table 6.15: Water demand and the recommended volume of water storage tanks

School	Design Population	Drinking Water Requirement (@3L/cap/day)	Water Requirements for Hygiene and Sanitation (L/cap/day)			Total Water Requirement (L/day)	Minimum Borehole Yield Requirement (L/min)	Recommended Borehole Yield (L/min) @ 1.15 safety Margin	Recommended Vol of Water Storage Tanks
			Flushing @ 18L/cap/day)	Handwashing (@4L/cap/day)	Bathing @9L/cap/day)				
Abossey Okai 1& 2 Cluster	1335	4005	24030	5340	12015	45390	47.3	54.4	2No. Rambo 2000 and 1No. Ram 500 (Overhead Tank)
Kaneshie West 1&2 Cluster	1318	3954	23724	5272	11862	44812	N/A	N/A	2No. Rambo 2000 and 1No. Rambo 500 (Overhead Tank)
Mataheko R/C Cluster	1527	4581	27486	6108	13743	51918	N/A	N/A	2No. Rambo 2000 and 1No. Rambo 1000 (Overhead Tank)
Korle Gonno R/C Boys	519	1557	9342	2076	4671	17646	18.4	21.1	1No. Rambo 2000
Owusu Mills Primary/JHS	212	636	3816	848	1908	7208	7.5	8.6	1No. Rambo 1000
Socco/M1 Cluster of Schools	363	1089	6534	1452	3267	12342	N/A	N/A	1No. Rambo 1000 and 1No. Rambo 500
Sempe '8' & '12' JHS	297	891	5346	1188	2673	10098	10.5	12.1	1No. Rambo 1000
Dr F.V. Nanka Bruce JHS	511	1533	9198	2044	4599	17374			1No. Rambo 2000
Accra Newtown 6&8 Primary Classroom Block	234	702	4212	936	2106	7956	8.3	9.5	1No. Rambo 1000

School	Design Population	Drinking Water Requirement (@3L/cap/day)	Water Requirements for Hygiene and Sanitation (L/cap/day)			Total Water Requirement (L/day)	Minimum Borehole Yield Requirement (L/min)	Recommended Borehole Yield (L/min) @ 1.15 safety Margin	Recommended Vol of Water Storage Tanks
			Flushing @ 18L/cap/day	Handwashing (@4L/cap/day)	Bathing @9L/cap/day				
Accra Newtown 4&11 Primary Classroom Block	285	855	5130	1140	2565	9690	10.1	11.6	2No. Rambo 500
Kwame Nkrumah JHS	183	549	3291	731	1646	6217	6.5	7.4	2 No. Rambo 500
Ayalolo Cluster of Schools	2688	8064	48384	10752	24192	91392	95.2	109.5	5 No Rambo 2000
Independence 1&2 Cluster	1759	5277	31662	7036	15831	59806	62.3	71.6	3 No Rambo 2000
Osu Presby Cluster	1040	3120	18720	4160	9360	35360	36.8	42.4	2 No Rambo 2000
Farisco Cluster of Schools	834	2502	15012	3336	7506	28356	29.5	34.0	1 No Rambo 2000 and 1 No Rambo 1000
Osu St. Barnabas Anglican Schools	686	2058	12348	2744	6174	23324			1 No Rambo 2000 and 1 No Rambo 500
Osu Salem 1 Primary Schools	452	1356	8136	1808	4068	15368	16.0	18.4	1 No Rambo 1000 and 1No. Rambo 500
Osu Salem 5 Primary School	425	1276	7658	1702	3829	14465			1 No Rambo 2000
Unity Cluster	1593	4779	28674	6372	14337	54162	56.4	64.9	2 No Rambo 2000, 1 Rambo 1000 and 1 No Rambo 500
Kanda Cluster	1616	4848	29088	6464	14544	54944	57.2	65.8	2 No Rambo 2000, 1 Rambo 1000 and 1 No Rambo 500

School	Design Population	Drinking Water Requirement (@3L/cap/day)	Water Requirements for Hygiene and Sanitation (L/cap/day)			Total Water Requirement (L/day)	Minimum Borehole Yield Requirement (L/min)	Recommended Borehole Yield (L/min) @ 1.15 safety Margin	Recommended Vol of Water Storage Tanks
			Flushing @ 18L/cap/day	Handwashing (@4L/cap/day)	Bathing @9L/cap/day				
Anumle Cluster of Schools	1902	5706	34236	7608	17118	64668	67.4	77.5	3 No Rambo 2000 and 1 No Rambo 500
Shiayennor 1&2 Primary	564	1692	10152	2256	5076	19176	20.0	23.0	1 No Rambo 2000
Shiayennor A&B JHS	354	1062	6372	1416	3186	12036	12.5	14.4	1 No Rambo 1000 and 1 No Rambo 500
Kaneshie 6 Primary/ Kaneshie Kingsway 1 JHS A&B	308	924	5544	1232	2772	10472	10.9	12.5	1 No Rambo 1000 and 1No Rambo 100
Kaneshie 8 Primary/ Kaneshie Kingsway 2 JHS A&B	781	2343	14058	3124	7029	26554	27.7	31.8	1 No Rambo 2000 and 1 No Rambo 1000
La Bawaleshie Presby Cluster	463	1389	8334	1852	4167	15742	16.4	18.9	2 No Rambo 2000
Maamobi Prisons Cluster	714	2142	12852	2856	6426	24276	25.3	29.1	1 No Rambo 2000 and 1 No Rambo 500
Dzorwulu JHS	542	1626	9756	2168	4878	18428	19.2	22.1	2 No Rambo 1000
Kwashieman Cluster	3327	9981	59886	13308	29943	113118	117.8	135.5	6 No Rambo 2000
Darkuman 1 JHS	230	690	4140	920	2070	7820	8.1	9.4	1 No Rambo 1000

NB: Schools with no borehole yield indicated have existing boreholes

## 6.5 Design of W/C Septic Tanks

### 6.5.1 Design Parameters

The required sizes/capacity of septic tanks for the various school facilities was determined using the standard design data below:

- ❖ Average per capital flow (Q)/day is 10 litres
- ❖ Selected Period for desludging (N) , should be less than  $N < 5$  years, say  $N = 1$
- ❖ If  $N < 5$  years, then per capita sludge accumulation rate  $r$ , is  $0.03 \text{ m}^3/\text{yr}$
- ❖ Selected ambient temperature of coldest month (T) is  $25^\circ\text{C}$
- ❖ Selected septic tank free board is 0.3m

### 6.5.2 Calculation of Tank Volumes and Dimensions

Applicable design of septic tanks in tropical climates was adapted. The approach defines four functional/operational zones as follows:

- ❖ Scum formation and storage which occurs as the first layer or zone in the tank
- ❖ Sedimentation process in the layer beneath the scum zone therefore the 2<sup>nd</sup> zone of operation
- ❖ Sludge digestion zone which is 3<sup>rd</sup> zone and beneath the sedimentation zone and
- ❖ Digested sludge storage zone which is the last and final zone of operation

Each zone defines a specific space or volume of the tank to accommodate its formation.

#### SCUM ACCUMULATION:

Empirically scum accumulates at approximately (30-40)% the rate at which digested sludge is stored at the base of the tank. If  $V_{sl}$  is the volume of sludge stored at the base of the tank the volume of scum,  $V_{sc}$  is determined as:

$$V_{sc} = 0.4 \times V_{sl} \text{ in } \text{m}^3 \text{ ---- eqn 1.0}$$

#### SEDIMENTATION:

The time required to allow for effective sedimentation of settleable solids,  $T_h$  is determined by the rational formula:

$$T_h = 1.5 - 0.3 \log (PQ) \text{ in days ----- eqn 2.0}$$

P is the Design Loading

Q is the per capital waste flow rate in l/day. Good designs require a  $T_h$  value  $< 0.2$  day.

The tank volume for sedimentation in Zone 2, is given by:

$$V_h = 10^{-3} \times (P \times Q \times T_h) \text{ ----- eqn 3.0}$$



## SLUDGE DIGESTION:

The time needed for anaerobic digestion of the settled solids ( $t_d$  in days) varies with the ambient temperature ( $T$  °C) in the tank and related according to the equation:

$$t_d = 30 \times (1.035)^{T-35} \text{ in days} \text{ ---- } 4.0$$

The volume of fresh/digested sludge produced at the end of completion of anaerobic digestion in  $t_d$  days is:

$$V_d = 0.5 \times 10^{-3} \times P \times t_d \text{ in m}^3 \text{ ---- } 5.0$$

## SLUDGE STORAGE:

The volume of produced sludge stored in the sludge storage zone depends on the rate of sludge digestion ( $r$ ,  $\text{m}^3$  per person/yr) and the interval between successful desludging operations ( $N$  in years)

For $N < 5$ years	$r = 0.03\text{m}^3/\text{person per year}$
For $N > 5$ years	$r = 0.025\text{m}^3/\text{person per year}$

The sludge storage volume is given by:

$$V_{sl} = r \times P \times N \text{ in m}^3 \text{ ---- } 6.0$$

## OVERALL DESIGN CAPACITY:

The effective volume of the tank  $V_{\text{eff}}$  should accommodate the volume scum produced, volume sewage undergoing sedimentation, volume of fresh/digested sludge and volume of stored sludge.

$$V_{\text{eff}} = V_{\text{sc}} + V_h + V_d + V_{sl} \text{ in m}^3 \text{ ---- } 7.0$$

Table 6.16 presents calculations of septic tank volumes and their sizes. Dimensions of the 2-compartment septic tanks recommended for schools to be provided new facilities and those with deficient septic tanks are presented in Table 6.17 below.

Table 6.16: Calculation of capacity (volume) of septic (holding) tank

School	Design Population (Pn)	Design Loading (P)	Effective settling time (Th)/days	Tank volume for sedimentation (Vh)/m3	Time for anaerobic digestion (td)/days	Volume for fresh sludge (Vd)/m3	Sludge storage volume (Vsl)/m3	Scum accumulation volume (Vsc)/m3	Holding Tank Capacity (Veff)/m3
		Pn/10	Th = 1.5 – 0.3log (PQ)	Vh = 10 <sup>-3</sup> x (P x Q x Th)	td = 30 x (1.035) <sup>T - 35</sup>	Vd = 0.5 x 10 <sup>-3</sup> x P x td	Vsl = r x P x N	Vsc = 0.4 x Vsl	Veff = Vsc + Vh + Vd + Vsl
Abossey Okai 1& 2 Cluster	1335	134	0.49	11.71	21.27	1.42	4.02	1.608	24.27
Kaneshie West 1&2 Cluster	1318	132	0.49	11.58	21.27	1.40	3.96	1.584	23.70
Korle Gonno R/C Boys	519	52	0.61	5.70	21.27	0.55	1.56	0.624	5.67
Owusu Mills Primary/JHS	212	21	0.73	2.75	21.27	0.22	0.63	0.252	1.55
Socco/M1 Cluster of Schools	363	36	0.66	4.25	21.27	0.38	1.08	0.432	3.30
Sempe '8' & '12' JHS	297	30	0.68	3.67	21.27	0.32	0.9	0.36	2.54
Dr F.V. Nanka Bruce JHS	511	51	0.61	5.61	21.27	0.54	1.53	0.612	5.51
Accra Newtown 6&8 Primary Classroom Block	234	23	0.71	2.96	21.27	0.24	0.69	0.276	1.75
Accra Newtown 4&11 Primary Classroom Block	285	29	0.68	3.57	21.27	0.31	0.87	0.348	2.42
Ayalolo Cluster of Schools	2688	269	0.39	19.10	21.27	2.86	8.07	3.228	72.59
Independence 1&2 Cluster	1759	176	0.45	14.25	21.27	1.87	5.28	2.112	37.24
Osu Presby Cluster	1040	104	0.52	9.70	21.27	1.11	3.12	1.248	16.33
Osu St. Barnabas Anglican Schools	686	69	0.57	7.10	21.27	0.73	2.07	0.828	8.68
Osu Salem 1 Primary Schools	452	45	0.63	5.08	21.27	0.48	1.35	0.54	4.57
Unity Cluster	1593	159	0.46	13.25	21.27	1.69	4.77	1.908	31.74

School	Design Population (Pn)	Design Loading (P)	Effective settling time (Th)/days	Tank volume for sedimentation (Vh)/m3	Time for anaerobic digestion (td)/days	Volume for fresh sludge (Vd)/m3	Sludge storage volume (Vsl)/m3	Scum accumulation volume (Vsc)/m3	Holding Tank Capacity (Veff)/m3
		$Pn/10$	$Th = 1.5 - 0.3 \log (PQ)$	$Vh = 10^{-3} \times (P \times Q \times Th)$	$td = 30 \times (1.035)^{T - 35}$	$Vd = 0.5 \times 10^{-3} \times P \times td$	$Vsl = r \times P \times N$	$Vsc = 0.4 \times Vsl$	$Veff = Vsc + Vh + Vd + Vsl$
Shiyennor A&B JHS	354	35	0.66	4.16	21.27	0.37	1.05	0.42	3.17
Mamobi Prisons Cluster	714	71	0.57	7.26	21.27	0.75	2.13	0.852	9.07
Dzorwulu JHS	542	54	0.60	5.87	21.27	0.57	1.62	0.648	6.00
Kwashieman Cluster	3327	333	0.37	21.98	21.27	3.54	9.99	3.996	101.36
Darkuman 1 JHS	230	23	0.71	2.96	21.27	0.24	0.69	0.276	1.75

Table 6.17: Recommended capacity and sizing of septic tank

School	Cal. Holding Tank Capacity (V <sub>eff</sub> )/m <sup>3</sup>	Recommended Septic Tank Capacity (m <sup>3</sup> )	Effective depth Off Septic Tank <sup>2</sup>	Internal Sizing of Septic Tank				
				Calculated Width (W)/m	Recommended Width (W)/m	Total Length (L)/m	Length of 1st Comp (L <sub>1</sub> )/m	Length of 2nd Comp (L <sub>2</sub> )/m
Abossey Okai 1& 2 Cluster	24.27	18.9 (2No.)	2.1	2.89	4.00	9.00	6.00	3.00
Kaneshie West 1&2 Cluster	23.70	18.9 (2No.)	2.1	2.89	4.00	9.00	6.00	3.00
Korle Gonno R/C Boys	5.67	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Owusu Mills Primary/JHS	1.55	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Socco/M1 Cluster of Schools	3.30	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Sempe '8' & '12' JHS	2.54	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Dr F.V. Nanka Bruce JHS	5.51	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Accra Newtown 6&8 Primary Classroom Block	1.75	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Accra Newtown 4&11 Primary Classroom Block	2.42	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Ayalolo Cluster of Schools	72.59	75.6	2.1	4.08	4.00	9.00	6.00	3.00
Independence 1&2 Cluster	37.24	75.6	2.1	2.98	4.00	9.00	6.00	3.00
Osu Presby Cluster	16.33	18.9	2.1	2.36	4.00	9.00	6.00	3.00
Osu St. Barnabas Anglican Schools	8.68	18.9	2.1	1.67	2.00	4.50	3.00	1.50
Osu Salem 1 Primary Schools	4.57	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Unity Cluster	31.74	75.6	2.1	2.98	4.00	9.00	6.00	3.00
Shiayennor A&B JHS	3.17	18.9	2.1	1.41	2.00	4.50	3.00	1.50
La Bawaleshie Presby Cluster	4.72	18.9	2.1	1.41	2.00	4.50	3.00	1.50

<sup>2</sup> Inclusive of septic tank free board depth of 0.3m

School	Cal. Holding Tank Capacity (Veff)/m3	Recommended Septic Tank Capacity (m3)	Effective depth Off Septic Tank <sup>2</sup>	Internal Sizing of Septic Tank				
				Calculated Width (W)/m	Recommended Width (W)/m	Total Length (L)/m	Length of 1st Comp (L1)/m	Length of 2nd Comp (L2)/m
Mamobi Prisons Cluster	9.07	18.9	2.1	1.67	2.00	4.50	4.00	1.50
Dzorwulu JHS	6.00	18.9	2.1	1.41	2.00	4.50	3.00	1.50
Kwashieman Cluster	101.36	75.6 (2No.)	2.1	4.28	4.00	9.00	6.00	3.00
Darkuman 1 JHS	1.75	18.9	2.1	1.41	2.00	4.50	3.00	1.50

Detailed design drawings for the recommended septic tanks are attached as Appendix C of this report.



## 6.6 Design of Solid Waste Holding Bays (SWHBs)

### 6.6.1 Justification and Design Method

It has been observed with great concern the need to improve the poor refuse management situation in most of the schools (refer to Table 4.1). Open burning of refuse in dug out pits is common practice in most schools providing ample justification for refuse management improvements.

The non-expensive technical solution recommended is concrete pads or solid waste holding bays. The waste holding bays will protect bins from direct contact with ground.

The refuse holding bays recommended will provide an adequate container sitting space of 7.5m X 3.3m and 9.95 X 3.3 enough to conveniently accommodate three (3)No. or four (4)No. 240 litre bins respectively. The platform is 0.3m above ground level.

### 6.6.2 Design Results

The designed solid waste holding bay has the following functional units:

- ❖ A 24.75m<sup>2</sup>/ 32.84m<sup>2</sup> reinforced concrete floor space with dimensions 7.5m X 3.3m and 9.95m X 3.3m big enough to house up 3No./4No. 240 litre bin with adequate working space around and in between the bins. Detail designs for the proposed solid waste holding bays are indicated in *Appendix D*
- ❖ A concrete ramp placed in front of the concrete floor to provide smooth climbing provisions for roll off refuse bins
- ❖ In inculcating the practice of waste segregation at generation point as part of hygiene promotion in the schools, each of the three (3) bins will be dedicated to paper waste, rubber and other waste streams including organic wastes. Collection of sachet “pure” water bags was observed in some schools (see plate 6.1 below). For schools with enrolment above 1000, an extra bin for other waste materials is provided.



Plate 6.1: Collection of Sachet “pure” water bags in Sempe Cluster

Table 6.18 below shows the proposed SWH bay to be provided each school.

Table 6.18: Proposed Solid Waste Holding Bays for Schools

Type- A (24.75m <sup>2</sup> )	Type B (32.84m <sup>2</sup> )
Korle Gonno R/C Boys	Abossey Okai 1& 2 Cluster
Owusu Mills Primary/JHS	Kaneshie West 1&2 Cluster
Socco/M1 Cluster of Schools	Mataheko R/C Cluster
Sempe '8' & '12' JHS	Ayalolo Cluster of Schools
Dr F.V. Nanka Bruce JHS	Independence 1&2 Cluster
Accra Newtown 6&8 Primary Classroom Block	Osu Presby Cluster
Accra Newtown 4&11 Primary Classroom Block	Unity Cluster
Kwame Nkrumah JHS	Kanda Cluster
Farisco Cluster of Schools	Anumle Cluster of Schools
Osu St. Barnabas Anglican Schools	Kwashieman Cluster
Osu Salem 1 Primary Schools	
Osu Salem 5 Primary School	
Shiayennor 1&2 Primary	
Shiayennor A&B JHS	
Kaneshie 6 Primary/Kaneshie Kingsway 1 JHS A&B	
Kaneshie 8 Primary/Kaneshie Kingsway 2 JHS A&B	
La Bawaleshie Presby Cluster	
Mamobi Prisons Cluster	
Dzorwulu JHS	
Darkuman 1 JHS	

### 6.7 Furnace fitted with smoke stack for Menstrual Hygiene Waste Management (MHWM)

In ensuring the hygienic disposal of menstrual hygiene waste (e.g. sanitary pads), a 0.91m<sup>2</sup> furnace fitted with smoke stack has been recommended for all schools with the exception of Korle Gonno RC Boys. Design details have been attached as Appendix D.

### 6.8 Plumbing Works Design

The Consultant's mechanical/plumbing installation design conforms to the national regulations and codes for designing building plumbing works.

All materials proposed in our plumbing design layouts also conformed to the relevant British Standards (i.e. BS2781, Parts 1 and 2).

- ❖ 19mm UPVC pipes and fittings will be used for inflow water pipes
- ❖ 25mm draw off taps and stop valves are the recommended water services stop corks.

### 6.9 Design of Internal and External lighting

The Consultant's electrical designs conformed to the E.C.G regulations/codes for electrical works. The following are electrical services provisions recommended:

- ❖
- ❖ Cabling for control devices external to switchboards will be 1.5mm<sup>2</sup> cross-section
- ❖ Cabling for lighting will be 1.5mm<sup>2</sup> cross-section
- ❖ Cabling for general power will be 2.5mm<sup>2</sup> cross-section

The type of electrical cabling will be X-linked polyethylene XLPE insulated single wire armored type with PVC over sheath.

Our outdoor lighting services have been designed to provide adequate illumination of toilets outdoor premises and luminaries have been placed at adequate heights on the superstructure and evenly spread. Recommended voltage rating for lighting services is 240V AC, 50Hz frequency.

## 6.10 Design of School Compound Drainage

### 6.10.1 General

In avoiding flooding and ponding (observed in schools with high water table e.g. Osu Presby and Kanda Clusters), collector drains will be provided. The drains will connect the roadside drains/outfalls to be able to discharge the water collected from the site into the bigger roadside drains. The required total length of the collector drains to be provided in each school is presented in Table 6.19 below. It should be concrete as the roadside drain. The collector drains will be U-drain of cross section 450mm width x 450mm depth.

Table 6.19: Total Length of U-drains

Schools	Length(m)
Abossey Okai 1& 2 Cluster	68
Kaneshie West 1&2 Cluster	74
Mataheko R/C Cluster	60
Korle Gonno R/C Boys	78
Owusu Mills Primary/JHS	38
Socco/M1 Cluster of Schools	68
Sempe '8' & '12' JHS	40
Dr F.V. Nanka Bruce JHS	38
Accra Newtown 6&8 Primary Classroom Block	54
Accra Newtown 4&11 Primary Classroom Block	
Kwame Nkrumah JHS	14
Ayalolo Cluster of Schools	44
Independence 1&2 Cluster	28
Osu Presby Cluster	28
Farisco Cluster of Schools	28
Osu St. Barnabas Anglican Schools	20
Osu Salem 1 Primary Schools	20
Osu Salem 5 Primary School	20

Schools	Length(m)
Unity Cluster	28
Kanda Cluster	41
Anumle Cluster of Schools	40
Shiayennor 1&2 Primary	20
Shiayennor A&B JHS	20
Kaneshie 6 Primary/Kaneshie Kingsway 1 JHS A&B	48
Kaneshie 8 Primary/Kaneshie Kingsway 2 JHS A&B	
La Bawaleshie Presby Cluster	20
Mamobi Prisons Cluster	20
Dzorwulu JHS	20
Kwashieman Cluster	48
Darkuman 1 JHS	18

### 6.10.2 *Paving of Sanitary Sites*

The Consultant has provided paving as an essential site drainage requirement for two reasons.

- ❖ Paving will augment the total drainage solution by providing a solid impervious cover over the entire sanitary sites which will eliminate the collection and stagnation of rainwater at scattered depressions in the sites thereby also reducing the messiness of the sites after rainfall.
- ❖ Paved sanitary sites are easy to sweep and maintain.

The table 6.20 below shows the recommended areas of paving for each school.

Table 6.20: Areas to paved for each school

Schools	Area(m <sup>2</sup> )
Abossey Okai 1& 2 Cluster	236.42
Kaneshie West 1&2 Cluster	340.90
Mataheko R/C Cluster	188.88
Korle Gonno R/C Boys	175.96
Owusu Mills Primary/JHS	90.86
Socco/M1 Cluster of Schools	231.02
Sempe '8' & '12' JHS	90.86
Dr F.V. Nanka Bruce JHS	86.34
Accra Newtown 6&8 Primary Classroom Block	161.38
Accra Newtown 4&11 Primary Classroom Block	
Kwame Nkrumah JHS	23.54
Ayalolo Cluster of Schools	469.70
Independence 1&2 Cluster	172.68
Osu Presby Cluster	188.88

Schools	Area(m <sup>2</sup> )
Farisco Cluster of Schools	188.88
Osu St. Barnabas Anglican Schools	86.34
Osu Salem 1 Primary Schools	75.04
Osu Salem 5 Primary School	86.34
Unity Cluster	161.38
Kanda Cluster	419.90
Anumle Cluster of Schools	368.34
Shiayennor 1&2 Primary	86.34
Shiayennor A&B JHS	86.34
Kaneshie 6 Primary/Kaneshie Kingsway 1 JHS A&B	372.86
Kaneshie 8 Primary/Kaneshie Kingsway 2 JHS A&B	
La Bawaleshie Presby Cluster	86.34
Mamobi Prisons Cluster	86.34
Dzorwulu JHS	86.34
Kwashieman Cluster	540.34
Darkuman 1 JHS	86.34

## 7 SOURCES OF CONSTRUCTION MATERIALS

It is very essential that the Consultant specify materials that are for the desired quality for site construction. It is also essential to determine and recommend sources where these materials can be obtained or purchased at reasonable costs. These two factors mentioned have a significant bearing on overall cost of the project, project completion time and quality/durability of the completed works.

The Consultant has on this note recommended the use of the following materials that are common/easy to obtain in the open market, robust, durable, not too costly and easy to work with.

Various sections of the works recommended interventions will comprise concrete and block works, reinforcement, carpentry, roofing, joinery and finishes.

- ❖ Structural concrete in floor and suspended slabs, columns, lintels and ring beams of new toilets, bin pads and septic tanks shall have a mix ratio of (1:2:4). Meaning every structural concrete that will be placed in the works will consist of one part of ordinary Portland cement in 2 parts of sharp and clean sand/quarry dust and 4 parts of clean and organic free chippings or stone aggregates. Cement for concrete works will be purchased from GHACEM/Open markets in Accra depending on the price differential at the factory/depos and transportation cost. Quarry dust and chippings may be purchased from quarries/sand pits in Accra.
- ❖ Sandcrete blocks in sub and superstructure of the above mentioned site facilities shall have a mix ratio of (1:4) meaning site blocks shall be a composite of 1 part ordinary Portland cement in 4 parts of sharp sand/quarry dust or a mixture of both sand and quarry dust. Sandcrete blocks will upon convenience and cost be either produced on-site or purchase from block factories close to the project sites. Only blocks that are more than 21 days will be allowed to be used in the works.
- ❖ Reinforcement in suspended slabs, beams, columns and column bases of new facilities shall either be (12mm or 16mm) sized high yield steel rods or a combination of both and 6mm stirrups/links in 9m unit lengths, cut, bent and fixed in shapes shown in the working drawings in Appendix B. Steel rods may be purchased from the factories in Tema, depots in Accra or at any suitable open market close in the project site depending on cheaper cost.
- ❖ Timber for roof members shall consist of (2" x 6"), (2" x 4") and (2" x 3") hardwood treated with solignum. Sawn (2" x 9") boards shall be used for roof fascia. Timber in roofing shall be purchased from the timber markets in Accra or close to the site.
- ❖ Aluminium roofing sheet of gauge 0.5mm will be used for roofing. Aluminium roofing sheets may be purchased from the factory in Tema or open markets in Accra.
- ❖ Tiles that will be used to clad walls of WC toilet rooms shall be smooth porcelain tiles of size 150mm x 150mm. Floors of the toilet rooms shall be tiled with non-slip floor tiles. These materials for walls and floor finishes shall be purchased from the open markets in Accra.
- ❖ 19mm uPVC pipes shall be used to connect clean water supply into the toilets for flushing and hand-washing purposes. 150mm uPVC pipes shall be used as effluent wastewater connection pipes to discharge wastewater from toilets into septic tanks. Pipes shall be purchased from pipes and plastics factories or depots.



## 8 SUMMARIZED LIST OF RECOMMENDED INTERVENTIONS

Table 8.1 below presents a summary of interventions recommended for implementation in the various schools covered under the project.

Detailed/standard drawings of the below listed interventions are attached to this draft detailed design report in Appendices A to D including location maps and layouts.

Table 8.1: Summary of Recommended WASH Interventions

	SCHOOL	SANITATION			WATER SUPPLY		SOLID WASTE	FURNACE	DRAINAGE	PAVEMENT
No		Description of Facility	Capacity of WC/No. of Seats	No.	Borehole Water Supply	Water Storage facility	Floor Area/No. of 240L Bins	Floor Area/No.	Length of U-drain/m	Total Area/m2
1	Abossey Okai 1& 2 Cluster	New	16	1	Provision of mechanised borehole	2No. Rambo 2000 and 1No. Rambo 500	32.84 m2 refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	68	236.42
		Rehabilitated and Remodeled	10	1						
2	Kaneshie West 1&2 Cluster	Rehabilitated and Remodeled	20	1		2No. Rambo 2000 and 1No. Rambo 500	32.84 m2 refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	74	340.9
		New	3	1						
		New	10	1						
3	Mataheko R/C Cluster	Rehabilitated and Remodeled	24	1		2No. Rambo 2000 and 1No. Rambo 1000	32.84 m2 refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	60	188.88
4	Korle Gonno R/C Boys	New	14	1	Provision of mechanised borehole	1No. Rambo 2000	24.75 m2 refuse holding bay and 3No. 240L bins		78	175.96
5	Owusu Mills Primary/JHS	Rehabilitated and Remodelled	12	1	Provision of mechanised borehole	1No. Rambo 1000	24.75 m2 refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	38	90.86
6	Socco/M1 Cluster of Schools	New	10	1		1No. Rambo 1000 and 1No. Rambo	24.75 m2 refuse holding bay and	0.91m <sup>2</sup> Furnace fitted	68	231.02

	SCHOOL	SANITATION			WATER SUPPLY		SOLID WASTE	FURNACE	DRAINAGE	PAVEMENT
No		Description of Facility	Capacity of WC/No. of Seats	No.	Borehole Water Supply	Water Storage facility	Floor Area/No. of 240L Bins	Floor Area/No.	Length of U-drain/m	Total Area/m <sup>2</sup>
						500	3No. 240L bins	with smoke stack		
7	Sempe '8' & '12' JHS	Rehabilitated and Remodeled	12	1	Provision of mechanised borehole	1No. Rambo 1000	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	40	90.86
8	Dr F.V. Nanka Bruce JHS	New	10	1		1No. Rambo 2000	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	38	86.34
9	Accra Newtown 6&8 Primary Classroom Block	Rehabilitated and Remodeled	8	1	Provision of mechanised borehole	1No. Rambo 1000	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	54	161.38
10	Accra Newtown 4&11 Primary Classroom Block	New	10	1	Provision of mechanised borehole	2No. Rambo 500	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins			
11	Kwame Nkrumah JHS	Rehabilitated	4	1	Provision of mechanised borehole	2 No. Rambo 500	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins		14	23.54
12	Ayalolo Cluster of Schools	Rehabilitated and Remodeled	8	1	Provision of mechanised borehole water supply	5 No Rambo 2000	32.84 m <sup>2</sup> refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	44	469.7
		Rehabilitated and Remodeled	12	1						
		Rehabilitated and Remodeled	20	1						
13	Independence 1&2 Cluster	New	10	2	Provision of mechanised borehole	3 No Rambo 2000	32.84 m <sup>2</sup> refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	28	172.68
14	Osu Presby Cluster	Rehabilitated and Remodeled	20	1		2 No Rambo 2000	32.84 m <sup>2</sup> refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	28	188.88

	SCHOOL	SANITATION			WATER SUPPLY		SOLID WASTE	FURNACE	DRAINAGE	PAVEMENT
No		Description of Facility	Capacity of WC/No. of Seats	No.	Borehole Water Supply	Water Storage facility	Floor Area/No. of 240L Bins	Floor Area/No.	Length of U-drain/m	Total Area/m2
15	Farisco Cluster of Schools	Rehabilitated and Remodeled	20	1	Provision of mechanised borehole	1 No Rambo 2000 and 1 No Rambo 1000	24.75 m2 refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	28	188.88
16	Osu St. Barnabas Anglican Schools	Rehabilitated and Remodeled	14	1	Reticulation of water to toilet facility	1 No Rambo 2000 and 1 No Rambo 500	24.75 m2 refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	20	86.34
17	Osu Salem 1 Primary Schools	Rehabilitated and Remodeled	8	1	Provision of mechanised borehole	1 No Rambo 1000 and 1No. Rambo 500	24.75 m2 refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	20	75.04
18	Osu Salem 5 Primary School	Rehabilitated and Remodeled	10	1		1 No Rambo 2000	24.75 m2 refuse holding bay and 3No. 240L bins		20	86.34
19	Unity Cluster	New	10	1	Provision of mechanised borehole	2 No Rambo 2000, 1 Rambo 1000 and 1 No Rambo 500	32.84 m2 refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	28	161.38
		New	20	1						
20	Kanda Cluster	Rehabilitated and Remodeled	24	1	Provision of mechanised borehole water supply	2 No Rambo 2000, 1 Rambo 1000 and 1 No Rambo 500	32.84 m2 refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	41	419.9
21	Anumle Cluster of Schools	Rehabilitated and Remodeled	20	1	Provision of mechanised borehole water supply	3 No Rambo 2000 and 1 No Rambo 500	32.84 m2 refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	40	368.34
		Rehabilitated and Remodeled	10	2						
		New	3	1						
22	Shiayennor 1&2 Primary	Rehabilitated and Remodeled	10	1	Provision of mechanised borehole water supply	1 No Rambo 2000	24.75 m2 refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	20	86.34

	SCHOOL	SANITATION			WATER SUPPLY		SOLID WASTE	FURNACE	DRAINAGE	PAVEMENT
No		Description of Facility	Capacity of WC/No. of Seats	No.	Borehole Water Supply	Water Storage facility	Floor Area/No. of 240L Bins	Floor Area/No.	Length of U-drain/m	Total Area/m <sup>2</sup>
23	Shiayennor A&B JHS	Rehabilitated and Remodelled	10	1	Provision of mechanised borehole	1 No Rambo 1000 and 1 No Rambo 500	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	20	86.34
24	Kaneshie 6 Primary/	Rehabilitated and Remodelled	20	1	Provision of mechanised borehole	1 No Rambo 1000 and 1No Rambo 100	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	48	372.86
	Kaneshie Kingsway 1 JHS A&B	Rehabilitated and Remodeled	10	1		1 No Rambo 2000 and 1 No Rambo 1000	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins			
25	and Kaneshie 8 primary/Kaneshie Kingsway 2 JHS A&B	Rehabilitated and Remodeled	12	1						
26	La Bawaleshie Presby Cluster	Rehabilitated and Remodeled	10	1	Provision of mechanised borehole	2 No Rambo 2000	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	20	86.34
27	Maamobi Prisons Cluster	Rehabilitated and Remodeled	10	1	Provision of mechanised borehole		24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	20	86.34
28	Dzorwulu JHS	Rehabilitated and Remodeled	10	1	Provision of mechanised borehole	2 No Rambo 1000	24.75 m <sup>2</sup> refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	20	86.34
		Rehabilitated and Remodeled	10	1						
29	Kwashieman Cluster	Rehabilitated and Remodeled	24	1	Provision of mechanised borehole	6 No Rambo 2000	32.84 m <sup>2</sup> refuse holding bay and 4No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	48	540.34
		Rehabilitated and Remodeled	12	1						
		New	24	1						

	SCHOOL	SANITATION			WATER SUPPLY		SOLID WASTE	FURNACE	DRAINAGE	PAVEMENT
No		Description of Facility	Capacity of WC/No. of Seats	No.	Borehole Water Supply	Water Storage facility	Floor Area/No. of 240L Bins	Floor Area/No.	Length of U-drain/m	Total Area/m2
30	Darkuman 1 JHS	New	10	1	Provision of mechanised borehole	1 No Rambo 1000	24.75 m2 refuse holding bay and 3No. 240L bins	0.91m <sup>2</sup> Furnace fitted with smoke stack	18	86.34

## 9 APPROXIMATE BULK/GROSS COST OF PROPOSED INTERVENTIONS

The table below provides breakdown of the approximate cost of proposed interventions in each of the selected schools.

Table 8.1: Bulk/Gross cost estimates of proposed school WASH facility interventions

No.	Schools	Toilet with septic tank (GH¢)	Drainage (GH¢)	Pavement (GH¢)	Borehole (GH¢)	SWHB (GH¢)	Furnace fitted with smoke stack (GH¢)	Total Cost (GH¢)
1	Abossey Okai 1& 2 Cluster	353,734.12	47,002.96	13,052.56	15,000	23,722.1325	4,500.00	457,011.78
2	Kaneshie West 1&2 Cluster	556,628.34	51,150.28	20,539.23		23,722.13	4,500.00	656,539.98
3	Mataheko R/C Cluster	308,407.04	41,473.20	11,380.02		23,722.13	4,500.00	389,482.39
4	Korle Gonno R/C Boys	287,311.01	53,915.16	10,601.59	15,000.00	23,722.13	4,500.00	395,049.89
5	Owusu Mills Primary/JHS	148,358.03	26,266.36	5,474.32	15,000.00	23,722.13	4,500.00	223,320.83
6	Socco/M1 Cluster of Schools	377,214.08	47,002.96	13,918.96		23,722.13	4,500.00	466,358.12
7	Sempe '8' & '12' JHS	148,358.03	27,648.80	5,474.32	15,000.00	23,722.13	4,500.00	224,703.27
8	Dr F.V. Nanka Bruce JHS	140,977.68	26,266.36	5,201.99		23,722.13	4,500.00	200,668.16
9	Accra Newtown 6&8 Primary Classroom Block	263,504.49	37,325.88	9,723.15	15,000.00	23,722.13	4,500.00	353,775.65
10	Accra Newtown 4&11 Primary Classroom Block							
11	Kwame Nkrumah JHS	38,436.58	9,677.08	1,418.29	15,000.00	23,722.13		88,254.08
12	Ayalolo Cluster of Schools	766,935.55	30,413.68	28,299.43	15,000.00	23,722.13	4,500.00	868,870.79
13	Independence 1&2 Cluster	281,955.36	19,354.16	10,403.97	15,000.00	23,722.13	4,500.00	354,935.62
14	Osu Presby Cluster	308,407.04	19,354.16	11,380.02		23,722.13	4,500.00	367,363.35
15	Farisco Cluster of Schools	308,407.04	19,354.16	11,380.02	15,000.00	23,722.13	4,500.00	382,363.35
16	Osu St. Barnabas Anglican Schools	228,268.24	23,501.48	8,422.95		23,722.13	4,500.00	288,414.80



No.	Schools	Toilet with septic tank (GH¢)	Drainage (GH¢)	Pavement (GH¢)	Borehole (GH¢)	SWHB (GH¢)	Furnace fitted with smoke stack (GH¢)	Total Cost (GH¢)
17	Osu Salem 1 Primary Schools	122,526.81	13,824.40	4,521.16	15,000.00	23,722.13	4,500.00	184,094.51
18	Osu Salem 5 Primary School	140,977.68	13,824.40	5,201.99		23,722.13		183,726.20
19	Unity Cluster	263,504.49	19,354.16	9,723.15	15,000.00	23,722.13	4,500.00	335,803.93
20	Kanda Cluster	685,621.12	28,340.02	25,298.98	15,000.00	23,722.13	4,500.00	782,482.25
21	Anumle Cluster of Schools	601,432.92	27,648.80	22,192.49	15,000.00	23,722.13	4,500.00	694,496.34
22	Shiayennor 1&2 Primary	140,977.68	13,824.40	5,201.99	15,000.00	23,722.13	4,500.00	203,226.20
23	Shiayennor A&B JHS	140,977.68	13,824.40	5,201.99	15,000.00	23,722.13	4,500.00	203,226.20
24	Kaneshie 6 Primary/ Kaneshie Kingsway 1 JHS A&B	608,813.27	33,178.56	22,464.82	15,000.00	23,722.13	4,500.00	707,678.77
25	Kaneshie 8 Primary/ Kaneshie Kingsway 2 JHS A&B							
26	La Bawaleshie Presby Cluster	140,977.68	13,824.40	5,201.99	15,000.00	23,722.13	4,500.00	203,226.20
27	Mamobi Prisons Cluster	140,977.68	13,824.40	5,201.99	15,000.00	23,722.13	4,500.00	203,226.20
28	Dzorwulu JHS	140,977.68	13,824.40	5,201.99	15,000.00	23,722.13	4,500.00	203,226.20
29	Kwashieman Cluster	883976.09	33,178.56	32,555.49	15,000.00	23,722.13	4,500.00	991,234.14
30	Darkuman 1 JHS	140,977.68	12,441.96	5,201.99		23,722.13	4,500.00	186,843.76
	<b>TOTAL</b>	<b>8,667,922.94</b>	<b>730,619.54</b>	<b>319,840.74</b>	<b>300,000.00</b>	<b>664,219.71</b>	<b>74,293.31</b>	<b>10,799,602.93</b>

## 10 PROJECT LOTING AND TENDER DOCUMENTS

### 10.1 Project Loting

We propose to divide the entire project scope of works into nineteen (19) lots as follows:

Table 10.1: Proposed Contract Packaging

Lot	Name of School	Description of Works
1	Abossey Okai 1 & 2 Cluster	<ul style="list-style-type: none"> <li>• Completion of new 16-seater 2-storey toilet with septic tank</li> <li>• Rehabilitation of 10-seater WC with septic tank</li> <li>• Provision of mechanised borehole and 2No. Rambo 2000 and 1No. Ram 500</li> <li>• Provision of a 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins</li> <li>• Provision of 68m length U-drain</li> <li>• Paving 236.42 m<sup>2</sup> of the site</li> <li>• Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
	Kaneshie West 1&2 Cluster	<ul style="list-style-type: none"> <li>• Rehabilitation and remodelling of existing 16-seater to 20-seater to meet GES standards.</li> <li>• Provision of new 3-seater and 10-seater WC with septic tank</li> <li>• Provision of 2No. Rambo 2000 and 1No. Rambo 500</li> <li>• Provision of a 32.84m<sup>2</sup> refuse holding bay and 4No. 240L bins</li> <li>• Provision of 74m length U-drain</li> <li>• Paving 340.9 m<sup>2</sup> of the site</li> <li>• Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
2	Mataheko R/C Cluster	<ul style="list-style-type: none"> <li>• Rehabilitation and remodelling of 24-seater WC with septic tank</li> <li>• Provision of 2No. Rambo 2000 and 1No. Rambo 1000</li> <li>• Provision of a 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins</li> <li>• Provision of 60 m length U-drain</li> <li>• Paving 188.88m<sup>2</sup> of the site.</li> <li>• Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
3	Osu Presby Cluster	<ul style="list-style-type: none"> <li>• Rehabilitation and remodelling of existing 20-seater WC to meet GES standards.</li> <li>• Provision of 2 No Rambo 2000.</li> <li>• Provision of 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins.</li> <li>• Provision of 28m length of U-drain.</li> <li>• Paving 188.88m<sup>2</sup> of the site.</li> <li>• Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
4	Osu Salem 1 Primary Schools	<ul style="list-style-type: none"> <li>• Rehabilitation and remodelling of existing 8-seater WC with septic tank</li> <li>• Provision of water supply to school-GWCL and mechanized borehole water supply options will be considered and 1 No Rambo 1000 and 1No. Rambo 500.</li> <li>• Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>• Provision of 20 m length of U-drain.</li> <li>• Paving 75.04 m<sup>2</sup> of the site. Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
	Osu Salem 5 Primary School	<ul style="list-style-type: none"> <li>• Rehabilitation and remodelling of 10-seater WC with septic tank.</li> <li>• Provision of 1 No Rambo 2000.</li> <li>• Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>• Provision of 20 m length of U-drain.</li> <li>• Paving 86.34 m<sup>2</sup> of the site.</li> </ul>
5	Farisco Cluster of Schools	<ul style="list-style-type: none"> <li>• Rehabilitation and remodelling of existing 20-seater facility to meet GES standards.</li> <li>• Provision of water supply to school-GWCL and mechanised borehole water supply options will be considered, 1 No Rambo 2000 and 1 No Rambo 1000.</li> <li>• Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins</li> <li>• Provision of 28m length of U-drain.</li> <li>• Paving 188.88 m<sup>2</sup> of the site.</li> </ul>

Lot	Name of School	Description of Works
		<ul style="list-style-type: none"> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
6	Osu St. Barnabas Anglican Schools	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 10-seater WC facility to 14-seater WC.</li> <li>Reticulation of water to toilet facility and provision of 1 No Rambo 2000 and 1 No Rambo 500.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 20m length of U-drain.</li> <li>Paving 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
7	Independence 1&2 Cluster	<ul style="list-style-type: none"> <li>Provision of new 10-seater WC with septic tank.</li> <li>Provision of a mechanised borehole and 3 No Rambo 2000.</li> <li>Provision of 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins.</li> <li>Provision of 28m length of U-drain.</li> <li>Paving 172.68 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
8	Ayalolo Cluster of Schools	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of the existing 3 facilities (8, 12 and 20- seater WCs toilets) to meet GES standards.</li> <li>Provision of mechanised borehole water supply and 5 No Rambo 2000.</li> <li>Provision of 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins.</li> <li>Provision of 44m length of U-drain.</li> <li>Paving 469.7 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
9	Korle Gonno R/C Boys	<ul style="list-style-type: none"> <li>Provision of new 14-seater WC with septic tank</li> <li>Provision of mechanised borehole</li> <li>Provision of 1No. Rambo 2000</li> <li>Provision of a 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins</li> <li>Provision of a 78 m length of U-drain</li> <li>Paving 175.96 m<sup>2</sup> of the site</li> </ul>
	Dr F.V. Nanka Bruce JHS	<ul style="list-style-type: none"> <li>Provision of new 10-seater WC with septic tank.</li> <li>Provision of 1No. Rambo 2000</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 38 m length of U-drain.</li> <li>Paving 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
10	Socco/M1 Cluster of Schools	<ul style="list-style-type: none"> <li>Provision of new 10-seater WC with septic tank.</li> <li>Provision of 1No. Rambo 1000 and 1No. Rambo 500</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins</li> <li>Provision of 68 m length of U-drain</li> <li>Paving 231.02m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
11	Sempe 8/12 JHS	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 16-seater WC to 12-seater WC.</li> <li>Provision of water supply to school-GWCL and mechanised borehole water supply options will be considered and 1No. Rambo 1000.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 40 m length of U-drain.</li> <li>Paving 90.86 m<sup>2</sup> of site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
	Owusu Mills Primary/ JHS	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 16-seater WC facility to 12-seater WC with septic tank.</li> <li>Provision of mechanised borehole with 1No. Rambo 1000.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 38m length of U-drain.</li> <li>Paving 90.86 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
12	Accra Newtown 6&8 Primary Classroom Block	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of 8-seater WC with septic tank.</li> </ul>

Lot	Name of School	Description of Works
	Accra Newtown 4&11 Primary Classroom Block	<ul style="list-style-type: none"> <li>Provision of new 10-seater WC with septic tank.</li> <li>Provision of mechanised borehole, 1No. Rambo 1000 and 2No. Rambo 500.</li> <li>Provision of 2No 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 54 m length of U-drain</li> <li>Paving 161.38 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
	Kwame Nkrumah JHS	<ul style="list-style-type: none"> <li>Rehabilitation of existing bio-fill toilet</li> <li>Provision of mechanised borehole and 2 No. Rambo 500.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 14 m length of U-drain.</li> <li>Paving 23.54 m<sup>2</sup> of the site</li> </ul>
	Unity Cluster	<ul style="list-style-type: none"> <li>Provision of new 10 and 20-seater WC with septic tanks.</li> <li>Provision of mechanised borehole water supply with 2 No Rambo 2000, 1 Rambo 1000 and 1 No Rambo 500.</li> <li>Provision of 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins.</li> <li>Provision of 28 m length of U-drain.</li> <li>Paving 161.38 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
13	Kanda Cluster	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 20-seater to 24-seater WC with septic tank.</li> <li>Provision of mechanised borehole with 2 No Rambo 2000, 1 Rambo 1000 and 1 No Rambo 500.</li> <li>Provision of 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins.</li> <li>Provision of 41 m length of U-drain.</li> <li>Paving 419.9 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
14	Anumle Cluster of Schools	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of 20-seater WC and 2No 10-seater WC and provision of a new 3-seater WC.</li> <li>Provision of mechanised borehole water supply and 3 No Rambo 2000 and 1 No Rambo 500.</li> <li>Provision of 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins.</li> <li>Provision of 40 m length of U-drain.</li> <li>Paving 368.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
15	Shiayennor 1&2 Primary	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 10-seater WC with septic tank.</li> <li>Provision of mechanised borehole water and 1 No Rambo 2000.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 20 m length of U-drain.</li> <li>Paving of 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
	Shiayennor A&B JHS	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of 10-seater with septic tank.</li> <li>Provision of water supply to school-GWCL and mechanised borehole water supply options will be considered and 1 No Rambo 1000 and 1 No Rambo 500.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 20 m length of U-drain.</li> <li>Paving 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
16	Kaneshie 6 Primary/ Kaneshie Kingsway 1 JHS A&B and Kaneshie 8 Primary/ Kaneshie Kingsway 2 JHS A&B	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of 20,10 and 12-seater WC with septic tank.</li> <li>Provision of water supply to school-GWCL and mechanised borehole water supply options will be considered with 2 No Rambo 1000, 1 No Rambo 2000 and 1No Rambo 100.</li> <li>Provision of 48m length of U-drain and 20m length of U-drain</li> <li>Provision of 2 No 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Paving of 372.86 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
17	La Bawaleshie Presby	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 10-seater facility with septic tank.</li> </ul>

Lot	Name of School	Description of Works
	Cluster	<ul style="list-style-type: none"> <li>Provision of water supply to school-GWCL and mechanised borehole water supply options will be considered.</li> <li>Provision of 2 No Rambo 2000.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 20m length of U-drain.</li> <li>Paving 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
	Maamobi Prisons Cluster	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 10-seater facility and provision of ancillary facilities to meet GES standards.</li> <li>Provision of water supply to school-GWCL and mechanised borehole water supply options will be considered.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 20 m length of U-drain.</li> <li>Paving of 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
18	Dzorwulu JHS	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of 2 No 10-seater WC with septic tanks.</li> <li>Provision of mechanised borehole and 2 No Rambo 1000.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 20 m length of U-drain.</li> <li>Paving 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
19	Kwashieman Cluster	<ul style="list-style-type: none"> <li>Rehabilitation and remodelling of existing 20-seater WC to 24-seater WC with septic tank.</li> <li>Rehabilitation of existing 12-seater WC facility to meet GES standards.</li> <li>Provision of new 24-seater WC with septic tank.</li> <li>Provision of mechanised borehole with 6 No Rambo 2000</li> <li>Provision of 32.84 m<sup>2</sup> refuse holding bay and 4No. 240L bins</li> <li>Provision of 48 m length of U-drain.</li> <li>Paving 540.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>
	Darkuman 1 JHS	<ul style="list-style-type: none"> <li>Provision of new 10-seater WC with septic tank.</li> <li>Provision of mechanised borehole with 1 No Rambo 1000.</li> <li>Provision of 24.75 m<sup>2</sup> refuse holding bay and 3No. 240L bins.</li> <li>Provision of 18 m length of U-drain.</li> <li>Paving of 86.34 m<sup>2</sup> of the site.</li> <li>Provision of 0.91m<sup>2</sup> furnace fitted with smoke stack</li> </ul>

We recommend bidding to be opened to eligible bidders who have registered with the Ministry of works and housing and have certificates with financial class D2/K2 and above. Bidding should be made flexible such that bidders may bid for more than one lot.

Table 10.2 below shows bulk/gross cost estimates for the proposed school WASH interventions per lot.

Table 10.2: Bulk/Gross cost estimates of proposed interventions of per lot

Lot	School	Total Cost	Total Cost of Lot (GHC)
1	Abossey Okai 1& 2 Cluster	457,011.78	1,113,551.76
	Kaneshie West 1&2 Cluster	656,539.98	
2	Mataheko R/C Cluster	389,482.39	389,482.39
3	Osu Presby Cluster	367,363.35	367,363.35
4	Osu Salem 1 Primary Schools	184,094.51	367,820.71
	Osu Salem 5 Primary School	183,726.20	
5	Farisco Cluster of Schools	382,363.35	382,363.35
6	Osu St. Barnabas Anglican Schools	288,414.80	288,414.80
7	Independence 1&2 Cluster	354,935.62	354,935.62
8	Ayalolo Cluster of Schools	868,870.79	868,870.79
9	Korle Gonno R/C Boys	395,049.89	595,718.05
	Dr F.V. Nanka Bruce JHS	200,668.16	
10	Socco/M1 Cluster of Schools	466,358.12	466,358.12
11	Sempe '8' & '12' JHS	224,703.27	448,024.10
	Owusu Mills Primary/JHS	223,320.83	
12	Accra Newtown 6&8 Primary Classroom Block	353,775.65	777,833.66
	Accra Newtown 4&11 Primary Classroom Block		
	Kwame Nkrumah JHS	88,254.08	
	Unity Cluster	335,803.93	
13	Kanda Cluster	782,482.25	782,482.25
14	Anumle Cluster of Schools	694,496.34	694,496.34
15	Shiayennor 1&2 Primary	203,226.20	406,452.40
	Shiayennor A&B JHS	203,226.20	
16	Kaneshie 6 Primary/Kaneshie Kingsway 1 JHS A&B	707,678.77	707,679.77
	Kaneshie 8 Primary/Kaneshie Kingsway 2 JHS A&B		
17	La Bawaleshie Presby Cluster	203,226.20	406,452.40
	Mamobi Prisons Cluster	203,226.20	
18	Dzorwulu JHS	203,226.20	203,226.20
19	Kwashieman Cluster	991,234.14	1,178,077.90
	Darkuman 1 JHS	186,843.76	
	TOTAL		10,799,603.96



## 10.2 Tender Documents

The entire project which comprises nineteen (19) lots will be packaged separately. Tender information in all tender documents will be the same and will consist of:

- ❖ The Tender which has five sections – Sections (1-5)
- ❖ Technical Specification – Section 6
- ❖ Un-priced Bills of Quantities – Section 7
- ❖ Working Drawings – Section 8 and
- ❖ Sample Forms of Securities – Section 9

Details of the various main sections of the Tender Documents are as follows:

### 10.2.1 *The Tender*

The tender is made up of the following:

- ❖ Invitation for Bids, IFB (Section 1)
- ❖ Instruction to Bidders, ITB (Section 2)
- ❖ Form of Bid and Qualification Information (Section 3)
- ❖ Conditions of Contract (Section 4) and
- ❖ Contract Data (Section 5)

### 10.2.2 *Technical Specification*

The technical specification consists of description of works, materials, equipment and methods of works under the following:

- ❖ General provisions
- ❖ Earthworks
- ❖ Concrete works
- ❖ Brickwork and Blockwork
- ❖ Roofing
- ❖ Carpentry and Joinery
- ❖ Ironmongery
- ❖ Plumbing and Electrical Installations
- ❖ Electrical Installations
- ❖ Plasterwork, Floor, Wall and Ceiling Finishes
- ❖ Cleaning
- ❖ Glazing
- ❖ Painting and Decoration and
- ❖ Roads, Drains and Paved Ways
- ❖ Sewer, Septic Tanks and Water Mains

### 10.2.3 *Bills of Quantities (BOQs)*

Bills of Quantities in the Tender documents are un-priced meaning unit rate columns are without their unit costs. Un-priced bills of quantities (BOQs) have been prepared to give sufficient information on the quantities of works to be performed to enable bids to be priced by all competing bidders on equal

basis. The prepared bills of quantities shall also be used as a guide in measuring works for payment periodically as construction progresses.

#### 10.2.4 *Working Drawings*

Working drawings consists of set of detailed designs/working drawings of recommended interventions in each lot and each set has been presented in the tender documents.

#### 10.2.5 *Sample Forms of Securities*

These are attached forms containing formats of contract agreement, performance bond and advance payments required to be filled by the eligible contractor who wins the bid. They are also key components of the contract documents.

## 11 CONCLUSION

Field studies revealed the poor state of WASH facilities and services in selected schools within the AMA and hence the urgent need for improvements (refer to table 4.1).

The WASH facility interventions recommended are the most cost effective for securing school health and hygiene.

Site observations/interactions also showed that management of the beneficiary schools are aware of the existing sanitation problems and have brought their problems to the attention of both the AMA and the Accra Metro Educational Office for prompt solutions. The lack of action so far has been attributed to financial constraints.

This project therefore offers a timely opportunity for financial support towards improvement of school WASH facilities in AMA. The beneficiaries have expressed satisfaction with inclusion of hygiene promotion and the proposed one (1) year facilities O&M management support to be provided by the Consultant as part of the second phase of the assignment.

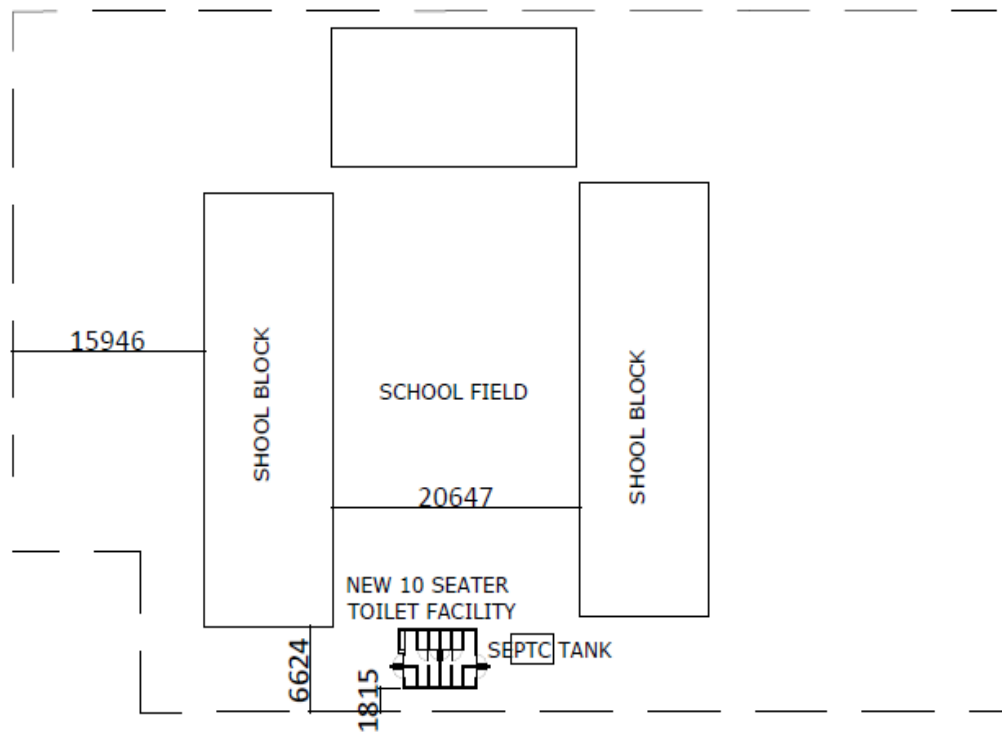
The Consultant has recommended simple designs of the WC toilet options, solid waste holding bays, septic tanks and drainage. All the recommended designs are in line with the minimum standards of GES and the needs expressed by the beneficiary schools.

The total project cost covering all interventions have been estimated as ***GH Cedis 10,799,602.93***

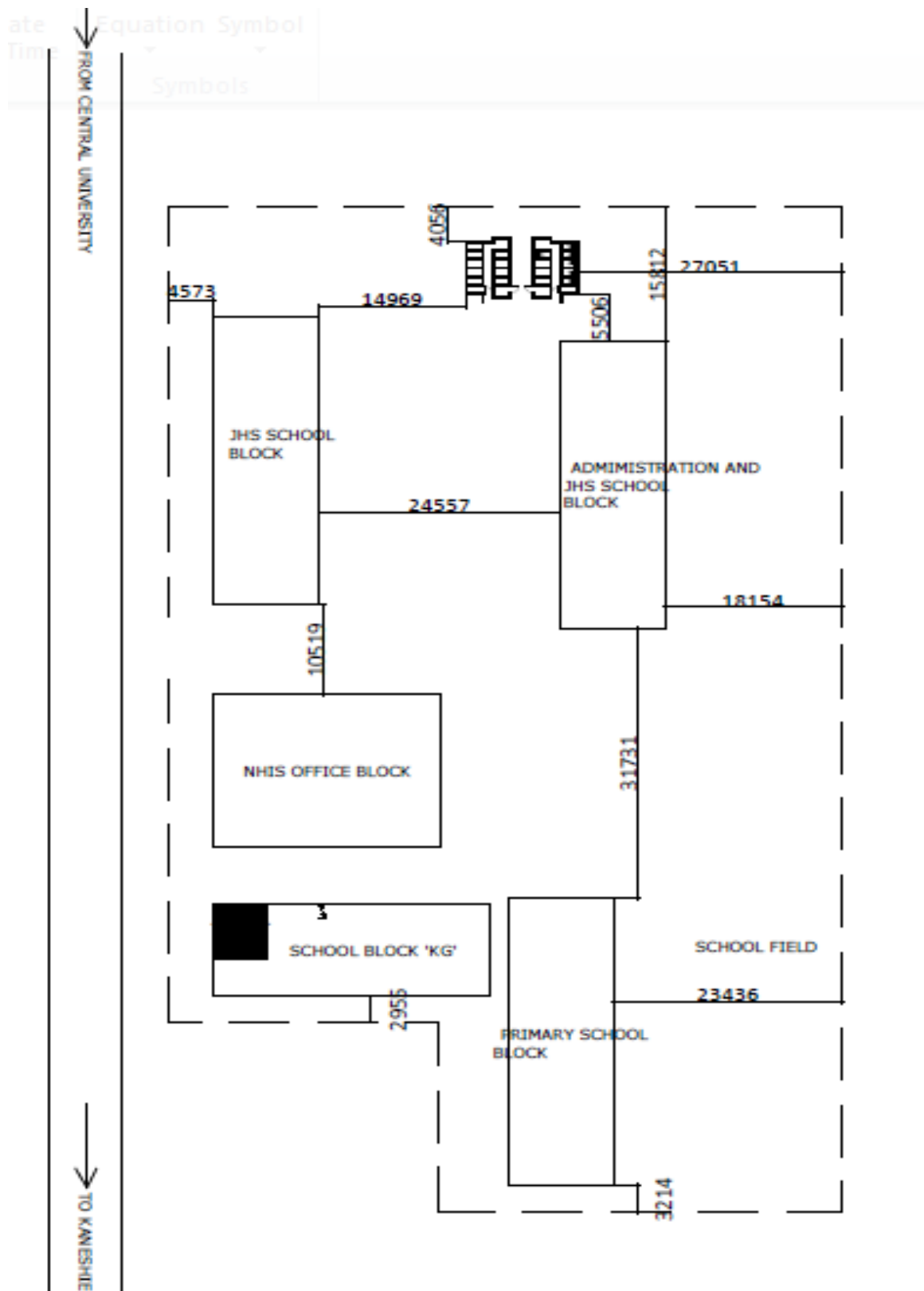
## **12 APPENDICES**

Appendix A:	Block Plans for Schools
Appendix B:	Design Drawings for Sanitation (Toilet) Facilities
Appendix C:	Design Drawings for Septic Tanks
Appendix D:	Design Drawings for Solid Waste Holding Bays
Appendix E:	Geological Map of Accra Metropolitan Area

## 12.1 Block Plans for Schools

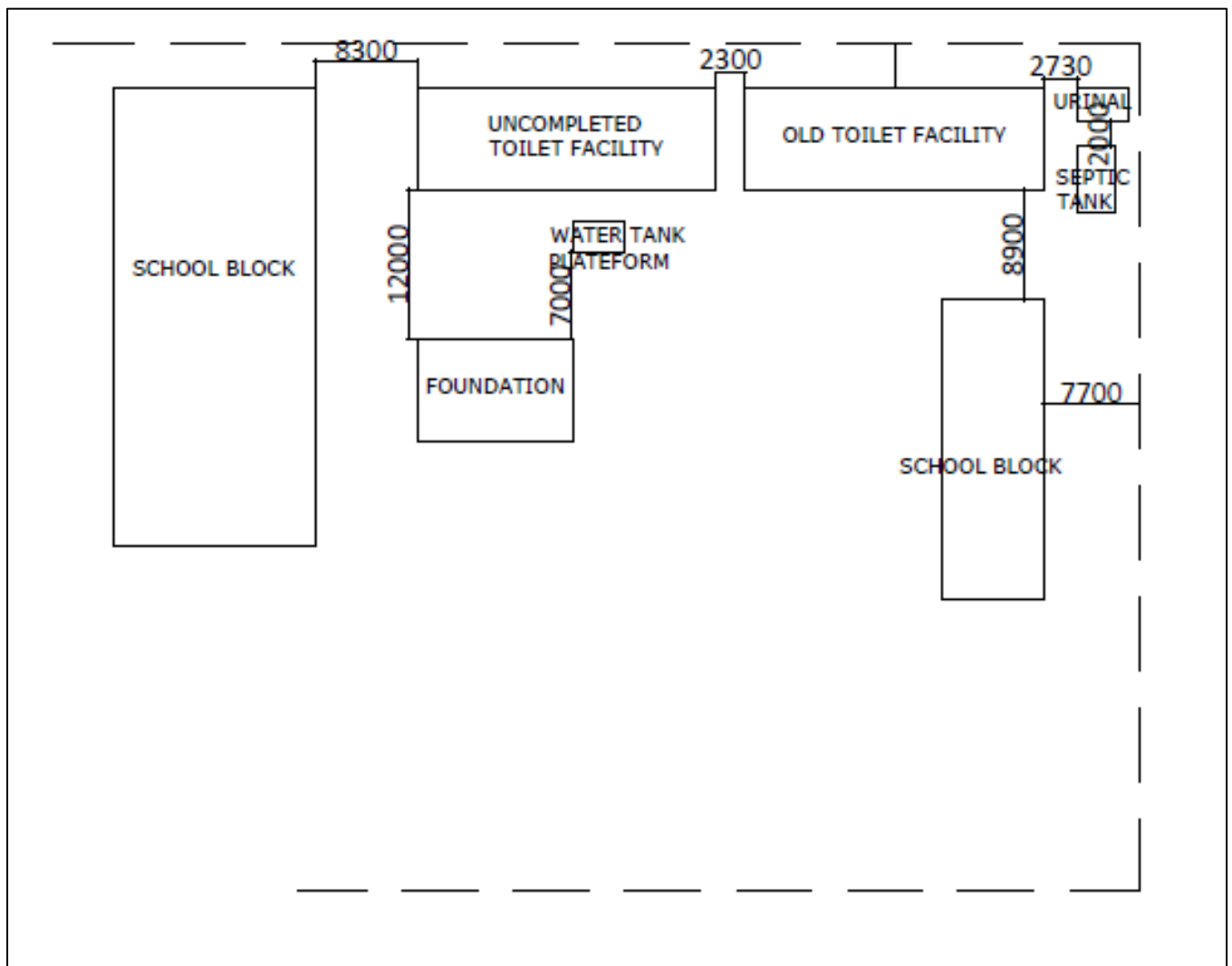


### ABOSSEY OKAI 1&2 CLUSTER

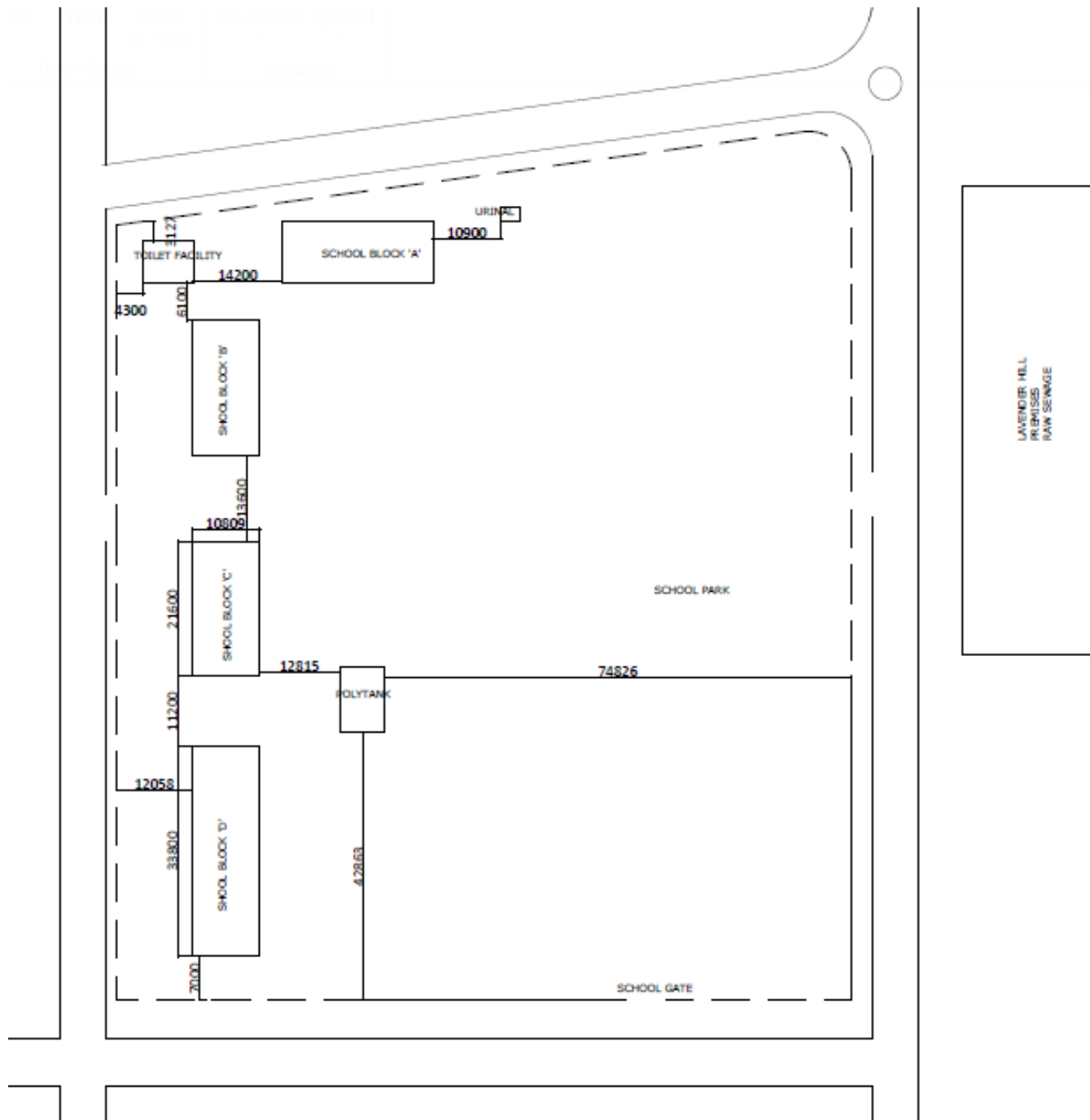


## KANESHIE WEST 1&2 CLUSTER

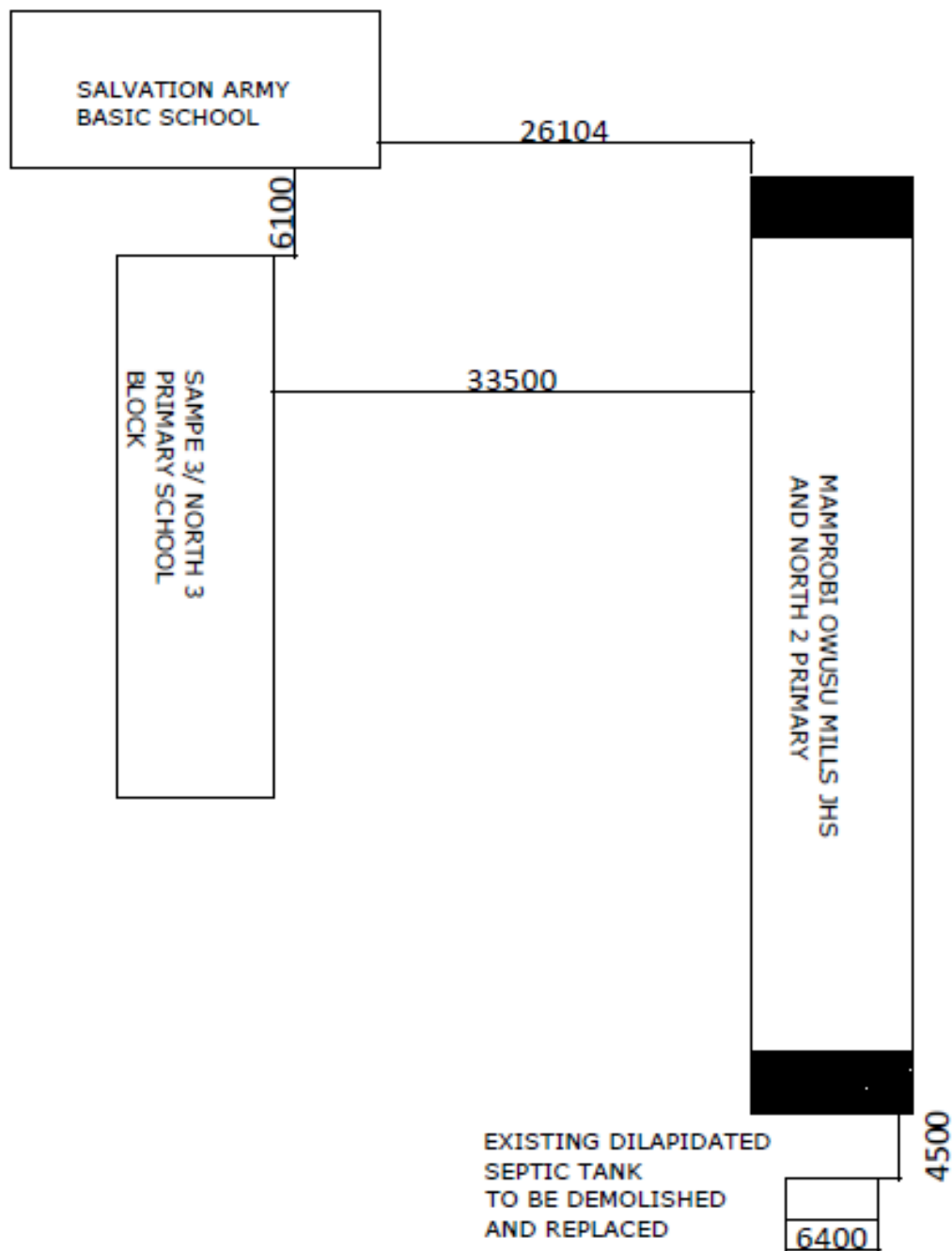




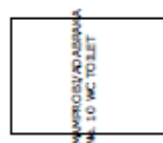
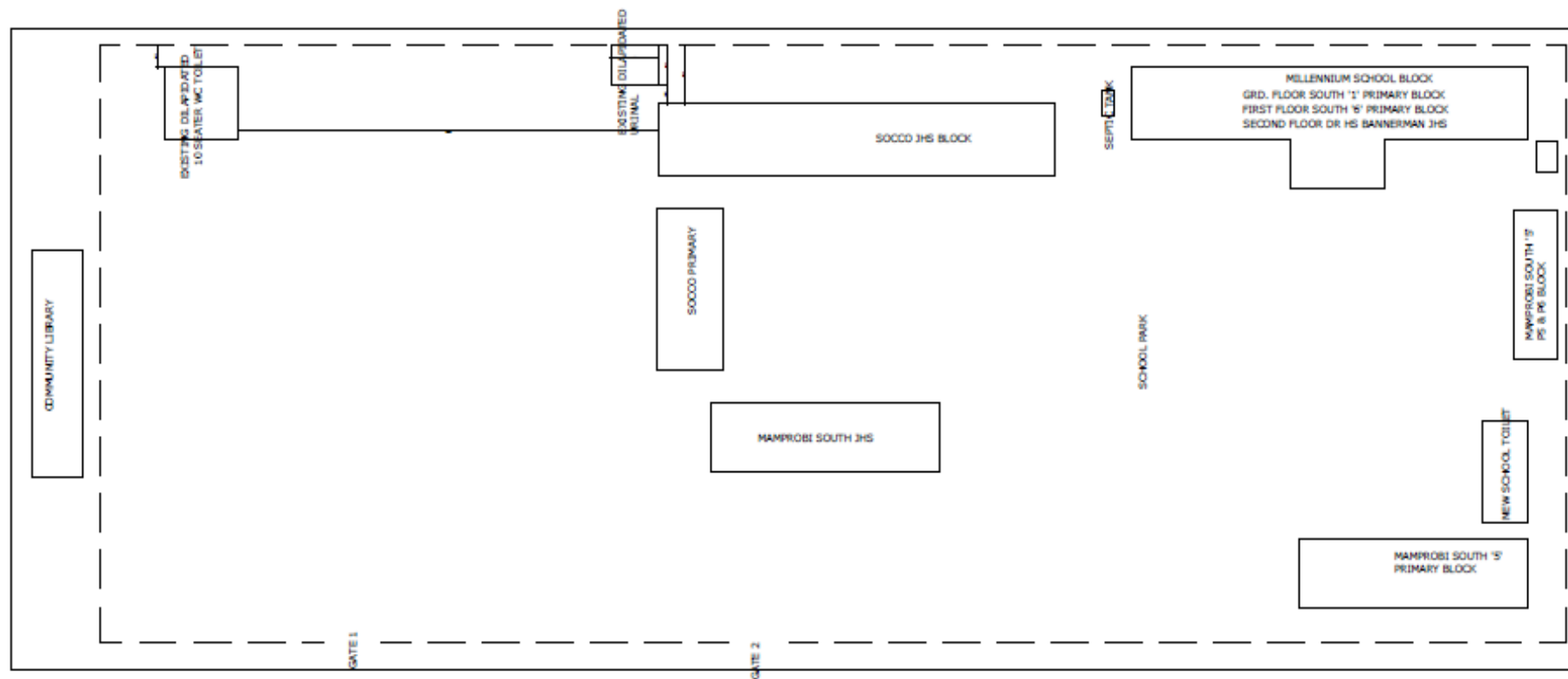
## MATAHEKO R/C CLUSTER



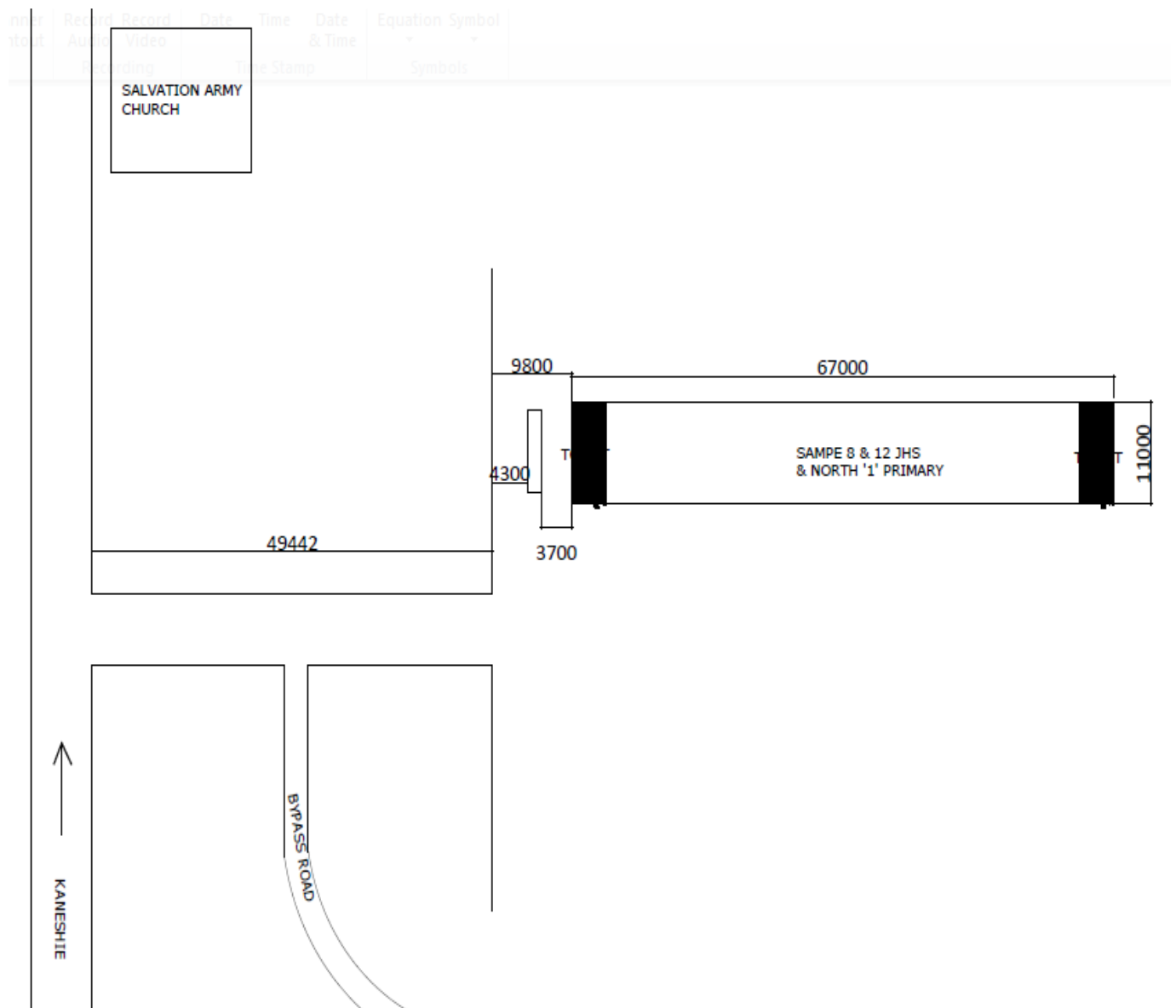
## KORLE GONNO R/C BOYS



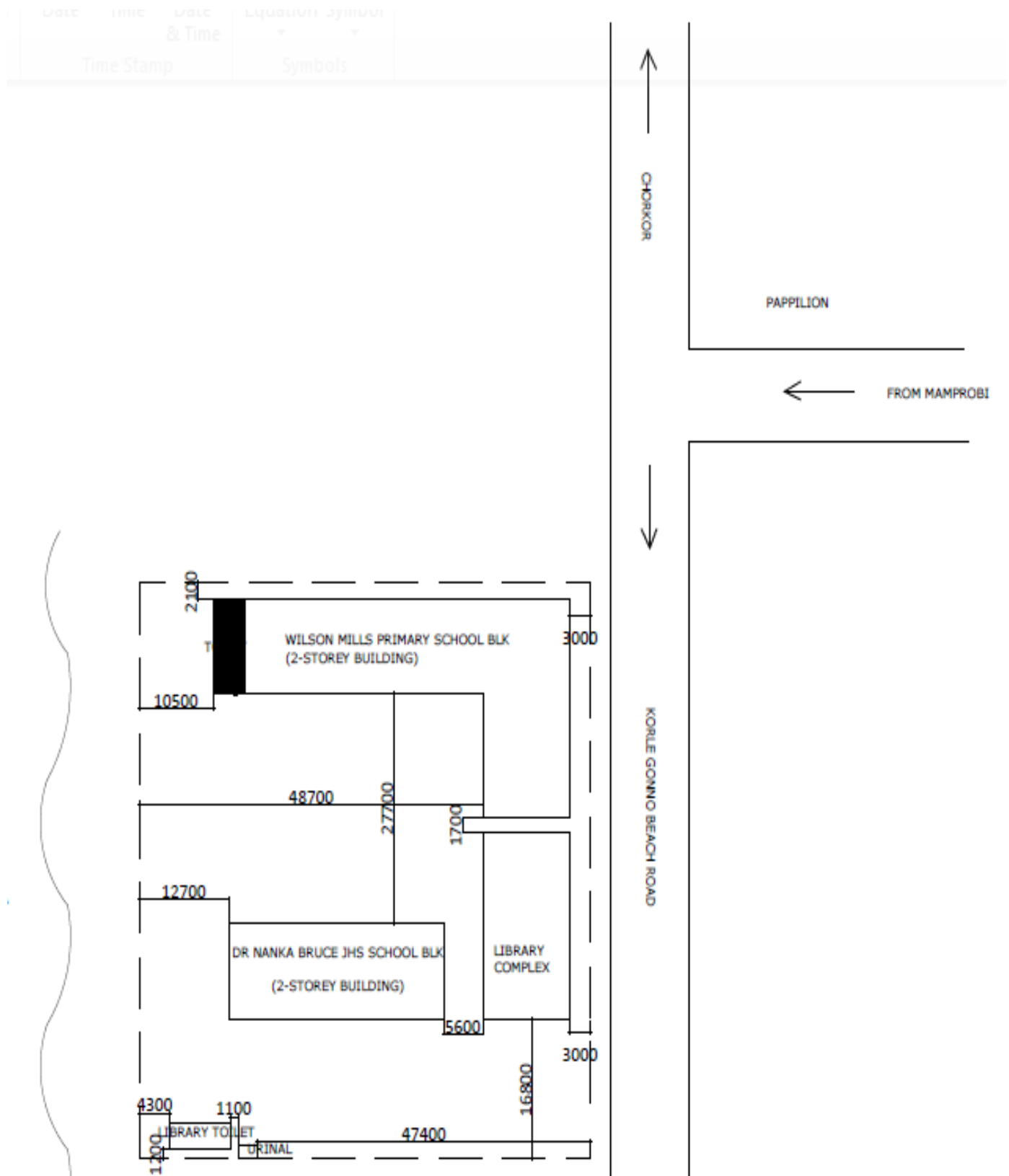
## OWUSU MILLS PRIMARY/JHS



## SOCCO/MAMPROBI 1 CLUSTER

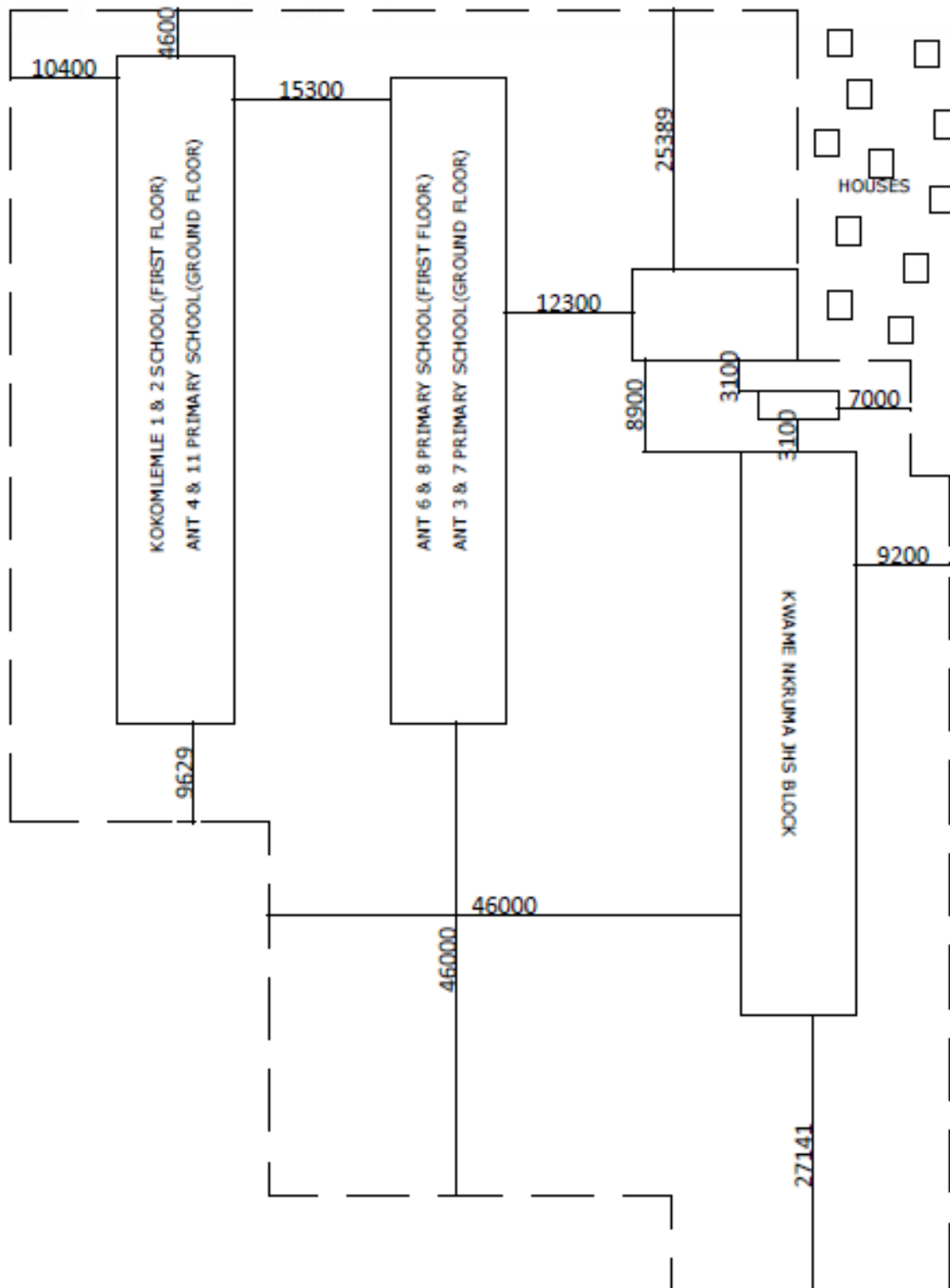


## SEMPE 8 & 12 JHS

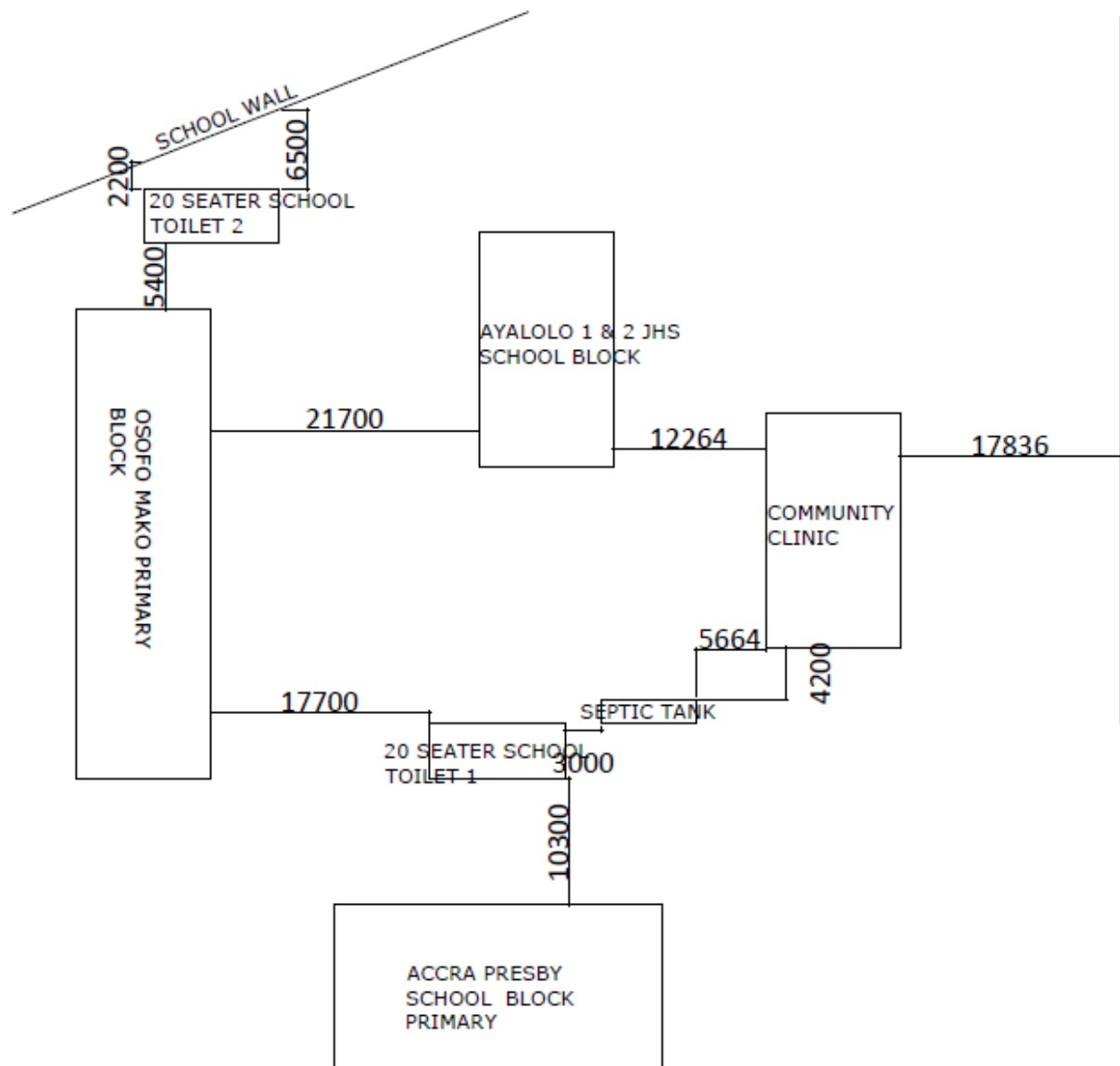


## DR. F.V. NANKA BRUCE JHS

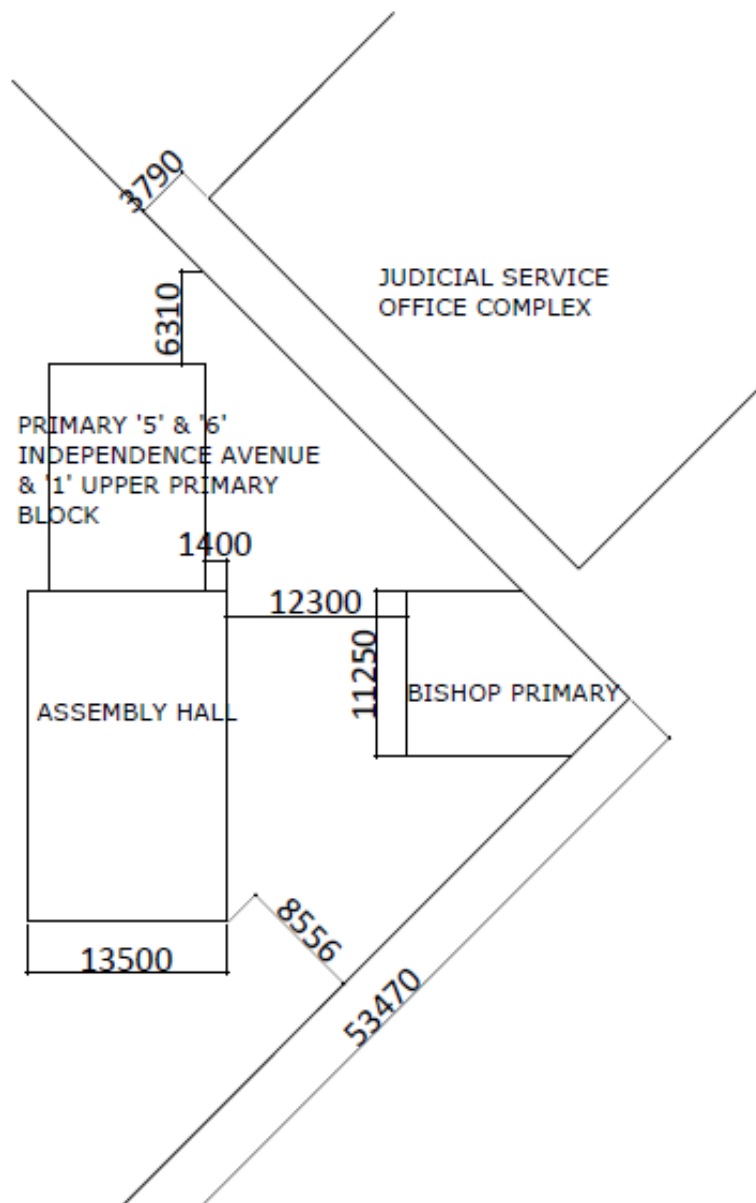




## ACCRA NEWTOWN 4&11 AND 6&8 PRIMARY SCHOOLS AND KWAME NKURUMAH JHS

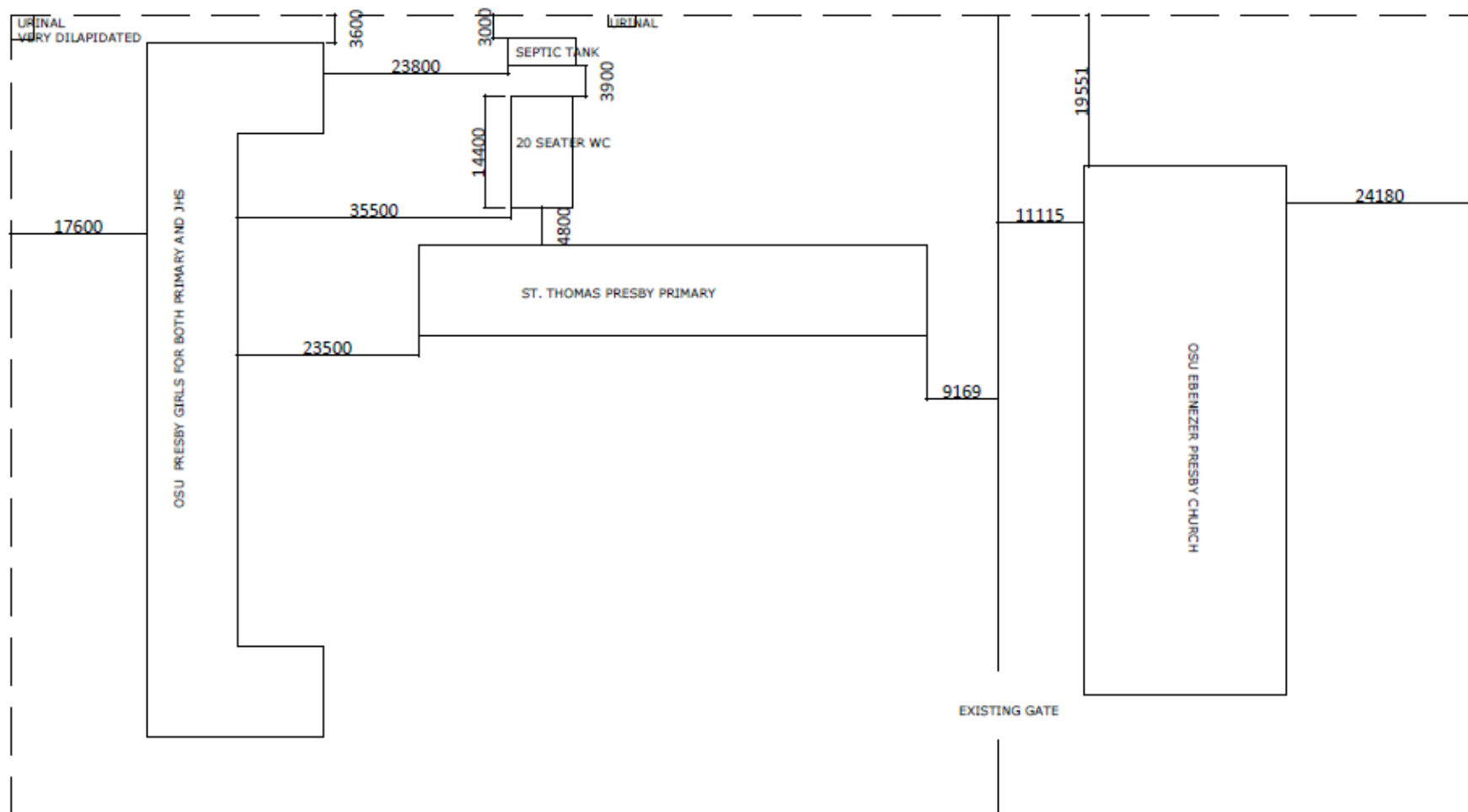


## AYALOLO CLUSTER OF SCHOOLS

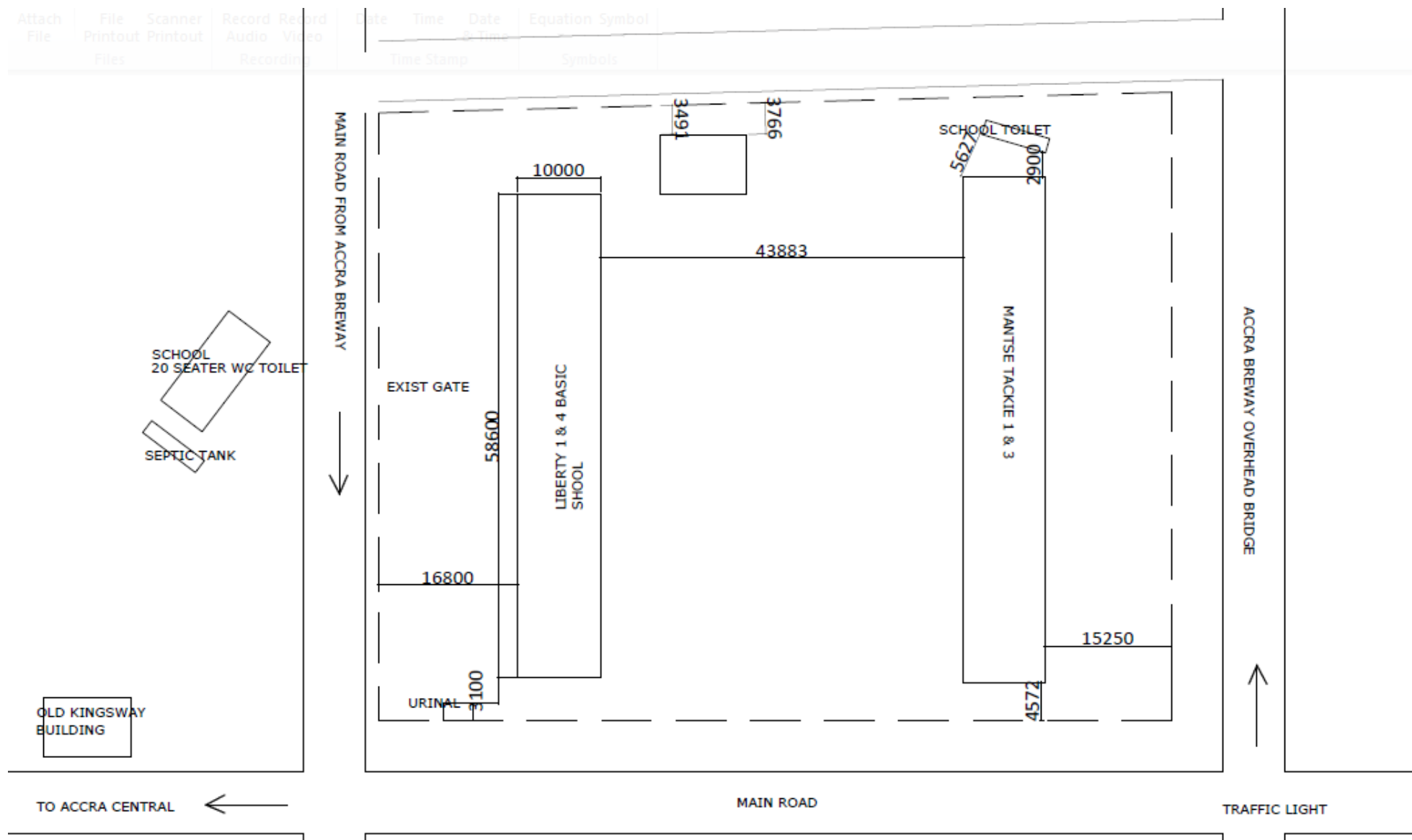


## INDEPENDENCE 1&2 CLUSTER

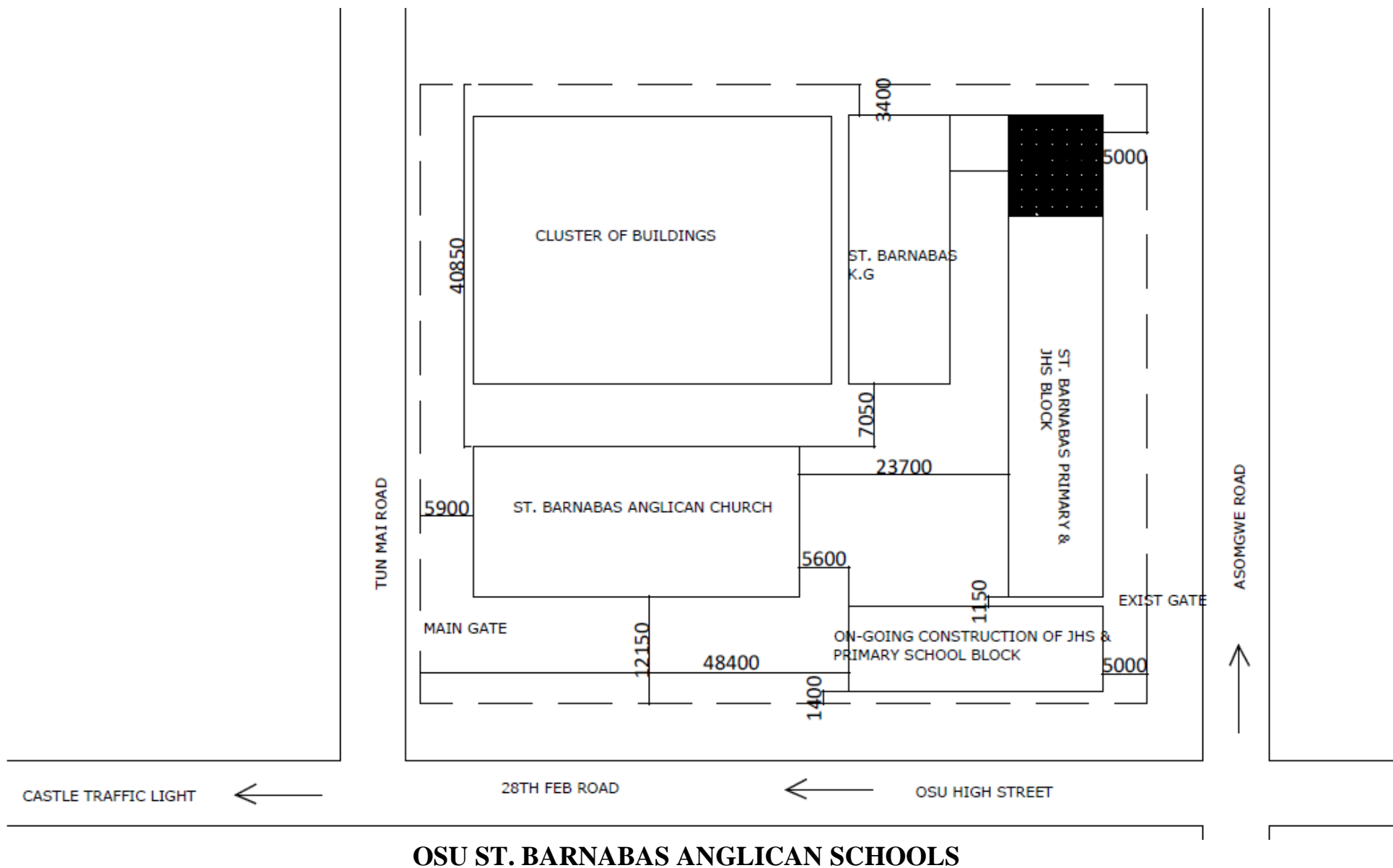
OXFORD ROAD



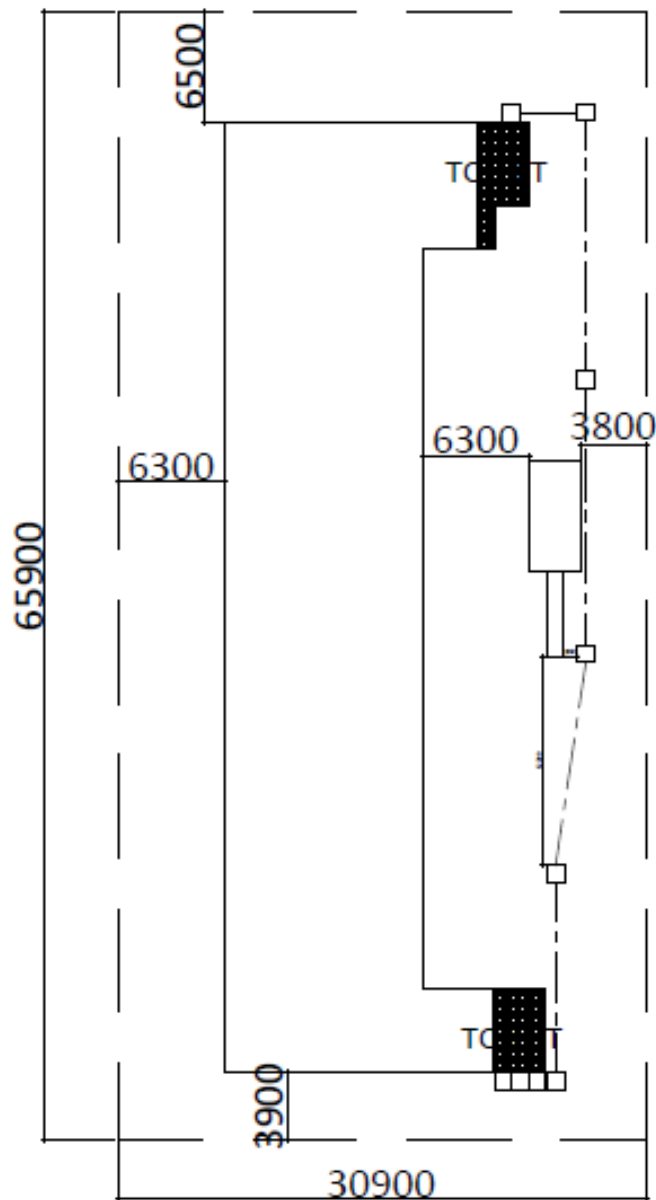
## OSU PRESBY CLUSTER



## FARISCO CLUSTER OF SCHOOLS

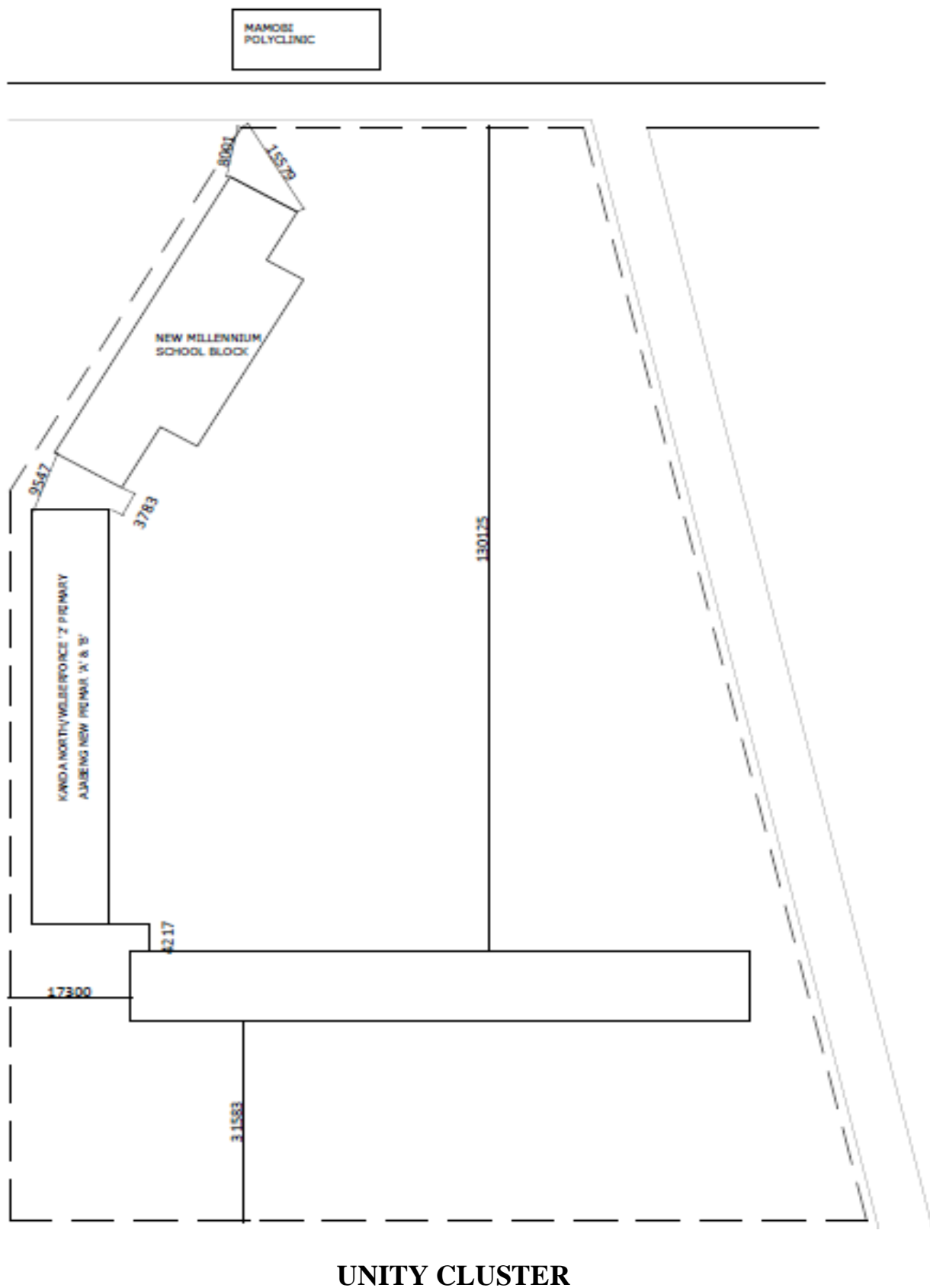


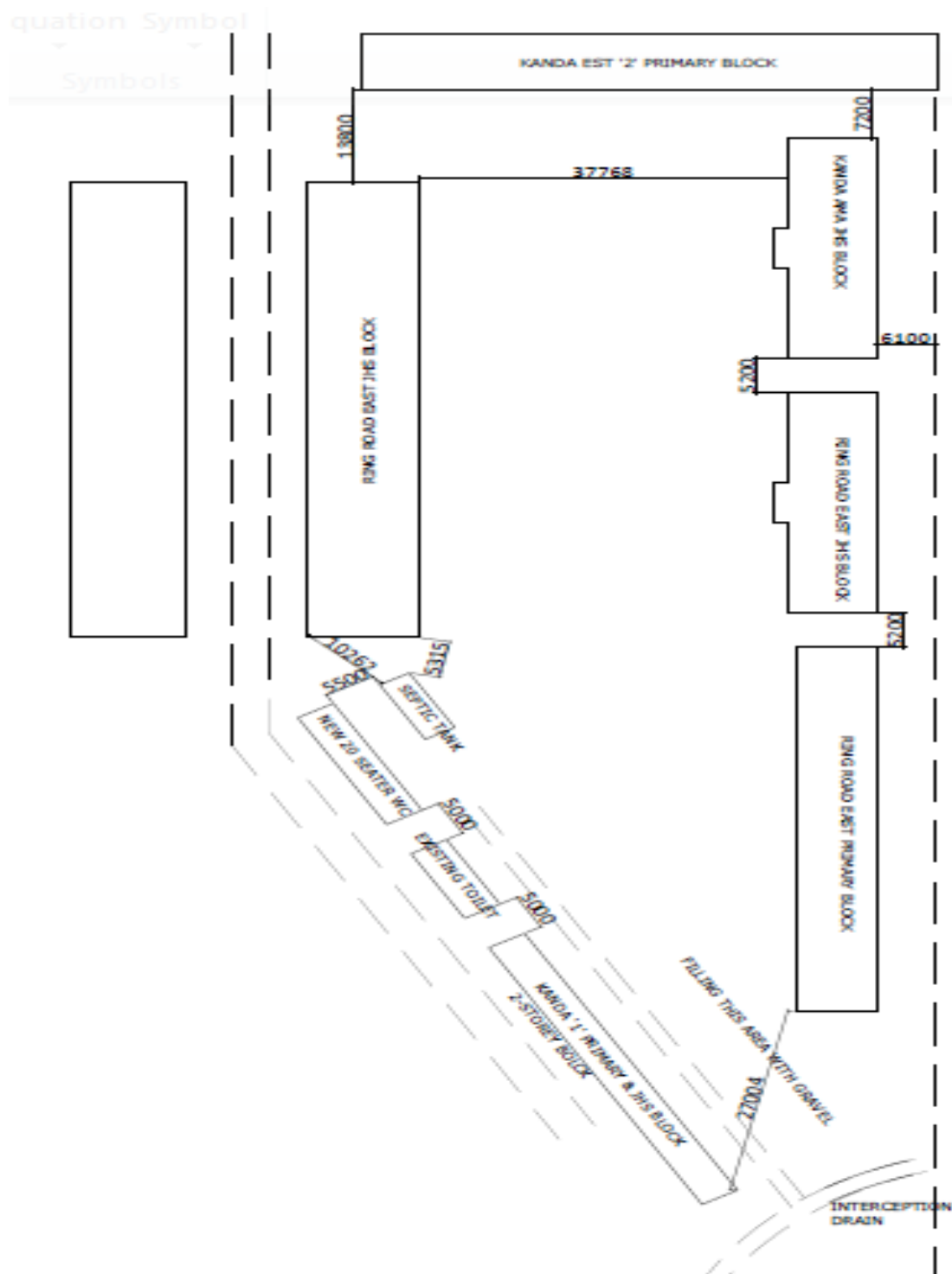
OTU KOFI'S STREET



OSU SALEM 1 PRIMARY SCHOOL

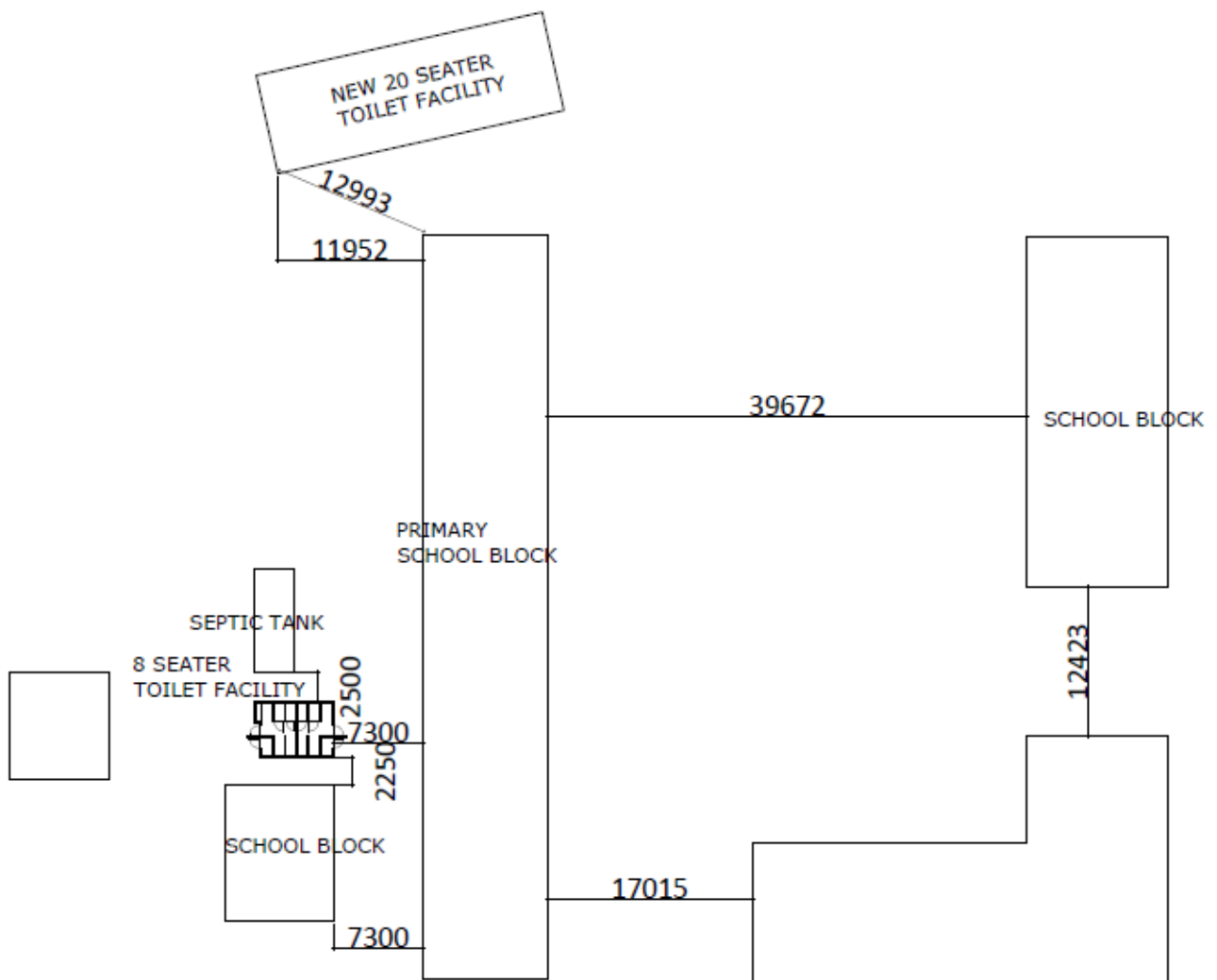




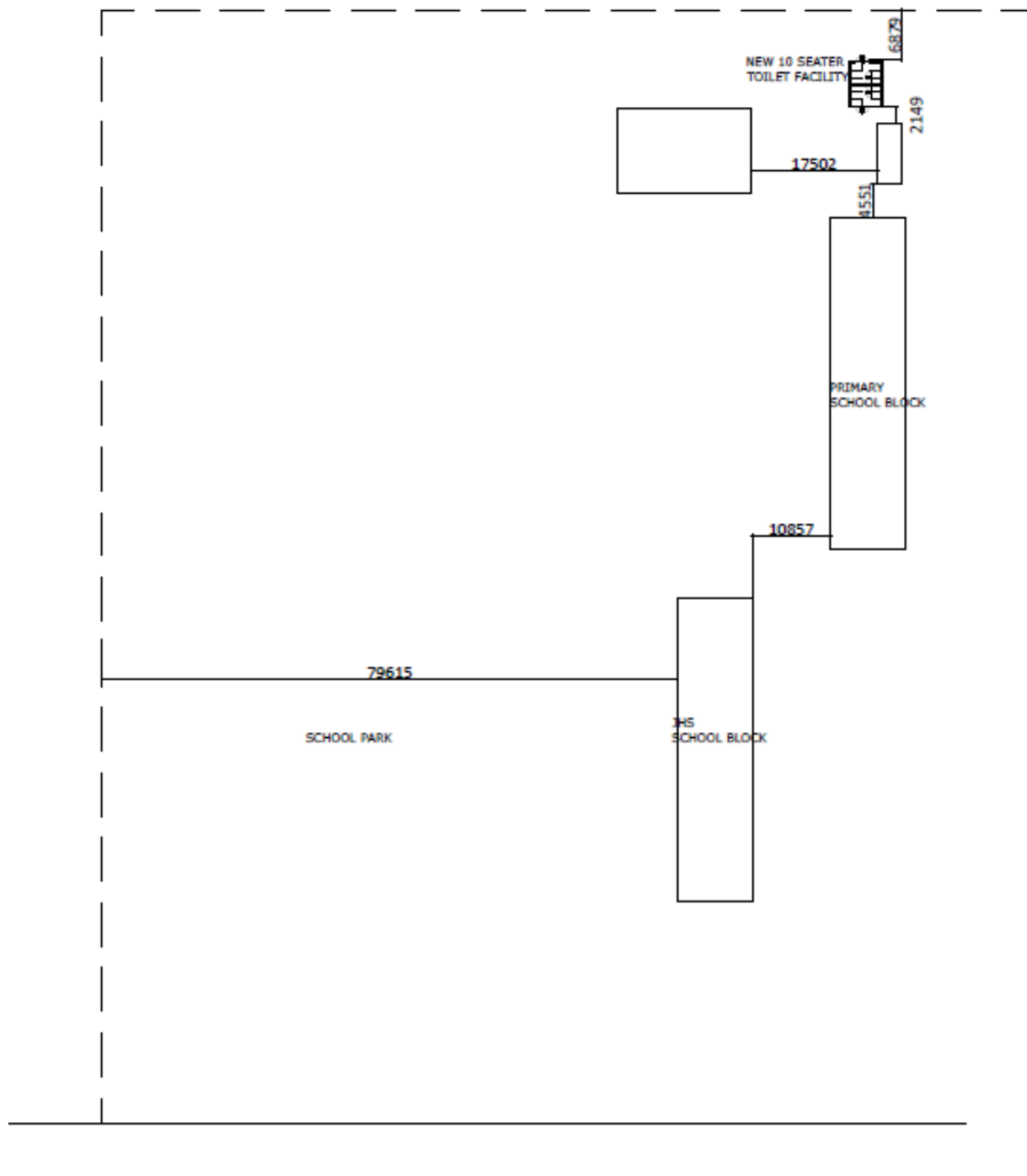


## KANDA CLUSTER SCHOOLS

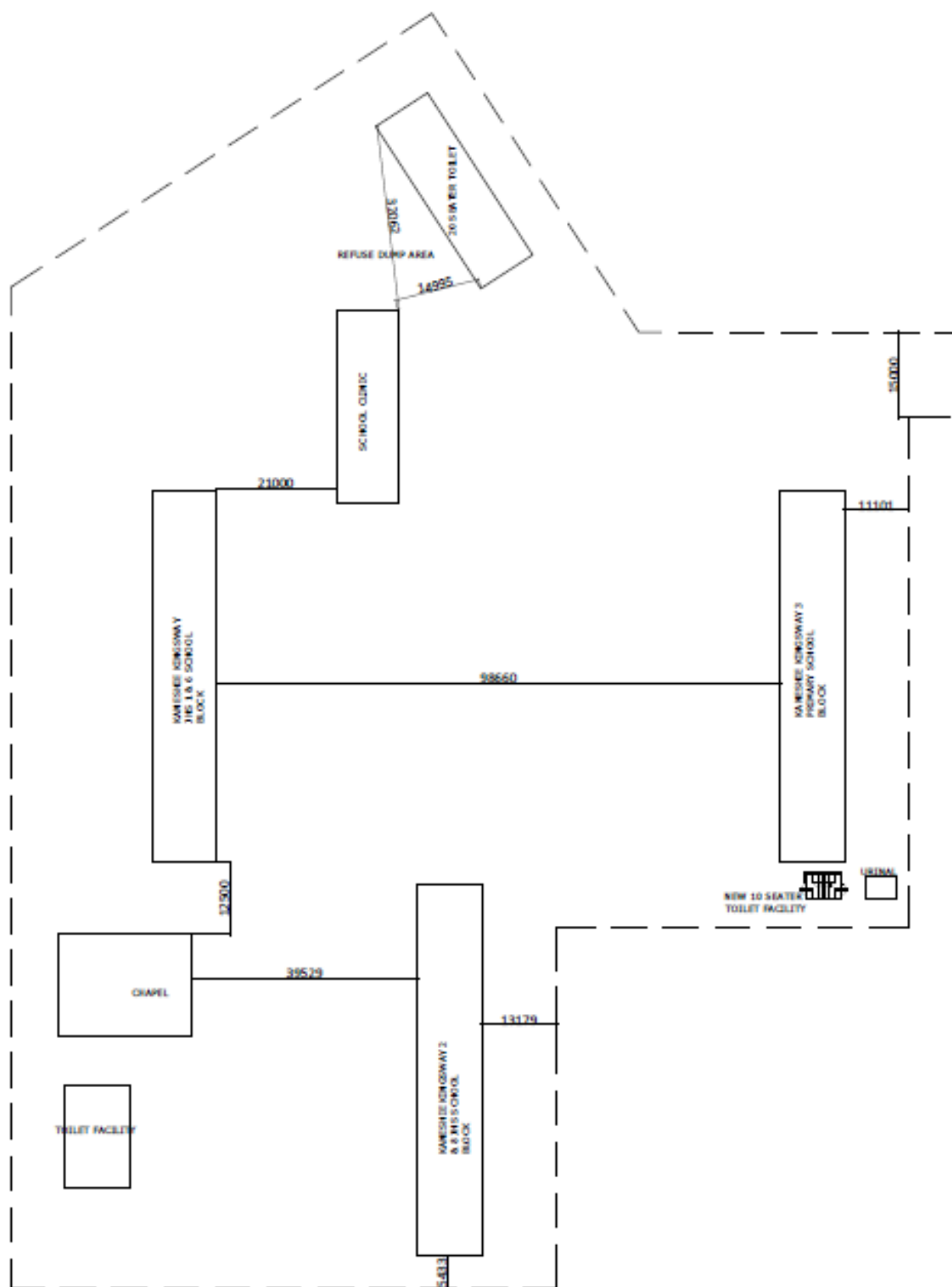




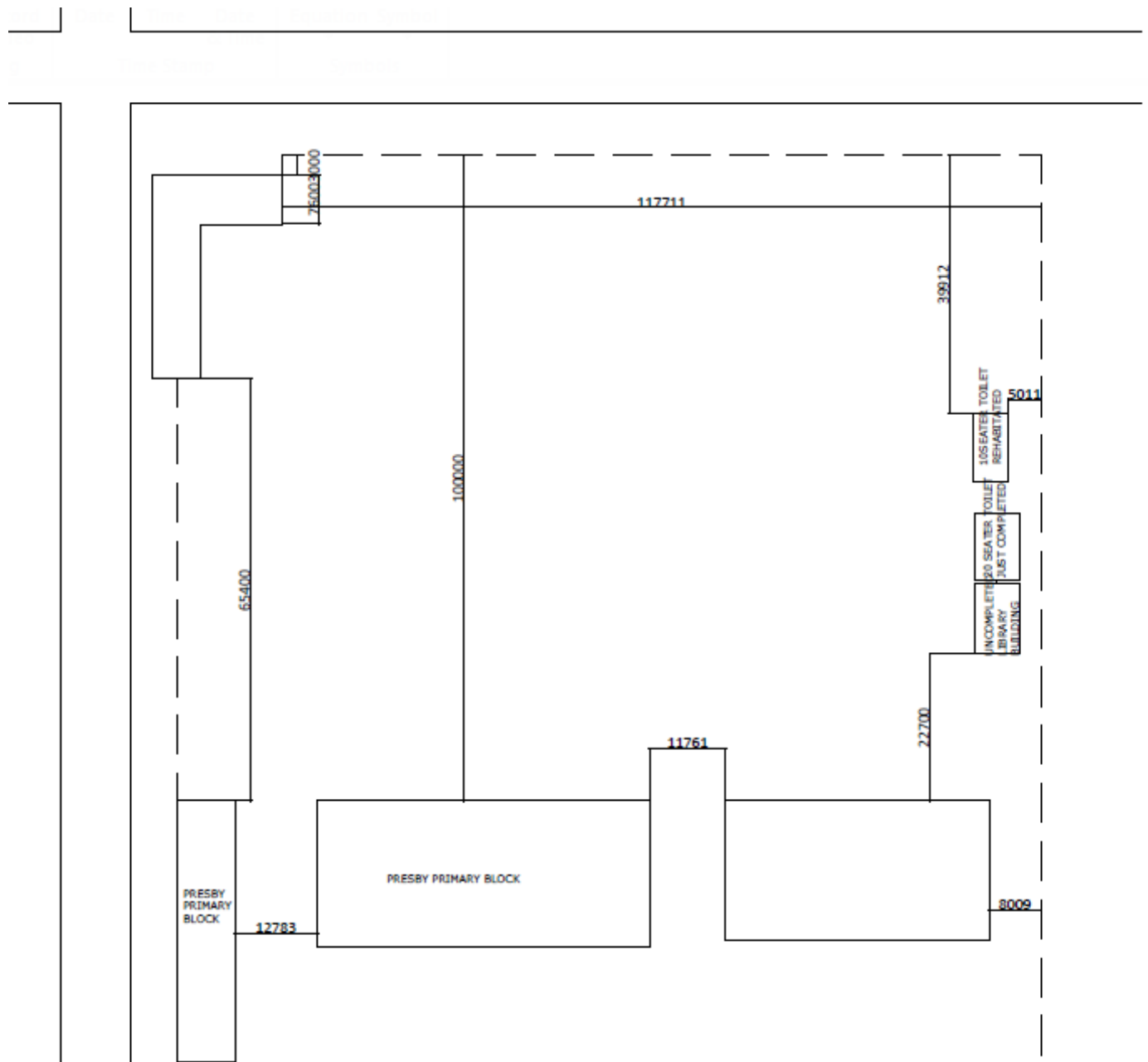
## SHIAYENNOR 1&2 PRIMARY



## SHIAYENNOR A&B JHS

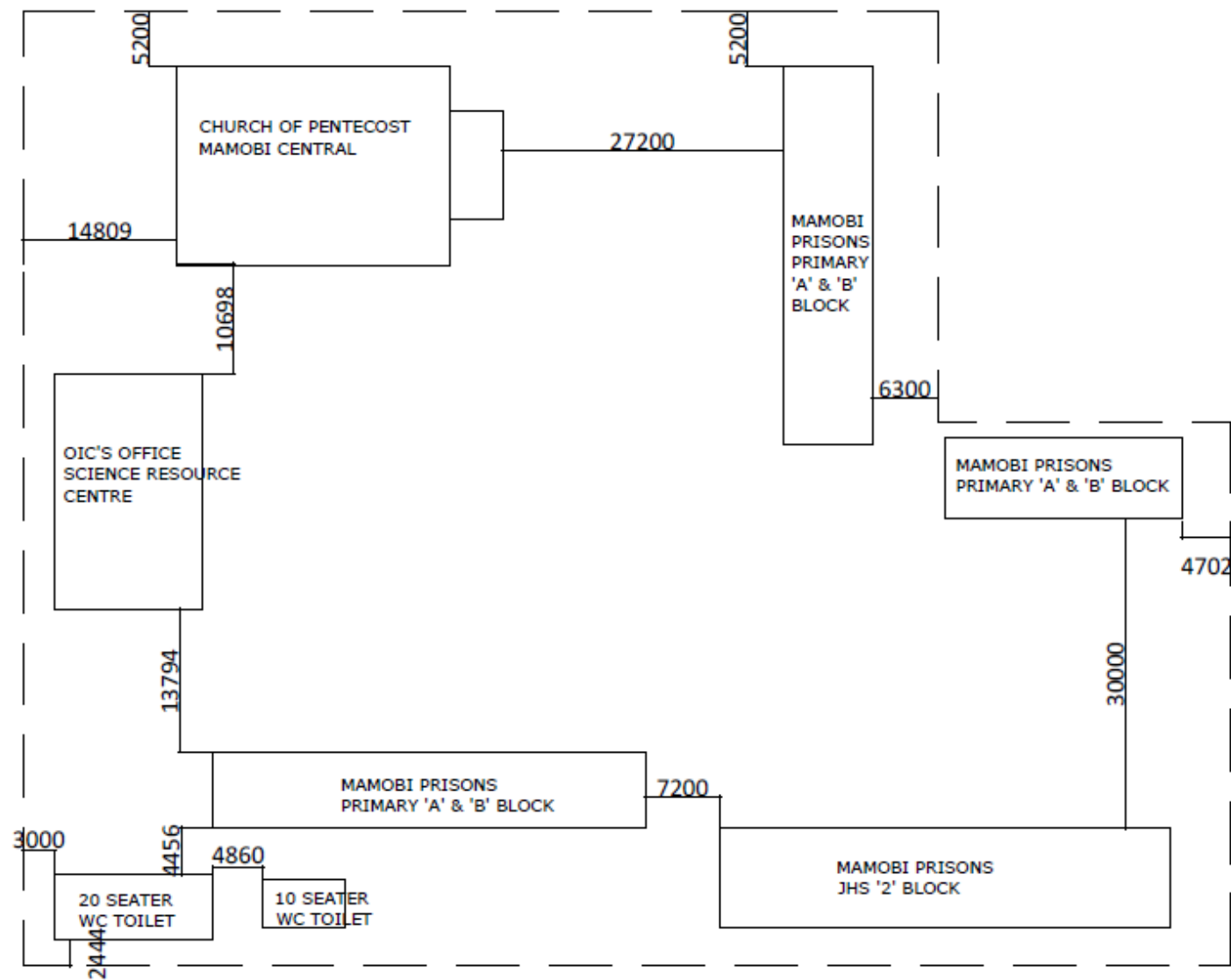


## KANESHIE/KINGSWAY CLUSTER

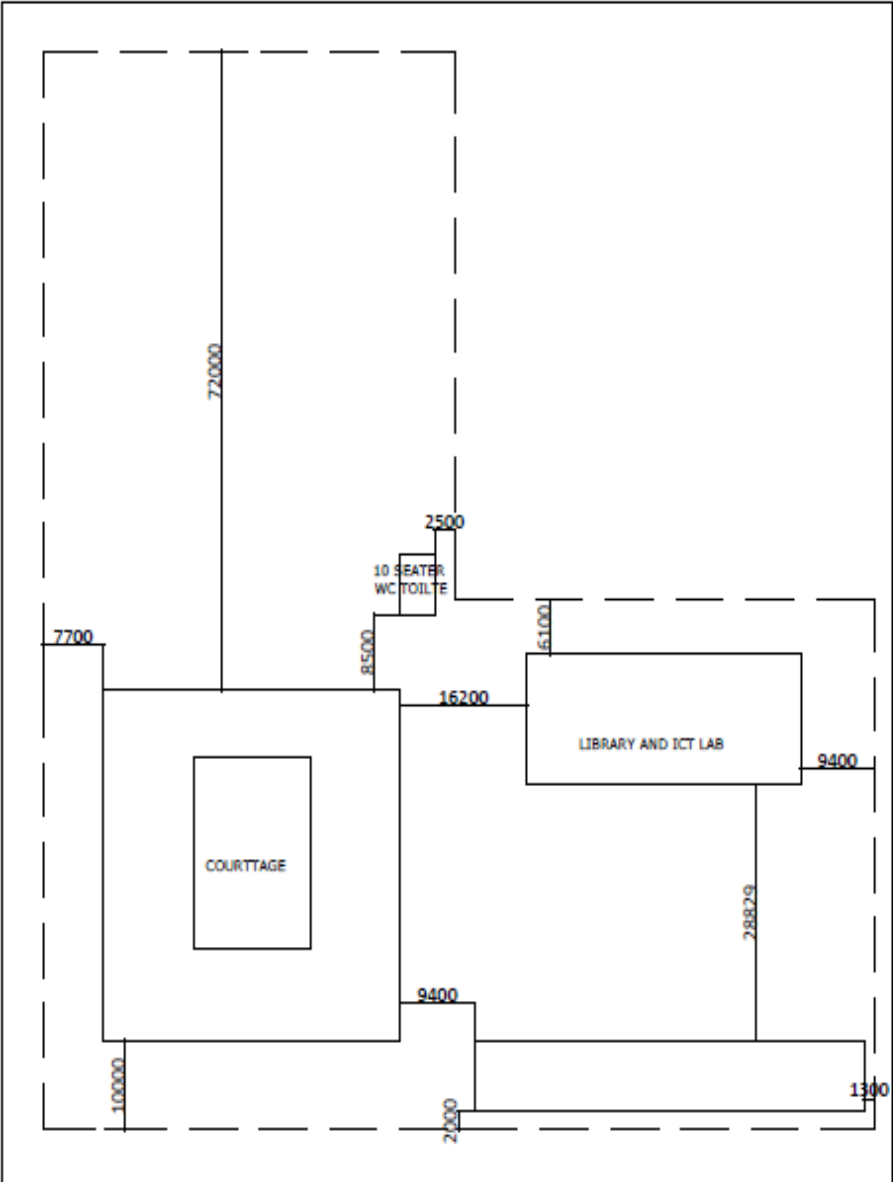


## LA BAWALESHE PRESBY CLUSTER

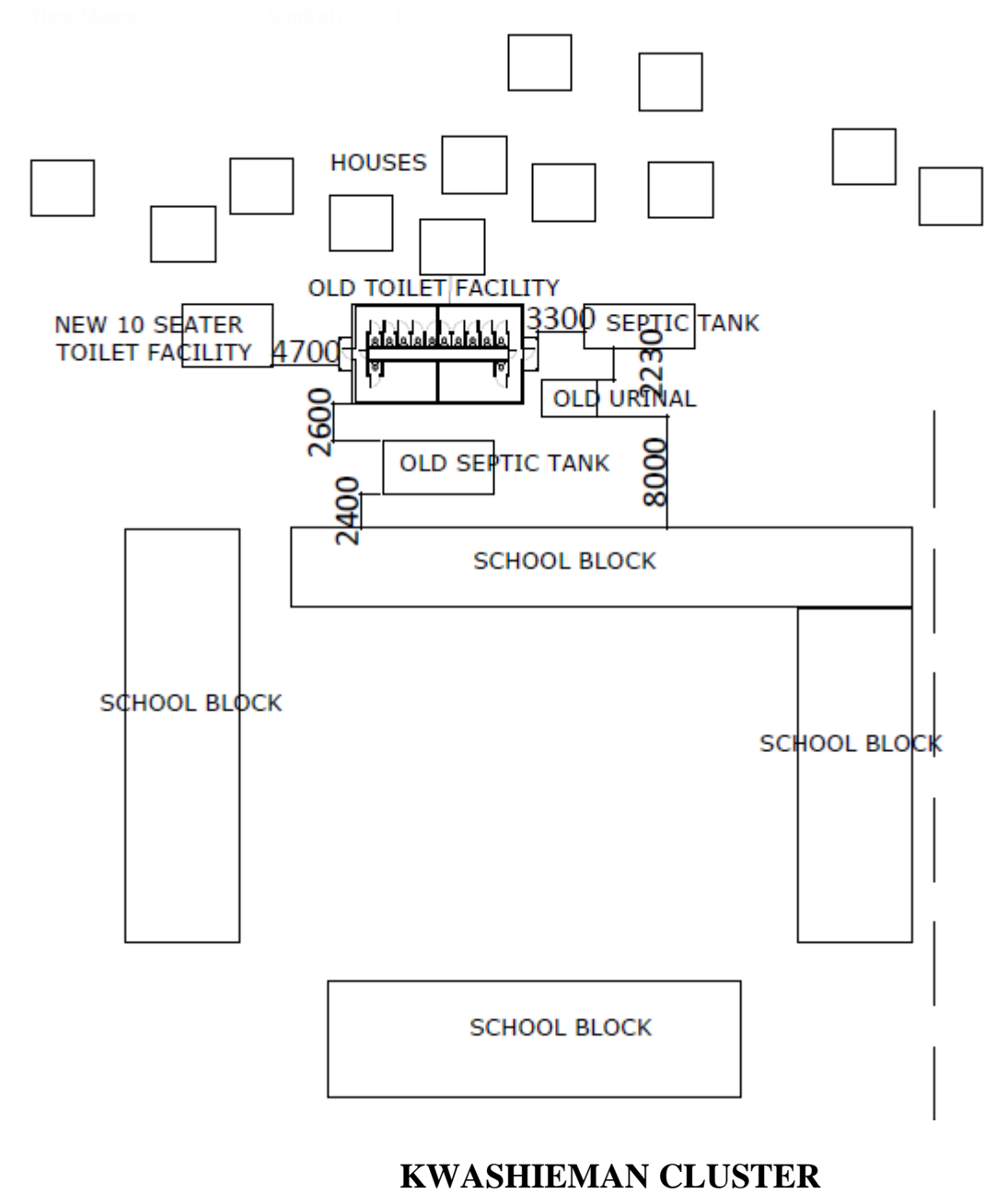




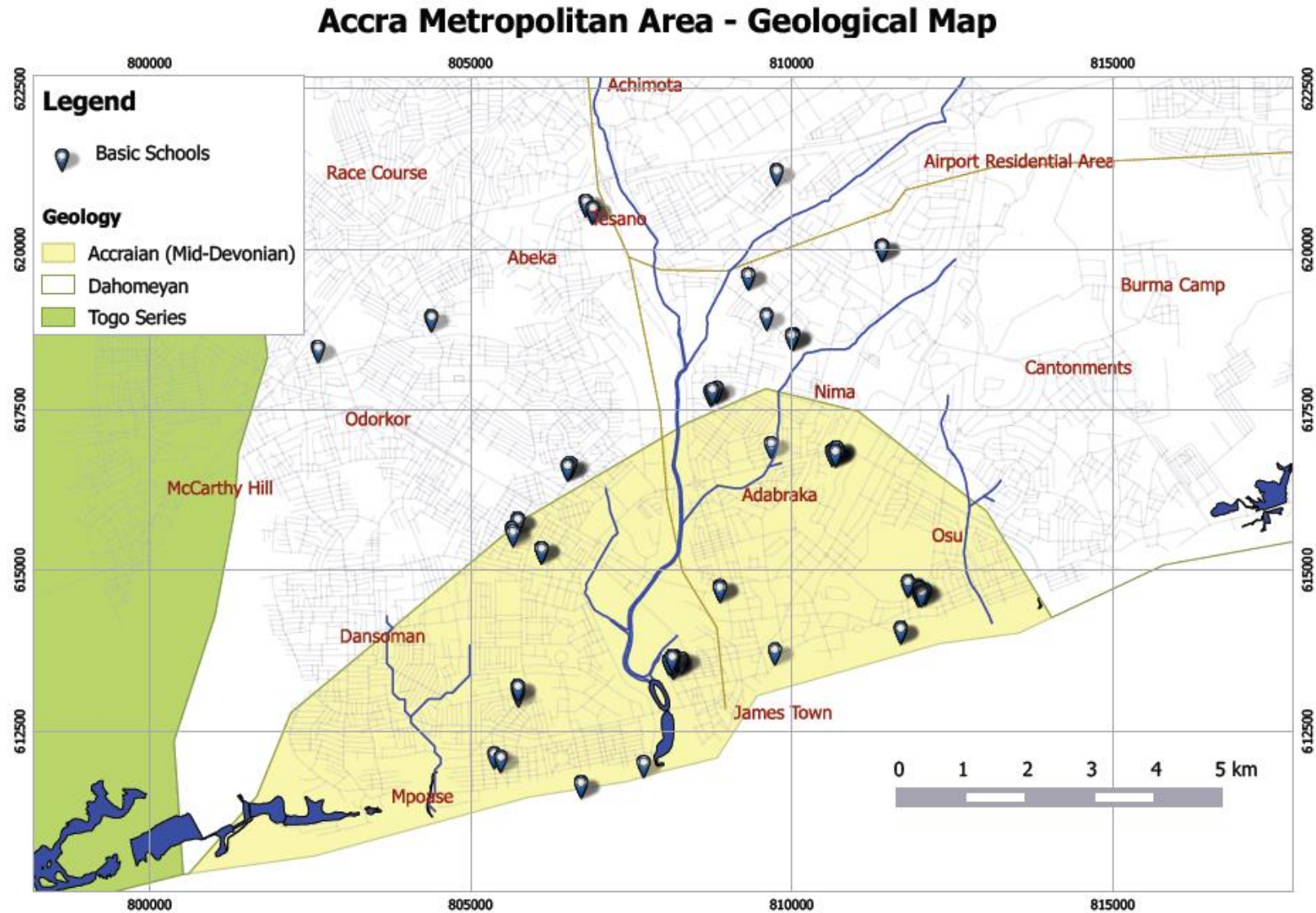
**MAAMOBI PRISONS CLUSTER**









DZORWULU JHS















## Appendix E: Geological Map of Accra Metropolitan Area and Results of Geotechnical Survey



School	Dimensions from bottom of pit	Labelling	Graphic	Groundwater	Pictures
Korle Gonno R/C Boys	0.0 to 1.5m	mixture of sand and gravel		No sign of groundwater	 
Sempe 8&11 JHS	0.0 to 1.5m	Fine sand		No sign of groundwater	 
Kanda Cluster	1.5m	Fine Sand		High water table. Groundwater was visible at a depth of 1m below ground surface	 



Shiayennor 1&2 Primary	1.35 to 1.5m	Sand		Groundwater was visible a day after trial pit was dug.		
	1.2 to 1.35m	Gravel				
	1 to 1.2m	Sand				
	0.65 to 1m	Gravel				
	0.0 to 0.65m	Rock Sediments				
Shiayennor A&B JHS	0.0 to 1.5m	Fine Sand		High water table. Groundwater was visible at 1m below ground surface.		
Dzorwulu JHS	0.93 to 1.5m	Gravel		No sign of groundwater		
	0.81 to 0.93m	Thin layer of sand				
	0.0 to 0.81m	Dark clay				

Farisco Cluster of Schools	0.8 to 1.5m	Sand		High water table. Groundwater was visible a day after trial pit was dug	 
	0.0 to 0.8m	Clay			
Unity Cluster	0.0 to 0.73m	Clay		Groundwater was visible a day after trial pit was dug.	 
	0.73 to 1.13m	Sand			
	1.13 to 1.5m	Rock Sediments			
Osu Presby Cluster	0.9 to 1.5m	Sand		No sign of groundwater	 
	0.8 to 0.9m	Gravel			
	0.0 to 0.8m	Dark Clay			