Chapter 6. Quick Reconstruction Support Project for Educational Facilities

6.1 Design Aims of Educational Facilities

As referred to in Chapter 5.2, the planned size of the new classrooms is to be 6m x 6m = 36m^2. The floor area is equal to the standard of DPEP. It was also decided that they should be built by precast concrete prefabrication methods, and be considered to be permanent structures in view of their superior durability as compared to other lightweight prefab constructions. A covered verandah is also provided for shelter during breaks, and as protection against rainy or scorching weather. In view of the rather restricted nature of the sites, and to maximize efficient use of the available site area, it is decided to limit the width of the covered verandah to 2.5m. Fig. 6-1 shows a Standard Classroom Unit Plan.

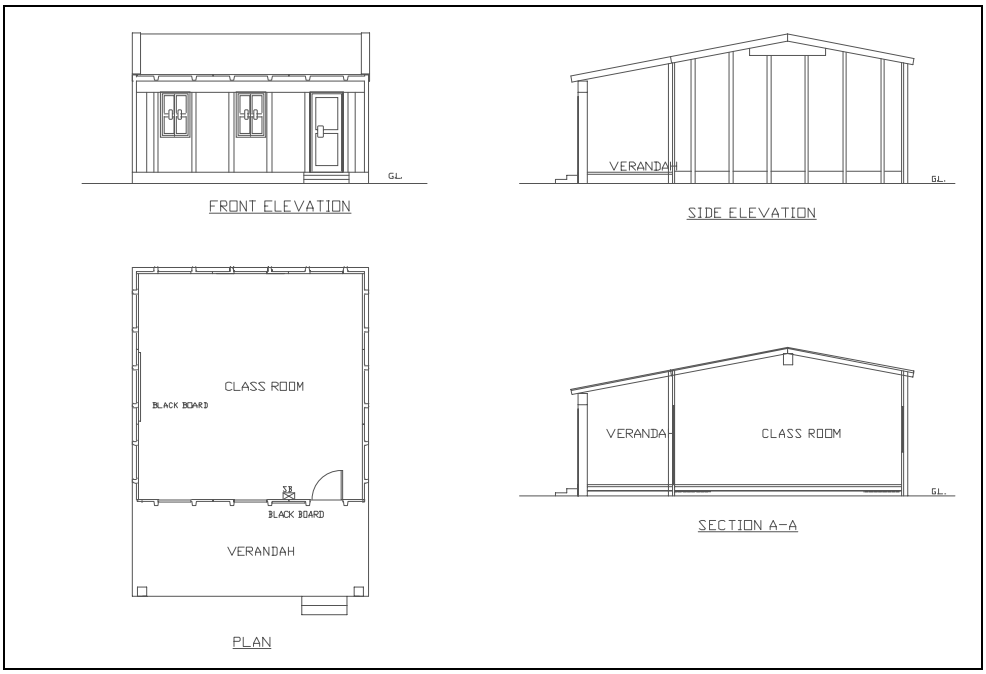


Fig. 6-1 Standard Classroom Unit Plan

For each classroom, two ceiling fans and four fluorescent lights shall be fitted as standard. Teaching equipment shall meet minimum requirements only, and include one blackboard in the classroom, a desk and chair for the teacher, and a cupboard to store teaching materials, books, pencils and writing/drawing paper etc. A blackboard as a notice board shall also be provided on the outside wall of the verandah. As it is common practice for the pupils to sit on the floor, no desks or chairs shall be provided for the pupils.

At most of the existing primary school sites, no toilets presently exist. However, for this project, and to avoid inconvenience to the female teachers and older girl pupils, it has been decided to provide toilets at each of the sites. The toilets shall be in compliance with DPEP standard specifications, and it is planned to provide soak-pits and soak-wells to dispose of the waste. In view of the difficulties in assuring a constant adequate water supply in this fairly arid area, it was decided to use the simplest system with the lowest demand on the water supply.

At most of the proposed sites, masonry fences surrounding the schools have been damaged or destroyed by the earthquake. For the reconstruction of the school classrooms, if no perimeter wall is provided, then it becomes difficult to control the entry of domestic cattle freely entering the site, eating the grass, leaves and other green vegetation, and then depositing waste and cow-dung in the school site. To prevent this, in the reconstruction plan, it has been decided to provide a perimeter wall and gate.

Some other standard facilities often provided at primary schools, including staff rooms and store rooms and the like, were considered, but are not provided in this plan as they are not essential facilities. Their future provision, if required, is to be arranged by the GOG.

6.2 Primary School Plans at Each Site

6.2.1 Sumarasar Sheikh Primary School

(1) Proposed Site

The proposed reconstruction area lies within the existing school site. The existing school site has two of its sides facing to the main village square, with the other two sides bounded by small village roads. Of the 9 original classrooms, 4 were completely destroyed by the earthquake. Furthermore, 3 of the remaining 5 were severely damaged and their current use is prohibited, and are awaiting repair arranged by the GOG.

The relatively lightly damaged remaining two rooms are currently used as store rooms for teaching materials, with classes now being held under tents within the school premises, or else in the open air, with blackboards being used for teaching.

The site area is 1,189 m^2 , which although is relatively small, the presence of approx. 6 m wide roads at the rear of the site allow construction work to be carried out without too much difficulty.

As there is no existing piped water supply, water is brought in by tankers at regular intervals and

stored in a water tank. The site has an electrical power supply connection. Fig. 6-2 shows the Proposed Site.

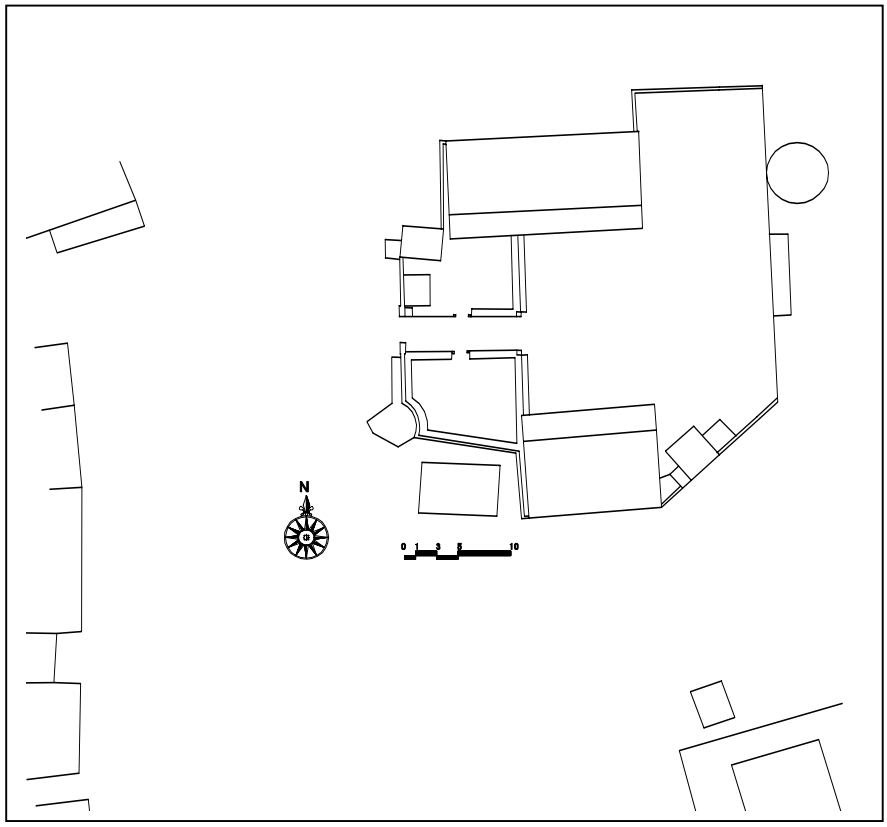


Fig. 6-2 Proposed Site

(2) New Site Layout Plan

Although only 4 classrooms were destroyed in the earthquake, in view of the rise in the number of pupils, it was requested by the GOG to provide 5 new classrooms.

4 classrooms will be built in the same location as the old ones, which were destroyed, and one more in spare space located to the side of the entrance gate. This layout of new and existing classrooms provides a feeling of a built enclosure around a central court, making it possible to form an arrangement, which gives an impression of uniformity. Fig 6-3 shows the New Site Layout Plan.

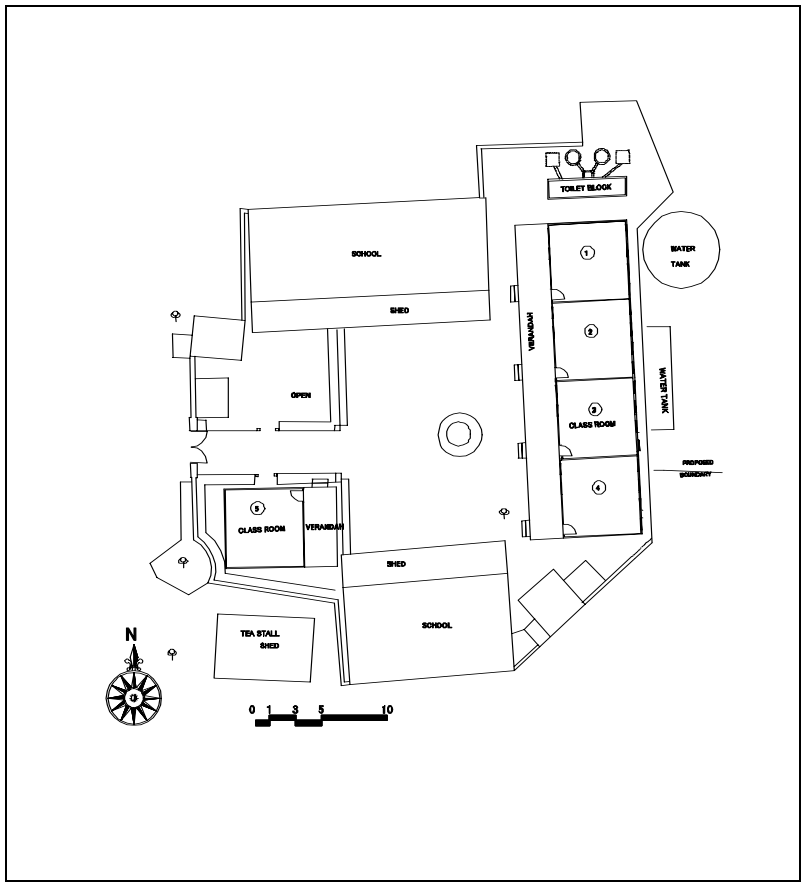


Fig. 6-3 New Site Layout Plan

6.2.2 Bhadreshwar (Boys) Primary School

(1) Proposed Site

The proposed reconstruction site at Bhadreshwar will combine the Boys and Girls primary schools at the same site, separated by a boundary wall, due to the reasons as explained later in 6.2.3 Bhadreshwar (Girls) Primary School. The new site for the Boys school lies on where the old boys primary school used to exist prior to the earthquake, but with the overall site enlarged to accommodate both schools. One of the original classroom buildings at the Boys Primary School was destroyed in the earthquake, while the other one was damaged but still remains standing. Since the earthquake, a new temporary classroom structure has been erected adjacent to the remaining building, consisting only of a concrete plinth with a light steel frame, over which a cloth is pulled over to provide shelter from rain and sunlight. Currently boys and girls classes are held by the same teacher, but with boys and girls pupils sitting on different sides of the plinth.

In the new plan, both the remaining damaged masonry classroom building (currently used as a store)

and the temporary platform and steel frame will be demolished to make room for the new classroom buildings.

Access will be from a small access road on the southern boundary of the site. Further to the south behind another boundary wall lie various buildings, mainly residential, some of which were severely damaged by the earthquake. To the north, beyond the projected new boundary wall, lies a concrete water tank and a stone well, from where most of the villagers draw their water supply. To the west lies the access road to this well. Fig. 6-4 shows the Proposed Site.

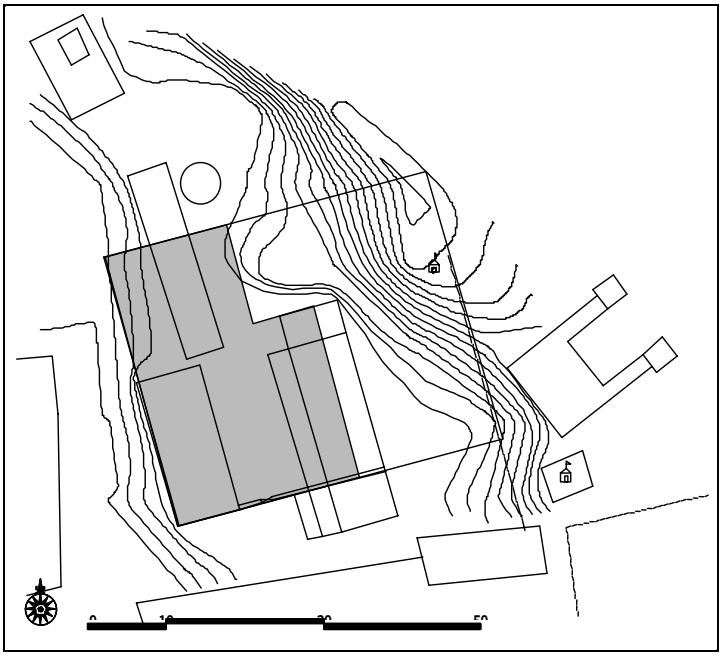


Fig. 6-4 Proposed Site

The site area for the boys school is 717 m^2. Access for construction vehicles is through the village, and vehicles can easily reach the south-west corner of the site. After demolition and land leveling works is complete, construction can be made with almost no obstacles.

The existing well could be used as a water supply during construction (with perhaps permission required from the villagers). There is a power line across the road on the west side of the site.

(2) New Site Layout Plan

8 new classrooms will be erected to replace the damaged buildings, and will be arranged in one row of 5 units on the west side, and one row of three units on the east side, with the toilets positioned at the rear (northern) side.

The entrance gate shall be on the front southern side, and the space between the two rows of units forms a central open play area. Fig. 6-5 the shows New Site Layout Plan.

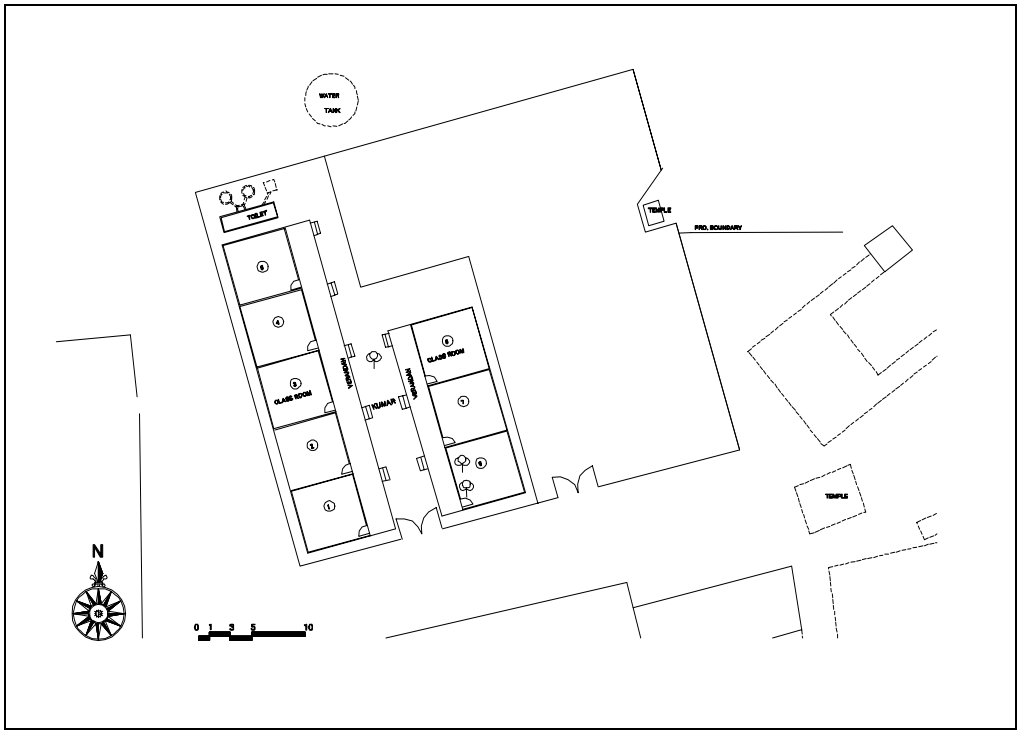


Fig. 6-5 New Site Layout Plan

6.2.3 Bhadreshwar (Girls) Primary School

(1) Proposed Site

The original girls primary school buildings were damaged in the earthquake, but the constrained nature of the original site did not readily allow any demolition and reconstruction work to take place, as it was not accessible to construction equipment nor to other vehicles necessary for demolition and prefab construction work. Relocation of the girls school to another site was necessary to allow quick reconstruction to be made. It was thus decided, after consultation with the Sarpanch (village leader) of Bhadreshwar and with his consent, to relocate the girls school to a more spacious and accessible site adjacent to the boys school, which would allow reconstruction work to be completed quicker and with less obstacles.

The new girls school site will lie directly to the east of the boys school, separated by a boundary wall, and at a slightly higher level due to the slope of the ground. The north-eastern extremity of the site abuts against a small knoll, whose complete removal and leveling would involve increased excavation, which can be avoided by carefully planning the classroom layout (see below). Just to the east, is an

old temple area, now existing as a stone plinth, as some parts were damaged in the earthquake. The school site cannot be moved any further to the east as it would otherwise encroach further upon the temple boundaries. About 50m further to the east is a small lake. Other features of the site are described in 6.2.2.(1) above.

The site area of the girls school part is 847 m^2. Access is made from the same road on the southern boundary as described for the boys school. Fig. 6-6 shows the Proposed Site.

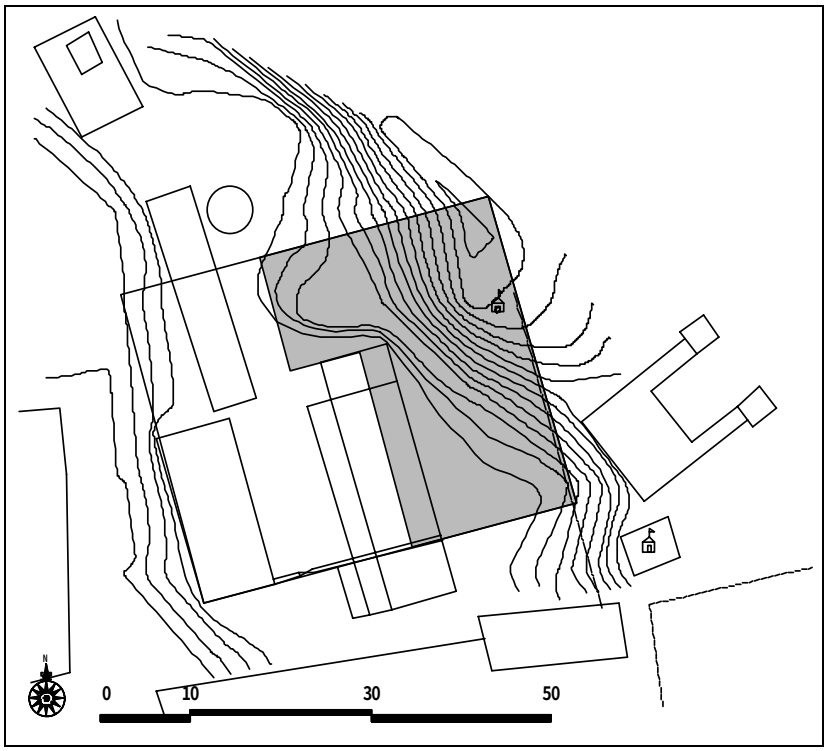


Fig. 6-6 Proposed Site

(2) New Site Layout Plan

6 classrooms will be built in the new girls school site. In view of the hillock in the northeast corner of the site, they will be split in two rows of three units each, laid out orthogonal to each other, and facing west and south respectively to form a central open play area on the western side of the girls school site. The toilets will be placed in the northwest corner, in a western extension of the site to allow for adequate space caused by the hillock taking up the northeast corner of the site (see Fig 6-7).

The entrance gate shall be on the southern side of the site.

A boundary fence shall separate the boys and girls schools, with the girls school on finished land approx. 1m higher than the boys. Fig 6-7 shows the New Site Layout Plan.

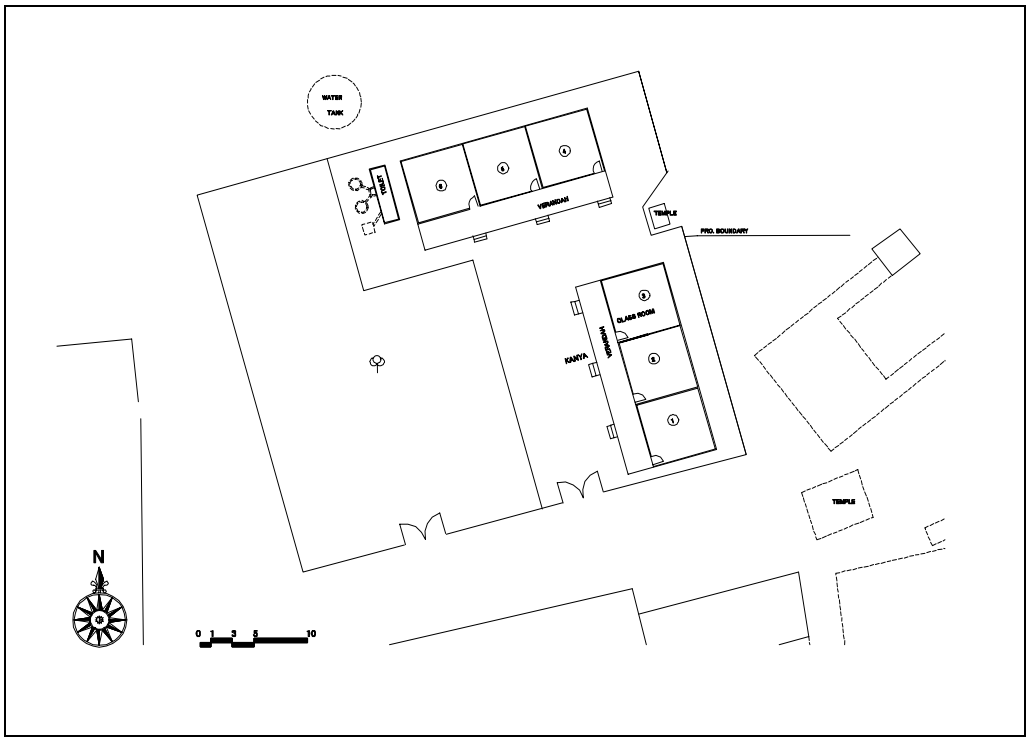


Fig. 6-7 New Site Layout Plan

6.2.4 Mathak Primary School

(1) Proposed Site

The proposed reconstruction area lies within the existing school site. The existing school site has its west side facing the main village road, the north side facing a 3 m wide road, with the other two sides bounded by other properties and also fields on the east side. All the original school buildings have been destroyed or demolished since the earthquake struck, with only their plinths and foundations remaining. Two temporary corrugated sheet-metal shed buildings have since been built on the site, set on concrete plinths, which are acting as temporary classrooms and storage sheds. The original boundary wall has also been severely damaged in the earthquake. The site is also characterized by the presence of some trees in the middle of the site, which provide natural shelter from the sun and allow outdoor classes to be held.

The land is generally flat. There is a small shrine on the southwest side of the site, between the school and the road. The main side facing the road, however, provides adequate access for reconstruction work.

The school site area is 1,641 m^2. Water supply to the site is mainly by tanker delivery. Electricity is available. Fig. 6-8 shows the Proposed Site.

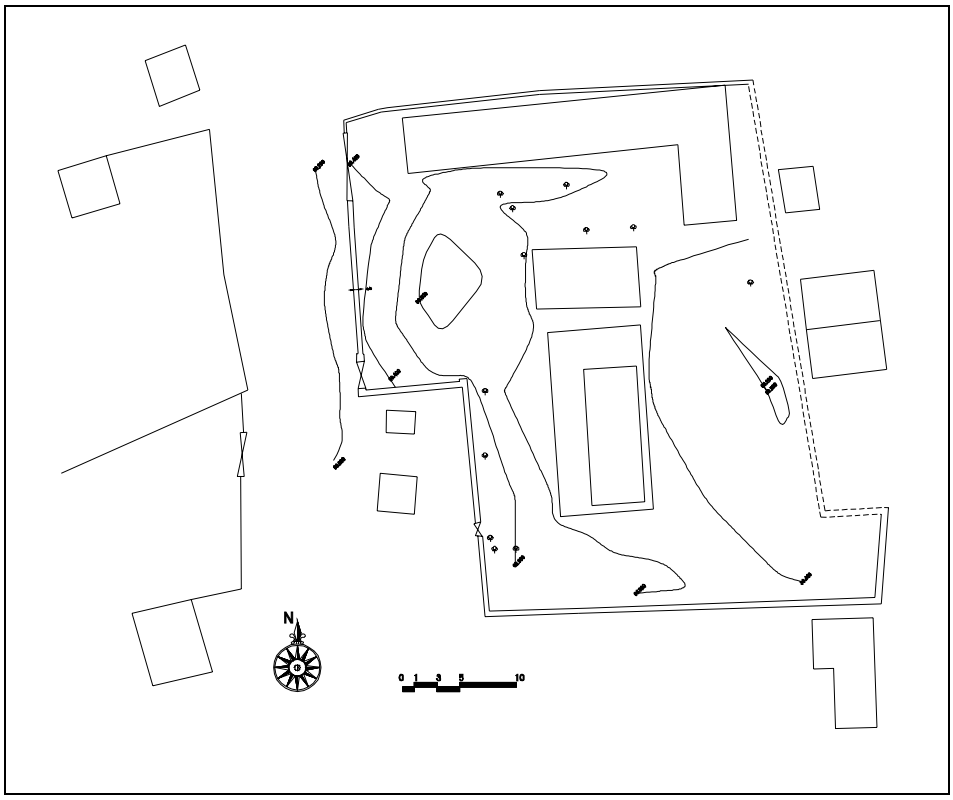


Fig. 6-8 Proposed Site

(2) New Site Layout Plan

9 new classrooms will be built on the site. In order to maintain as much as possible the open central area and to preserve the existing trees, the new classrooms are arranged around the site periphery. The existing temporary metal sheds, which are of very basic lightweight construction, all need to be demolished to make room for the new classrooms.

The toilets are to be located in the southeast projecting corner of the site, so as to have as little impact on the main school area as possible.

Construction access will be through the west side from the existing main road, and the main gate will also be on the west side.

The final layout creates a pleasant central area with trees, which serves as a play area and a place to hold outdoor events in the shade. All the new classrooms face onto this central area, creating a sense of uniformity and security. Fig 6-9 shows the New site Layout Plan.

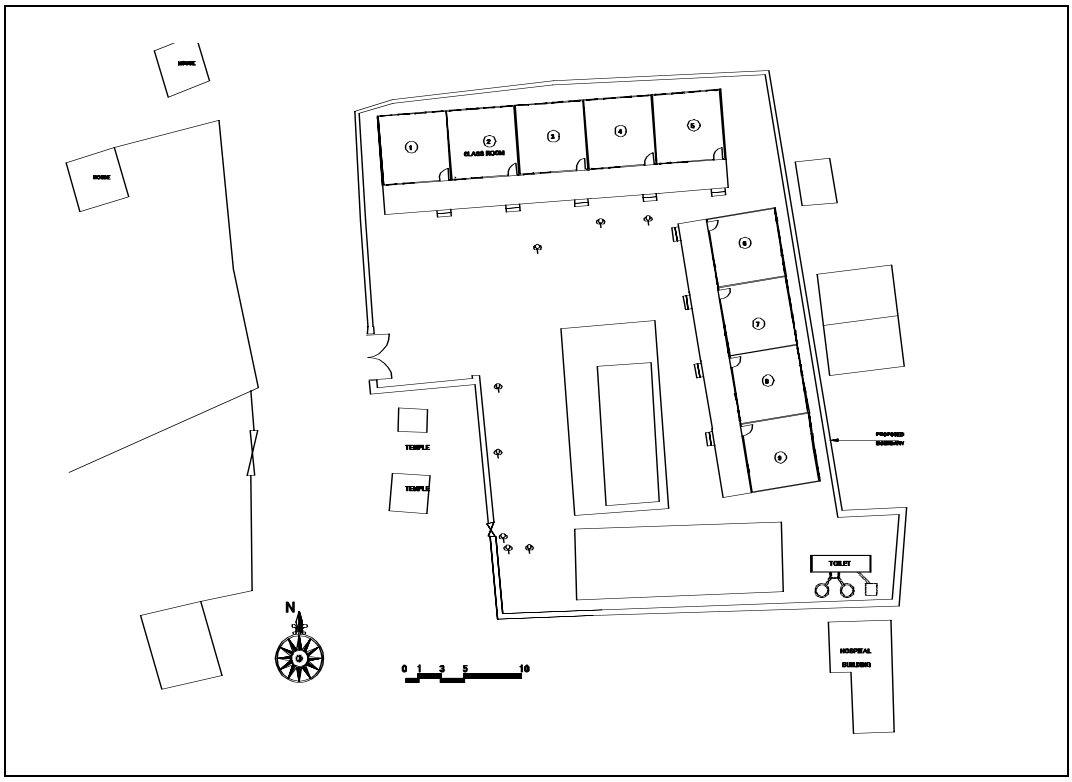


Fig. 6-9 New site Layout Plan

6.2.5 Dhamadka Primary School

(1) Proposed Site

The proposed reconstruction area lies within the existing school site. The existing school site has its south side facing to the main village access road, with the other three sides bounded by adjacent surrounding properties, including fields on the northwest side. All the original school buildings have been destroyed or demolished since the earthquake struck, with only some plinths and foundations remaining.

The original boundary wall has also been severely damaged in the earthquake, and will require extensive reconstruction.

The site is also characterized by the presence of some trees in the middle of the site, which provide natural shelter from the sun and allow outdoor classes to be held. Any rebuilding should preserve these trees as much as possible.

The land is generally flat. The southern side facing the road provides adequate access for reconstruction work.

The school site area is 1,036 m^2, and is L-shaped in nature. Water supply to the site is mainly by tanker delivery. Power could be drawn from a line on the north or south side of the site. Fig. 6-10 shows the Proposed Site.

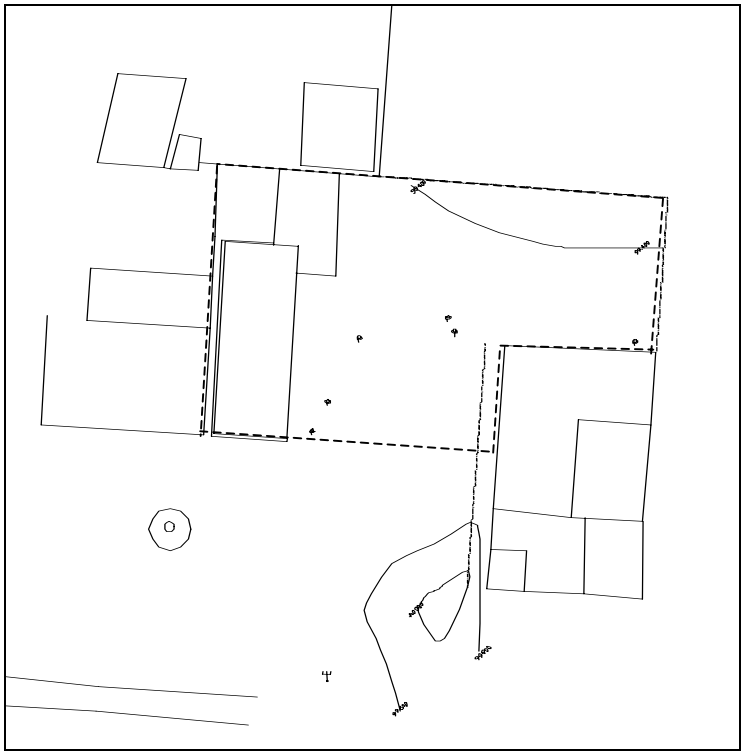


Fig. 6-10 Proposed Site

(2) New Site Layout Plan

7 new classrooms are to be reconstructed at the site. In order to maintain the central open area, and the existing trees, the new classrooms are arranged in units around the site perimeter to face on to the central area. To fit into the site geometry, the classrooms are arranged into one row of 4 units (on the northern side), one row of two units (on the southern side) and one individual unit on the east side. The toilets are located in the far northeast corner, away from public view as much as possible.

The entrance gate will be maintained on the front south side, facing the main road, which leads to the open central area. This layout of the new classrooms provides a feeling of a security around the open central play area, with the trees also providing shade against the sun, and forms a pleasant arrangement which gives an impression of uniformity. Fig 6-10 shows the New Site Layout Plan.

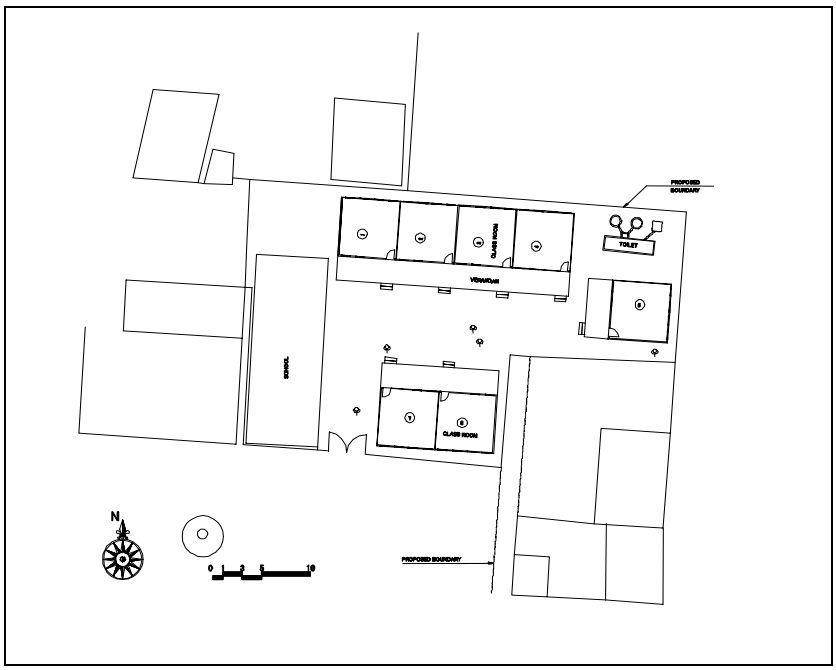


Fig. 6-11 New Site Layout Plan

6.2.6 Design Drawings

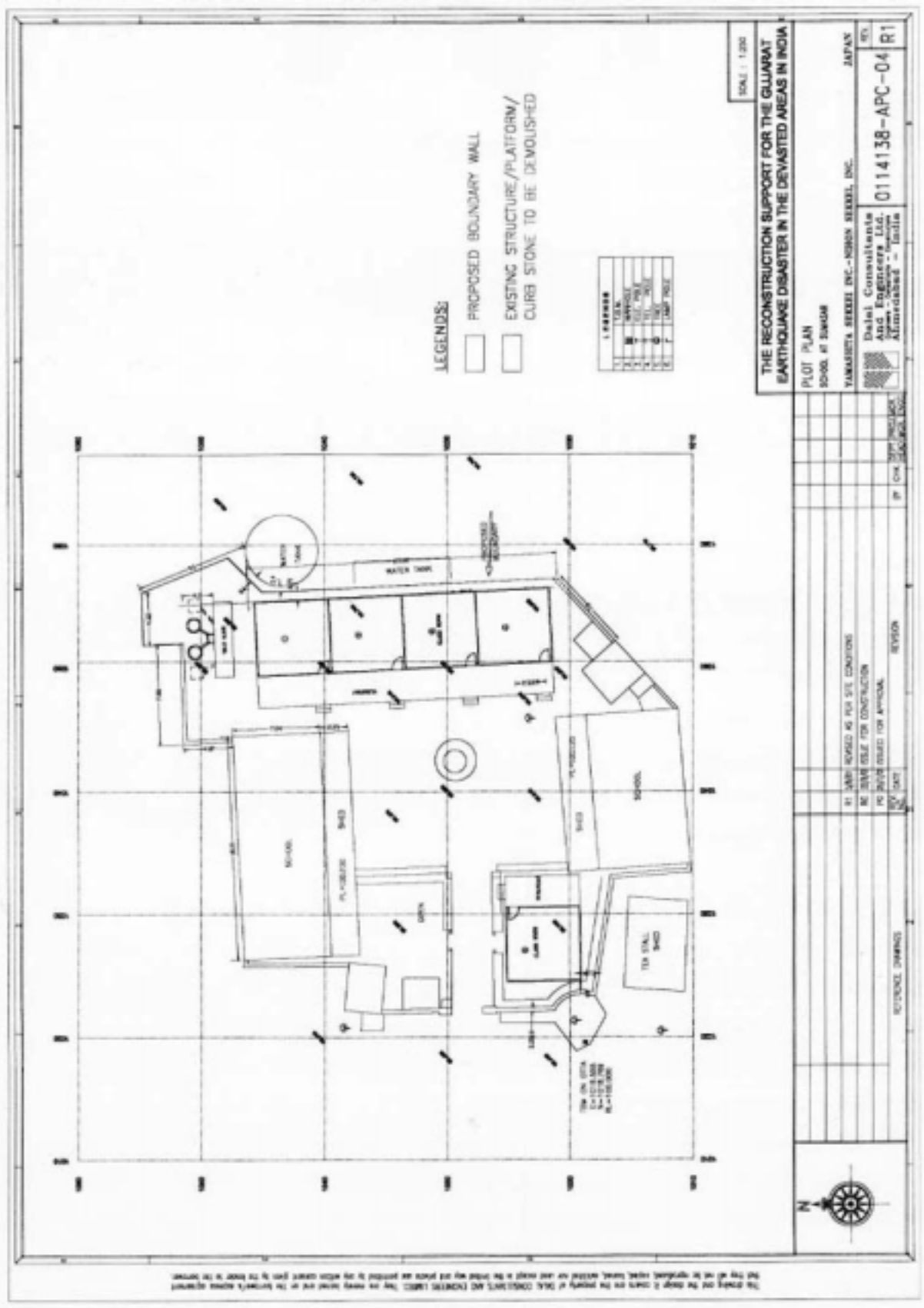
(1) Table of Floor Areas

Name of school	Area (m^2)			
Sumarasar Sheikh	180 m^2	(5 classrooms),	+	sanitary block
Bhadreshwar (Boys)	288 m^2	(8 classrooms),	+	sanitary block
Bhadreshwar (Girls)	216 m^2	(6 classrooms),	+	sanitary block
Mathak	324 m^2	(9 classrooms),	+	sanitary block
Dhamadka	252 m^2	(7 classrooms),	+	sanitary block
Total	1,260 m^2	(35 classrooms),	+	5 sanitary blocks

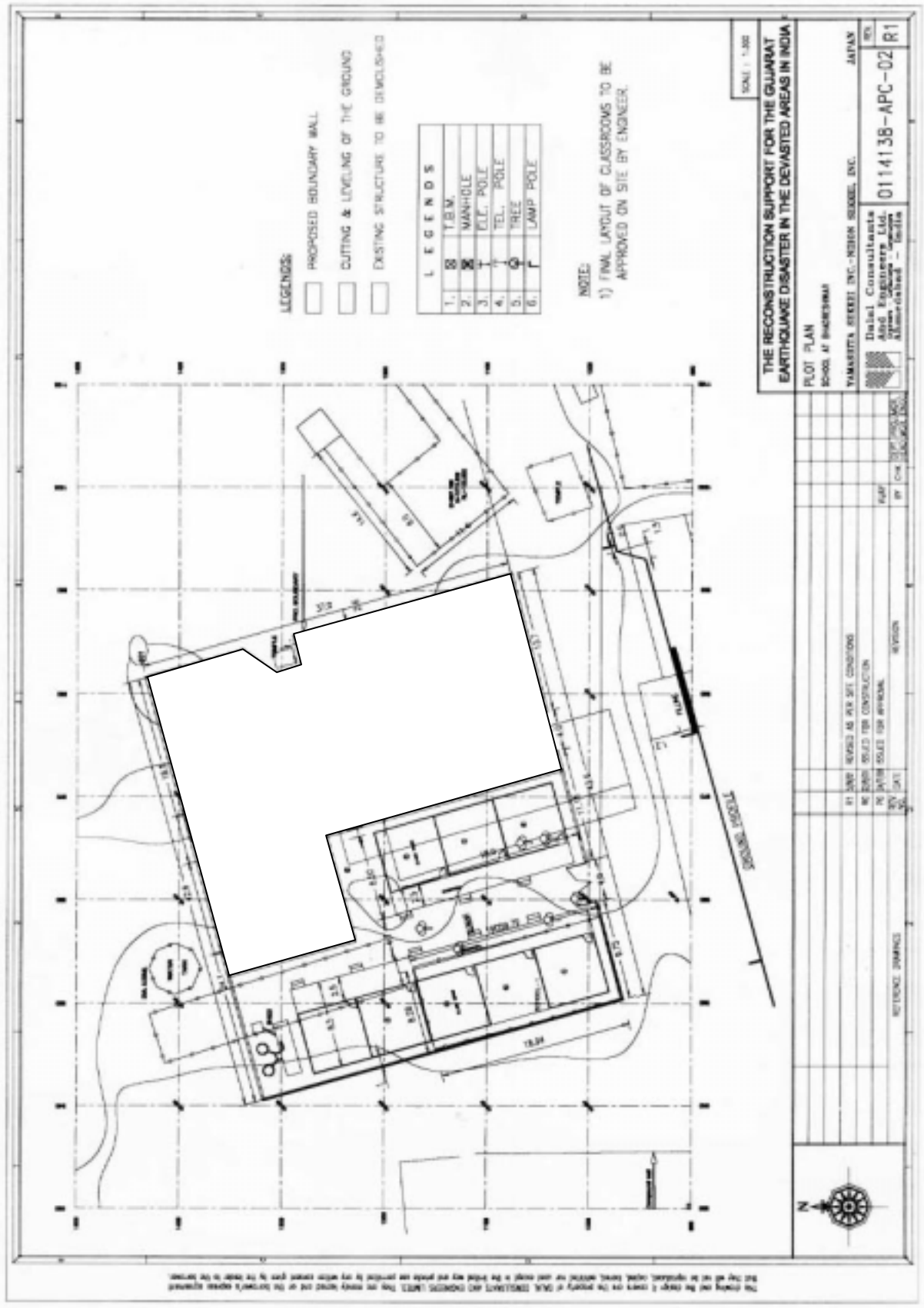
(2) Drawing List

Item	Contents
1. Sumarasar Sheikh	Layout Plan
2. Bhadreshwar (Boys)	Layout Plan
3. Bhadreshwar (Girls)	Layout Plan
4. Mathak	Layout Plan
5. Dhamadka	Layout Plan
6. Typical Classroom Unit	Plan, Elevation, Sections

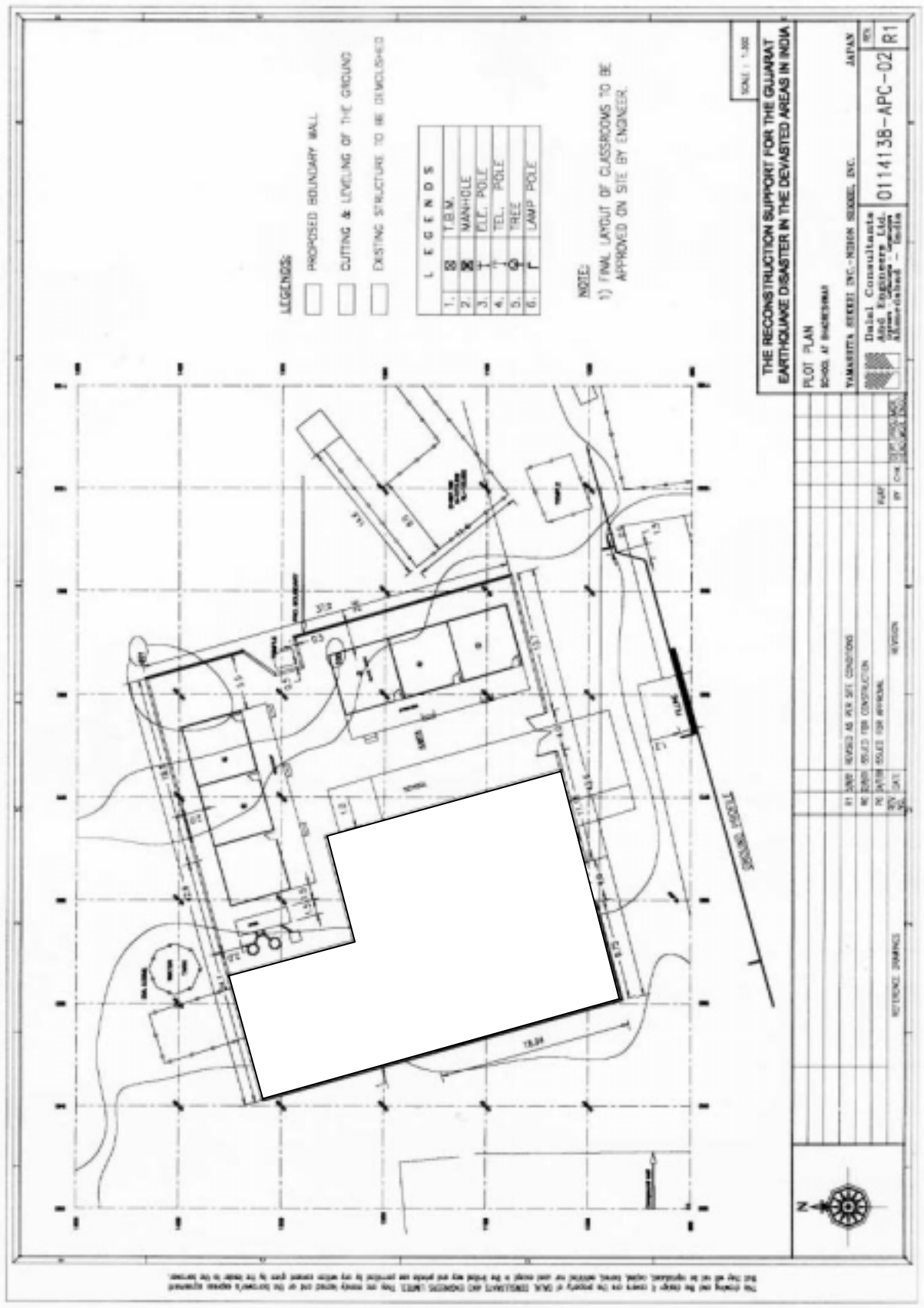
Drawing Sumarasar Sheikh



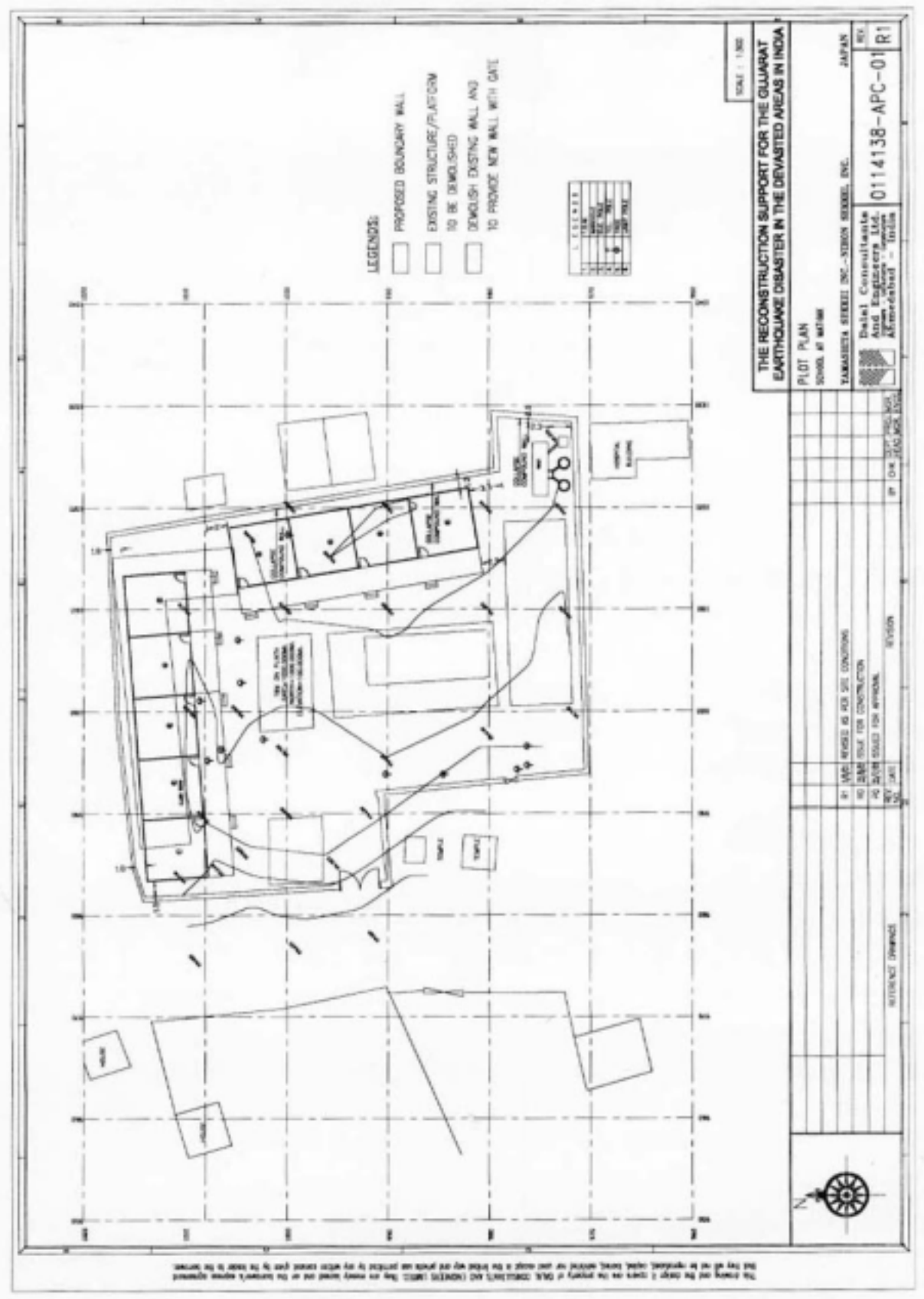
Drawing Bhadreshwar (Boys)



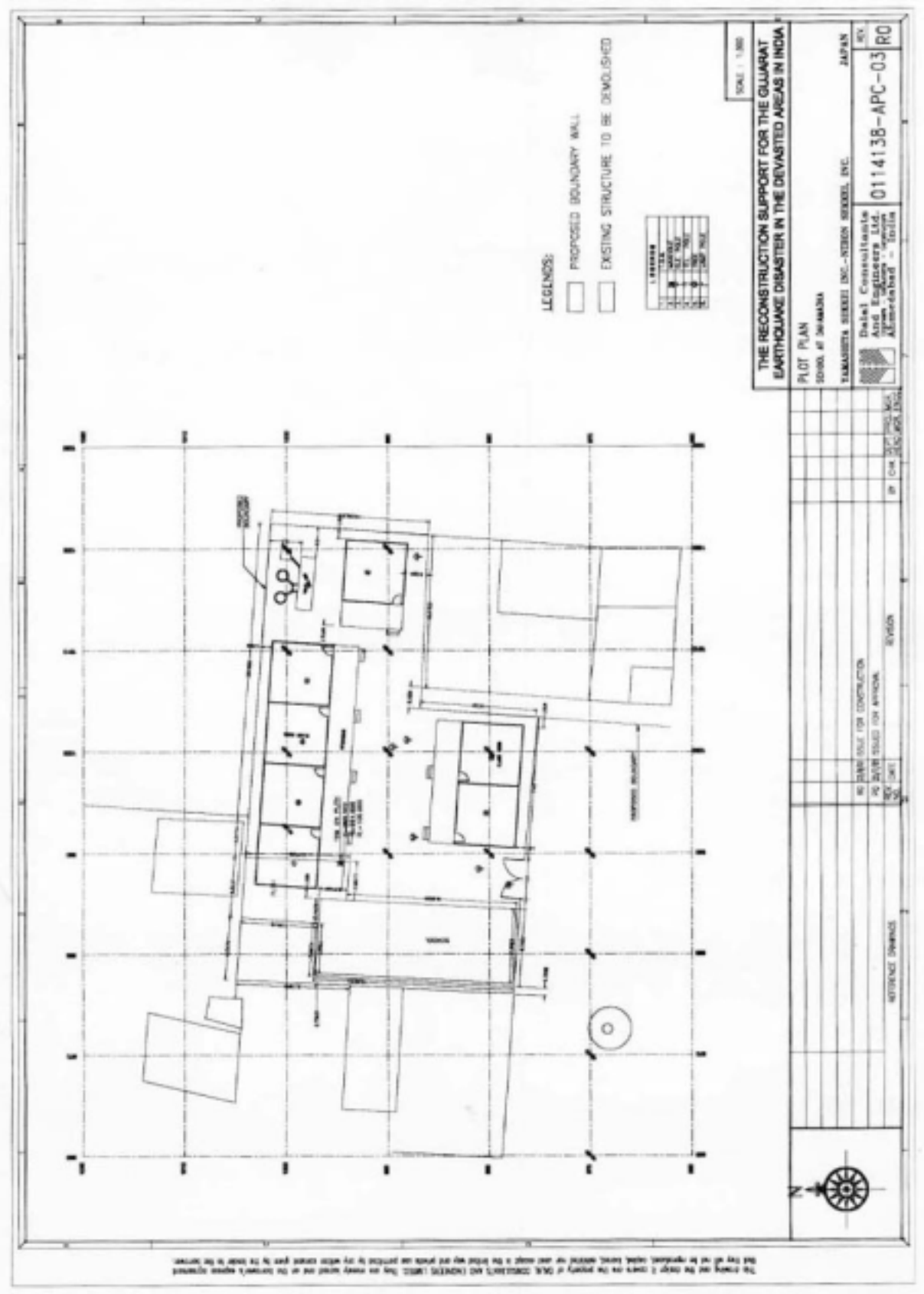
Drawing Bhadreshwar (Girls)



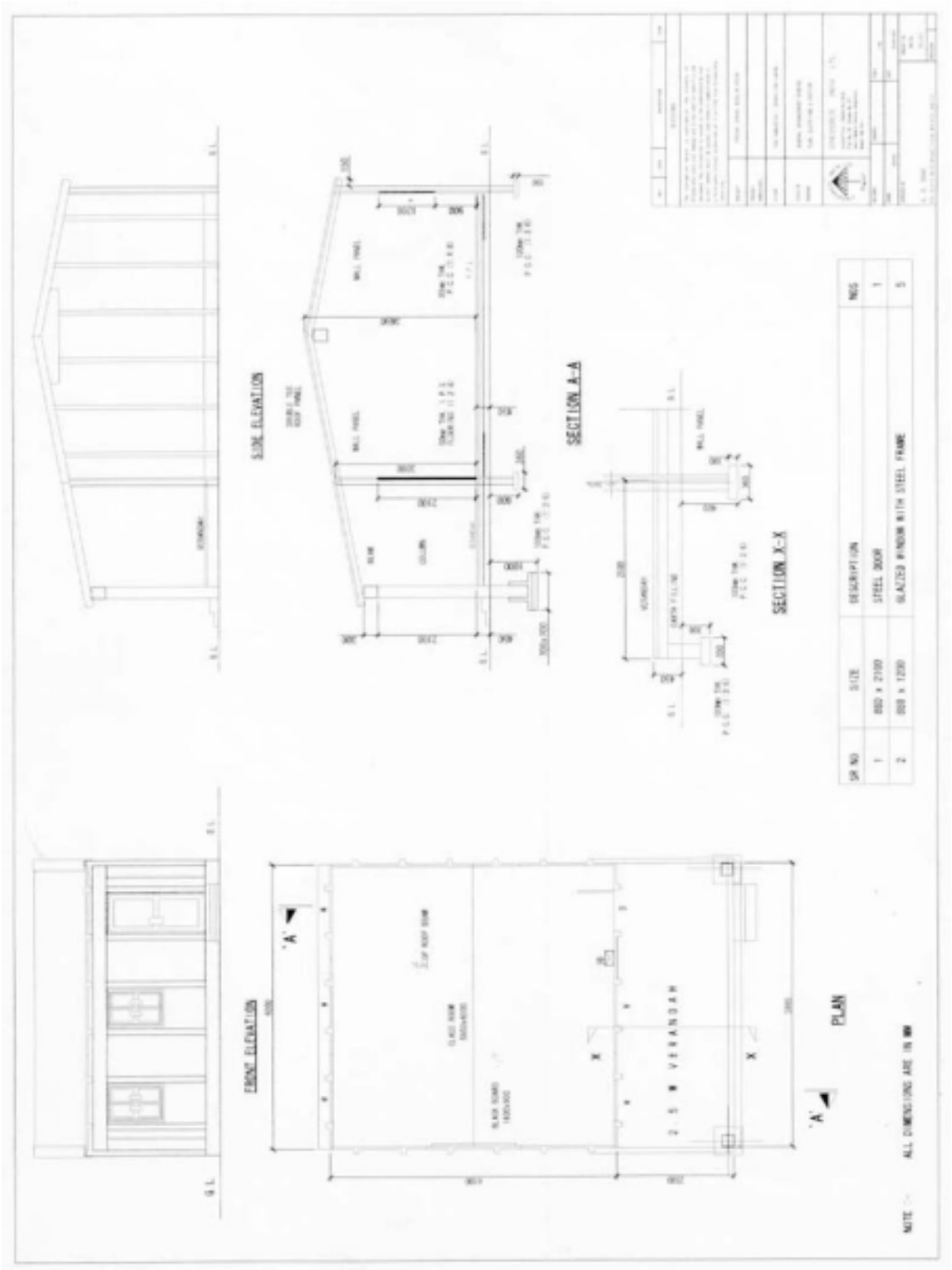
Drawing Mathak



Drawing Dhamadka



Drawing Typical Classroom Unit



6.3 Structural Planning and Design

6.3.1 General

The reconstructed school buildings to be built at the sites mentioned in the previous clause shall all be prefabricated types, but designed to remain as permanent structures.

The principal requirements of their construction is that they be economical and quickly built, and be designed to withstand the seismic design forces as stipulated for zone V of the latest Indian standards, in addition to other acting loads. They should also be procured, transported and erected into place at the sites within a two month period.

Each unit should be an independent stable unit, comprising four walls, a roof and a covered balcony, and also be able to be built adjacently in a line, when they would share common partition walls.

In view of the above critical factors, it was decided as a first step to select precast concrete type units, in view of their perceived superior durability properties.

The design and construction of the units would be let as a single contract to the successful bidder, and so aside from basic structural criteria as described below, the details of the design would be done by the contractor, subject to the review and approval of the concerned authorities, as well any comments made by the Project Team.

6.3.2 Ground Conditions

Whilst the soil conditions at the respective sites would be subject to variation, as the units would be simple one-storey wall and roof structures, foundation loads would be small and thus unlikely to be affected by the existing ground conditions. Only in cases of extremely soft soils, or expansive soils, would additional precautions be necessary. None of these conditions were observed at any of the sites, and so simple direct foundations, either of strip type for walls or individual pad type for balcony roof columns, would be required.

6.3.3 Design Criteria

As explained above, only basic design criteria will be described here. Further characteristics of the design are the responsibility of the contractor. Certain aspects of the criteria described below are based on design data as specified by the contractor himself.

(1) Loads :

1) Dead Loads (DL) :

Actual dead weights for structure self-weight, and any finishes

2) Imposed Loads or Live Loads (LL) :

Note: Only the roof (and walls) support live loads.

Inaccessible roofs : 0.75 kN/m^2

3) Wind/Cyclone Load (WL) :

As per IS:875, the following wind loads and factors shall be considered.

a.	Basic wind speed Vb	:	50 m/sec. (standard coastal cyclone area)
b.	Risk Coefficient K1	:	1.00 – 1.08 (as School building)
c.	Terrain Coefficient K2	:	0.98 (up to 10m high, outskirts of built-up areas)
d.	Topography Factor K3	:	1.0 (permanent structure)
e.	Design wind pressure (pz)	:	1.68 kN/m²

Note that the resulting calculated wind forces are less than seismic forces, hence will not govern overall design although may govern for certain elements.

4) Earthquake Loads (EL) :

As per IS:1893-1984 "Criteria for Earthquake Resistant Design of Structures (Fourth Revision)" the following seismic design forces and formulae are to be considered.
Basic formula by seismic coefficient method is;

$\alpha_h = \beta I \alpha_o$ Where

Basic seismic coefficient (α_o) for Seismic Zone V (Kutch) : 0.08

Soil foundation type coefficient (β): 1.2 (RC footings or un-reinforced strips with no tie beams)

Importance factor (I) : 1.5 (for schools)

Furthermore, the base shear V_B is given by:

$V_B = KC\alpha_h W$, Where

K (structural framing/ductility factor) : 1.6 (non-ductile moment frame)

C (coefficient relating to stiffness/frequency of structure) : 1.0 (T less than 0.3 secs)

W (total dead load plus 25% of applicable live load)

The design base shear for the school buildings should be : $V_B = 0.23$

(2) Material Data

1) Concrete

Precast reinf. Elements to use grade M20 and M40 (cube strength = 28N/mm^2)

2) Reinforcement steel

Use high-yield reinforcing steel (per IS :1786), where fy = 415 N/mm^2

3) Prestressing strands (for precast panel units)

As per local Indian standards

(3) Performance Data, Durability, Exposure etc.

As concrete is not protected against weather by a plaster finish, it shall be designed as being under 'moderate' exposure.(including the foundations). Cover to meet IS standards.

Deflection, cracking etc to be checked under serviceability limit and erection, lifting loads.

(4) Design

Following IS methods, precast RC structures to be designed using Ultimate Limit State Methods, using load combinations and load factors as prescribed in Indian standards.

(5) Analysis

Method of analysis at discretion of contractor.

(6) Overall Factors of Safety

Adequate factors of safety to be maintained against overturning, sliding and flotation:

(7) Miscellaneous

– Pre-cast elements are also to be designed to withstand any stresses that may occur during transportation, lifting and erection etc.

– Special attention shall be given to detailing of joints, so that connections between roof and wall elements, adjacent wall elements, and corner elements provide rigidity and allow seismic shear forces to be transmitted across the joints (e.g. welded plates, shear keys, in-fill mortar etc.).

– No RC grade-slabs need be provided for the ground floors of the schools.

(8) Primary Indian Standards and Code references as used.

IS	:	456 (2000)	:	Design of reinforced concrete structures.
IS	:	875 (Part 3) (- 1987)	:	Loading Standards.
IS	:	1893 (-1984)	:	Earthquake resistant design of structures.

6.4 Mechanical and Electrical Planning and Design

6.4.1 Site Condition

(1) Electricity

Main low voltage electric power line with 415/240V was installed around the QRS project site before the earthquake disaster and connected to each school building. Although tentative electrical power is supplied to the houses, no power is supplied to the school building now. According to Bhuj officials concerned, it will take a long time for the permanent power to be supplied to the school.

(2) Water Supply

A water tank made of concrete was under construction at the Sumarasar Sheikh School, but the tank has not been used, because the earthquake damaged the tank before completion. Since other schools have no water tank except for Sumarasar Sheikh School, pupils are taking their drinking water from bottles.

(3) Drainage

Toilets for teachers and pupils are provided at Sumarasar Sheikh School, but no toilet is available at the other schools. So, pupils normally go to school after going to the toilet. Drainage from the toilet is to be treated by providing the soak pit/wells.

6.4.2 Planning and Design

(1) Electricity

The low voltage electricity will be supplied to the school from the main line nearby. If an application form for electricity is submitted to the GEB (Gujarat Electricity Board), electrical works to the main switching board locating each school unit will be done by GEB. The fixing work of lighting fixtures and ceiling circulation fans and piping/wiring to the main switching board will be done by the contractor for the QRS project. Lighting fixtures of standard type with 40 watts will be adopted for the school.

(2) Water Supply

Cylindrical plastic water tanks will be provided beside the toilet and one water tap will be used for flushing out. The water consumption will be calculated by the condition and formula below.

- Approximately 20% of pupils will use the toilet per day
- One cubic meter of water will be expected to be stored for one week's consumption
- 1.8 litters/person × 500 person/day × 0.2 = 180 litters/day → 1 week consumption
- Water tank will be fixed tightly to prevent overturning from earthquake loads.

The water will be supplied from water tanker for a while. After rehabilitation of water supply infrastructure, intake water piping can be connected to the main line.

(3) Drainage

The drainage from the toilet is to be treated based on the standards commonly adopted locally. Soil water from the water closet is to be lead and treated by two numbers of Soak wells. Soak wells will operate alternatively. When of one Soak well is clogged another one will be used. The clogged Soak well will be cleaned by night soil-truck or by hand. If the permeability of the Soak well is not adequate, the Soak well is to be reconstructed. Soil water from urinal is to be treated by Soak pits. Storm drains from the roof are to be discharged directly. A typical plumbing system for a school is indicated in Fig. 6-11.

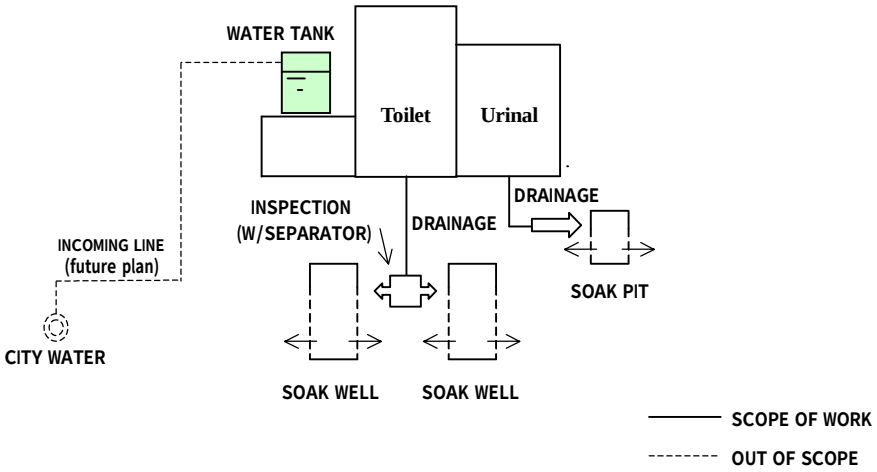


Fig. 6-11 Plumbing System for School (Typical)

(4) Ventilation

The QRS project depends on natural ventilation by opening the window. Ceiling type circulation fans will also be adopted, to cool effectively.

(5) Equipment for schools

The blackboard, cupboard and desk and chair for the teachers are the equipment of the QRS project. Desks and chair for the pupils were expected as a equipment initially, but these items of equipment were omitted, because the pupils normally sit on the ground directly during studying.

6.5 Maintenance and Management Plan

6.5.1 Maintenance and Management System

The maintenance and management of primary schools after completion is assumed by DPEP. DPEP staff members are in charge of maintenance and management for the facility and repairing equipment and furniture.

6.5.2 Maintenance and Management of Schools

Since, the school facilities are constructed by the permanent prefabricated concrete, periodical maintenance will be conducted by DPEP to paint roof, floor, wall and sash.

The lighting fixtures and ceiling type circulation fans are to be repaired by DPEP or some local agent.

The reinforced plastic made water tank is durable, but cleaning inside of the tank shall be done at regular interval.

The flow condition of the drainage pipe from the toilet shall be inspected periodically, because of clogging by the dirt materials occasionally. Daily cleaning of the school is important for long usage of the facility.

6.5.3 Maintenance and Management Expenses

Table 6-1 shows a tentative calculation of maintenance expenses required annually after completion of the QRS project.

Table 6-1 Maintenance and Management Expenses

No	Item	Annual Expenses				
		Sumarasar Sheikh	Bhadreshwar (Boys)	Bhadreshwar (Girls)	Mathak,	Dhamadka,
(1)	Electricity	10,440	16,704	12,528	18,792	14,616
(2)	Water	0	0	0	0	0
(3)	Building Maintenance	5,400	8,640	6,480	9,720	7,560
Total		15,840	25,344	19,008	28,512	22,176

(Unit : Rs)

(1) Electricity

Conditions and calculation formula are as follows,

- Each school unit has four nos. of fluorescent bulb with 40w (consumption shall be 48/50w considering choke losses) and one no. of incandescent lamp with 60w with one hour operation per day for 200 days per year.
  (0.05×4+0.06×1) kw×3 h/day×200 day/year = 156 kwh/year
- Each school unit has 2 nos. of ceiling type circulation fan of 60w with eight hours operation per day for 200 days per year.
  (0.06×2) kw×8 h/day×200 day/year = 192 kwh/year
- Power consumption of electricity per unit.
- 156 + 192 = 348 kwh/year/unit

Electricity expenses of each school are as follows,

- Sumarasar Sheikh:
  6 Rs/kwh×348 kwh/year/unit×5 units = 10,440 Rs/year

- Bhadreshwar(Boys):
  6 Rs/kwh × 348 kwh/year/unit × 8 units = 16,704 Rs/year
- Bhadreshwar(Girls):
  6 Rs/kwh × 348 kwh/year/unit × 6 units = 12,528 Rs/year
- Mathak:
  6 Rs/kwh × 348 kwh/year/unit × 9 units = 18,792 Rs/year
- Dhamadka:
  6 Rs/kwh × 348 kwh/year/unit × 7 units = 14,616 Rs/year

(2) Water

Since the water expenses for the government facilities are free of charge, these expenses are not calculated.

(3) Building Maintenance

Building maintenance expenses for repairs on interior and exterior finishing, mechanical and electrical installations and for the purchase of spare parts are estimated at 30 Rs/m^2/year (as generally used in India.) Expenses of each school unit is calculated as follows,

30 Rs/m^2/year × 36m^2 = 1,080 Rs/year

Expenses of each school are as follows,

- Sumarasar Sheikh:
  1,080 Rs/year/unit × 5 unit = 5,400 Rs/year
- Bhadreshwar(Boys):
  1,080 Rs/year/unit × 8 unit = 8,640 Rs/year
- Bhadreshwar(Girls):
  1,080 Rs/year/unit × 6 unit = 6,480 Rs/year
- Mathak:
  1,080 Rs/year/unit × 9 unit = 9,720 Rs/year
- Dhamadka:
  1,080 Rs/year/unit × 7 unit = 7,560 Rs/year

6.6 Implementation Method

6.6.1 Work flow from Design to Completion

One of the main objectives of the Project is to carry out the QRS project for the selected educational and healthcare facilities in the devastated areas as early as possible. In order to ensure a smooth implementation of the above objective, the Project Team worked in an effective manner in collaboration with local consultants from design stage to completion of the construction works, by executing each of the tasks itemized below.

[Site survey]	*	Topographical surveying on each site and production of site survey drawings
[Plan and design]	*	Selection of local consultancy firm
	*	Planning and designing of required facilities with the determined design conditions at the allotted sites.
	*	Planning of equipment procurement
	*	Planning of construction method and materials
[Bid and contract]	*	Preparation of bidding documents, evaluation and Contracting
[Supervision]	*	Supervision of construction works

6.6.2 Topographical Survey

The Project Team conducted topographical surveys, with the assistance of a selected local surveying firm, on each site and produced site maps prior to planning / designing the required facilities. The surveying firm selected through the tender procedure from amongst three short-listed firms was K.C.T Consultancy Services, who are registered for public works, and have ample experience of various scales from similar to this project to bigger sites. The said firm had been involved with a number of projects in the district of Kutch, and hence proved their experience in performing similar works. The Project Team selected the said firm on the above mentioned grounds and also by considering the fact that they submitted the lowest quotation for their fee.

6.6.3 Selection of Local Consultancy Firm

As stated before, the QRS project is to be implemented as early as possible. Therefore the Project Team selected a local firm of consultants and engineers, whose local knowledge and experience was

essential for the smooth execution of the QRS project, by examining their experience, competence, adaptation ability to swift work and their quotation for the scope of works presented.

The consultancy firm selected through tender procedure from amongst three short listed firms was Dalal Consultants and Engineers Limited (DCEL). The services to be rendered consisted of architectural, civil/structural, mechanical and electrical works for both the building and equipment procurement from design stage to construction stage. DCEL is one of the largest consulting firms in India and is a multi-disciplinary practice where architects and various engineers work together under the same roof and are able to provide the required services according to the fixed project schedule. They are currently undertaking various projects in the Kutch district.

6.6.4 Planning and Designing of Required Facilities

The Project Team made plans and produced design drawings with the above-mentioned consultants for each of the allotted sites within the time constrained schedule by concurrently visiting sites and by identifying the design conditions. Regarding the statutory applications, building permissions were not required prior to commencement of the construction for the permanent prefabricated classrooms. The Project Team proceeded the work by contacting the State Project Director of DPEP, Gandhinagar and the District Primary Education Officer, Kutch, and the QRS project was acknowledged.

6.6.5 Planning of Equipment Procurement

The equipment for the permanent prefabricated classrooms consist of basic educational furniture such as a teacher's desk and a chair, a cupboard, and a blackboard. The determined quantity per classroom was one each of the teacher's desk and chair, cupboard, and two blackboards. Their dispositions were planned along with the design of classrooms.

6.6.6 Planning of Construction Method and Materials

In view of the urgency for provision of the facilities and of structural durability, the classroom buildings, toilet units and fencing are to be made with permanent prefab PC concrete panel structures. These structures and other materials to be used for the educational facilities including equipment are all Indian-made. It was possible to procure these materials within the project time schedule since there was no difficulty in their supply situation, and are of adequate standard to meet the required specifications.

6.6.7 Bidding and Contracting

The Project Team prepared a set of documents necessary to conduct competitive bidding for the selection of the contractor who would take charge of the construction and procurement of equipment for the QRS project. These documents were handed to two selected PC concrete manufacturers for their bidding on 26th July 2001. They were reputable manufacturers who were able to design, supply and erect permanent prefab PC concrete units and at the same time were able to carry out the work in the project area. The bidding form was made for a lump sum contract since there was no apparent advantage to divide the work into small packages. As a result of the bidding and also as a result of the technical examination of the related documents submitted, the Project Team selected a contractor for the QRS project for educational facilities. The bids were opened on 3rd August 2001 and the construction contract for the educational facilities was signed on 29th August 2001.

6.6.8 Supervision of Works

The architect/engineers of the Project Team in association with the local consultancy firm, DCEL, supervised the work at each site at regular intervals and at specific necessary times during the construction period. The monthly progress reports were submitted to the GOG counterparts and JICA. The objectives of the construction supervision work were to ensure that the construction works were carried out in accordance with the drawings and specifications and to maintain a high quality of the works by giving guidance and coordination to the contractor. The supervision works also included the following tasks;

- examination and approval of the working drawings and the manufacturing drawings,
- factory inspection of the prefabricated concrete products,
- confirmation and approval of the building materials and the basic educational furniture,
- reporting on the progress of the construction work,
- final inspection of the completed facilities in order to issue the certificate of completion.

6.6.9 Proposed Construction Schedule

Originally the construction period of the work was set with 6 months. The work was commenced at September 1st, 2001 and expected to complete by February 25, 2002. After the commencement, some unforeseen matters arose, such as insufficient coordination of assistance agencies by the GOG, unexpected soil condition, the communal riot in Ahmedabad and Kutch area started from February 27,

2002, arisen tension between Pakistan and India, etc. Due to these unforeseen matters, the completion date of the QRS project was revised and extended until May 24, 2002.

6.7 Construction Report

6.7.1 Summary of the Project

(1) Summary of the Project

Project Name	The Work Of Construction Of Schools In Kutch District As A Part Of The Reconstruction Support For The Gujarat-Earthquake Disaster In The Devastated Areas In India	
	Construction Site	
	Dhamadka	(Site area: 1,036m^2)
	Mathak	(Site area: 1,641m^2)
	Bhadreshwar Kumar	(Site area: 717m^2)
	Bhadreshwar Kanya	(Site area: 847m^2)
	Sumarasar Sheikh	(Site area: 1,189m^2)
Employer	The Consortium of Yamashita Sekkei Inc. & Nihon Sekkei Inc.	
Engineer	The Consortium of Yamashita Sekkei Inc. & Nihon Sekkei Inc. In Association with Dalal Consultants & Engineers Ltd.	
Contractor	Stresscrete India Ltd.	
Contract Date	August 29, 2001	
Commencement	September 01, 2001	
Expected Completion	Originally February 25, 2002 and extended up to May 24, 2002	

(2) Outline of Building

Buildings	Classroom : 6m×6m Precast Concrete unit with 2.7m Wide verandah Toilet : Precast concrete unit
Dhamadka	7 classrooms Toilet
Mathak	9 classroom Toilet
Bhadreshwark Kumar	8 classroom Toilet
Bhadreshwar Kanya	6 classroom Toilet
Sumarasar Sheikh	5 classrooms Toilet

Electrical	General Lighting, Receptacles and Distribution Board
Plumbing	Toilet Fixtures, Water tank (100L), Faucet
Mechanical	Ceiling fan
Equipment	Cupboard, Teacher's desk & Chair, Blackboard, Information Blackboard

6.7.2 Progress of Works

(1) Executed Work (September - December, 2001)

1) Preparatory work

1. Zone V certificate obtained (September 2001)
2. Detail design modifications in consultation with the Engineer (September - December 2001)

2) Factory Work

1.	Wall panel casting	75%
2.	Roof panel casting	41%
3.	Lintel beam casting	43%
4.	Roof beam casting	51%
5.	Verandah beam casting	63%
6.	Column casting	100%
7.	Footing casting	33%
8.	Barge Board casting	7%

3) Site Work

1. Bhadreshwar Kumar

(a) Classroom Building/Corridor

Dismantling	Completed - (Debris Removal - 80%)
Layout	Complete
Excavation	3 room unit completed 5 room unit on hold
P.C.C.	3 room unit to be rectified 5 room unit on hold

(b) Toilet

Layout	No progress
Excavation	No progress
P.C.C.	No progress

(c) Boundary wall and gate

Layout	No progress
Excavation	No progress
P.C.C.	No progress

2. Bhadreshwar Kanya

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	3 room unit completed
P.C.C.	3 room unit completed

(b) Toilet

Layout	No progress
Excavation	No progress
P.C.C.	No progress

(c) Boundary wall and gate

Layout	No progress
Excavation	No progress
P.C.C.	No progress

3. Dhamadka

(a) Classroom Building/Corridor

Dismantling	Completed - (Dismantling of plinth not done)
Layout	Completed
Excavation	Completed
P.C.C.	Completed

(b) Toilet

Layout	No progress
Excavation	No progress
P.C.C.	No progress

(c) Boundary wall and gate

Layout	No progress
Excavation	No progress
P.C.C.	No progress

4. Mathak

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed

(b) Toilet

Layout	No progress

Excavation	No progress
P.C.C.	No progress

(c) Boundary wall and gate

Layout	No progress
Excavation	No progress
P.C.C.	No progress

5. Sumarasar Sheikh

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed

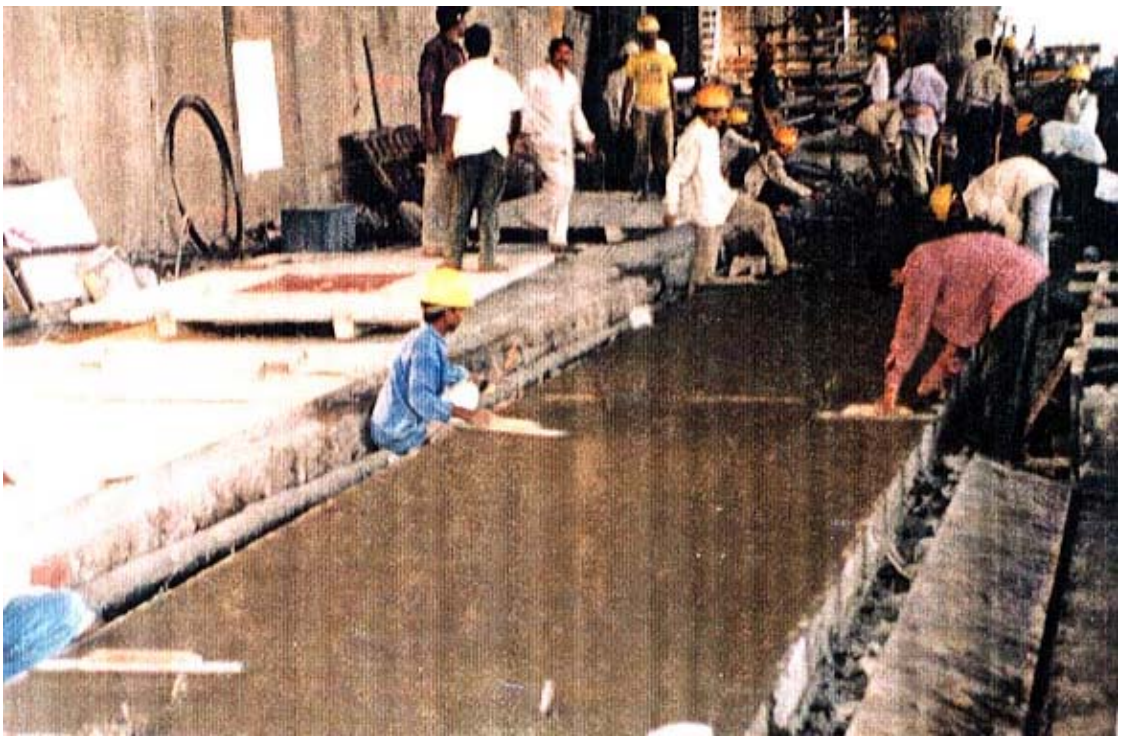
(b) Toilet

Layout	No progress
Excavation	No progress
P.C.C.	No progress

(c) Boundary wall and gate

Layout	No progress
Excavation	No progress
P.C.C.	No progress

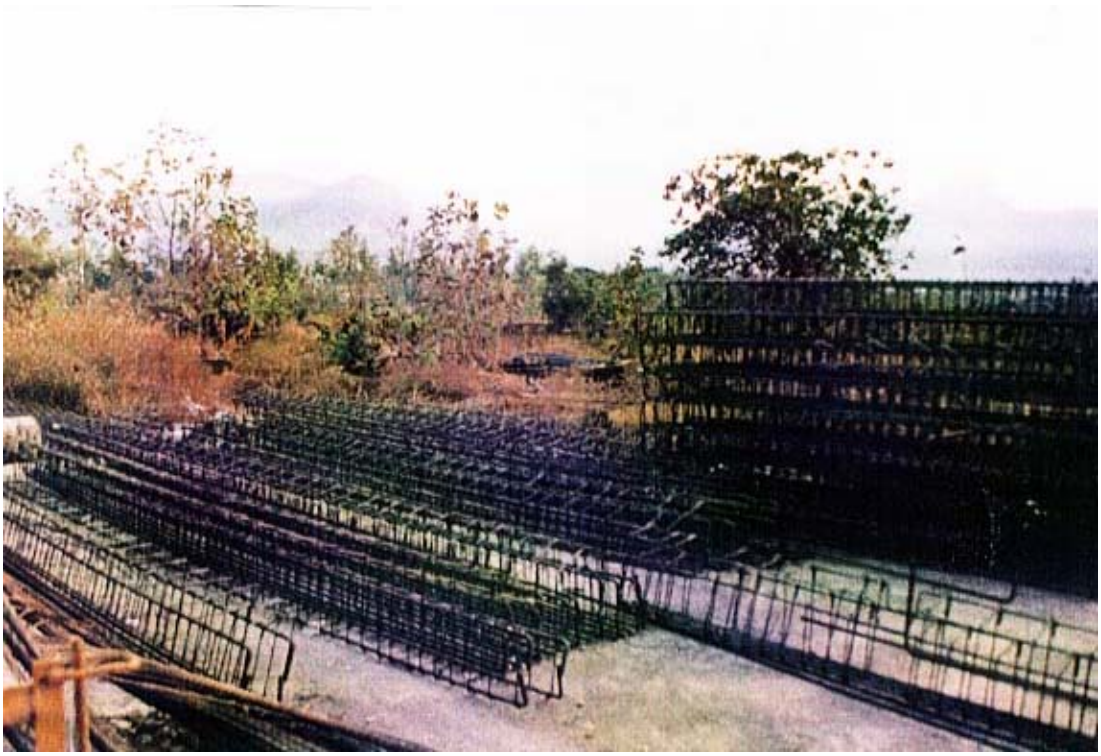
Vibrating In Progress Of Wall Panels as on 17/12/01



Finishing In Progress Of Wall Panels as on 17/12/01

Curing In Progress Of Wall Panels as on 18/12/01

Stacking & Delivering Of Wall Panels as on 20/12/01



Beam Reinforcements as on 26/12/01

Finished Products: Beam, Footing & columns as on 30/12/01

(2) Executed Work (January, February, 2002)

1) Preparatory work

1. Zone V certificate obtained (September 12, 2002)
2. Detail design modifications in consultation with the Engineer (September - January, 2002)

2) Factory Work

1.	Wall panel casting	93%
2.	Roof panel casting	78%
3.	Lintel beam casting	100%
4.	Roof beam casting	63%
5.	Verandah beam casting	94%
6.	Column casting	100%
7.	Footing casting	33%
8.	Barge Board casting	7%

3) Site Work

1. Bhadreshwar Kumar

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	3 room unit completed 5 room unit on hold
P.C.C.	3 room unit to be rectified 5 room unit on hold

(b) Toilet

Layout	-
Excavation	-
P.C.C.	-

(c) Boundary wall and gate

Layout	-
Excavation	-
P.C.C.	-

2. Bhadreshwar Kanya

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	3 room unit completed
P.C.C.	3 room unit completed

(b) Toilet

Layout	-
Excavation	-
P.C.C.	-

(c) Boundary wall and gate

Layout	-
Excavation	-
P.C.C.	-

3. Dhamadka

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed

(b) Toilet

Layout	Completed
Excavation	-
P.C.C.	-

(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	I.P.

4. Mathak

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed

Excavation	Completed
P.C.C.	Completed
Transportation	Completed

(b) Toilet

Layout	-
Excavation	-
P.C.C.	-

(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	-

5. Sumarasar Sheikh

(a) Classroom Building/Corridor

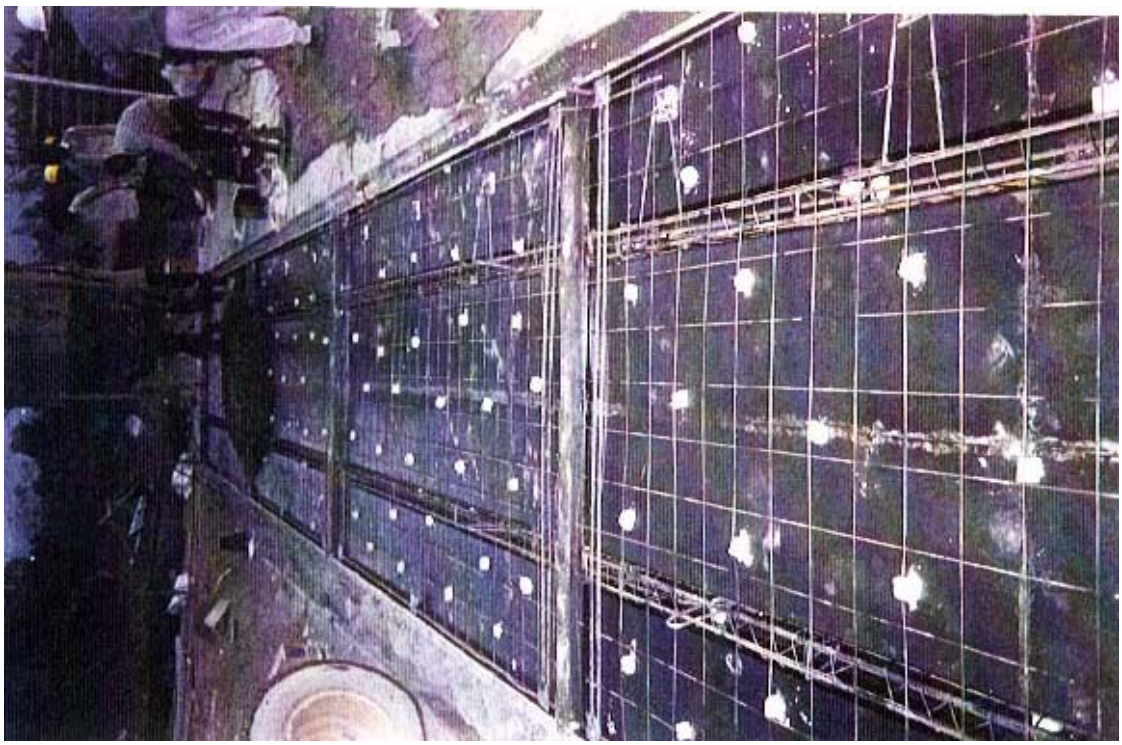
Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	I.P.

(b) Toilet

Layout	-
Excavation	-
P.C.C.	-

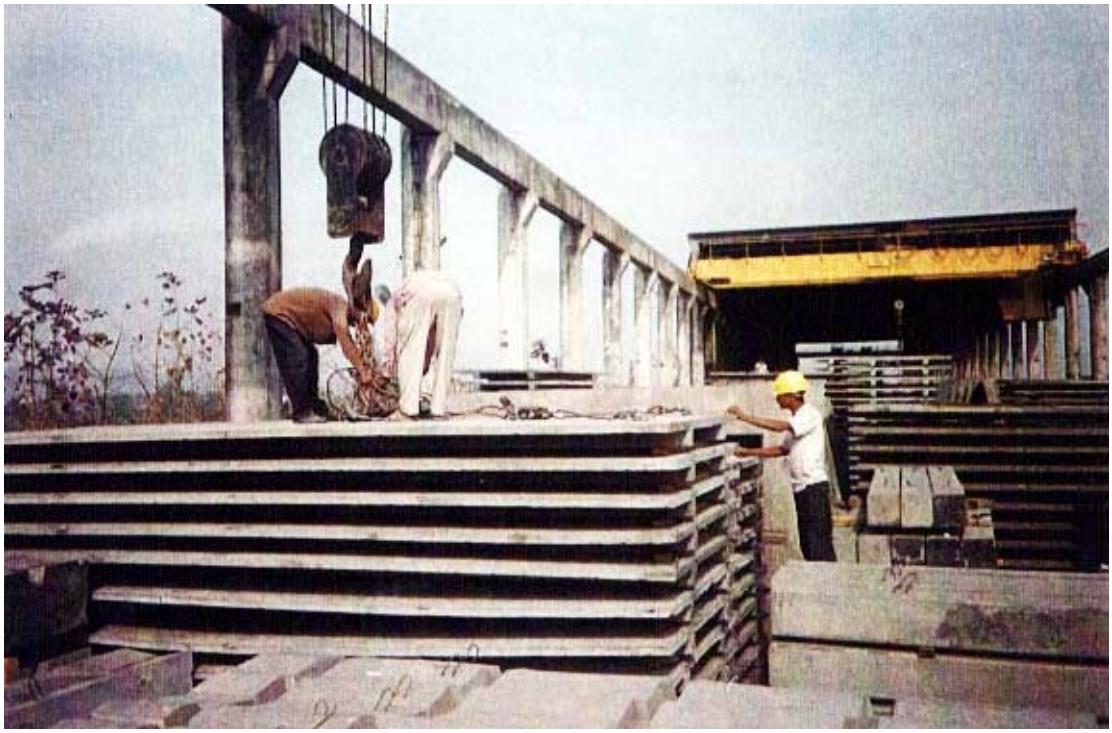
(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	-



Concrete In Progress of Wall Panel as on 02/01/02, 03/01/02

Stacking of Wall Panels 23/01/02



Mathak Primary School (01/07/02)

Mathak Primary School (02/05/02)

Dhamadka Primary School (02/02/02)

Dhamadka Primary School (02/02/02)

Bhadreshwar Boys' Primary School and girls' Primary School (02/05/02)

(3) Executed Work (March, 2002)

1) Preparatory work

1. Zone V certificate obtained (September 12, 2001)
2. Detail design modifications in consultation with the Engineer (September – February, 2002)

2) Factory Work

1.	Wall panel casting	100%
2.	Roof panel casting	100%
3.	Lintel beam casting	100%
4.	Roof beam casting	100%
5.	Verandah beam casting	100%
6.	Column casting	100%
7.	Footing casting	100%
8.	Barge Board casting	100%

3) Site Work

1. Bhadreshwar Kumar

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	3 room unit to be rectified 5 room unit in progress

(b) Toilet

Layout	-
Excavation	-
P.C.C.	-
Erection	-

(c) Boundary wall and gate

Layout	-
Excavation	-
P.C.C.	-
Erection	-

2. Bhadreshwar Kanya

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed
Joint Filling/flooring	I.P.

(b) Toilet

Layout	Completed
Excavation	-
P.C.C.	-
Erection	-

(c) Boundary wall and gate

Layout	I.P.
Excavation	-
P.C.C.	-
Erection	-

3. Dhamadka

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed
Joint Filling/Flooring	Completed
Painting/Electrification	Completed
Finishing	Completed

(b) Toilet

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	-

(c) Boundary wall and gate

Layout	Completed	
Excavation	Completed	
P.C.C.	Completed	
Erection	I.P.	

4. Mathak

(a) Classroom Building/Corridor

Dismantling	Completed	
Layout	Completed	
Excavation	Completed	
P.C.C.	Completed	
Erection	Completed	
Joint Filling/Flooring	Completed	
Painting/Electrification	Completed	
Finishing	Completed	

(b) Toilet

Layout	Completed	
Excavation	Completed	
P.C.C.	Completed	
Erection	-	

(c) Boundary wall and gate

Layout	Completed	
Excavation	Completed.	Except for the gate
P.C.C.	Completed.	Except for the gate
Erection	Completed.	Except for the gate

5. Sumarasar Sheikh

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed
Joint Filling/Flooring	Completed
Painting/Electrification	Completed
Finishing	Completed

(b) Toilet

Layout	Completed	
Excavation	Completed	
P.C.C.	Completed	
Erection	-	

(c) Boundary wall and gate

Layout	Completed	
Excavation	Completed.	
P.C.C.	Completed.	
Erection	Completed.	Except for the gate

Bhadreshwr Primary Schools Overall View from Boys' School Side (27/03/02)

Bhadreshwar Primary Schools Overall View from Girls' School Side (27/03/02)

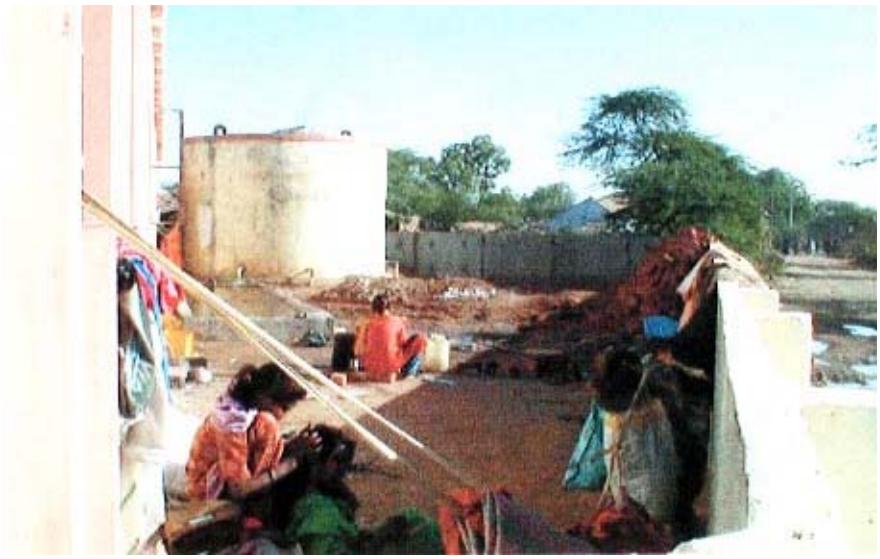
Bhadreshwar Primary Schools Between Boys' and Girls' School (27/03/02)

Dhamadka Primary School (02/02/02)

Dhamadka Primary School (02/02/02)

Dhamadka Primary School toilet Block (28/03/02)

Suarasar Sheik Primary School Overall View (28/03/02)



Dhamadka Primary School (02/02/02)

Sumarasar Sheikh Primary School Toilet Block (28/03/02)

Mathak Primary School Fron Side (27/03/02)

Dhamadka Primary School (02/02/02)

Mathak Primary School Toilet Block (27/03/02)

(4) Executed Work (May, 2002)

1) Preparatory work

1. Zone V certificate obtained (September 12, 2001)
2. Detail design modifications in consultation with the Engineer (September – March 2002)

2) Factory Work

1.	Wall panel casting	Completed
2.	Roof panel casting	Completed
3.	Lintel beam casting	Completed
4.	Roof beam casting	Completed
5.	Verandah beam casting	Completed
6.	Column casting	Completed
7.	Footing casting	Completed
8.	Barge Board casting	Completed

3) Site Work

1. Bhadreshwar Kumar

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

(b) Toilet

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

2. Bhadreshwar Kanya

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed

P.C.C.	Completed
Erection	Completed
Joint Filling/Flooring	Completed

(b) Toilet

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

3. Dhamadka

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed
Joint Filling/Flooring	Completed
Painting/Electrification	Completed
Finishing	Completed

(b) Toilet

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

4. Mathak

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed

P.C.C.	Completed
Erection	Completed
Joint Filling/Flooring	Completed
Painting/Electrification	Completed
Finishing	Completed

(b) Toilet

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

5. Sumarasar Sheikh

(a) Classroom Building/Corridor

Dismantling	Completed
Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed
Joint Filling/Flooring	Completed
Painting/Electrification	Completed
Finishing	Completed

(b) Toilet

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

(c) Boundary wall and gate

Layout	Completed
Excavation	Completed
P.C.C.	Completed
Erection	Completed

Dhamadka Primary School Front Side （17/05/2002）

Dhamadka Primary School Inner Court （17/05/2002）

Dhamadka Primary School Classroom with Furniture （17/05/2002）

Sumarasar Sheikh Primary School Overall View （17/05/2002）

Sumarasar Sheikh Primary School Backyard Boundary Wall and Toilet Block （17/05/2002）

Sumarasar Sheikh Primary School Classroom with Furniture （17/05/2002）

Mathak Primary School Front Side （19/05/2002）

Mathak Primary School Over View （19/05/2002）

Mathak Primary School Classroom with Furniture （19/05/2002）

Bhadreshwar Primary School Kumar （Boys' School） Overall View from Kumar Side （23/05/2002）

Bhadreshwar Primary School Kumar Classroom with Furniture （23/05/2002）

Bhadreshwar Primary School Kumar Donation Board （23/05/2002）

Bhadreshwar Primary School Kanya (Girls' School) Overall View from Kanya Side （23/05/2002）

Bhadreshwar Primary School Kanya Veranda and Donation Board （23/05/2002）

Bhadreshwar Primary School Kanya Classroom with Furniture （23/05/2002）

6.7.3 Issues Noted in Carrying Out the Works

(3) Revision of the layout plan of classrooms during the construction stage

1) Sumarasar Sheikh Primary School

At the design stage, existing 5 classrooms were to be remained, therefore, new classrooms were planned at the remaining space of the school premises. However, after the commencement of construction, these 5 classrooms were demolished, besides, village people and the school master of Sumarasar Sheikh insisted that the layout of classroom and the location of the toilet block be changed. The school plot was enlarged towards the back enlarged part of the plot. They did not allow for the Japanese side to carry out the work unless changing the overall layout. Accordingly, the original site layout plan was changed as shown in Fig.6-3.

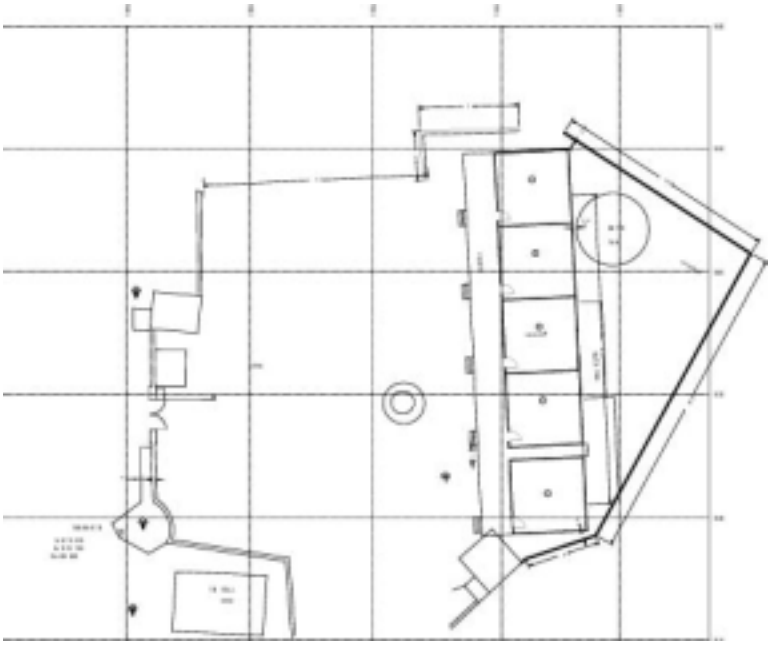


Fig. 6-3 Revised Layout Plan – Sumarasar Sheikh Primary School

2) Bhadreshwar (Boys) & (Girls) Primary School.

During the construction stage, the shape of the school premises had been rearranged to be rectangular with the consent of the village people and the school master of Bhadreshwar. Revised layout plan is shown in Fig. 6-4.

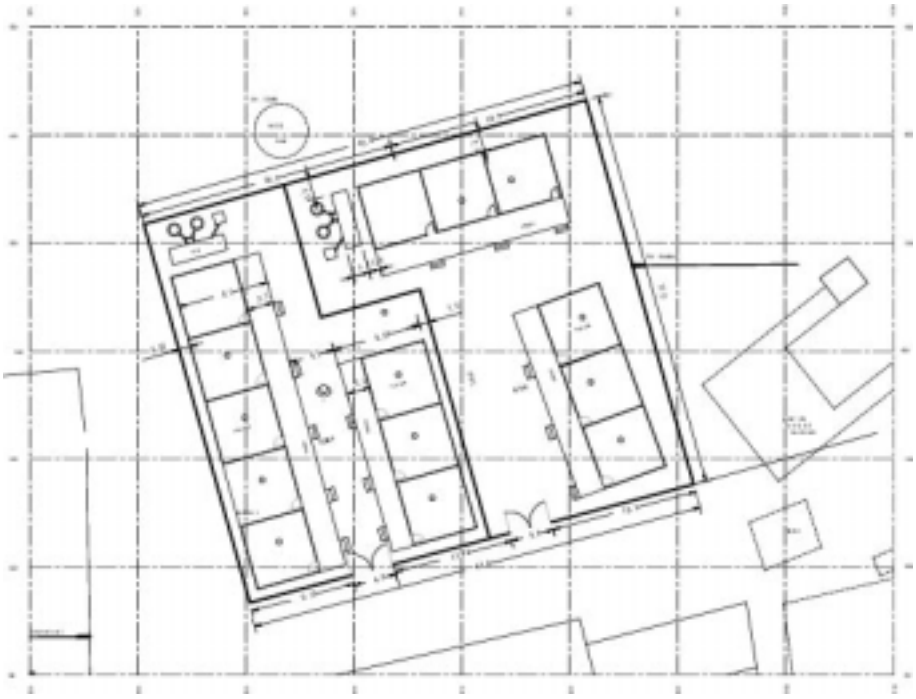


Fig. 6-4 Revised Layout Plan – Bhadreshwar (Boys) & (Girls) Primary School

3) Mathak Primary School

After the commencement of construction, the Sarpanch of Mathak requested to construct the toilet block at the southeast side of the site where the neighbor adjacent to the school agreed to let the use that part of his land. Thus, the site was slightly enlarged at the southeast corner. However, later as he came to know the area was to be used for the construction of the toilet block, he objected the construction, by saying, he had agreed to let his land used by the school, provided that the area was to be used for the construction of an Anganwadi, not toilet. Thus, the location of the toilet block had to be reconsidered. At first, the southwest corner of the site was suggested by the Sarpanch, but other villagers came to claim that the place had to be changed, because it was right next to the existing temple. Finally, the location was settled at the northeast corner of the site. Revised layout plan is shown in Fig.6-5.

Fig. 6-5 Revised Layout Plan – Mathak Primary School

6.7.4 Issues Occurred During the Construction Stage

(1) Sumarasar Sheikh

Sept. 14, 2001

An NGO, Bhuj Rotary Club, had started construction of permanent structure classrooms at the same site and excavation work of five classrooms was almost completed when the Team visited the site on September 14, 2001. Thereafter, the Team met with the Dty. DPEO and informed them of the incident. In consultation with the DPEO Bhuj, it was found out that the said NGO was allotted another Sumarasar but started the construction at Sumarasar Sheikh by mistake. The DPEO immediately informed the NGO to stop the work at Sumarasar Sheikh and shift to the correct location. The NGO accordingly shifted the site at once.

Oct. 17, 2001

Setting out of the classrooms, boundary walls were carried out. The schoolmaster informed the Team that they had received a letter from DPEO, Bhuj stating that JICA would construct 11 classrooms. The Team informed him that the number of the classroom to be constructed by JICA is five (5) and EPEO's letter is not correct.

The Contractor stated as soon as the excavation work at Bhadreshwar and Dhamadka finishes they would start the excavation work at Sumarasar Sheikh, most probably in 10 days to two weeks time.

From Oct. 17, 2001 to Dec. 21, 2001

Though the Contractor was repeatedly instructed to proceed with the work at the site every week, no progress was observed during this period.

It was observed that the existing classrooms were being demolished by the villagers on Dec. 17, 2001.

PC concrete elements were being cast at the Contractor's Bombay factory.

Jan. 8, 2002

The Contractor sent workers on Jan. 7, 2002, however, the work had not started because the villagers insisted that unless JICA build 11 classrooms, which was indicated in the DPEO's letter, they will not allow the Contractor to start construction work.

The JICA Team reminded the school master regarding this matter that JICA had informed the Sarpanch and the school master that five classrooms to be built by showing the layout drawing in last June. The school master confirmed that the Team did explain and accepted the fact that the indicated number of classrooms in the DPEO's letter was wrong. The Team and the school master agreed to

inform the DPEO regarding this matter from both sides.
The Team held a meeting with the Adl. DPEO in Bhuj regarding this matter and confirmed that JICA is building five classrooms at Sumarasar Sheikh. He assured that DPEO will make the necessary arrangements for construction of remaining six classrooms.

Jan. 17, 2002
Excavation and PCC work for the 4-classroom unit was completed. However, the position of the unit was shifted by 4 meters toward north by the request of the village/school master without informing the Engineer. The Contractor reported that the Sarpanch requested a relocation of the toilet block location towards the other side of the existing water tank and that the school plot had been enlarged to include the new toilet location. This information could not be confirmed due to unavailability of the Sarpanch and the school master on this day. The Contractor was instructed to have the Sarpanch confirm their request in writing.
Excavation work for the 1-classroom unit was in progress.

Feb. 1, 2002
PC elements were delivered to the site and erection of the 4-classroom unite began.
PCC work for the 1-classroom unit was to be rectified due to substandard quality.

Feb. 6, 2002
The villagers insisted that the 1-classroom unit to be constructed next to the 4 classroom unit and had it not been realized the construction would be hindered. Considering the schedule, the usage of the facility, and the enlarged plot and boundary line, the Team explained to the Sarpanch and the villagers that so long as they agree that the work to be carried out within the contracted amount of materials, e.g. total length of the boundary wall, the request could be considered and incorporated in to the JICA Project and whatever the remaining work was to be carried out by the villagers. The Team and the Sarpanch agreed to the term and the Sarpanch was requested to issue a letter regarding this matter. The Contractor was instructed to proceed with the work.

Feb. 20, 2002
Erection of all classroom units was completed. The floor work was in progress. About 90 % of erection of the boundary walls was finished.
The request letter regarding the requests was received.

Feb. 26-27, 2002
Classroom:
The floor work was in progress. Erection of boundary wall was completed.

Toilet block:

Excavation work for the soak pits/wells was completed. However, water supply two pipes for neighboring houses were found in the excavated area. The Contractor was instructed to shift the pipes to outside the site.

Between Feb. 28 and March 10, 2002

Progress was not reported due to the Gujarat Riot.

March 13, 2002

Classrooms:

Painting work was in progress.

The Contractor was requested to replace substandard doors.

Toilet block: No progress was observed.

March 20, 2002

Classrooms:

Painting work was in progress.

Toilet block: Brick work for the soak pits/wells was completed.

March 28, 2002

Classrooms:

Painting work was in progress.

Toilet block: PC elements being recast at the Bhuj factory.

April 6, 2002

Classrooms: Replacement of the substandard doors was completed.

The Contractor was instructed to rectify paint work for the door.

Toilet block: PC elements being recast at the Bhuj factory.

April 10, 2002

Classrooms: The rectification work for the doors were not carried out and the Contractor was instructed to carry out the work immediately.

April 17, 2002 Final Inspection

Rectification work

Classroom unit:

PC elements' joints and paint touch up work

Paint touch up work for walls, ceilings, windows and doors.

Remaining work

Classroom unit:

Glazing work, Light and ceiling fan fixture, Furniture installation, Barge board installation

Toilet block:

Erection of wall panels and a roof panel, Floor work, Plumbing work including construction of inspection chamber, Installation of water tank, setting the soak pits/wells cover

Gate erection

April 25, 2002

Rectification work

Classroom unit:

PC elements' joints and paint touch up was in progress

Paint touch up work for walls, ceilings, windows and doors was in progress

Remaining work

Classroom unit:

Glazing work, Light and ceiling fan fixture, Furniture installation, Barge board installation was not carried out.

Toilet block:

Except for one wall panel, erection of wall panels and a roof panel was finished.

Floor work, plumbing work including construction of inspection chamber and installation of water tank was finished with minor rectification work.

The soak pits/wells cover was installed.

Excavation for gate pillars was completed.

April 26, 2002

Toilet block: Remaining one wall panel was installed. Plumbing work was rectified.

Concrete for the gate pillars was cast.

May 1, 2002

Classrooms:

Glazing work was completed and cleaning was instructed.

Paint touch up work was in progress.

Light and ceiling fan fixture, Furniture installation and barge board installation were not carried out.

Toilet block: Remaining rectification work was in progress.

Gate: Painting work finished with some touch up work remaining.

May 6, 2002

Classrooms:

Paint touch up work was in progress.

Light and ceiling fan fixture was in progress.

Furniture installation and barge board installation were not carried out.

Toilet block: Remaining rectification work was in progress.

Gate: Painting work finished with some touch up work remaining.

May 11, 2002

Classrooms:

Paint touch up work was in progress.

Installation of lights, ceiling fans and furniture was completed.

Barge board installation was not yet carried out.

Toilet block: Remaining rectification work was in progress.

Gate: Painting work was completed.

May 17, 2002

All the remaining work and rectification work was completed.

The Contractor was instructed to request the Sarpanch to confirm all the items to be handed over and acknowledge the receipt.

May 24, 2002

The facilities were handed over to DPEO, Bhuj.

(2) Bhadreshwar

August, 2001

A four classroom unit of temporary prefab structure construction began by DPEP at the north-west side of the project site. Because it was obvious that the location of the structure would overlap with the classroom of the Project, the Team suggested the workers to shift the building location. However, the construction was completed without relocation. Hence most of the temporary structure is to be demolished by the Project.

The fact that the temporary classrooms were constructed at a location overlapping the JICA Project's buildings requires the JICA project to be carried out in two phases because the classroom function has to be maintained during the construction stage within the project site. This would cause the Projects construction schedule longer than originally expected.

A small shrine was discovered within the project site and it was requested by the village that the

boundary lines and layout plan of Kanya to be changed in order not to disturb the shrine.

Sept. 14, 2001

Two units of temporary toilet were constructed within the Project site by UNICEF. After informing the UNICEF regarding this matter, it was agreed that UNICEF would remove the toilet units before the construction work of the Project starts at the site.

Oct. 9, 2001

Setting out of the phase 1 buildings were carried out. The boundary lines were confirmed. The school master informed the Team that relocation of the small shrine would be discussed by the villagers.

Oct. 16, 2001

Excavation for the phase-1 3-classroom unit of Kumar was being carried out. The small shrine was found to be a grave of an individual and it was decided to be shifted to outside of the Project site. Thus the site boundary lines would be changed back to the original plan, however the classroom configuration of Kanya would remain two 3-classroom units.

Oct. 30, 2001

Excavation of the phase-1 3-classroom unit of Kumar was almost completed and PCC casting is scheduled on Oct. 31. Cutting the hill on the east and north sides of the site has yet to start. The dismantling work of the existing building has not started. Excavation work for the remaining classrooms and toilet blocks were to start accordingly.

Nov. 6, 2001

Kumar: Neither the excavation for 3-classroom unit was completed nor the PCC casting was carried out.

Kanya: In order to carry out efficient land cutting, the ground level for Kanya was instructed to the representative of the Contractor at the site to be in conformity to the design.

Nov. 12, 2001

Kumar: Dismantling the existing building was almost complete and the debris was to be removed.

Kanya: Shifting the existing grave to outside the Project site was completed by the village side and the land cutting was being carried out.

The land cutting was seems to have been done to the level lower than planed and thus the Contractor was instructed to survey the levels and inform the Engineer.

Nov. 21-28, 2001

Kumar: There was a little progress in removing the debris and no progress in excavation was observed since 12th.

Kanya: No progress was observed. No land level survey report has been submitted by the Contractor. PC elements were being cast at the Contractor's Bombay factory.

Dec. 4-21, 2001

Kumar & Kanya: Little progress in removal of the debris was observed. No progress in excavation was observed. The Contractor was instructed to make the necessary detailed adjustments in order to compensate the level difference from the design.

The level adjustments was being designed by the Contractor.

The PC elements were being cast at the Contractor's Bombay factory.

Jan. 7, 2002

Kumar & Kanya: The Contractor was informed of the ground levels for both the schools and boundary wall levels and instructed to start remaining excavation work.

PC elements were being cast at the Contractor's Bombay factory.

Jan. 17, 2002

Kumar & Kanya: No progress was observed at the site. The Contractor was instructed to start the remaining work.

PC elements were being cast at the Contractor's Bombay factory.

Feb. 5, 2002

Kumar & Kanya: Removal of the debris was completed. The boundary wall lines were again confirmed by the Contractor, Sarpanch, and the Engineer. The Contractor started preparation of remaining site work. The Engineer suggested the Contractor to use machine for cutting land half a foot above the required level for the hill side boundary wall and filling the land before starting excavation for classroom foundation. However, the site engineer of the Contractor did not agree to follow the instruction.

Feb. 19, 2002

Kumar: No progress was observed.

Kanya: Excavation work for six classrooms was completed.

The Contractor was instructed to carry out remaining work simultaneously wherever possible to catch up on the work schedule, e.g. leveling, cutting, filling, etc.

Feb. 25, 2002

Kumar: PCC was cast for three classrooms portion out of the 5-classroom unit. Revised PCC for 3-classroom unit was completed.

Kanya: Excavation work for the south side 3-classroom unit is in progress.

First batch of PC panels arrived at the site.

Between Feb. 28 and March 10, 2002

Progress was not reported due to the Gujarat Riot.

March 12, 2002

Kumar: Erection of 3-classrrom unit was completed. The foundation work of 5-classroom unit except for the area overlapping the existing temporary prefab structure was being carried out.

Kanya: The south side 3-classroom unit was being erected. The PCC was cast for the north side 3-classroom unit.

The school master requested to obtain permission for dismantling the prefab structure from DPEP. The matter was conveyed to the DPEP, Gandhinagar, and the Team was assured that the DPEO of Bhuj would issue the permission. However, the DPEO of Bhuj was on business trip at the moment and the permission would be issued as soon as he comes back.

March 16-18, 2002

Kumar: The floor work for 3-classroom unit was being carried out. The foundation work for 5-classroom unit is in progress.

Kanya: Erection of PC wall panels for all the six classrooms was completed.

The last batch of PC elements sent on six trucks from the Bombay factory was caught in a riot somewhere near Ahmedabad and missing and was being searched for by the Contractor.

March 20, 2002

Kumar: The floor work for veranda of 3-classroom unit is being done. The foundation work for the 5-classroom unit was found being done at the wrong position and the Contractor was instructed to rectify the mistake.

Kanya: The missing six trucks have not arrived at the site yet. The contractor reported that four of them had been located.

March 21, 2002

The Contractor reported that one of the missing trucks was attacked by in the riot and the PC elements were damaged. The Contractor was instructed to find out the damage in detail and to make all the necessary arrangements for repair/recast accordingly so that no delay due to this incident would take

place.

March 24, 2002

The Contractor reported that the site work was in progress.

March 27 - April 1, 2002

Kumar: The floor work for 3-classroom unit was completed and the school was requested to shift the school activity from the existing temporary structure classrooms so that the Contractor would be able to start dismantling the existing classrooms. The Contractor was instructed to dismantle the structure in a way that it could be reused for relocation by DPEP.

Foundation work for the 5-classroom unit was redone. However, it was again found done in a wrong manner and thus to be rectified again.

Kanya: The damaged PC elements were being recast at the Bhuj factory and to be delivered at the site on April 5, 2002.

Toilet block PC elements were being recast at the Bhuj factory.

April 5, 2002

Kumar: Dismantling work of the existing temporary classroom was in progress. The Team requested DPEP to shift the classroom unit where they planned to relocate the structure as soon as possible. However, DPEP replied that there is no immediate plan to relocate the unit and thus the materials to be left around the site.

Rectification of foundation work for 5-classroom unit was in progress.

The Contractor was instructed to shift the PC elements which are being kept at the toilet block location and to start preparation for constructing the toilet block.

Kanya: Land cutting of the hill is in progress and human remains were discovered from the area indicating some part of the area was a graveyard. According to the Contractor, agitated villagers insisted to stop the land cutting in the area. Consequently the cutting area and level of cutting had been changed not to minimize the disturbance to the graveyard.

The dismantled prefab elements of DPDP classrooms were kept at the location for the girls' school toilet block. The Contractor was instructed to shift the dismantled elements and start preparation of the toilet block construction.

Damaged PC elements, 5 PC wall panels and 4 PC roof panels, which were supposed to have arrived at the site have not been arrived.

April 9, 2002

Kumar: Foundation work for 5-classroom unit was in progress.

Dismantling of the existing temporary classroom was still in progress.
The PC elements at the toilet block location had not been shifted and the Contractor was again instructed to proceed with the preparation work for toilet block.
Kanya: Excavation of soak pit was in progress.

The Contractor was instructed to work two shifts and to increase number of workers in order to complete the Works as scheduled.

April 18, 2002
The Contractor reported that they employed about 70 workers on April 13, 2001. However, contrary to the report given by the Contractor, increase in number of workers was not observed at the site. The Contractor was, therefore, again strongly instructed to increase the number of workers.
Kumar:
Rectification work for 5-classroom unit was done, however, the foundations for the partition walls were again wrongly placed and the Contractor was instructed to rectify it.
Toilet block: Even though the Contractor had been repeatedly instructed to start the work for the toilet block, no work began and thus the Contractor was again instructed to immediately start the work for the toilet block.
Boundary wall: The excavation work for foundation, which was supposed to be in progress, has not been started. The Contractor was instructed to start the work immediately.
Kanya:
Floor finish of south side 3-classroom unit was completed. Filling work for the floor of north side 3-classroom unit was in progress

The excavation work for the boundary wall did not begin. The Contractor was instructed to immediately start work.

April 25-27, 2002
This was supposed to be the final inspection day for Bhadreshwar Kumar & Kanya according to the Contractor's revised schedule. However the progress of the work was not near to the completion. Thus the Engineer carried out regular site inspection.
Though it was reported that there were 30 workers working at the site from April 21, site work was observed that there was no improvement in efficiency due to poor site management. The site engineer was again instructed to simultaneously carry out the works where possible since it was observed not all workers were working, some were sitting/watching/talking, etc.

Kumar:

Erection of PC wall panels up to three classrooms of 5-classroom unit was done. However the site engineer reported three PC wall panels were damaged due to mishandling on April 22 and being recast at the Bhuj factory and to be delivered to the site on April 27.

Toilet block: The PC elements had not been shifted and thus no progress of work was observed. The Contractor was again reminded to start the work immediately if they were to complete the work.

Compound wall: No progress was observed. The Contractor was again instructed to start the work immediately.

Kanya:

Floor work of the south side 3-classroom was completed.

Toilet block: No progress was observed. No progress in excavation of soak pit.

Compound wall: The progress was nominal.

The Contractor was instructed to increase the number of workers in order to carry out each work simultaneously.

May 1-2, 2002

Kumar: According to the Contractor the erection of 5-classroom unit was supposed to have completed on April 29. However, it was reported that erection of 5-classroom unit was not completed due to lacking of a ridge beam. Because the ridge beam had not arrived from the Bhuj factory, the Engineer went to the factory and had them delivered to the site in his presence.

Wiring for 3-classroom unit was complete.

Toilet block: After four weeks of repeated instruction to shift the PC panels from the toilet block location, the work still not yet carried out. The Contractor was again instructed to do so.

Compound wall: Excavation for a part of the foundation began.

Kanya: Wiring for all the classrooms was complete. According to the Contractor the painting work to start from May 3.

Toilet block: No progress.

Compound wall: Cutting and excavation in progress.

May 3, 2002

Kumar:

Erection of the 5-classroom unit still in progress (Veranda column, two beams and six roof panels not put in position)

Toilet block: Excavation for soak pit was in progress. The foundation work for the toilet block had not begun, according to the Contractor due to lack of cement and brick. The Contractor's head office was instructed to make sure all the necessary materials, manpower, machinery to be readily provided

at the site.

Compound wall: The foundation work had not began due to the same reason as for the toilet block.

Kanya:

Paint work had not begun. The Contractor was instructed to start the work immediately.

Toilet block: No progress. The Contractor was again instructed to begin the work immediately. Brick work for soak pit was completed.

Compound wall: Cutting and excavation in progress.

The Contractor was instructed to start site leveling work.

May 6, 2002, Final Inspection

It was supposed to be the final inspection day, however, the work was not even close to completion due to lack of site management. And thus all the inspected issues were regarded as the remaining work.

The Contractor reported the following;

The subcontractor hired from Bhadreshwar village was preventing workers from outside the village to join the work. The matter was brought to the Sarpanch and the police. Also the Contractor claims that the subcontractor was not paying the workers even after he was paid by the Contractor and causing the workers unwillingness to work. The Contractor made arrangements to directly pay the workers.

Remaining Work

Kumar:

Erection of the 5-classroom unit was complete, however, the last column at the corner was found defective and to be replaced immediately. Filling work for the classroom was in progress. Veranda brick work was not commenced.

Toilet block: Excavation for soak pit was still in progress. The foundation work for the toilet block had not begun.

Compound wall: No progress was observed. The Contractor was instructed to start the work immediately.

Kanya:

The steps at the verandas were being constructed.

Paint work had not begun. The Contractor was instructed to start the work immediately.

Toilet block: No progress. The Contractor was again instructed to begin the work immediately.

Compound wall: Cutting and excavation in progress.

May 7, 2002

Kumar:

The Contractor was making arrangements for replacing the column. Filling work for the classroom was in progress. Veranda brick work was not commenced.

Toilet block: Excavation for soak pit was still in progress. The foundation work for the toilet block began.

Compound wall: Brick foundation work began.

Kanya:

Painting work began. The steps at the verandas were completed.

Toilet block: No progress.

Compound wall: Cutting and excavation in progress. Erection of wall panels began at the wrong position without completing proper excavation. The contractor was instructed to restart the erection work only after finishing proper excavation work done and make sure the position of the panels were at the correct position.

May 10, 2002

The Contractor reported that the well owner that they had been purchasing water refused to sell water for construction purpose anymore due to water shortage. The construction work had been hindered due to lack of water. The Contractor was instructed to immediately find and use alternative sources.

Kumar:

Replacement of the column was completed on May 9, 2002. Floor work for three of the classroom was complete and rest was in progress. Veranda brick work had not been commenced.

Toilet block: Brick work for soak pit was complete. The foundation work for the toilet block was complete.

Compound wall: Brick foundation work was in progress.

Kanya:

Painting work was in progress.

Toilet block: Erection of PC elements except for the roof panel was complete. Floor work had not begun.

Compound wall: Excavation was complete. Rectification work for the wall panels was done. Erection of wall panels was in progress.

Site leveling had not begun. The Contractor was instructed to start the work immediately.

May 16, 2002

Kumar:

Floor work for the classroom was complete. Veranda brick work was in progress. Painting work was in progress.

Glazing work was remaining.

Toilet block: Erection of PC elements was complete. Joint filling was in progress. Soak pit was complete.

Compound wall: Brick foundation work was in progress. Wall panel erection was in progress.

Gate: Gate post casting and gate fixing were complete. Paint work remaining.

Kanya:

Painting work was in progress. Glazing work was remaining.

Toilet block: The roof panel was installed. Floor work was in progress.

Soak pit to be rectified.

Compound wall: Erection of wall panels was in progress.

Gate: The work was not commenced.

Site leveling had not begun. The Contractor was instructed to start the work immediately.

May 19-20, 2002

Kumar:

Veranda work and Barge board installation were completed. Installation of lights, ceiling fans and furniture was completed. Painting work was in progress. Glazing work was remaining.

Toilet block: Joint filling was in progress. Plumbing work and Inspection chamber were completed.

Compound wall: Brick foundation work was in progress. Wall panel erection was in progress.

Gate: Paint work remaining.

Kanya:

Installation of lights, ceiling fans and furniture was completed. Barge board installation was completed. Painting work was in progress. Glazing work was remaining.

Toilet block: Floor work was in progress. Soak pit to be rectified.

Compound wall: Erection of wall panels was in progress.

Gate: The work was not commenced.

May 23, 2002

All the remaining work and rectification work was completed.

The Contractor was instructed to request the Sarpanch to confirm all the items to be handed over and acknowledge the receipt and the Sarpanch’s confirmation was obtained.

May 24, 2002

The facilities were handed over to DPEO, Bhuj.

(3) Mathak

Sept. 13, 2001

New layout of classrooms, for which the change was requested by the school master and village Sarpanch previously, was accepted by the school master. A light gauge steel structure at the south east side of the project site was also being constructed by other NGO without a requested shift even though the Team had earlier requested Sarpanch's brother to make the necessary arrangements to shift the structure toward the west by 5 meters in order to avoid overlap with the Project's toilet block. The team informed the Sarpanch that the structure must be shifted toward west by 5 meters at a later stage and it was accepted.

Sept. 22, 2001

Received a letter issued by the Sarpanch dated on Sept. 22nd stating that another NGO, Good Samaritan, intends to construct classrooms along with housings and healthcare facility, hence JICA project is not welcomed.

Sept. 27, 2001

The matter was brought to the DPEO and discussed between the DPEO and the JICA Project Team (the Team). The DPEO issued a letter on Sept. 27th declaring that the classrooms to be constructed by JICA not other organizations and directing the ADPEO in Anjar to solve the matter.

Oct. 11, 2001

When the Contractor, Stresscrete India Ltd., started setting out of the buildings at the site, a NGO and the village people came to stop the work. The ADPO talked to both the parties, however, they were not persuaded and thus the work had to be stopped for the time being. It was informed that the NGO was insisting to carry out all the reconstruction work including the school, health care facilities, etc., in the village and if other organizations intervene, the NGO would withdraw all of their work.

According to the site engineer of the Contractor, the Sarpanch of Mathak is supposed to make decision on this matter by Oct. 15, 2001.

Oct. 16, 2001

It was informed that the Sarpanch had not made the decision. The Team came across the school principal at the office of Anjar ADPEO when he brought a letter from the village people stating that they preferred to have the NGO build the school buildings and would not send their children until this matter is solved.

Thereafter, the Team and ADPEO met with Deputy DDO in Bhuj and the Deputy DDO promised to coordinate this matter and requested the Team to wait for two days.

Nov. 5, 2001

The NGO was not persuaded regarding this matter until November. When the Team met with the ADPEO and the Sarpanch at the office of ADPEO on Nov. 5, 2001, it was informed that both the NGO and village people came to the conclusion that they allow JICA to build the school.

Nov. 6, 2001

The Sarpanch, the Contractor and the Team held a meeting at the site and told the Contractor to start the work immediately. The Team requested the Sarpanch to confirm regarding this matter in writing. (Due to preparation for election, etc., issuance of the letter was delayed, however, the letter stating JICA to build the school was issued on Jan. 29, 2002.)

Nov. 12, 2001

No progress of the work was observed at the site. The Contractor was again instructed to start construction immediately. The Contractor informed the Team that they will start the work from Nov. 16, 2001.

Nov. 21, 2001

Demolition work of the existing temporary classrooms was confirmed to be in progress. The largest tree in the site which was in the way for constructing 4 classroom unit was also being cut.

Nov. 28, 2001

Demolition of existing temporary classrooms completed. The largest tree was still being cut.

Dec. 04, 2001

Setting out of the classrooms was complete. Two more trees were found in the way for constructing 5 classroom unit and thus cutting of them began.

Dec. 15, 2001

Excavation for 5 classroom unit was completed and PCC was being cast. Excavation for 4 classroom unit was in progress.

Dec. 21, 2001

Excavation for all the classrooms was completed and PCC being cast. However, the stump of the largest tree was found partially remaining within the building area and the Contractor was instructed to remove it completely.

The Contractor was also instructed to widen the PCC width according to the Contractor's specifications at one of the corners of 4 classroom unit.

Jan. 07, 2002

The PCC width at the corner of 4 classroom unit was not rectified yet. The Contractor was instructed to rectify the same. Location of the toilet block was confirmed and the Contractor was instructed to start constructing the toilet block.

Jan. 17, 2002

No progress of the site work was observed. The Contractor was again instructed to rectify the PCC width at the corner of 4 classroom unit. P.C. elements were being cast at the Contractor's Bombay factory.

Feb. 05, 2002

P.C. elements arrived at the site. Rectification work for the PCC width began. Preparation for boundary wall work began. The Sarpanch's letter regarding acceptance of construction of the school by JICA dated Jan. 29, 2002 was received.

Feb. 19, 2002

Erection of PC panels for boundary walls was in progress, however, discrepancy between the boundary line and the walls being erected was found and the Contractor was instructed to rectify the wall position accordingly. Erection of PC panels for classrooms was also in progress.

The neighbor who offered a part of his land for the construction claimed that he did not offer the land for construction of toilet block but for anganwadi and he opposed to construct the school toilet right next to his house. Hence relocation of toilet block was discussed with the Sarpanch and it was decided to construct at the south-west corner of the site.

Feb. 25, 2002

The villagers requested to reconstruct all the boundary walls. It was explained to them that since the total length of the boundary wall was approved by the Govt. of Japan last July and hence it was not possible to change the project scheme, however, reallocating the boundary wall at the site within the same total length was acceptable. Thus, it was agreed to dismantle the existing north-west side boundary wall and to shift the portion of boundary wall on the south-east side of approx. 19m to north-west corner to make a continuous new boundary wall all from the west to the north side boundary. A request letter mentioning regarding this change was to be submitted by the Sarpanch later.

Election of classroom PC panels was in progress.

Between Feb. 28 and March 10, 2002

Progress was not reported due to the Gujarat Riot.

March 11, 2002

Election of classrooms was completed. No progress of the toilet block was observed and the Contractor was again told to proceed with the work immediately.

March 12, 2002

While setting out the toilet block Mr. Mega J. along with other villagers came to complain regarding the toilet position. According to them it was not suitable to construct toilet block there because the temple was right next to it and proposed to shift it to the north-east corner of the site. It was found possible to construct the toilet block by changing the configuration of soak pit and soak well after surveying the proposed area and thus told the villagers to officially request in writing regarding this matter through the Sarpanch. The official request letter was received on March 14, 2002 and work started accordingly.

March 15-18, 2002

According to the Contractor the Sarpanch again requested the Contractor to reconstruct all the boundary walls but the Contractor refused the request.

Floor work was in progress. The toilet block was in progress however rocky strata encountered at the soak pit area was reported by the Contractor and possible relocation again to be consulted with the Sarpanch on March 20.

March 20, 2002

The Sarpanch was not available and possible relocation of the toilet block was discussed with the neighbor and the school master instead, however the neighbor's consent for relocation was not given. Thus it was decided that the work to proceed at the present location by replacing soil around the soak pit.

The floor work for all the classrooms was completed and verandas and in between the two blocks was in progress.

March 27, 2002

The PC elements for the toilet block were found being wrongly cast and being recast. The floor work of 5 classroom unit veranda and between the two classroom blocks was in progress.

April 9, 2002

The floor work for the 5 classroom unit veranda was completed. The soak pits/wells were being made.

April 18, 2002

It was supposed to be the final inspection day. However, the work was not completed to the level for

final inspection and thus it was postponed to 25 April, 2002.

The Contractor was instructed to increase the number of workers to completed the work.

Classroom: Rectification of PC elements' joint was instructed. Painting work to be carried out.

Toilet block: Construction of soak pits/wells was in progress.

April 25, 2002

The Contractor again failed to complete the work to the final inspection level. Thus final inspection date was again postponed to April 30, 2002.

Classroom: Electrical wiring was in progress. Painting work was in progress.

Toilet block: PC elements were being erected. However, some of the elements were not newly cast ones and the Contractor was instructed to replace them.

Construction of soak pits/wells was still in progress.

April 26, 2002

No progress was observed except for the soak pits/wells construction. The site engineer reported that paint was being procured in Bhuj and scheduled to start in the afternoon.

The Contractor was instructed to immediately start erection of gate posts.

April 27, 2002

Classroom: Painting work was in progress.

Toilet block: No rectification work had begun.

Construction of soak pits/wells was almost completed.

Excavation work for the gate posts had not begun.

April 30, 2002 Final Inspection

Rectification work

Classroom unit:

PC elements' joints and paint touch up work

Paint touch up work for the walls, ceilings, windows and doors.

Remaining work

Classroom unit:

Glazing work, Light and ceiling fan fixture, Furniture installation, Barge board installation

Toilet block:

Installation of roof panel, Floor work, Plumbing work including construction of inspection chamber, Installation of water tank, setting the soak pits/wells cover

Gate erection work

May 1, 2002

Roof panel of toilet block was installed. Excavation of gate posts began.

May 2, 2002

Toilet block: The floor work and plumbing work were in progress. Construction of water tank platform was in progress. Excavation of gate post was almost complete and PCC was to be carried out the same day.

May 3, 2002

Rectification work

Classroom unit:

PC elements' joints and paint touch up work was in progress

Paint touch up work for the walls, ceilings, windows and doors was in progress.

Remaining work

Classroom unit:

Glazing work was not complete.

Light and ceiling fan fixture, Furniture installation and Barge board installation were not carried out.

Toilet block:

The floor work was in progress. The plumbing work finished, however, some rectification work was required. Construction of water tank platform was completed and a water tank was being installed.

Gate erection work was in progress.

May 7, 2002

Rectification work

Classroom unit:

PC elements' joints and paint touch up work was in progress

Paint touch up work for the walls, ceilings, windows and doors was in progress.

Remaining work

Classroom unit:

Glazing work was completed. Light and ceiling fan fixture was in progress. Furniture was installed.

Barge board installation was not carried out.

Toilet block:

The floor work was finished with some rectification work to be carried out. The plumbing work finished, however, some rectification work was still required.

Gate erection work finished and paint work was in progress.

The Contractor was instructed to carry out the remaining work immediately.

May 10, 2002

The paint touch up work was still not completed and the Contractor was instructed to finish the work immediately. The Contractor claimed that the neighboring children take off the calking from the windows. The Contractor was instructed to dispatch some guards until hand over of the project.

Rectification work

Classroom unit:

PC elements' joints and paint touch up work was in progress.

Paint touch up work for the walls, ceilings, windows and doors was in progress.

Remaining work

Classroom unit:

Light and ceiling fan fixture was installed.

Barge board installation was not carried out.

Toilet block:

The floor and the plumbing work were rectified

Painting work of the gate was completed.

The Contractor was instructed to clean the site before the handing over.

May 16, 2002

Rectification work

Classroom unit:

PC elements' joints and paint touch up work was complete.

Paint touch up work for the walls, ceilings, windows and doors was complete.

Remaining work

Classroom unit:

Barge board installation was completed.

Broken glass of the windows to be replaced.

Toilet block:

The water supply pipes to be fixed with clamps.

Cleaning of the site was complete.

May 19, 2002

All the remaining work and rectification work was completed.

The Contractor was instructed to request the Sarpanch to confirm all the items to be handed over and acknowledge the receipt.

May 24, 2002

The facilities were handed over to DPEO, Bhuj.

(4) Dhamadka

Two rooms of temporary prefab structure were found being constructed at the site on July 19, 2001. It was not clear who was building the rooms until July 25, 2001 when DPEP found it out that it was being done by their order by mistake. Though the company, Sintex, was ordered to demolish the prefab rooms by DPEP in July, they remained until Sept. 23, 2001.

Oct. 17, 2001

The Contractor was instructed to start the work at the site. The boundary lines and building positions were confirmed at the site. The work to start from Oct. 18, 2001.

Oct. 31, 2001

Excavation work for the 2-classroom unit was in progress and for other unit to start accordingly.

Nov. 7, 2001

Excavation work and PCC work for all the rooms were complete. However, the setting out of 1-classroom unit was found slightly off the axis and thus the Contractor was instructed to rectify it.

Between Nov. 11 Dec. 22, 2001

No progress at the site was observed. PC elements were being cast at the Bombay factory.

The Contractor was repeatedly instructed to rectify the issue pointed out on Nov. 7, 2001 during this period, however, no action was taken.

Jan. 8, 2002

PC elements had been delivered to the site and inspection of the elements was carried out. The Contractor was reminded to rectify the setting out of 1-classroom unit.

Jan. 9, 2002

Preparation for erection of PC elements was in progress.

Jan. 18, 2002

Erection of wall panels for 4-classroom unit was complete and setting roof panels was in progress. A structural crack on one of the PC panels was found and the Contractor was instructed to properly

rectify the problem in accordance with the India Standard.

The rectification work of the setting out was carried out and erection of 1-classroom unit was complete. However, a misplacement of one of the roof panels was found and the Contractor was instructed to rectify the problem.

Boundary wall: Excavation work was in progress.

Feb. 2, 2002

Erection work for all the classroom unit and rectification work was complete.

Boundary wall: About 90% of wall panel erection work was complete.

Feb. 6, 2002

Boundary wall: Panel erection work was complete except for the 3 panels that were intentionally left for bringing in the toilet block PC elements to the site.

Toilet block: Excavation work for the soak pits/wells was complete.

Feb. 20, 2002

Floor work and PC panel joint filling work for the classrooms was in progress.

Toilet block: No progress was observed.

Feb. 27, 2002

Floor work and PC panel joint filling work for the classrooms was in progress. Rectification for the joint filling work was instructed to the Contractor.

Toilet block: Brick work for the soak pits/wells was in progress.

Between Feb. 28 and March 10, 2002

Progress was not reported due to the Gujarat Riot.

March 13, 2002

Floor work for the classroom was complete.

Toilet block: Brick work for the soak pits/wells was complete.

March 18, 2002

Toilet block: PCC work for the toilet unit was complete.

Gate: Form work for the gate posts was in progress.

March 23, 2002

Paint work for the classroom was in progress.

Toilet block: Foundation work was in progress.

Gate: The gate post was complete and the gates were set.

March 28, 2002

Paint work for the classrooms was complete. Glazing work was to be carried out. The Contractor was instructed to rectify the PC elements' joints.

Toilet block: Some PC elements for the toilet block was found made wrong and the Contractor was instructed to recast the elements.

April 6, 2002

Rectification work for the PC elements' joints was in progress.

Boundary wall: Erection of wall panels was complete.

Toilet block: Erection of PC elements was in progress, however, some of the elements were found not newly recast the elements. The Contractor was instructed to replace the old elements.

April 17, 2002 Final Inspection

Rectification work

Classroom unit:

PC elements' joints and paint touch up work

Mortar filling of around the windows and doors

Paint touch up work for the windows and doors.

Remaining work

Classroom unit:

Glazing work, Light and ceiling fan fixture, Furniture installation, Barge board installation

Toilet block:

Plumbing work including construction of inspection chamber, Installation of water tank, setting the soak pits/wells cover

April 19, 2002

No workers/engineers were found at the site and hence no rectification work/remaining work was in progress was observed at the site.

The Contractor was instructed to immediately begin the rectification/remaining work.

April 24, 2002

Classroom: Glazing work was in progress. No other rectification/remaining work was commenced.

Toilet block: The floor work, plumbing work, installation of water tank was finished.

The Contractor was instructed to rectify the inspection chamber.

The Contractor was again instructed to dispatch necessary workers and the engineer along with the necessary materials to immediately start the rectification and remaining work and strictly stick to the expected completion date.

April 30, 2002

Rectification work

Classroom unit:

Rectification of PC elements' joints was in progress. Paint touch up work had not begun.

Mortar filling of around the windows and doors was in progress.

Paint touch up work for the windows and doors had not begun.

Remaining work

Classroom unit:

Glazing work was complete

Light and ceiling fan fixture, Furniture installation had not begun.

Barge board installation had not begun.

Toilet block:

Rectification of the inspection chamber had not begun.

Cleaning of soak pits/wells and installation of covers was not carried out.

May 7, 2002

Rectification work

Classroom unit:

Rectification of PC elements' joints was complete.

Mortar filling of around the windows and doors was complete.

Paint touch up work was in progress.

Remaining work

Classroom unit:

Light and ceiling fan fixture was complete.

Furniture installation had not begun.

Barge board installation had not begun.

Toilet block:

Rectification of the inspection chamber was in progress.

Cleaning of soak pits/wells and installation of covers was in progress.

May 11, 2002

Rectification work

Classroom unit:

Paint touch up work was done with wrong color and to be painted again.

Remaining work

Classroom unit:

Furniture installation was not complete. All the items were kept at the Sarpanch's house for security reasons.

Barge board installation was not complete.

Toilet block:

Rectification of the inspection chamber was carried out according to the instructions and to be done again.

Cleaning of soak pits/wells and installation of covers was complete.

The Contractor was instructed to prepare handing over documents.

May 17, 2002

All the remaining work and rectification work was complete and the Contractor was instructed to request the Sarpanch to confirm all the items to be handed over and acknowledge the receipt.

Preparation of the handing over documents was in progress.

May 24, 2002

The facilities were handed over to DPEO, Bhuj.

Chapter 7. Quick Reconstruction Support Project for Healthcare Facilities

7.1 Site Conditions

The two sites where the planned facilities are to be constructed are within the existing CHC facility sites at Anjar Taluka and Mundra Taluka.

7.1.1 Site at Anjar CHC

(1) Topography, Soil Conditions etc.

The planned site lies on relatively high ground within the built-up area of Anjar. The site is bounded on the North (front) side by a relatively wide road of 6-8m width, which would allow for ready access, and there are no obvious obstacles regarding access to the site by construction vehicles.

The site area is approx. 40,665m^2. Along parts of the south side boundary, the land rises up by approx. 5m above the rest of the site, and the rest of the terrain generally slopes down towards the north-west part of the site, which is the most low-lying.

At the main entrance and the vehicle drop-off area to the damaged main hospital building, there are numerous tress and shrubs, and it will be necessary to keep these in the new layout plan as much as practically possible.

The soil conditions at the site were established by carrying out a soil investigation (the report of which is attached in the Appendix of this report). The results show that the soil conditions are generally uniform across the site. A clayey sand layer of approx. 0.6 to 1.4m depth covers the site, and 10m deep borings revealed that this is underlain by soft weathered rock, of SPT N-value between 50 to 70, which extends down to below 10m depth. No ground water was encountered at depths down to GL-10m. According to the general ground water level situation in Kutch district, it can be assumed that seasonal variation would not cause the ground water level to rise significantly, and remain at depths below that would affect the construction.

(2) Existing Site Conditions

Although the main existing hospital building (A) did not undergo complete structural collapse during the earthquake, it suffered severe damage, with some parts of the walls, roof and entrance canopy partially destroyed. The building can not be used in its existing condition, and great care should be

exercised in entering the building as it is still in a dangerous condition. The existing (previous) staff quarters (B, C in above plan) were completely destroyed by the earthquake, and have since been demolished and cleared. In addition, the postpartum (post natal care) building (D), garage, post-mortem building and other structures suffered extensive damage, and are also now beyond use. Trying to plan a new layout based on keeping the various damaged facilities in their existing place, while trying to make space for new buildings within the site, and planning new flow lines of patients and staff, would lead to a chaotic layout. All the above-mentioned buildings should therefore be carefully demolished before the reconstruction work properly can start.

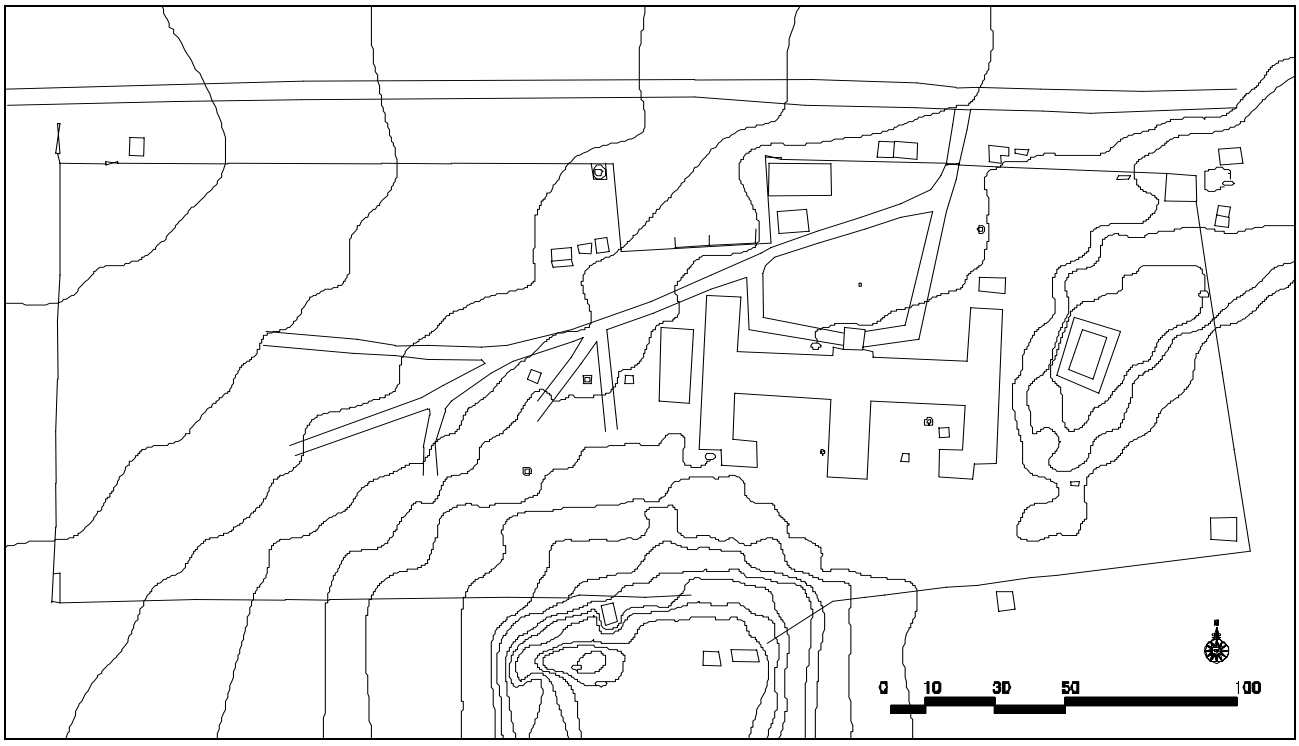


Fig. 7-1 Proposed Construction Site

(3) Conditions of Existing Public Utilities

1) Electricity

Electricity at the related area is under jurisdiction of the GEB (Gujarat Electricity Board). High voltage power is fed to the existing facilities at Anjar CHC from the north side near the gate and dropped to low voltage power at 415V/220V by the transformer located on the pole. No power is now supplied because of damage from the earthquake disaster. At the site, emergency tents are being utilized and temporary power is used only for the lighting.

2) Telephone

Several telephone incoming lines were utilized before the earthquake disaster, but only one telephone is used in the temporary facility.

3) Water

Both deep well water and city water were utilized for the Anjar CHC facilities before the disaster. A deep well of 400ft (or 120m) depth is located at the site of south east area. Since the quality of city water is good, this water is used for drinking. Three water reservoirs with 10, 10 and 30 cubic meters respectively are provided near the deep well. The water was pumped up to the overhead water tanks located on the hill at the back of the main hospital and supplied to the respective point by gravity. The deep well pump, water lift pump and overhead water tanks are out of use since the disaster.

4) Drainage

Drainage from the toilet, shower room, kitchen sink etc. were treated by a septic tank and soak pits within the site.

7.1.2 Site at Mundra CHC

(1) Topography, Soil Conditions etc.

The project site lies within the Mundra built-up area. The west (front) side of the site faces on to a road of approx. 6m widths, so there should be no problem regarding the access of construction vehicles to the site.

The site area is approx. 22,680m^2, and almost the whole area is flat.

A soil investigation was also carried out at the project location, which showed the site is underlain by over 10m depth of clayey sand of SPT N value varying from 14 near the surface to 34 at 10m depth. No ground water was encountered at any of the 10m deep borings.

(2) Existing Site Conditions

Although the main hospital building and the staff quarters did suffer some damage from the earthquake, the principal load bearing structural elements have remained intact, and the necessary repair work is mainly limited to the treatment of surface or non-structural cracking to partition walls

and non-critical elements. Thus their continued use can be maintained. However, the maternity building suffered severe damage, including severe cracking and failure of some structural members, and even though the building did not suffer complete collapse, it remains in a dangerous condition and should not be entered into. In order to reconstruct the new maternity building, demolition of the existing building is required as, considering the existing overall site layout, including vehicle access routes, spaces between the existing buildings and possible future expansion, the existing location is the most suitable.

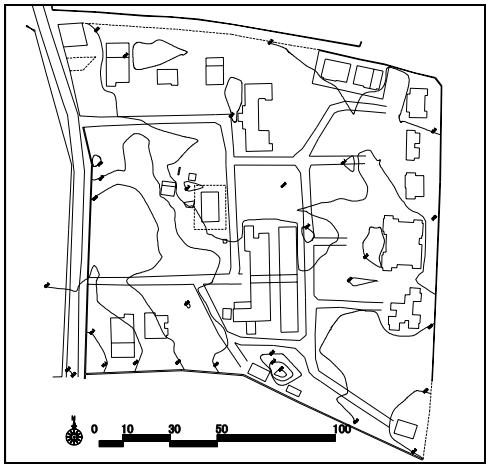


Fig. 7-2 Proposed Construction Site

(3) Conditions of Existing Public Utilities

1) Electricity

Low voltage electrical power of 415/220V is utilized at the existing maternity building. The power can be used now.

2) Telephone

Several numbers of telephone sets were used in the existing maternity building.

3) Water

City water was delivered to the existing under-ground water tank made of concrete. The water is pumped up to the overhead water tank located next door and supplied to the entire CHC by gravity.

4) Drainage

Drainage from the toilet, shower room, kitchen sink etc. were treated by septic tank and soak pits within the site.

7.2 Design Aims of Healthcare Facilities and Design Contents

7.2.1 Design Aims

The primary aims of the planning and reconstruction of these facilities are to restore the original functions of the facilities to their previous pre-earthquake state as quickly as possible. It is not a requirement that they be of higher quality than before, although as the new facilities will be newly constructed and installed in line with modern procedures and updated equipment, some improvement in the quality should result, even though this is not an objective as such.

The design aims of the healthcare facilities are described below:

(1) Design to be compatible with the natural surroundings and environment

The local climate of the Kutch area in Gujarat is characterized by a long dry season, in which temperatures often exceed 45 degree C. in the months of April and May, followed by a short monsoon season, with occasional heavy rain and slightly reduced temperatures. To counter these effects, all windows, ventilation penetrations and any other wall openings should have overhead projections or canopies to prevent or reduce direct sunlight or rain entering the building. The storey height has been set at 3.75m, which is high enough to allow air circulation in the rooms and prevent the hospital beds and patient areas nearer the floor from becoming too hot. The roofing follows local methods where the flat concrete slab is overlain by brick layer, using broken or similar size bricks, overlain by a sand-cement based waterproof mortar which acts a waterproof screed. The brick layer also provides thermal insulation properties to the roof top. In view of the hot external temperatures, it is important that the number and size of windows and other wall openings be kept as small as possible, whilst meeting minimum natural lighting requirements, in order to prevent uncomfortable overheating of the environment of the building interior

(2) Design to be compatible with the prevalent social conditions

For the design of these CHC facilities, and in view of the existing local social conditions, no special high-grade medical diagnosis or treatment facilities were planned for. Furthermore, no strict division was planned between clean zones and non-clean zones, as this would lead to increases in the floor area and in areas requiring air conditioning (and higher construction and running costs). Thus the main design strategy was to provide a flexible and functional layout.

For the medical equipment also, current standard and locally available equipment items would be specified, so as to allow future ease of parts replacements, repair, replacement, etc.

(3) Design to be compatible with prevalent maintenance system

For the planning of this rebuilding project, it is assumed there should not be any difficulty for allocating maintenance and running costs for the new facility of the amount does not increase from those incurred previously. Trying to determine by how much the maintenance and running costs of the new building would change can not be easily estimated, but as the new CHC building at Anjar would have a floor area of 1,313m^2 compared to the 3,300m^2 building before, whilst the maternity building at Mundra would remain at 300m^2, then it is fair to assume that maintenance and running costs will not increase. Furthermore, the new design was planned so that maintenance and running costs should decrease, such as by maximizing natural ventilation, making effective use of natural sunlight, improving the thermal insulation properties of the building to reduce air-conditioning costs and using durable building materials, aside from the improved seismic structural resistance.

(4) Design to suit the proposed project construction schedule.

One of the main objectives of the Project was to complete the QRS project as soon as possible and before the end of the Japanese fiscal year, which is at the end of March 2002, as the funding is by Japanese emergency assistance. Starting construction at the beginning of September 2001, the CHC at Anjar first needs to be demolished, and including this work in the overall construction, it leaves only 7 months to carry out the whole works, which is a fairly tight program. By the start of construction, the monsoon season should be largely over, so there will be few foreseeable climatic conditions likely to delay the works. To allow speedy construction within the short time-scale, the buildings have been designed to allow construction to proceed quickly and smoothly. The new CHC hospital building at Anjar has been designed as a single storey structure, divided by an expansion joint into three separate blocks, so that each block can be built simultaneously in parallel with few restrictions. Two of the four Staff Quarters buildings have two stories for efficient use of the site. The building area of the Staff Quarters have been minimized so that having two stories has little effect on the construction schedule. The Mundra maternity building has a floor area of only 300m^2, so poses no problem of the construction schedule.

7.3 Planning and Layout Design of Facilities

7.3.1 Anjar

(1) Site Layout Planning

As most of the existing facilities were extensively damaged by the earthquake, it is not necessary to have any functional connections between the existing and the new facilities.

Nevertheless, the location of the existing main gate appears most appropriate for the site, and with the presence of grown trees and greenery in front of the existing hospital building entrance, and in preserving this valuable asset, it is considered that is preferable to maintain the existing arrangement of the location of the hospital building entrance.

The location of the Class I and Class II staff quarters is close both to the hospital emergency entrance and the main entrance gate, and they are also conveniently and logically located with respect to the main hospital building. As the western part of the site is low-lying, the Class III and Class IV staff quarters have been planned to lie on higher ground in the south-west part of the site. This provides walking access to the main hospital building on the south side of the site, which allows nurses to go to and from the main building during night-shifts without any hindrance. Fig 7-3 shows Site Layout Plan.

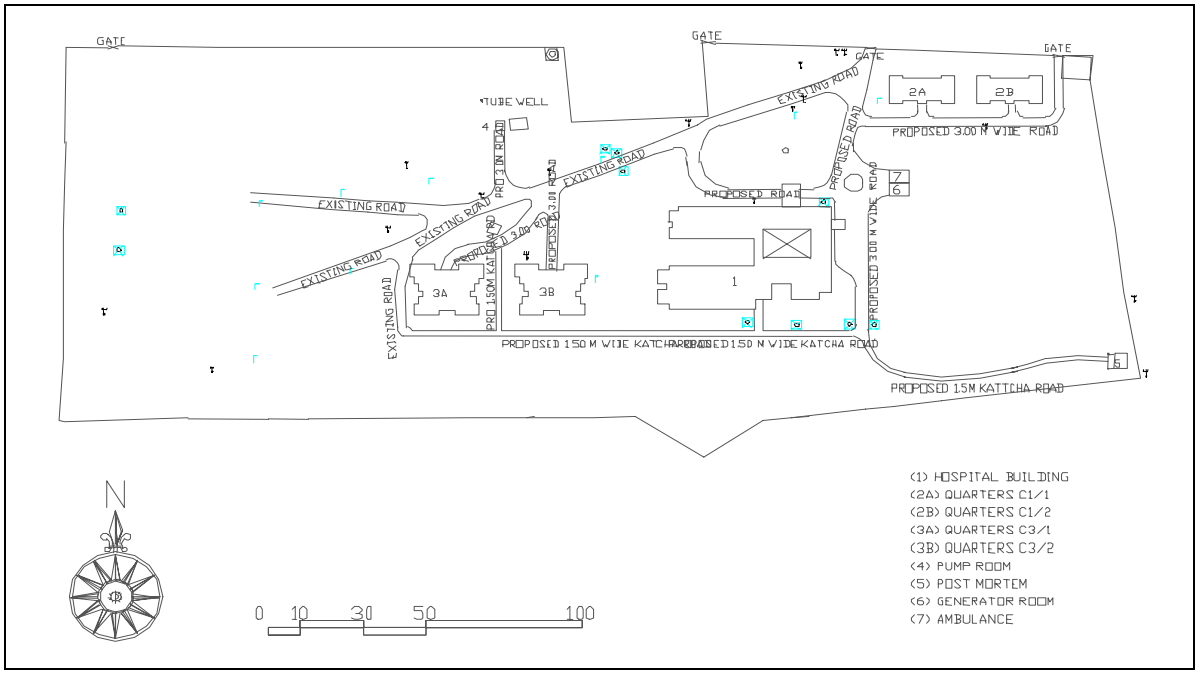


Fig. 7-3 Site Layout Plan

Should in the far future any expansion or improvement of the facilities be required, then some flat area exists on the east side of the main building to allow expansion eastwards. For the Class III staff quarters also, adequate space remains to allow building expansion towards the west side. In addition, the new hospital building, while planned as a single storey building, has been designed structurally to allow the addition of an additional second storey, with no further reinforcement necessary to the foundations of main frame.

(2) Building Zone Plan

The new floor plan for the CHC building at Anjar was based on requirements provided by the GOG, and on studies of floor area and functional room requirements. This lead to a plan which was based on a division into four main 'zones' according to functional zoning; an out-patient zone, a diagnosis zone, a operation theatre zone and an in-patient ward zone.

The flow movement lines for outpatients to the respective diagnosis, operation theatre rooms, and X-ray rooms were planned so as to be separate from the in-patient ward and surgery zones, and also so that there would be no crossing of flow movements of outpatients and in-patients.

A light and spacious entrance hall has been planned, and to provide a relaxing and calming atmosphere to the patients, and outside open court has also been arranged in the centre of the building. In suitable seasonal weather, this open area could have tables and chairs laid out and used by patients and family members to sit out in the open and relax. Between the two separate wings of the out-patient zone and the in-patient ward zone, an open space has been planned which can be landscaped with shrubs and greenery by the GOG side to provide a comforting natural environment and increased circulation of fresh air. In-patient visitors passing from the entrance hall to the in-patient ward move though a connecting corridor. Fig. 7-4 shows Zone Plan.

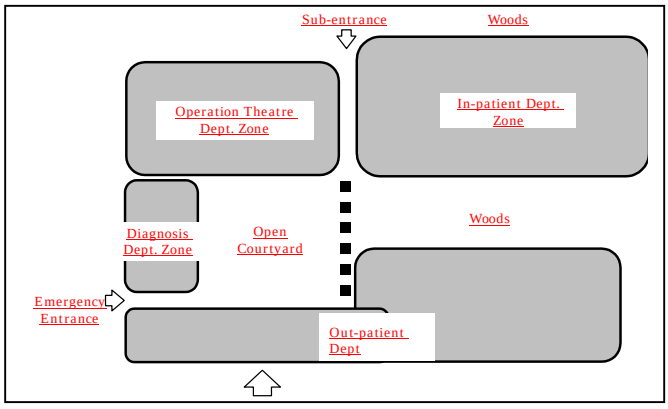


Fig. 7-4 Zone Plan

Common toilet areas have been provided for the out-patients and in-patients, and two separate toilets areas provided for staff use. No toilet has been provided in the operation theatre zone from the point of view of maintaining maximum cleanliness and to guard against possible infections.

It has been decided not provide a kitchen within the hospital building. This is to avoid problems relating to the carrying in of food, providing a washing space and an increase in noise and smell, requirements for storing gas cylinders and also the increased risk of infection from germ-carrying flies etc attracted to the food. Thus it was decided to house the kitchen in a separate outside building, and then for patients' food to be brought in through a closely located rear sub-entrance. It is agreed that this kitchen would be constructed by the GOG side. Similarly, laundry and cleaning services would be provided by an outside company.

Emergency patients would be brought by ambulance to the emergency entrance, and then swiftly carried to the nearby diagnosis/treatment and/or X-ray rooms. Minor operations can be carried out immediately at the facility. For serious injuries, whilst some surgery can be provided at this facility, for cases requiring more specialist treatment beyond the capacity of the CHC, then an ambulance would transport the patient to the Bhuj District General Hospital.

(3) Floor Area Planning

The floor plan layout is based on arranging the separate zones, and their required functions, rooms and floor areas, with respect to their patient and staff flow movement lines. By studying the functional requirements of each room and zone, and their interaction with other rooms and zones, and in considering patient and staff use, a suitable floor layout and final floor areas could then be determined.

Table 7-1 lists up the room planning requirements, in terms of function and size.

Table 7-1 Room Planning Based on Zoning

Room Name	No. of rooms	Floor area (m^2)	Remarks
Out-patient Zone		272.5	
Medical Store/ Dispensary	1	27.5	
Case Record Registration	1	15.0	Located near reception
Malaria Clinic Corner	1	17.5	Gives guidance on malaria prevention
General Store	2	19.0	
Clerk's Office	1	15.0	
Administration Room	1	15.0	
Superintendent's Room	1	21.0	
General Surgeon's Room	1	21.0	
Physician's Room	1	15.0	
Pediatrician's OPD Room	1	15.0	
Medical Officer's OPD Room	1	15.0	
Obstetrician and Gynecologists OPD Room	1	15.0	
Orthopedic Surgeon's Room	1	15.8	Including washing space
Dental Surgeon's Room	1	15.7	
Emergency OPD Room/Dressing and Minor Surgery Room	1	30.0	Include emergency reception office
Diagnosis Zone		50.0	
Laboratory	1	17.2	
X-Ray Room	1	24.0	Provide 350mm brick walls
Changing Room	1	3.5	
Dark Room	1	5.3	
In-Patient Zone		353.5	
6-Bed Ward	6	216.0	3 Men's Wards, 3 Women's Wards
2-Bed Ward	6	108.0	Each Ward to have toilet facing outside wall, for ventilation and prevent smells entering ward
Sister's Duty Room		7.5	Adjacent to both Ward and Operation Theatre
Medical Counseling Room	1	10.5	
Labour Room	1	11.5	
Operation Theatre Zone		121.0	
Pre-Operation Room	1	14.0	
Anaesthetician's Room	1	11.5	
Changing Room	1	11.0	Used by men/women
Scrub Room	1	6.0	
Operation Theatre	1	33.0	Provide window in case of power-cut-off
Sterilizing Room	1	10.5	
Clean Store	1	6.0	
Neonatal ICU	1	14.0	
Obstetric ICU	1	15.0	2 beds
Common Area		516.0	
Corridor, Ent. hall, Drinking water, etc.	-	440.0	
Toilets	4	76.0	
Total		1,313.0	
Others		87.0	
Garage/Generator Room	1	48.0	For ambulance and emergency generator
Post-Mortem House	1	30.0	
Pump House	1	9.0	
Grand Total		1,400.0	

7.3.2 Mundra

(1) Site Layout Plan

Apart from the original Maternity Building and the Family Accommodation building, which were both extensively damaged in the earthquake and are close to collapse, the other buildings at the site were much less severely affected and remain in current use. Thus the replacement buildings will have to be planned and located some distance away from the buildings remaining in use.

Furthermore, considering space for the possible future rebuilding of the existing main hospital building and the family accommodation building, and also the existing space relation and layout of the main building with respect to the overall site facilities, then the original location of the Maternity Building is thought to be the most suitable location for its reconstruction. Thus, demolition and clearance of the existing building is required before construction work can commence. Fig. 7-5 shows the Site Layout Plan.

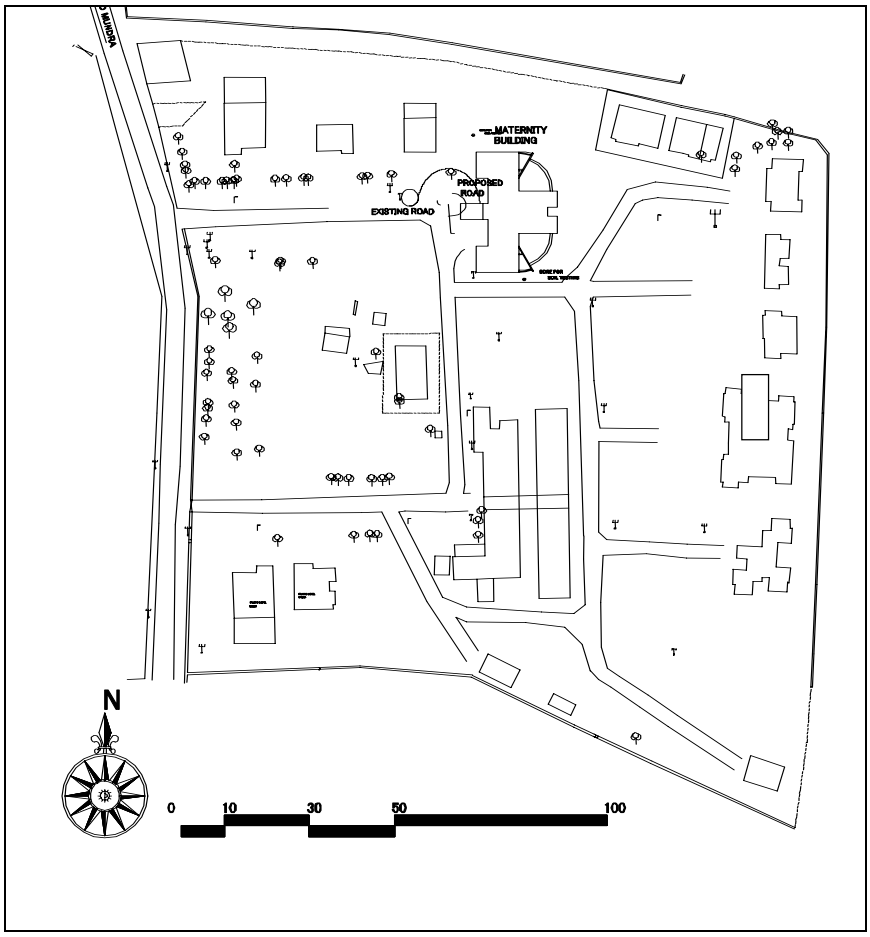


Fig. 7-5 Layout Plan

(2) Building Zone Plan

The new Maternity Building is planned to have almost the same floor area as the original, and with the same number of beds (14 no.).

The building is planned to have one 8-bed ward, and three (3) special 2-bed rooms, with an out-patient diagnosis room and labour/surgery zone, and basically will have the same level of functions and facilities as the original maternity ward building. Fig. 7-5 shows the Zone Plan.

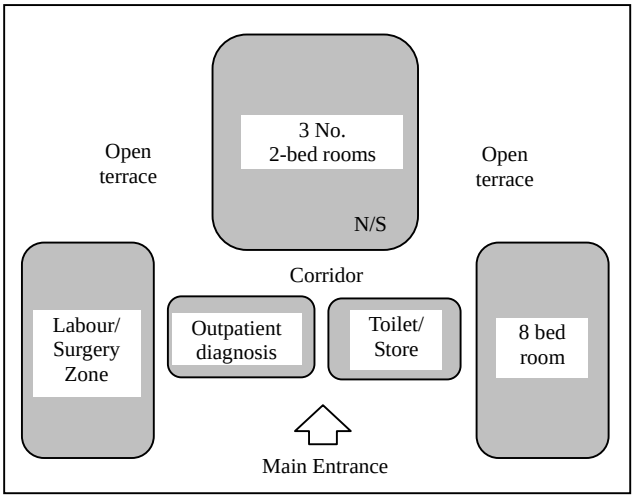


Fig. 7-6 Zone Plan

(3) Floor Area Planning

Table 7-2 below lists up the room planning requirements, in terms of function and size.

Table 7-2 Room Planning Based on Zoning

Room Name	No. of rooms	Floor area (m^2)	Remarks
Doctor's Room	1	11.1	Includes one toilet with wash basin
Nurse's Room	1	11.3	
Ward	1	58.5	8 beds
Special Room	3	50.7	2 beds
Changing Room	1	5.5	
Scrub Room	1	3.3	For washing hands
Labour Room	1	11.5	
Operation Room	1	27.3	
Sterilizing Room	1	3.9	
Sterilized/ Store	1	3.0	
Generator House	1	3.7	
Total		189.8	
Common Area		110.2	
Grand Total		300.0	

7.3.3 Design Drawings

(1) Floor areas

1) Anjar CHC

Building Name	Approx. Floor Area (m^2)
Hospital Building	1,313
Generator/Garage Building	48
Postmortem Building	30
Pump House	9
Sub-Total	1,400
Staff Quarters Class I & II	
A Building:	372
B Building:	193
Staff Quarters Class III	
A Building:	462
B Building:	308
Sub-Total	1,335
Total	2,735

2) Mundra CHC

Building Name	Approx. Floor Area (m^2)
Maternity Building	296
Maternity Generator House	4
Total	300

3) Anjar CHC + Mundra CHC

Site Name	Approx. Floor Area (m^2)
Anjar CHC	2,735
Mundra CHC	300
Grand Total	3,035

(2) Drawing List

1) Anjar CHC

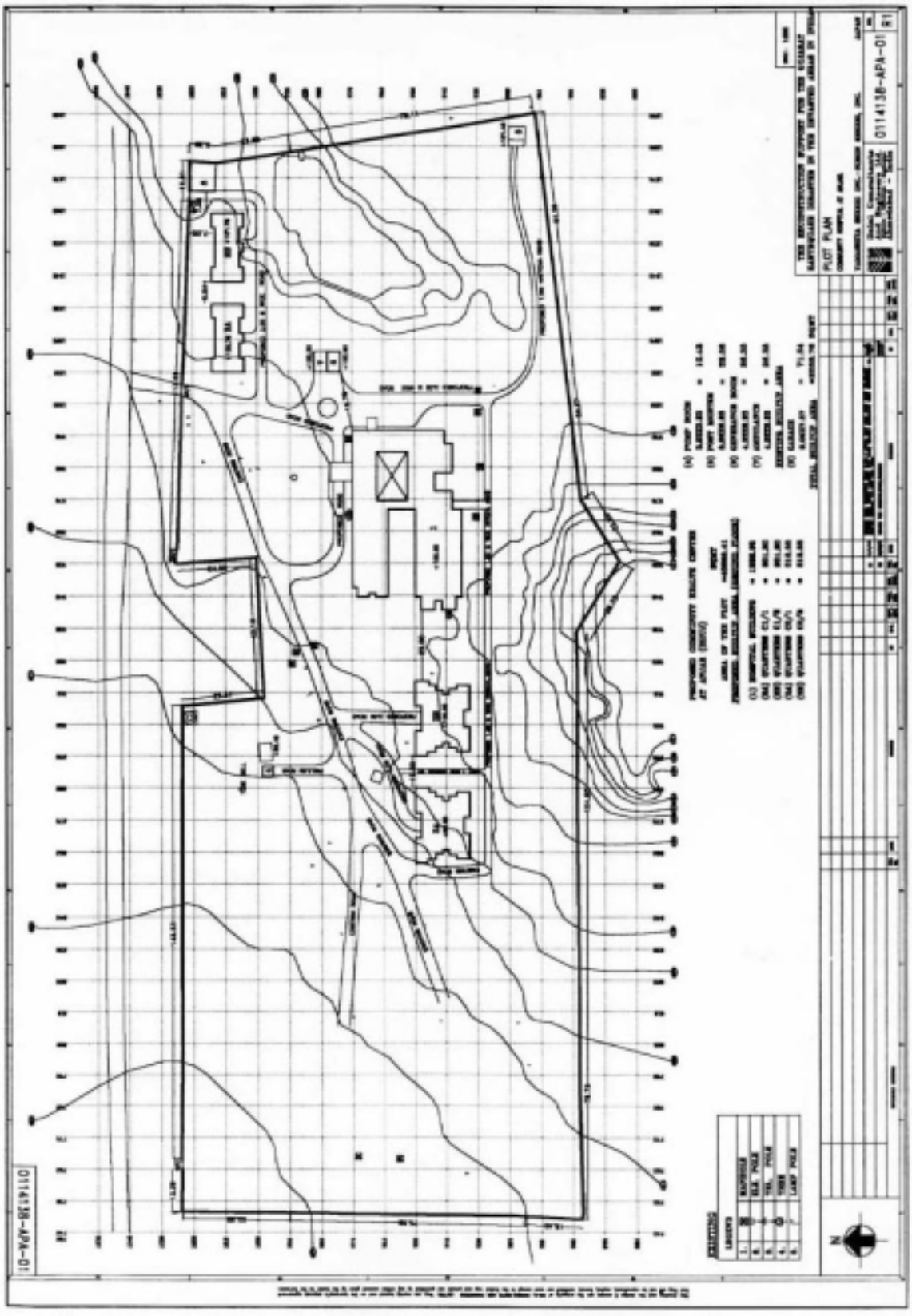
01. Layout Plan
02. Hospital Building: GF Plan
03. Hospital Building: Elevations & Section
04. Generator/Garage Bldg., Postmortem Bldg., Pump House: Plan, Section and Elevation
05. Staff Quarters Class I&II A Building: GF Plan
06. Staff Quarters Class I&II A Building: 1F Plan
07. Staff Quarters Class I&II A Building: Sections
08. Staff Quarters Class I&II A Building: Elevations
09. Staff Quarters Class I&II B Building: GF Plan
10. Staff Quarters Class I&II B Building: Sections
11. Staff Quarters Class I&II B Building: Elevations
12. Staff Quarters Class III C Building: GF Plan
13. Staff Quarters Class III C Building: 1F Plan
14. Staff Quarters Class III C Building: Sections
15. Staff Quarters Class III C Building: Elevations
16. Staff Quarters Class III C Building: Elevations
17. Staff Quarters Class III D Building: GF Plan
18. Staff Quarters Class III D Building: Sections
19. Staff Quarters Class III D Building: Elevations
20. Staff Quarters Class III D Building: Elevations

2) Mundra CHC

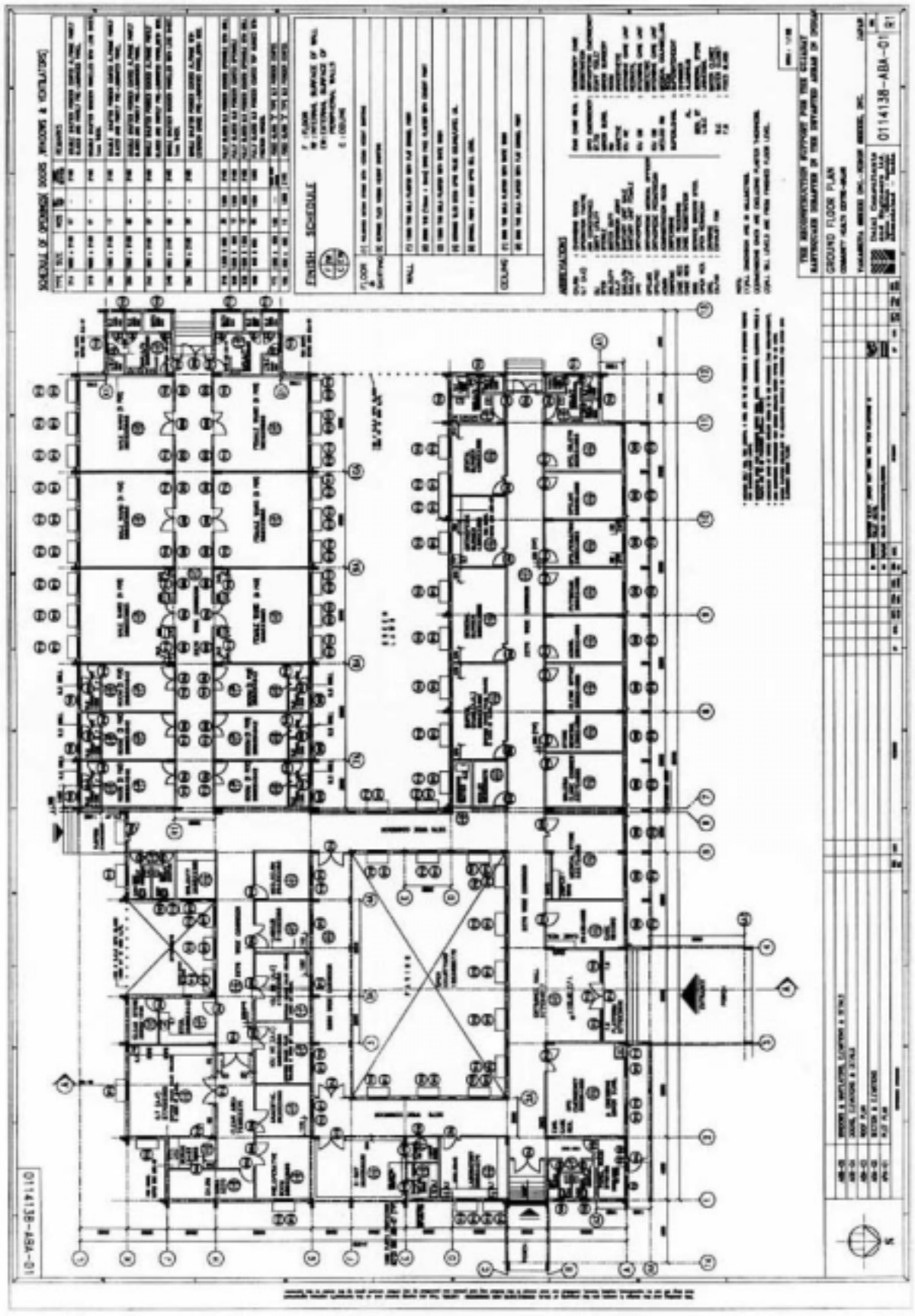
01. Layout Plan
02. Maternity Building: GF Plan
03. Maternity Building: Sections
04. Maternity Building: Elevations
05. Maternity Generator House: Plan, Sections and Elevations

Drawing Anjar CHC

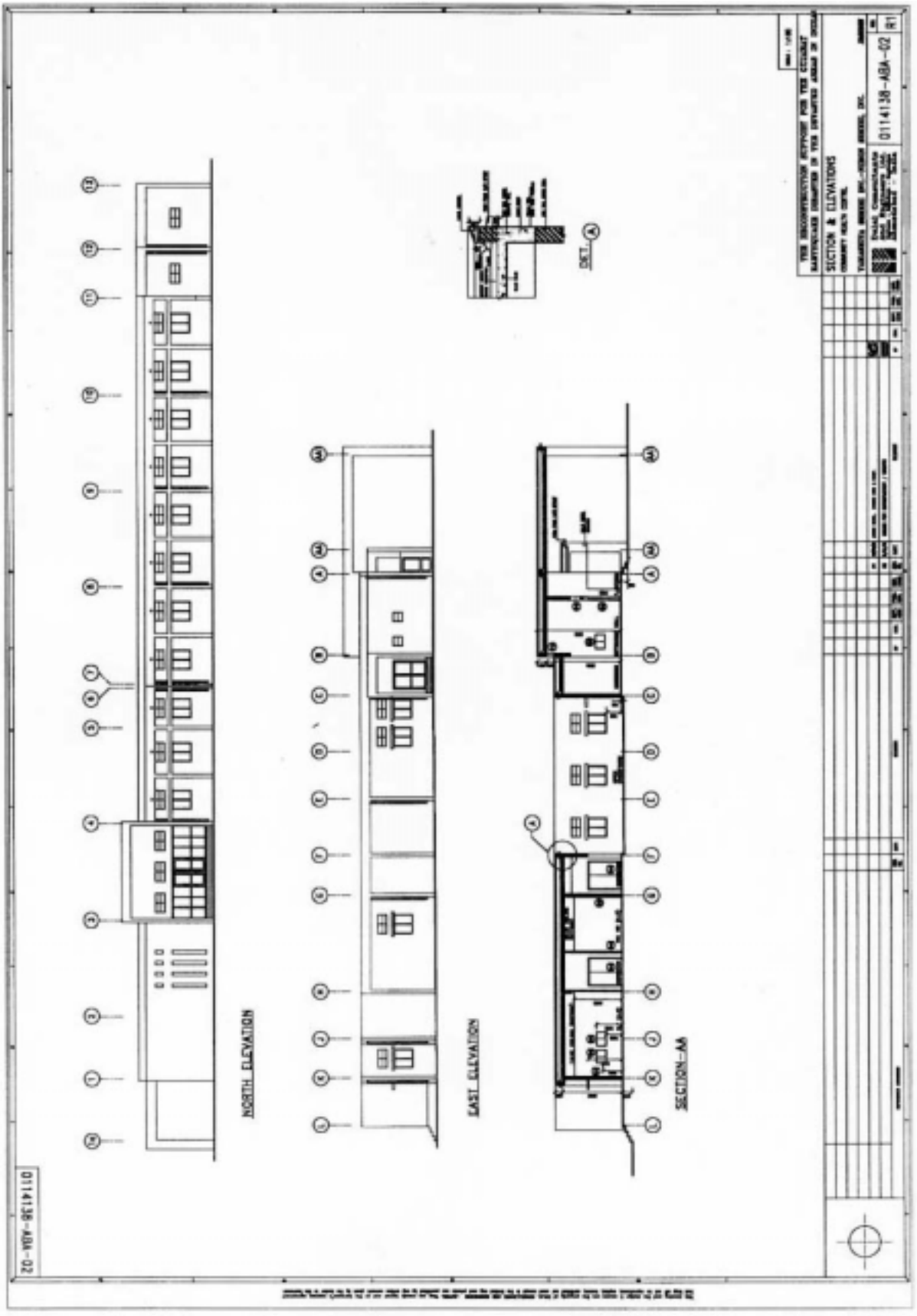
01. Layout Plan



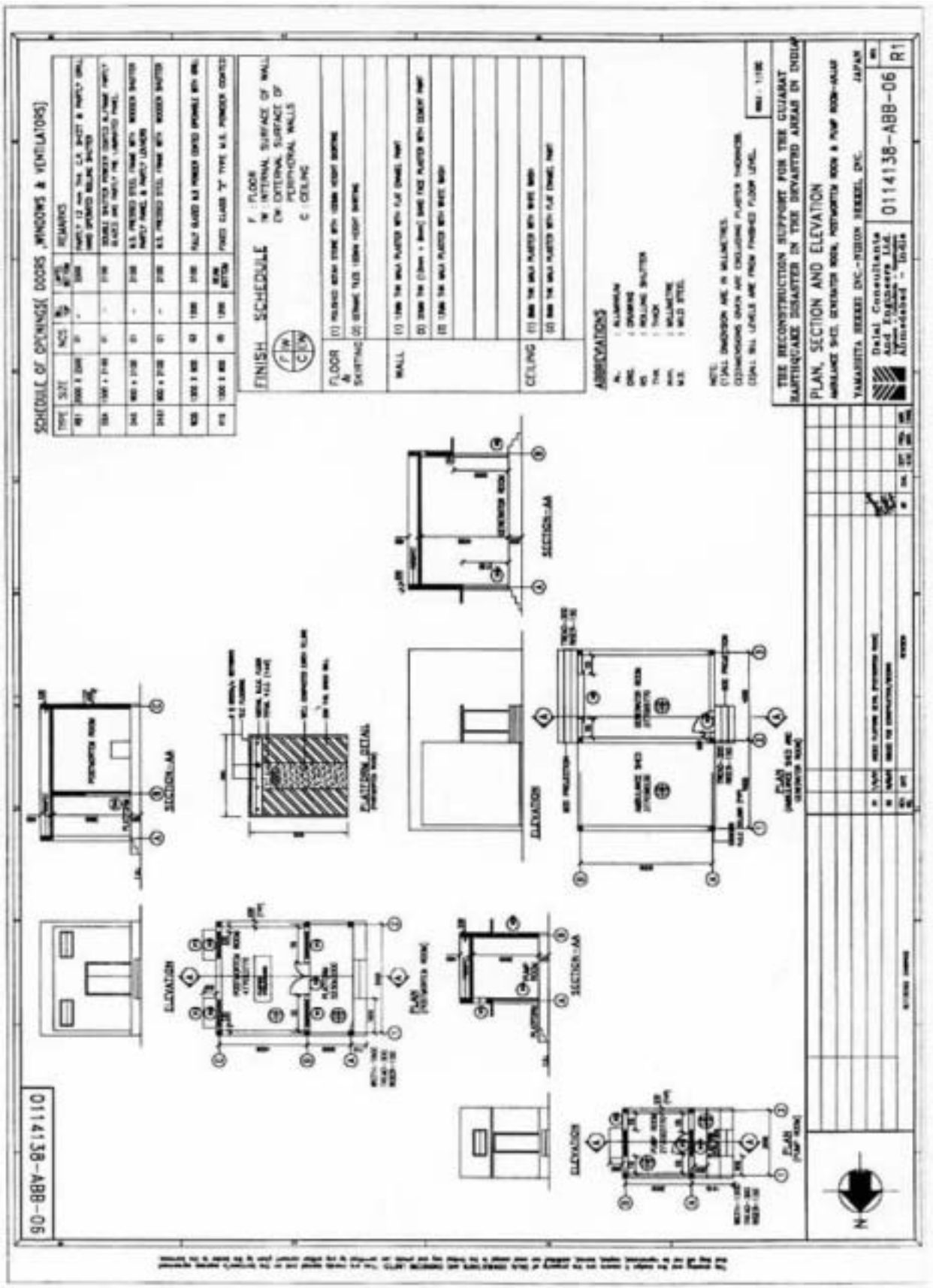
02. Hospital Building: GF Plan



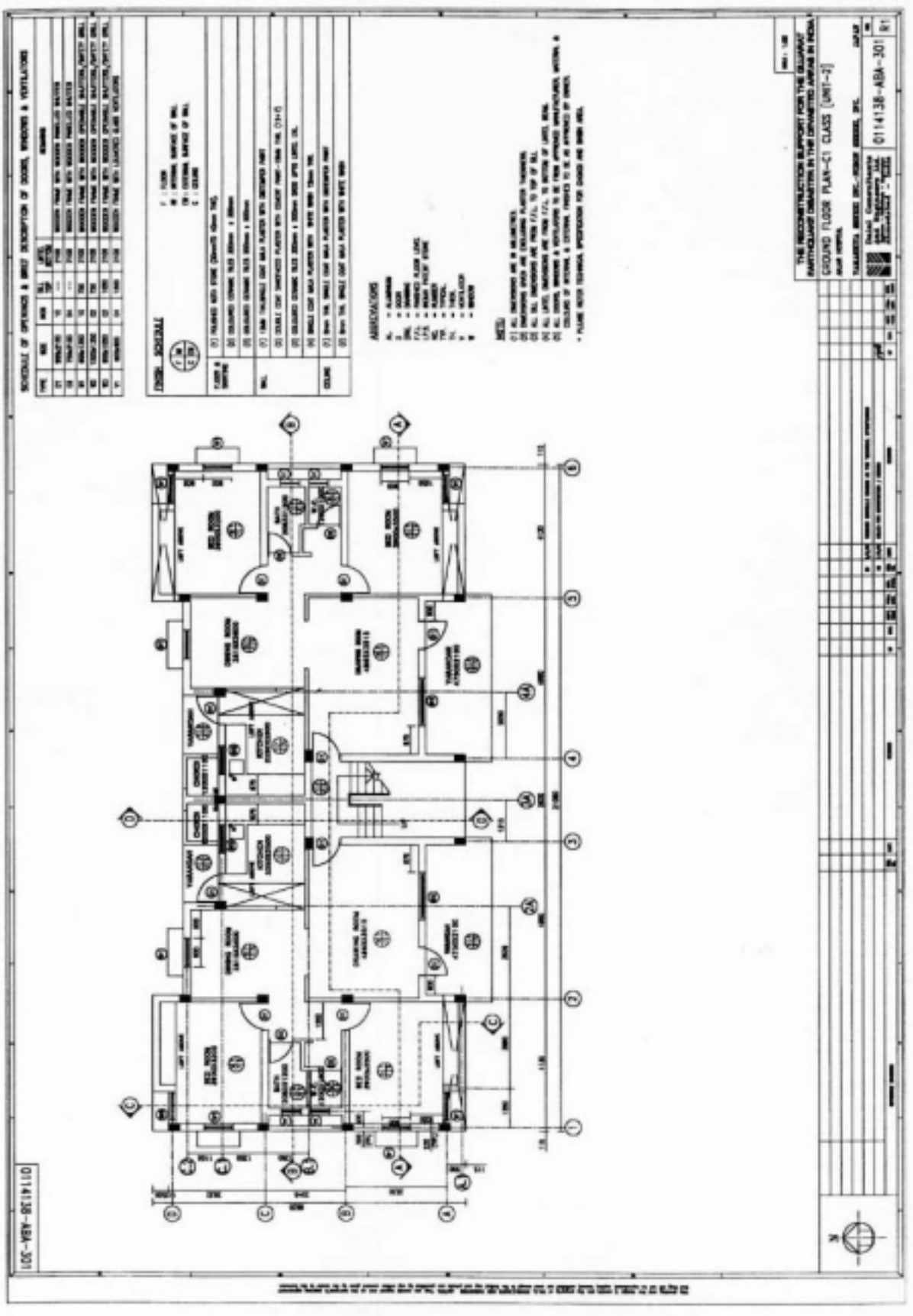
03. Hospital Building: Elevations & Section



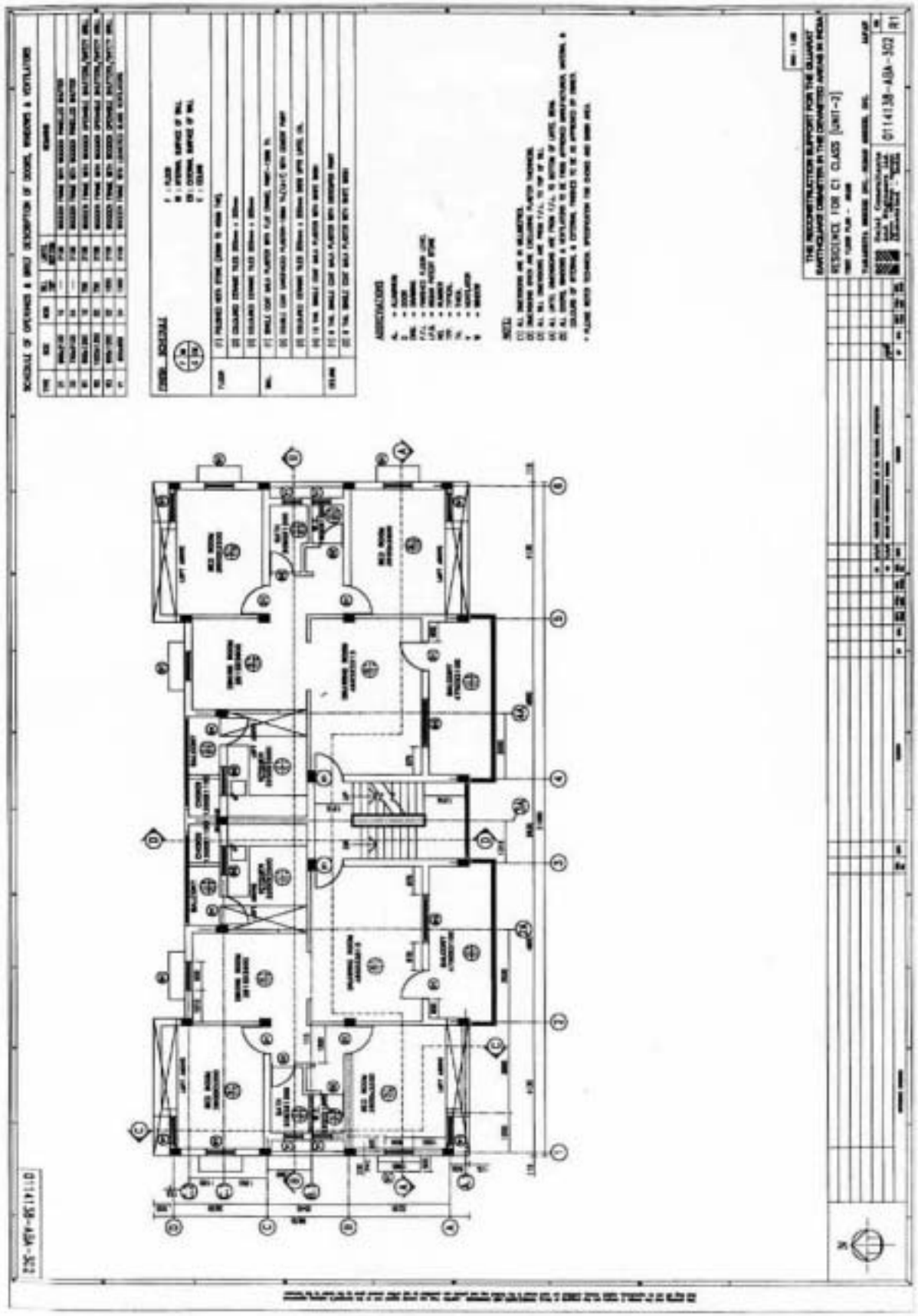
04. Generator/Garage Bldg., Postmortem Bldg., Pump House: Plan, Section and Elevation



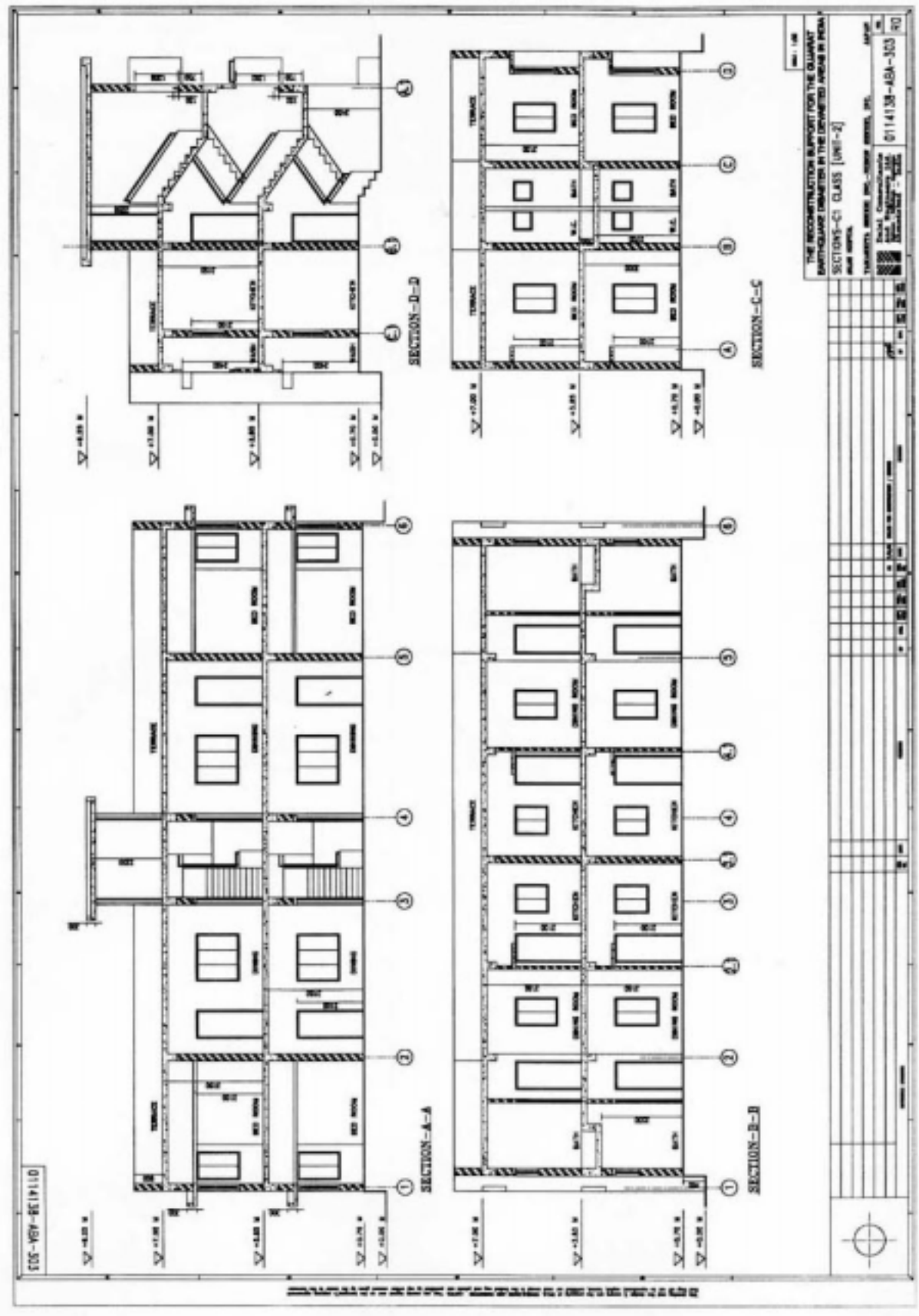
05. Staff Quarters Class I&II A Building: GF Plan



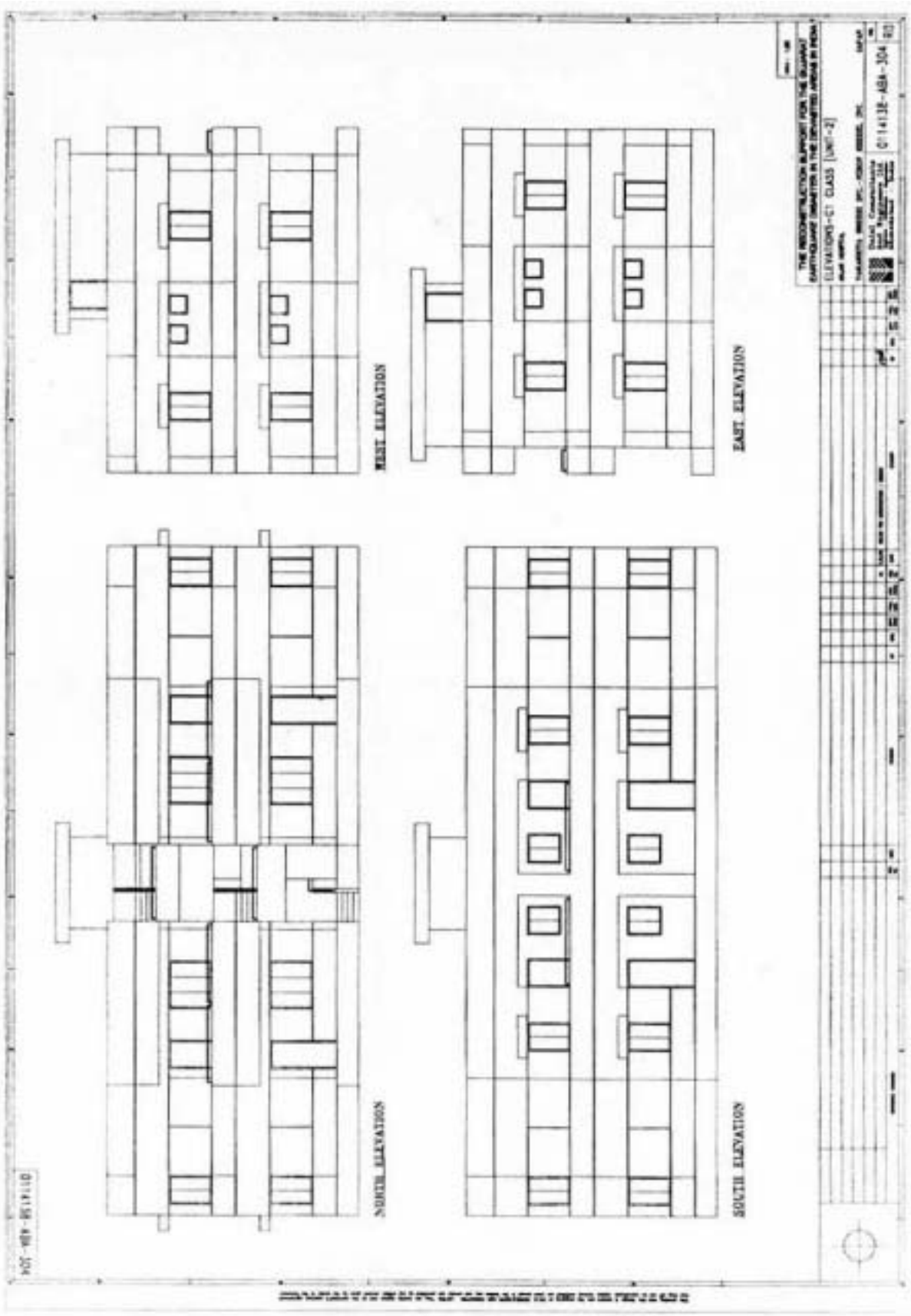
06. Staff Quarters Class I&II A Building: 1F Plan



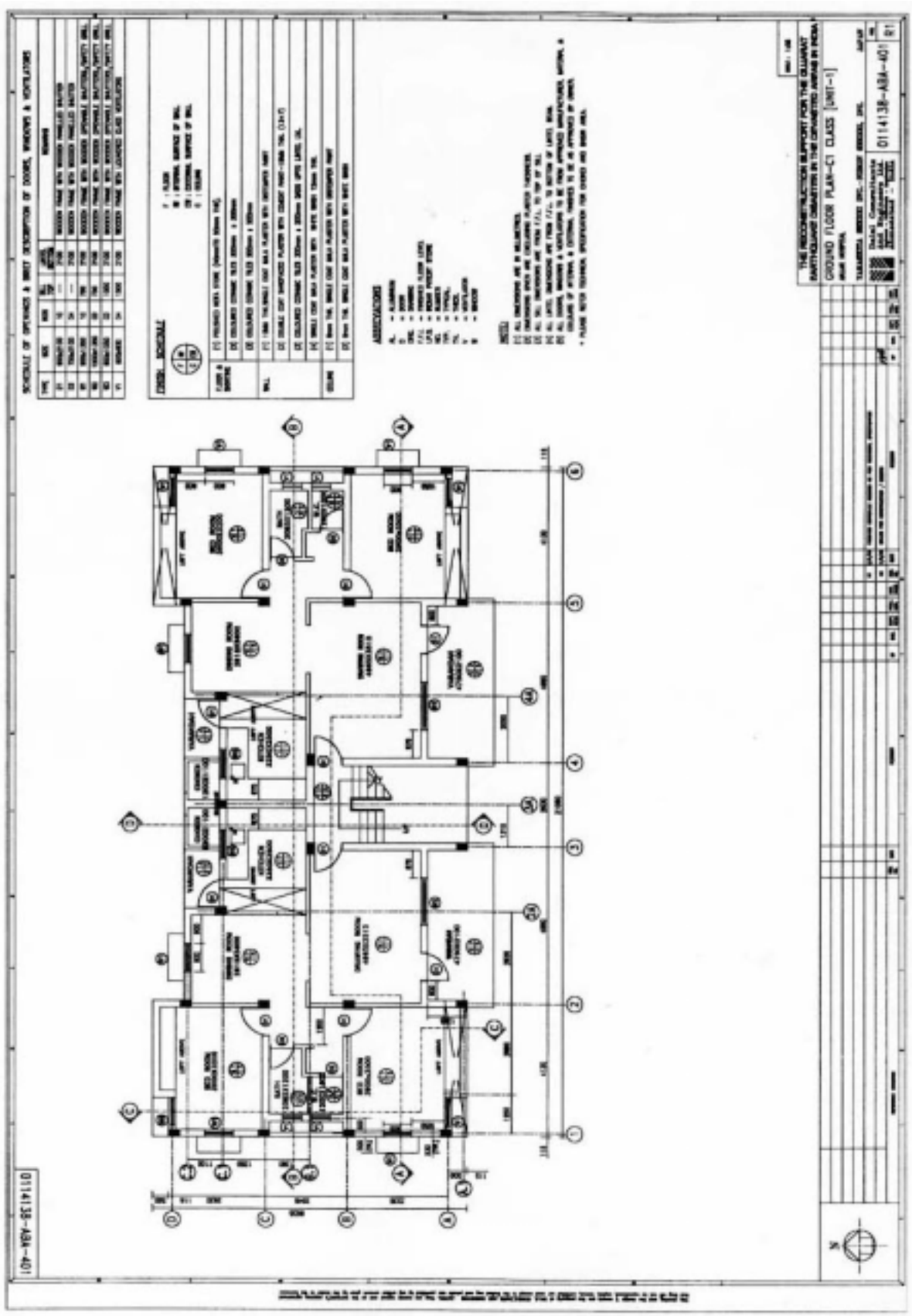
07. Staff Quarters Class I&II A Building: Sections



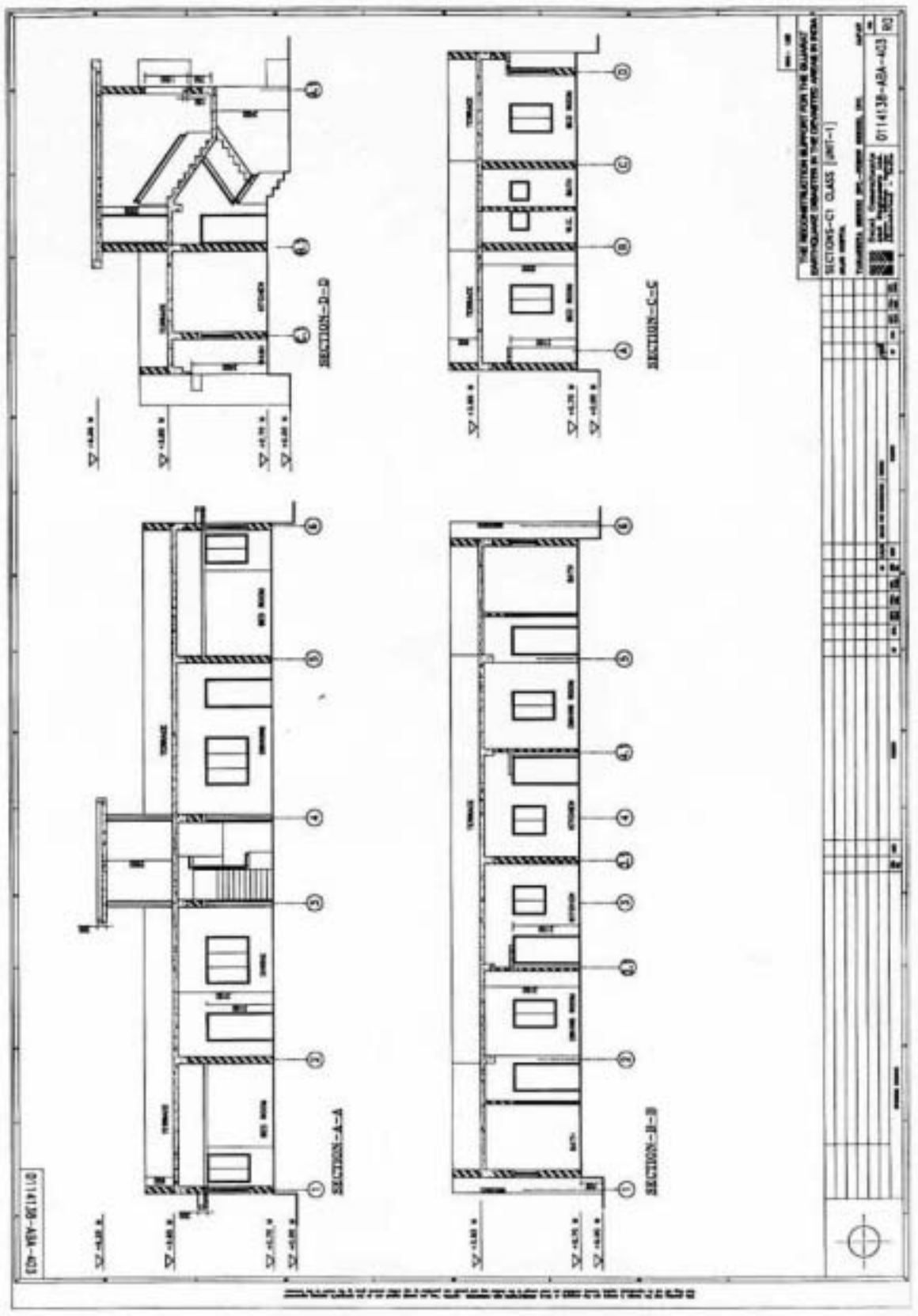
08. Staff Quarters Class I&II A Building: Elevations



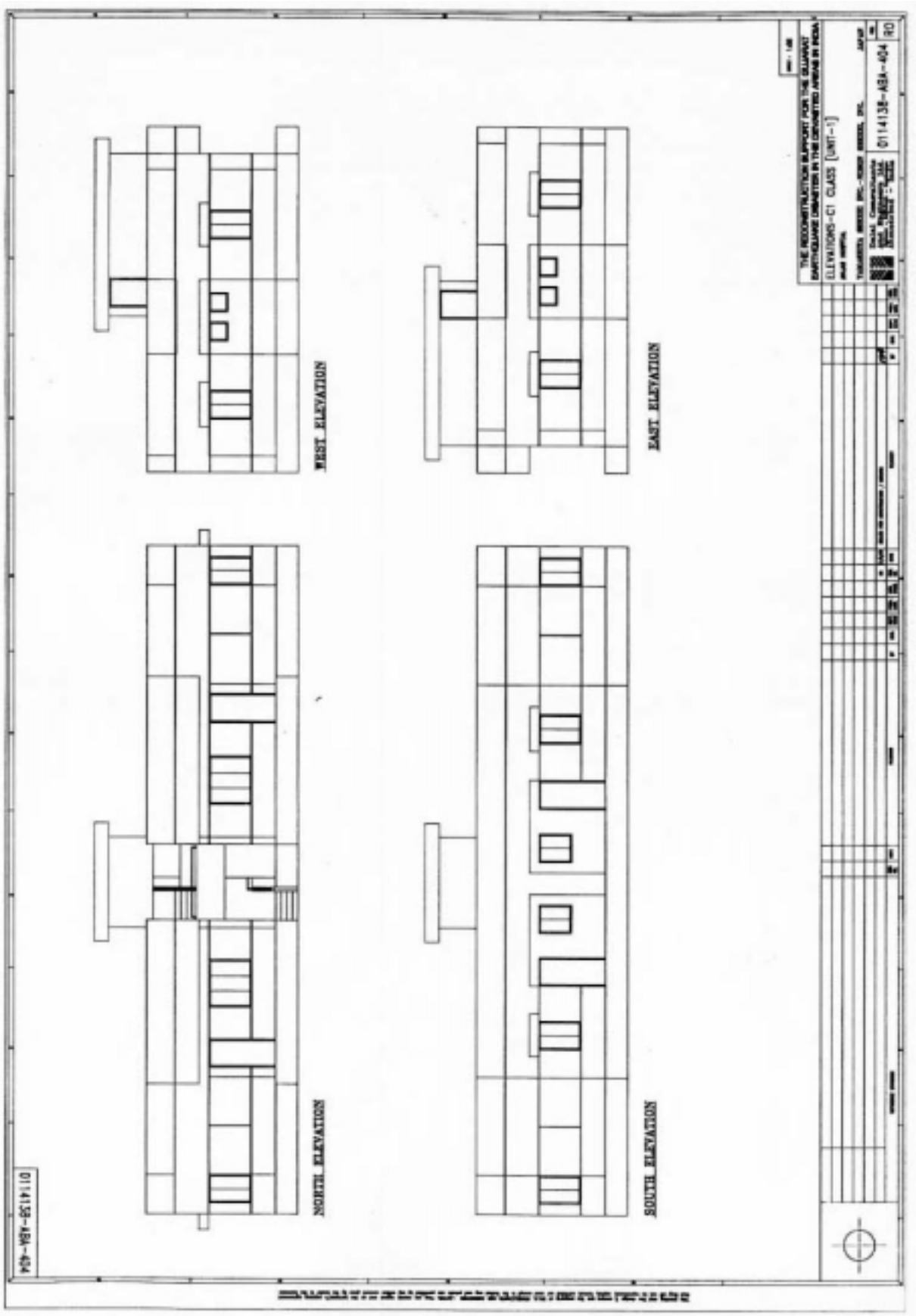
09. Staff Quarters Class I&II B Building: GF Plan



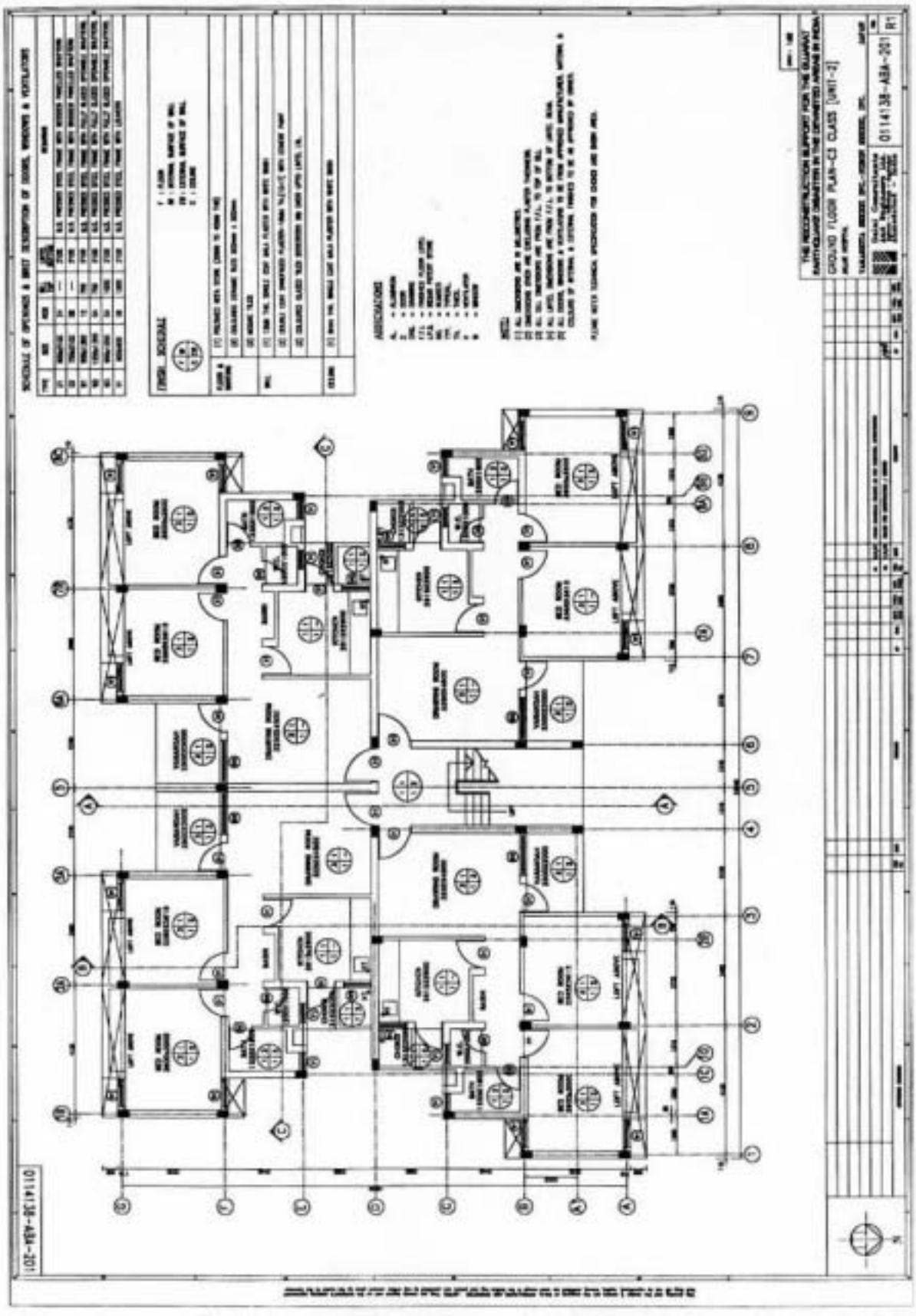
10. Staff Quarters Class I&II B Building: Sections



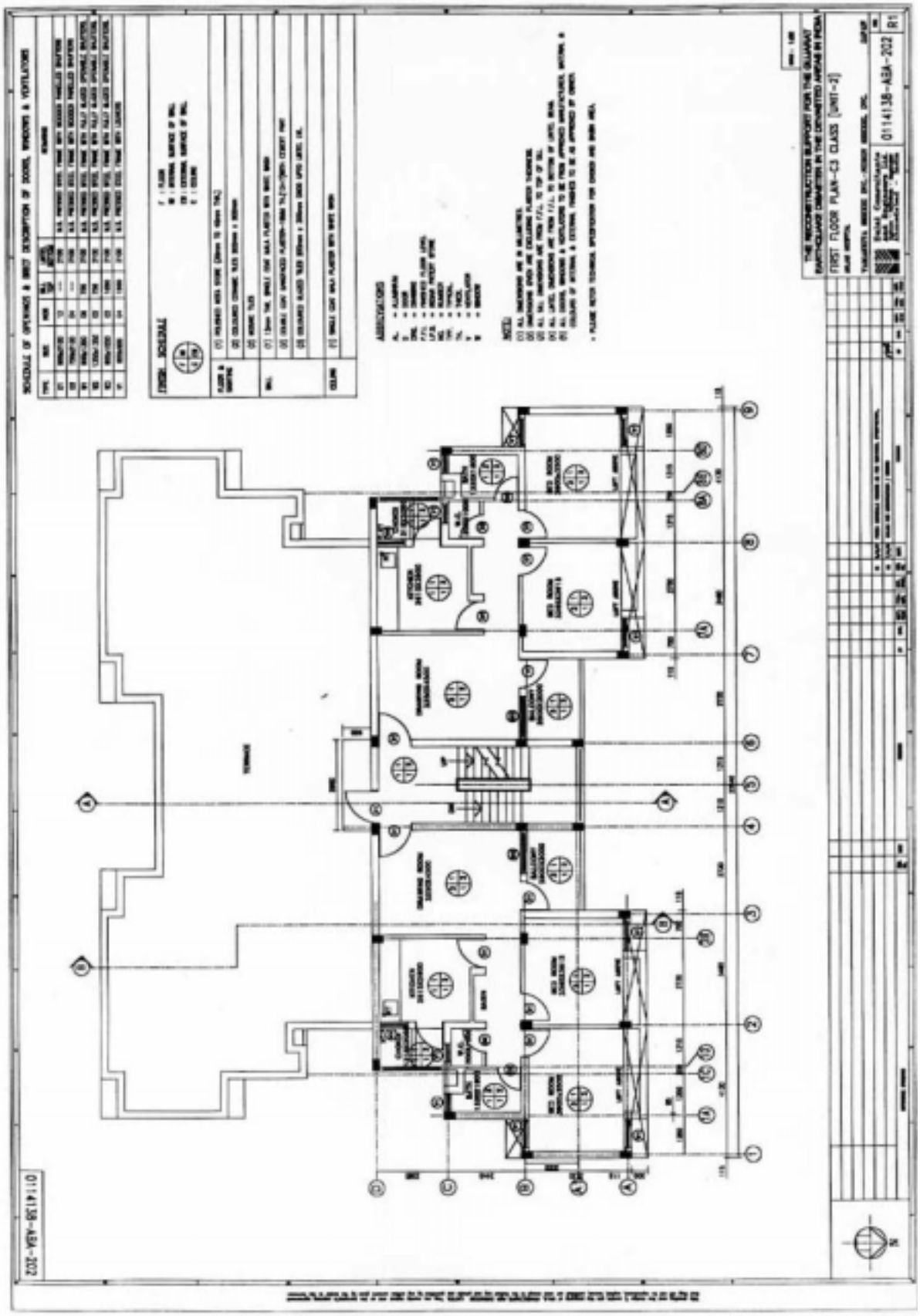
11. Staff Quarters Class I&II B Building: Elevations



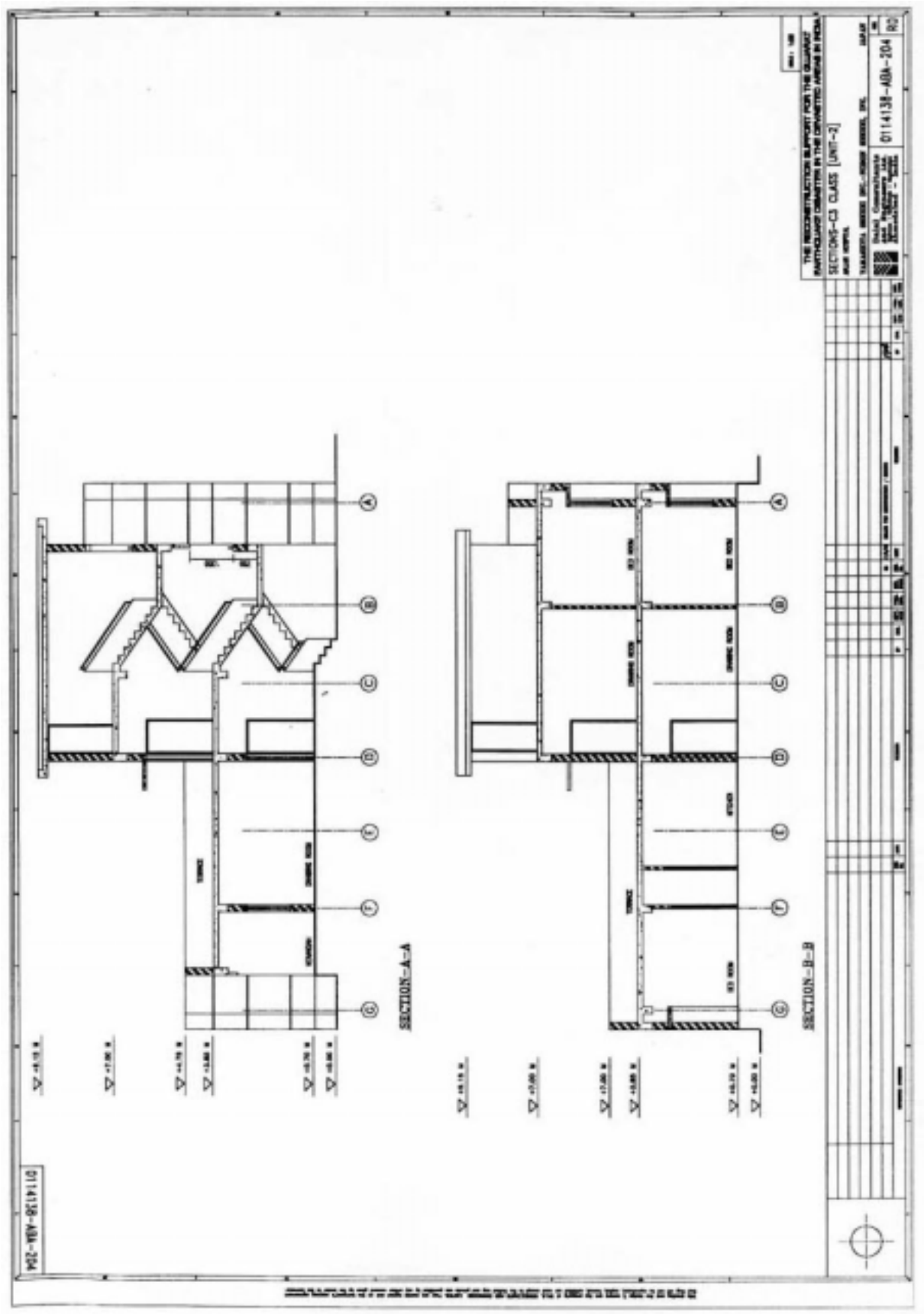
12. Staff Quarters Class III C Building: GF Plan



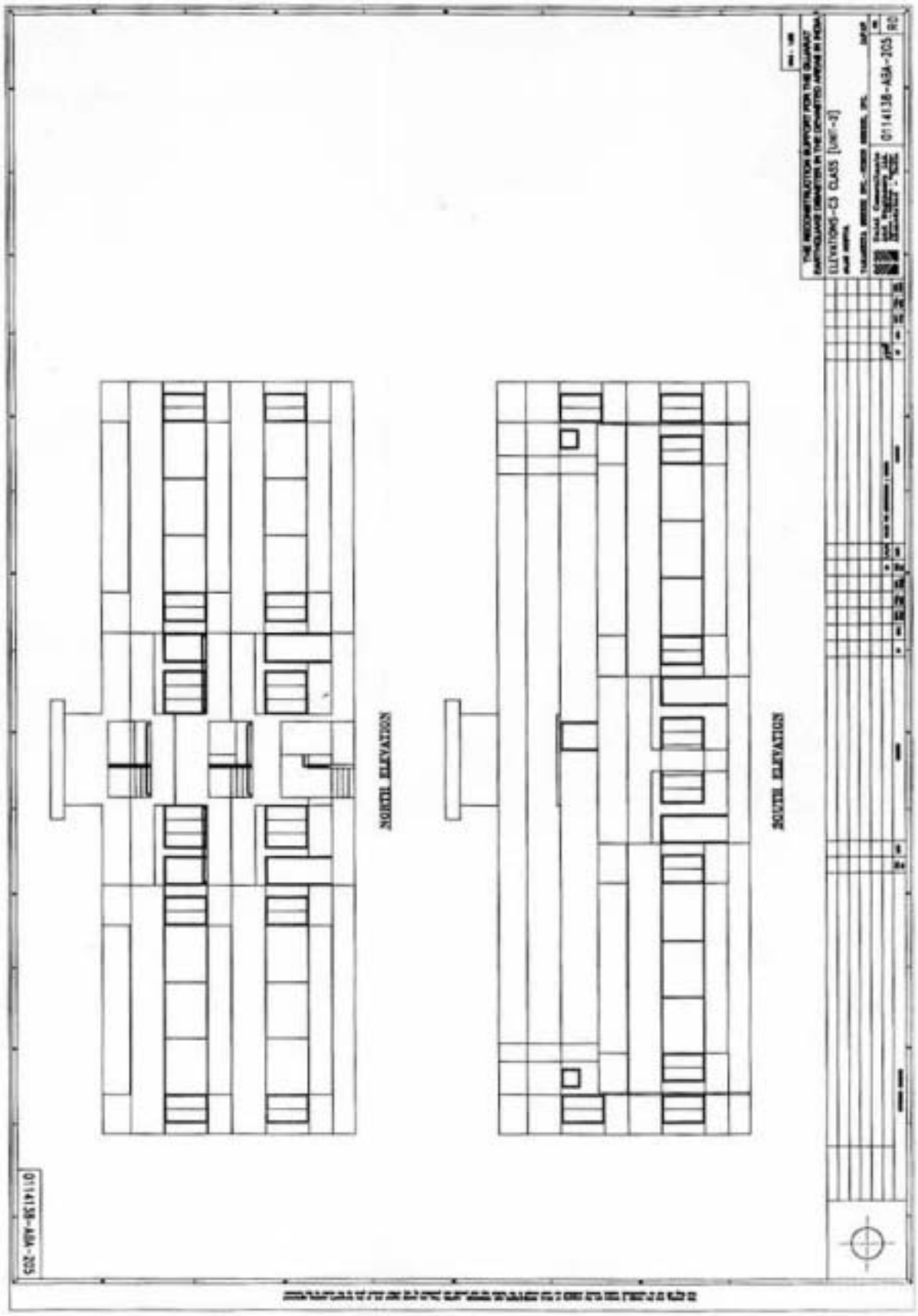
13. Staff Quarters Class III C Building: 1F Plan



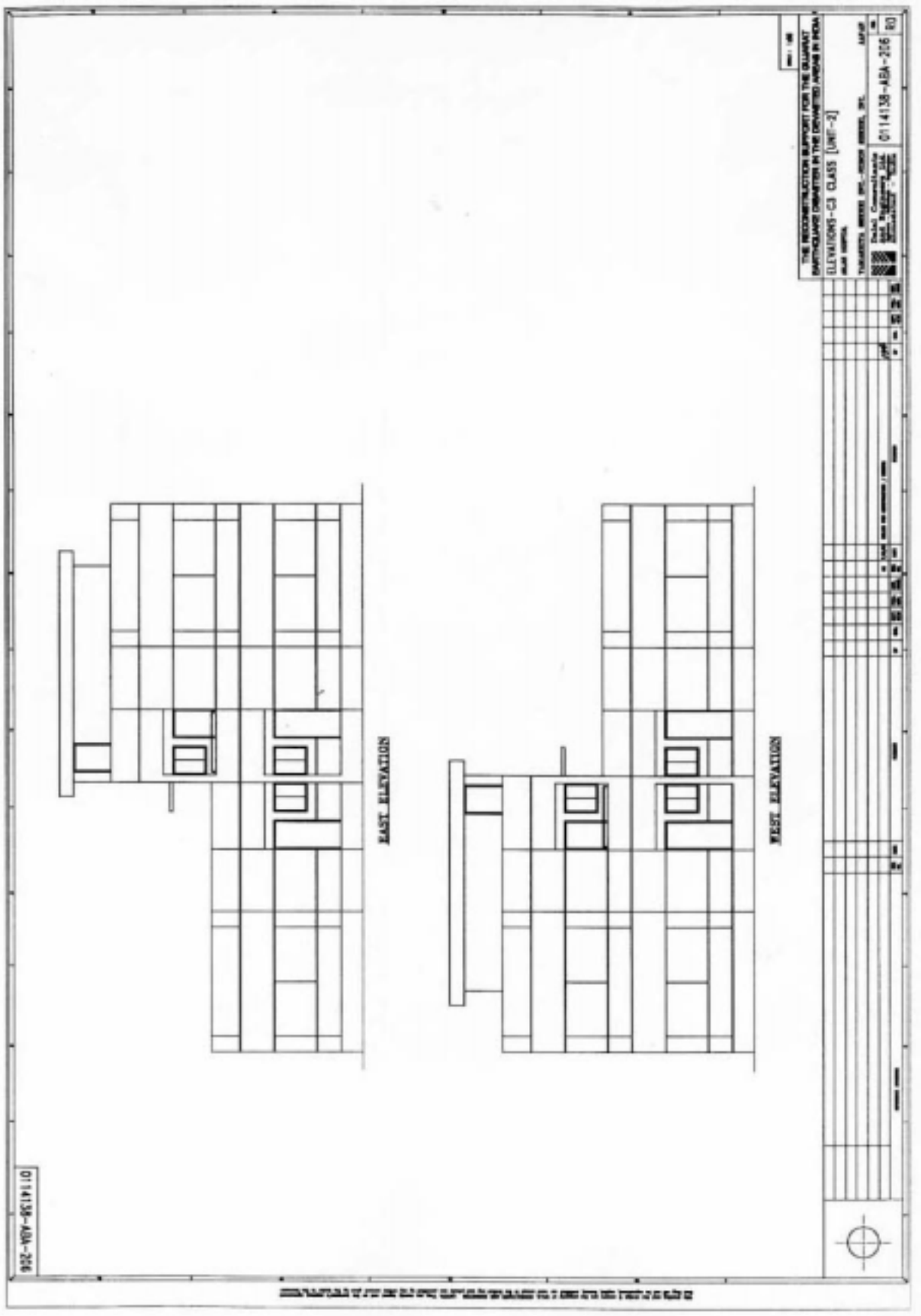
14. Staff Quarters Class III C Building: Sections



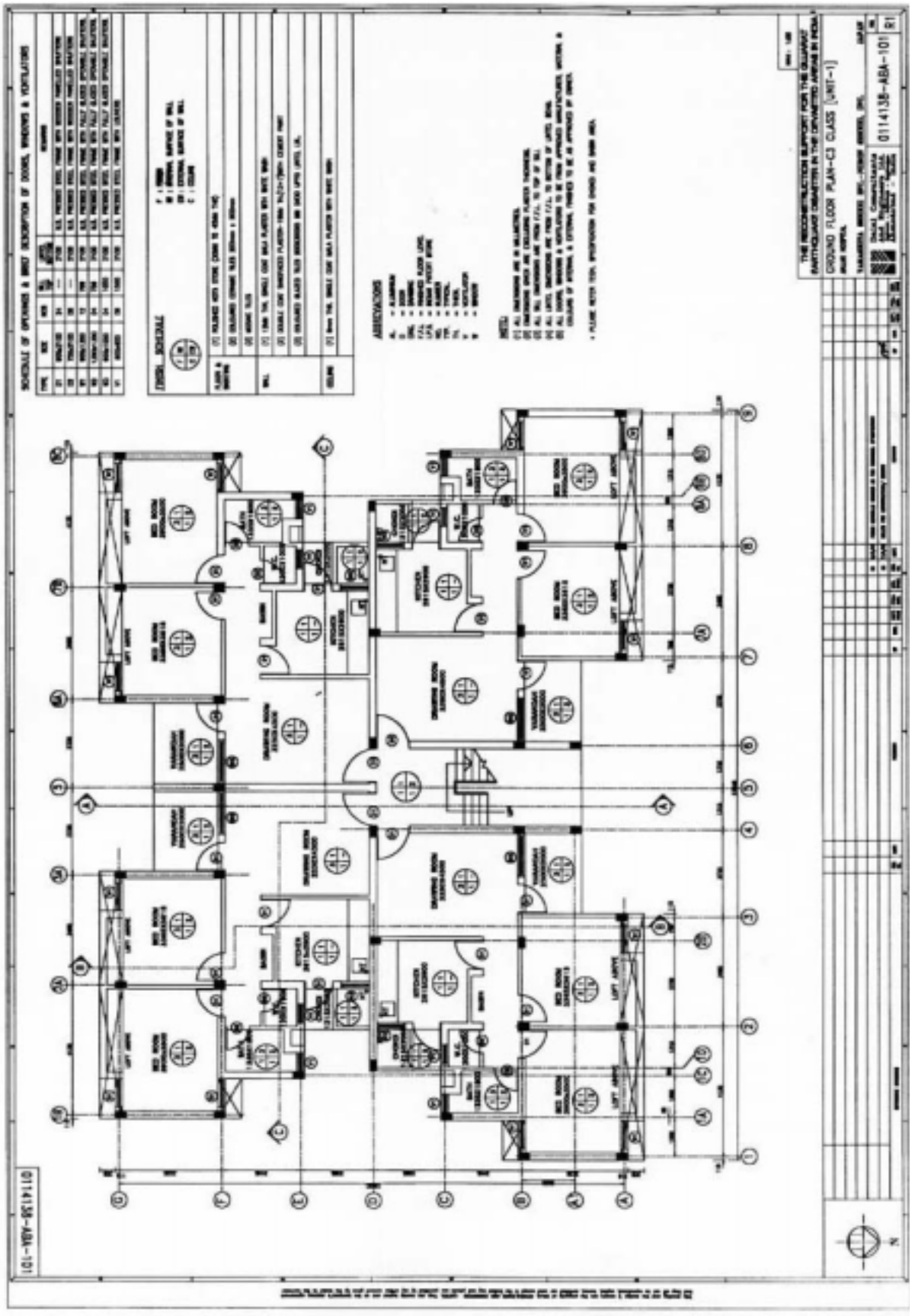
15. Staff Quarters Class III C Building: Elevations



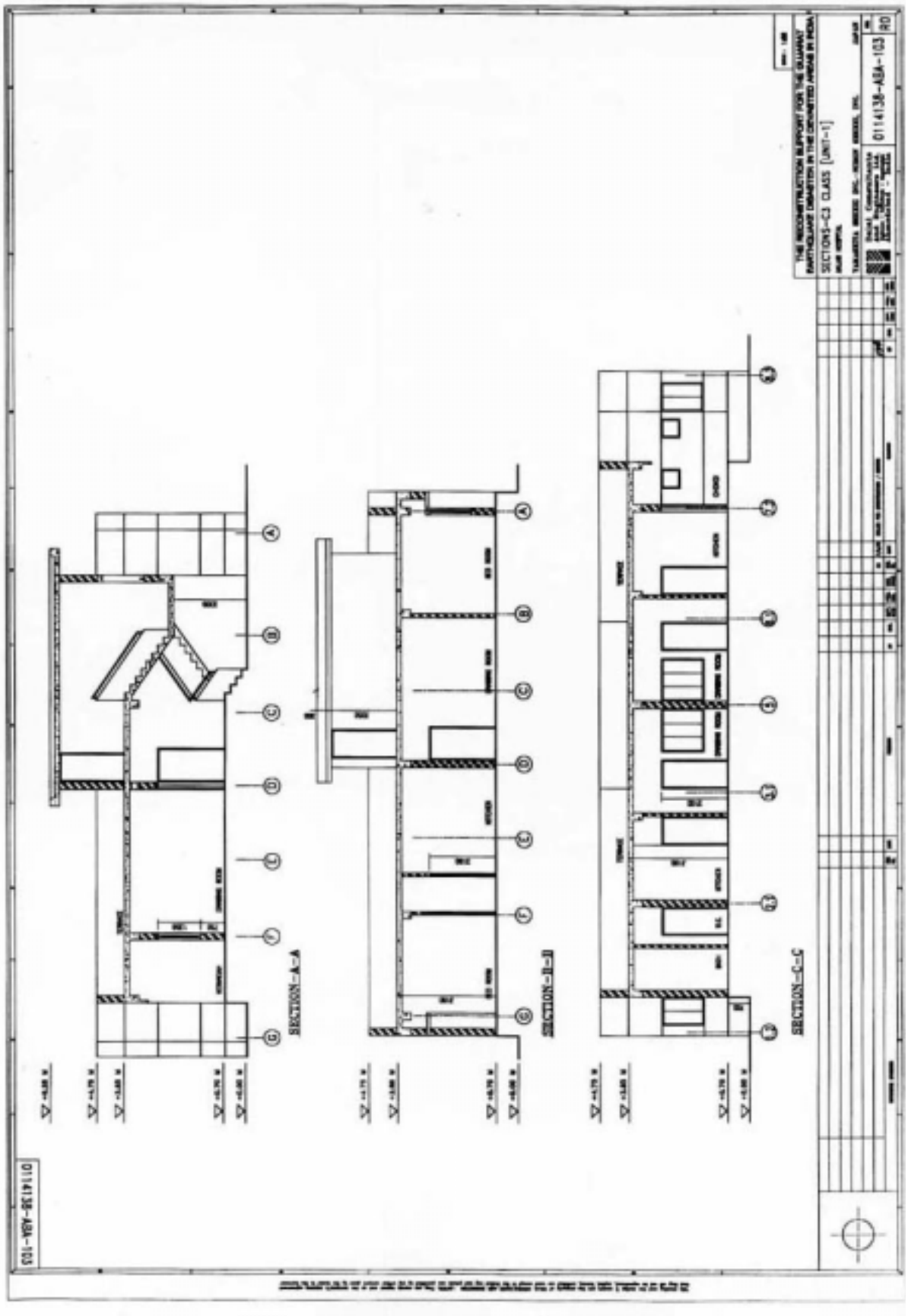
16. Staff Quarters Class III C Building: Elevations



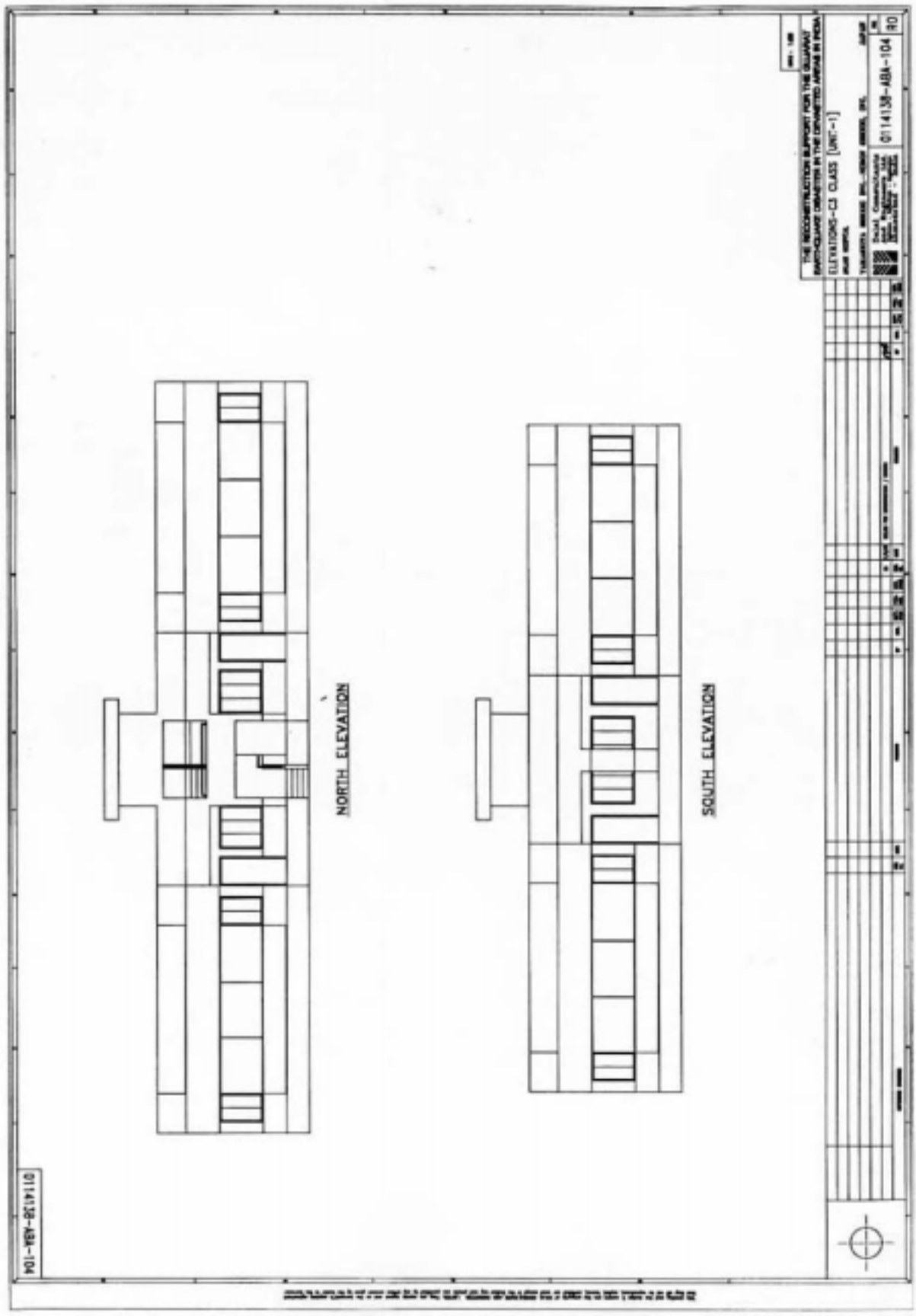
17. Staff Quarters Class III D Building: GF Plan



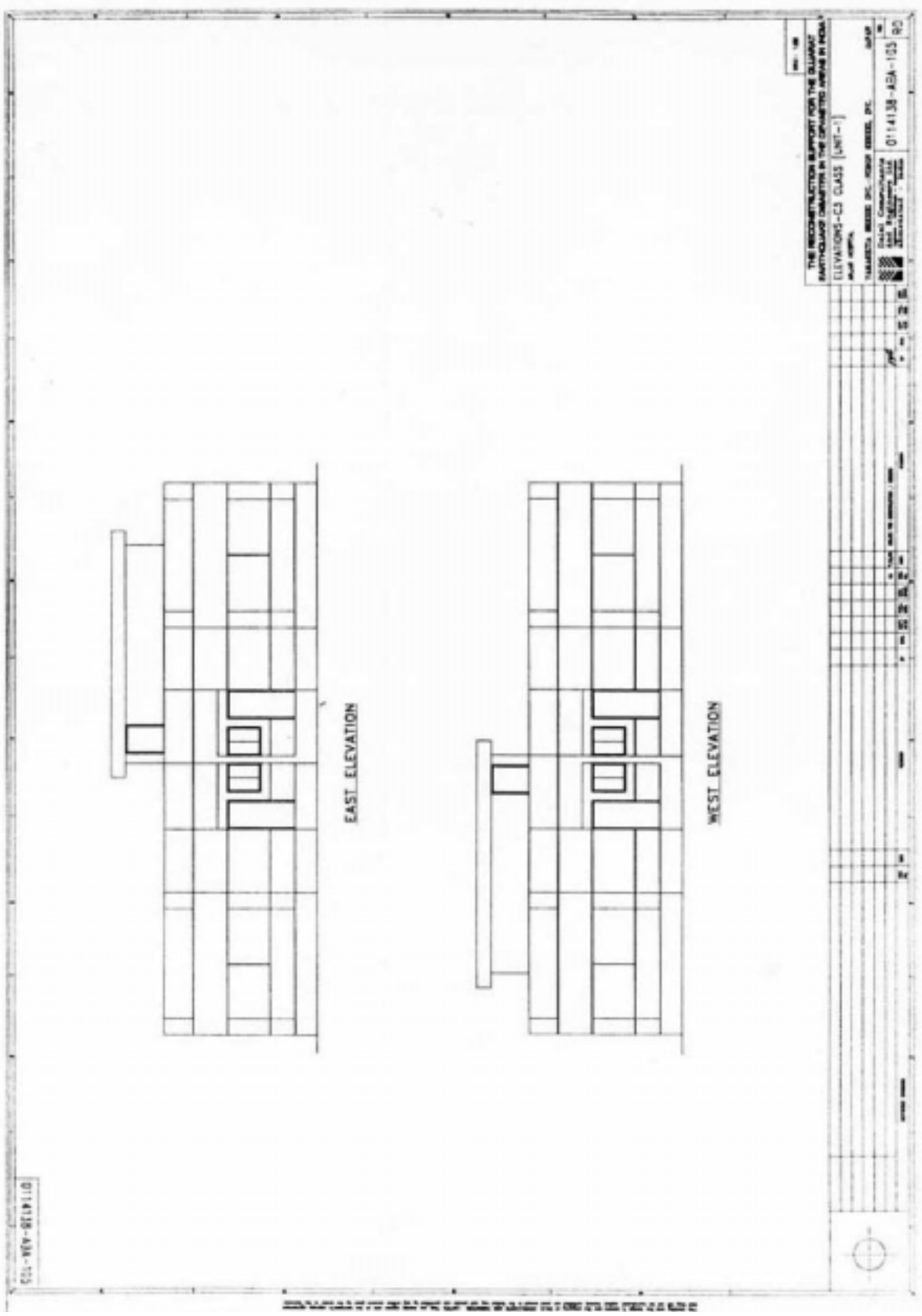
18. Staff Quarters Class III D Building: Sections



19. Staff Quarters Class III D Building: Elevations

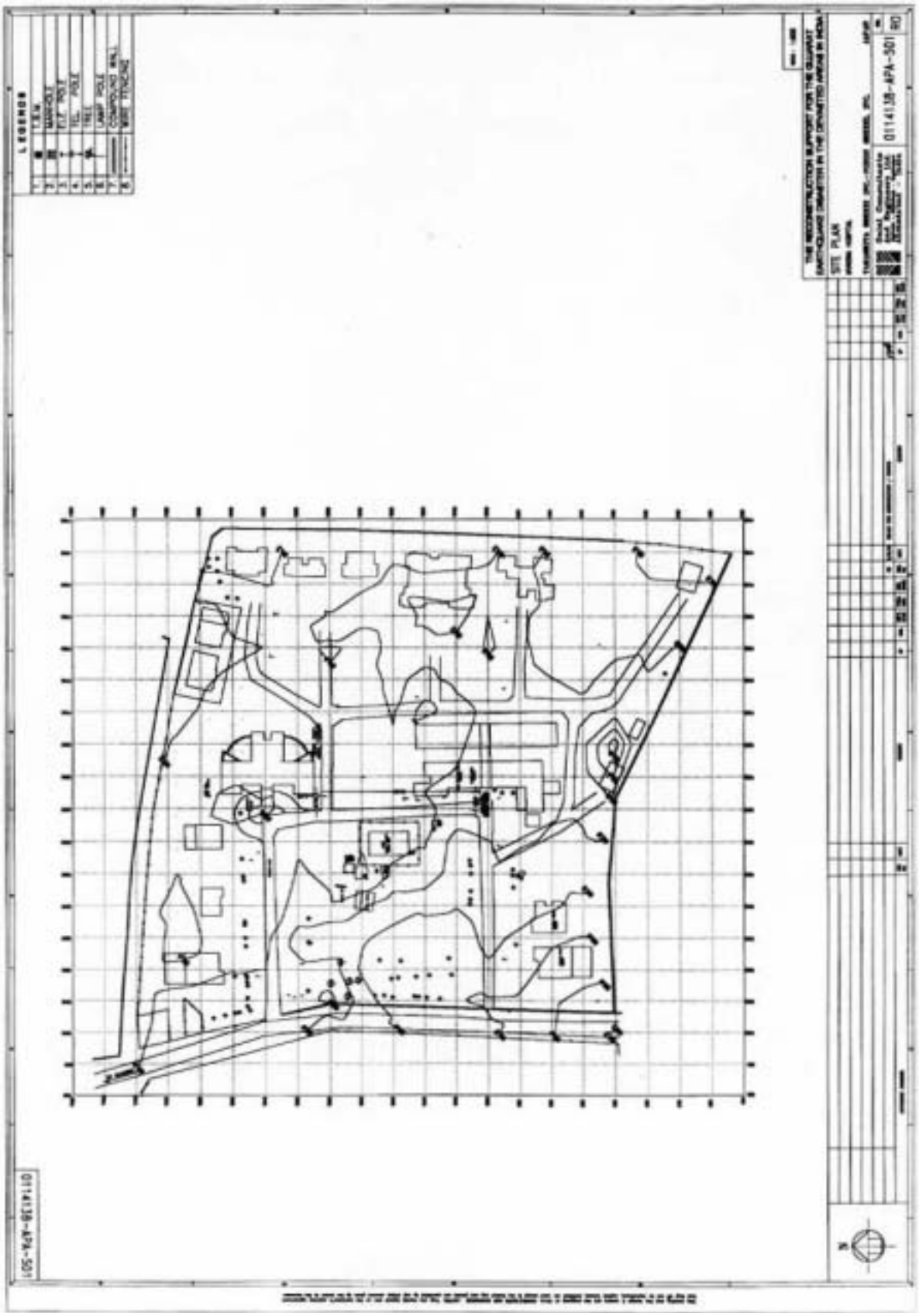


20. Staff Quarters Class III D Building: Elevations

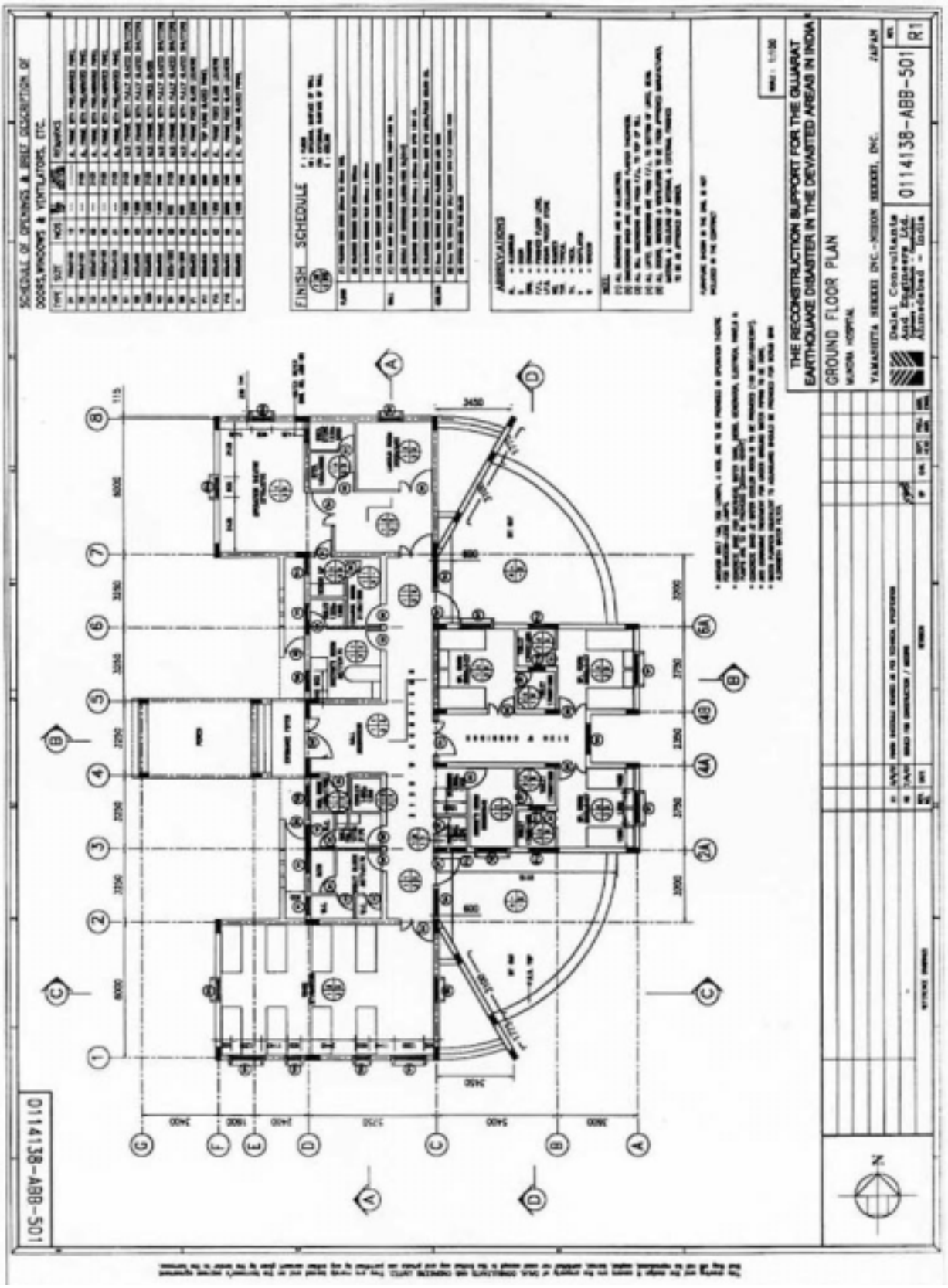


Mundra CHC

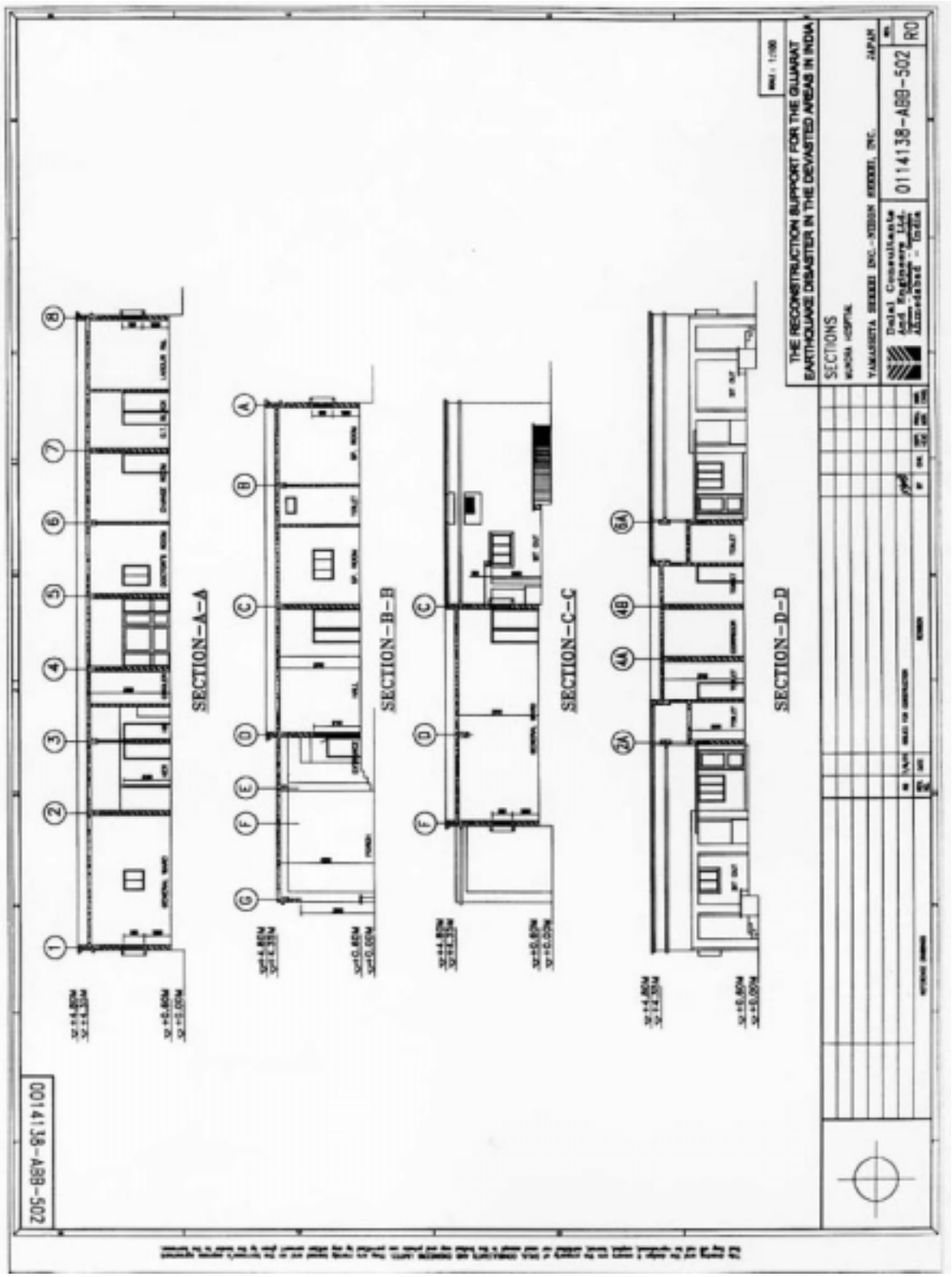
01. Layout Plan



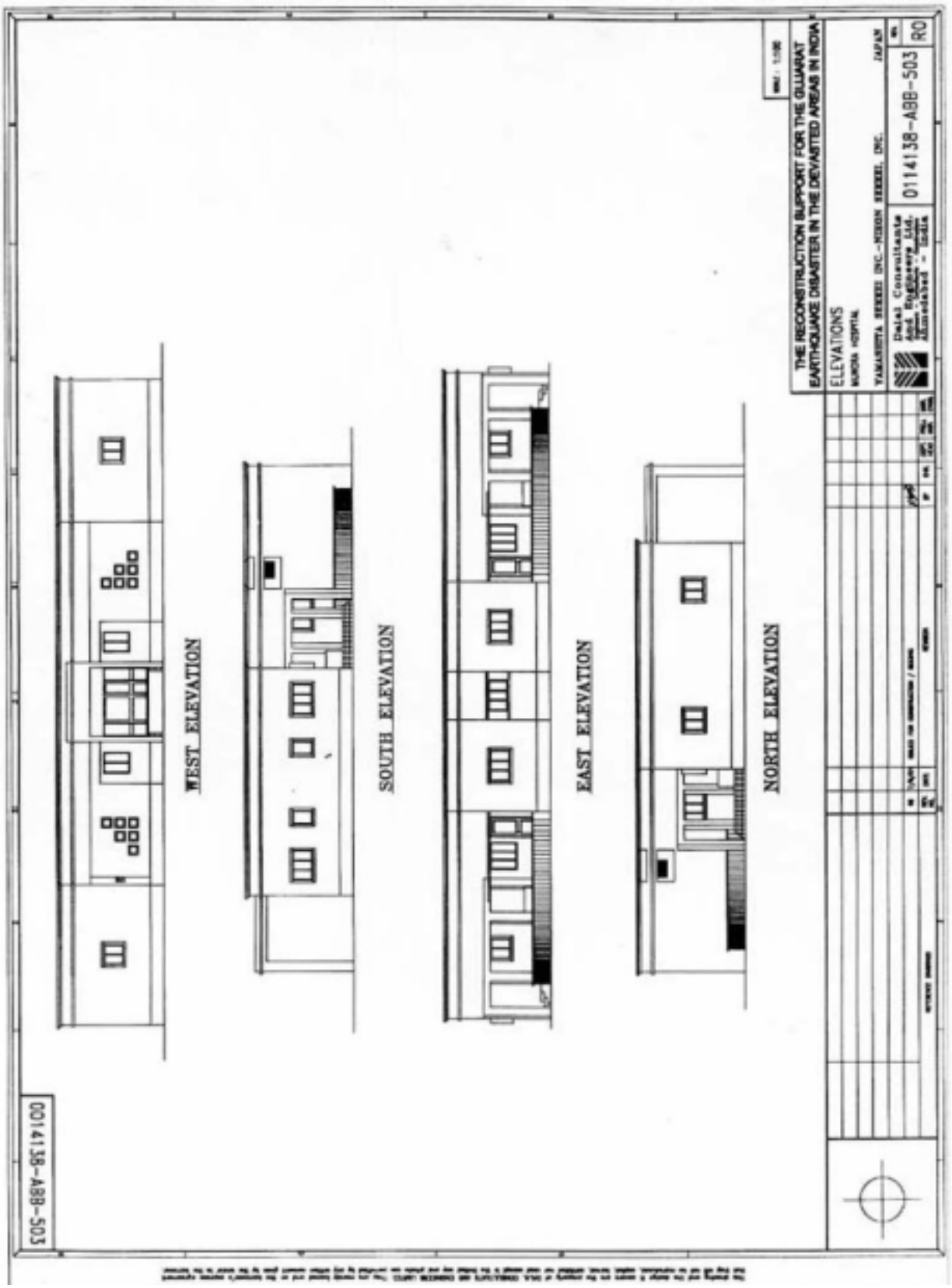
02. Maternity Building: GF Plan



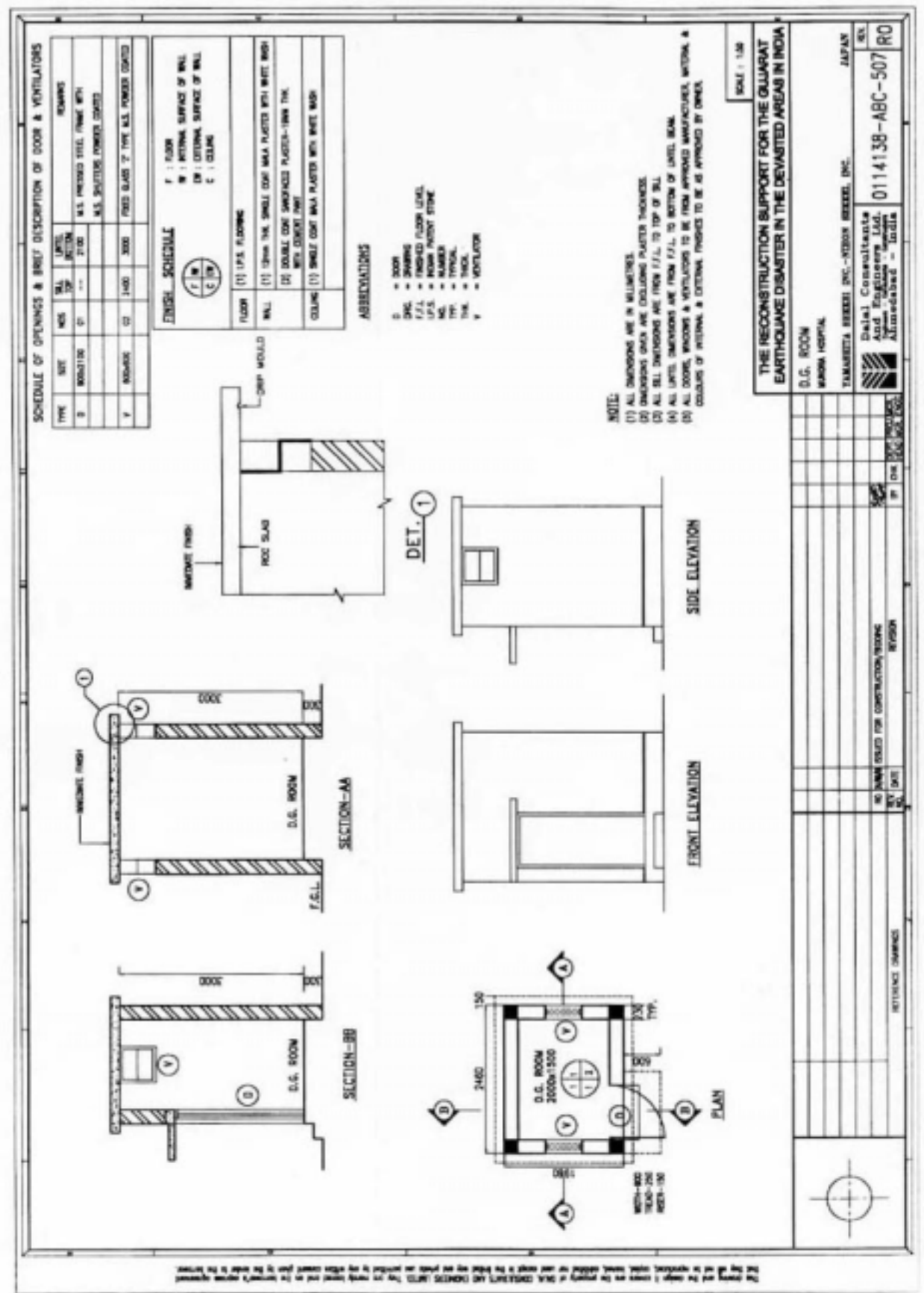
03. Maternity Building: Sections



04. Maternity Building: Elevations



05. Maternity Generator House: Plan, Sections and Elevations



7.4 Structural Planning and Design

7.4.1 Overall Structural Planning

The structural design of the rebuilt healthcare facilities reflects both the basic design planning requirements, local conditions, and the latest Indian structural standards, including seismic provisions.

Observations of the earthquake stricken area revealed that in many cases, extensive damaged occurred to poorly built low-rise masonry/rubble structures, while well-built and proportioned structures, which often employed reinforced concrete moment frames, generally performed much better.

In view of the economic and local conditions, it was decided to employ ductile reinforced concrete moment frames for the reconstruction of the healthcare facilities at both Anjar and Mundra, and for both the hospital building and staff quarters. Ductile moment frames were preferred to shear wall structures as they afford greater flexibility in layout planning, and avoid any problems relating to irregular horizontal stiffness distribution (leading to torsional or possible brittle behavior). The monolithic and homogenous nature of reinforced concrete moment frames is also simple and economic to construct.

Wall partitions (external and internal) will be non-structural masonry (normally brickwork). In view of local quality concerns, these are not designed as structural elements.

7.4.2 Ground Conditions

Soil investigations were carried out at the Anjar and Mundra sites, (refer to Appendix for attached reports by KCT Consultancy, dated July 2001).

At Anjar, the top 1-1.5 m is a fairly soft mixed clayey sand (CS) layer, underlain by a soft weathered rock strata. This weathered rock layer extends down to over 10m depth. SPT 'N' values of this weathered rock layer increase from 50 at the top to 70 at –10m depth. This weathered rock layer makes a convenient safe bearing layer for the building foundations. In some locations, the finished ground surface will be built up by around 500mm, so that all foundations will be at least at 1.5m depth below the existing ground surface.

At Mundra, the clayey sand layer extended down to over 10m depth, but with SPT 'N' vales increasing from 14 to over 35, at depths of approximately from GL-1.0m to GL –10m respectively.

In both cases, no ground water was encountered down to GL-10m depth. As the surveys were conducted in the wet season, any seasonal variation is unlikely to significantly affect the construction or bearing capacity.

In view of economy, all foundations for all buildings shall employ individual RC pad footings, tied in two orthogonal directions by grade beams, which shall be designed to take account of load eccentricities or base column moments. Safe-bearing values for various footing sizes of between 1.5m to 2.0 m depth were calculated using IS formula and using a factor of safety of 2.5, varied between 20 to over 35 t/m^2. In view of possible local variations, it was thus decided to adopt an overall safe long-term bearing value of **15t/m^2** for all structures.

7.4.3 Civil/ Structural Design Criteria

The basic design criteria for the buildings are described below, and this formed the basis for the detailed structural design and calculation.

(1) Loads :

1) Dead Loads (DL) :

Actual dead weights for structure self-weight, soils, brick wall finishes, floor finishes, roofing etc. were used based on actual conditions

2) Imposed Loads or Live Loads (LL) :

Design live loads are based on the Indian Design Load Standard IS:875 (Part 3) – 1987.

a. Occupied Floor Loads :

A) Hospital Building in Anjar CHC : 3 kN/m²

B) Staff Quarters (CI&II, CIII type) in Anjar CHC : 2 kN/m²

C) Maternity building in Mundra CHC : 3 kN/m²

b. Roof Loads :

Accessible roofs (with permanent stair access) : 1.5 kN/m^2

Inaccessible roofs : 0.75 kN/m^2

c. Future Provision for Expansion

The CHC at Anjar, have future provision for the construction of an additional second floor. Thus the roof (first floor) for this building will use the same floor design loads as the existing

occupied design floor load (i.e. 3.0 kN/m2), and the framing and foundations will also be designed to withstand the seismic loads that the additional floor would produce.

d. Loading effects due to impact and vibration shall be as per IS:875,Part-II.

3) Wind/Cyclone Load (WL) :

As per IS:875, the following wind loads and factors are considered.

a. Basic wind speed Vb : 50 m/sec. (standard coastal cyclone area)
b. Risk Coefficient K1 : 1.08 (as Hospital facility)
c. Terrain Coefficient K2 : 0.98 (10m high, outskirts of built-up areas)
d. Topography Factor K3 : 1.0 (permanent structure)
e. Design wind pressure (pz) : 1.68 kN/m²

Note that the resulting calculated wind forces are less than seismic forces, hence will not govern overall design, although may govern for certain elements.

4) Earthquake Loads (EL) :

As per IS:1893-1984 “Criteria for Earthquake Resistant Design of Structures (Fourth Revision)” the following seismic design forces and formulae are considered.

Basic formula by seismic coefficient method is;

$\alpha_h = \beta I \alpha_o$ Where

Basic seismic coefficient (α_o) for Seismic Zone V (Kutch) : 0.08
Soil foundation type coefficient (β) : 1.0 (RC pads w/- tie beams on firm or medium soil)
Importance factor (I) : 1.5 (for hospitals)
: 1.0 (for staff quarters)

Furthermore, the base shear V_B by equivalent static methods is given by:

$V_B = KC\alpha_h W,$ Where

K (structural framing/ductility factor) : 1.0 (ductile moment frame)
C (coefficient relating to stiffness/frequency of structure) : 1.0 (if T less than 0.3 secs)
W (total dead load plus 25% of applicable live load)

The design equivalent static base shear for the healthcare facilities are thus given as:

Hospital Building (Anjar) and Maternity Building (Mundra) : $V_B = 0.12$

Staff Quarters, other small buildings : $V_B = 0.08$

The Code also allows analysis to be made by the Response Spectrum method, which if a 5% damping value is used for reinforced concrete, may lead to lower base shear design values. Details are given in the Indian code.

(2) Material Data

1) Concrete

Most reinf. structural concrete grade M20 (cube strength = 20N/mm^2), although certain columns elements use M25

2) Reinforcement steel

Use high-yield reinforcing steel (per IS :1786), where fy = 415 N/mm^2

(3) Performance Data, Durability, Exposure etc.

As concrete is protected against weather by plaster finish, it is designed as being under 'mild' exposure, (except for foundations). Cover is determined as per IS standards.
Deflection, cracking etc are checked under serviceability limit loads.

(4) Design

Following IS methods, reinforced concrete structures are designed using the Ultimate Limit State Methods. The primary load factors and combinations used are :

a. 1.5 (DL + LL)
b. 1.5 (DL + EL)
c. 1.2 (DL + 0.25LL + EL)

(5) Analysis

3-D Frame analysis is done using STAAD-PRO software, allowing bi-axial bending to be analysed simultaneously.

(6) Overall Factors of Safety

The factor of safety against overturning, sliding and flotation are set as follows :

a. Against Overturning : 1.5
b. Against Sliding : 1.5
c. Against Flotation : 1.5

(7) Miscellaneous

- The Hospital Building at Anjar CHC, in view of the irregular floor plan layout and elongated form, shall be separated into three separate structures by a 25mm expansion joint. This is to avoid any seismic torsional loading that could otherwise occur, and to also to reduce possible excessive thermal stress cracking.

- RC grade-slabs shall be provided for the ground floors of the Hospital Building at Anjar CHC, the Maternity Building at Mundra CHC, and the post-mortem room building at Anjar CHC. Other buildings shall employ traditional non structural concrete grade layers and finishes only.

(8) Primary Indian Standards and Code references as used.

IS : 456 (2000)	:	Design of reinforced concrete structures.
IS : 875 (Part 3) (- 1987)	:	Loading Standards.
IS : 1893 (-1984)	:	Earthquake resistant design of structures.

7.5 Mechanical and Electrical Plan and Design

7.5.1 Site at Anjar CHC

(1) Electricity

The power for the facilities in this QRS project will be supplied from the nearest sub station (under the jurisdiction of the GEB) to the electrical room within the planned facilities via transformers located on the pole in the site. The total demand of the facilities is estimated at about 100 KVA. The power distribution system will use 415/220V which is the standard voltage used in India. Incase the GEB power shuts down, a diesel generator will be installed as an emergency power supply system in order to satisfy the minimum requirement for the CHC functions. The capacity of the generator is estimated as 40 KVA. In case of power failure, generator power will be supplied manually to the required load, such as lighting fixtures for the operating theatre and ICU room, underground water tank pump, external lighting and also to some power outlet used by essential medical equipment. As a rule, the design illumination will be based on the IS (Indian Standard). Table 7-3 shows Illumination Levels for Hospital Building.

Table 7-3 Illumination Level for CHC (Hospital)

Area / Room	Illumination Level (lux)
Operation Theatre	400
Labour Room, Obstetric ICU, Neonatal ICU	300
Adm. Room	250
Superintendent Chamber, Dispensing Room, Medicine Store, O.P.D. Area, Laboratory, Dental Surgeon, Orthopedic Surgeon, General Surgeon, Physician, Anaesthetic, Pre-operative Room, Sister's Duty, Medical Counseling Room, Emergency O.P.D. Room,	200
Case Registration, Case Record, Store (General), Ward, X-ray Room, Sanitary Unit, Dressing Room, Malaria Clinic Corner, Post Mortem, Corridor, Entrance Hall	150
Dark Room, Garage	100

For light sources, high-efficiency fluorescent lamps will be principally used as in the existing facilities but incandescent lamps also will be used for small rooms. Emergency lights with batteries will be provided for the corridor, operating room and ICU room in order to keep minimum functions as a CHC.

For the staff quarters, separate low voltage power supply feeder will be provided by the GEB to each staff quarters via their dedicated distribution board. For light sources, high-efficiency fluorescent lamps will be principally used as in the existing facilities, but white ball lamp also used for small rooms. Electrical outlets with 15/5A will be provided for each room and outlets with 15A specially used for air conditioners, water heaters and kitchen equipment in future extensions. The main Feeder Diagram is indicated in Fig.7-6.

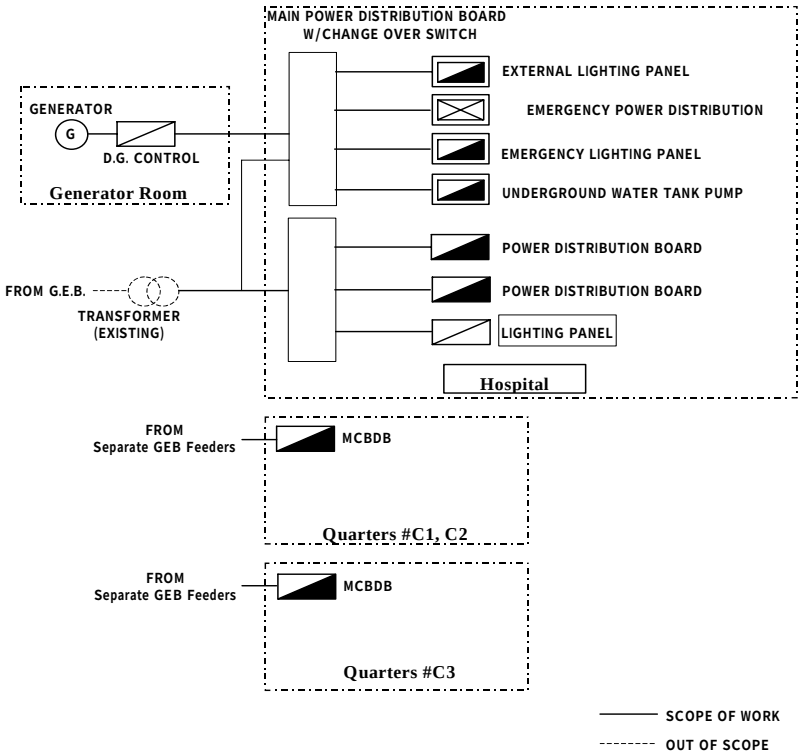


Fig. 7-6 Main Feeder Diagram for CHC Anjar

(2) Telephone

The line capacity assumed to be required for CHC the facility is to be about 2 lines with 30 extensions, so a PABX system will be adopted, which is commonly used locally. The capacity of the PABX will be planned with 10 lines with 70 extensions in consideration of the future staff quarters. For the quarters, one telephone line for each quarter is to be considered for future provision. The telephone system diagram is indicated in Fig. 7-7.

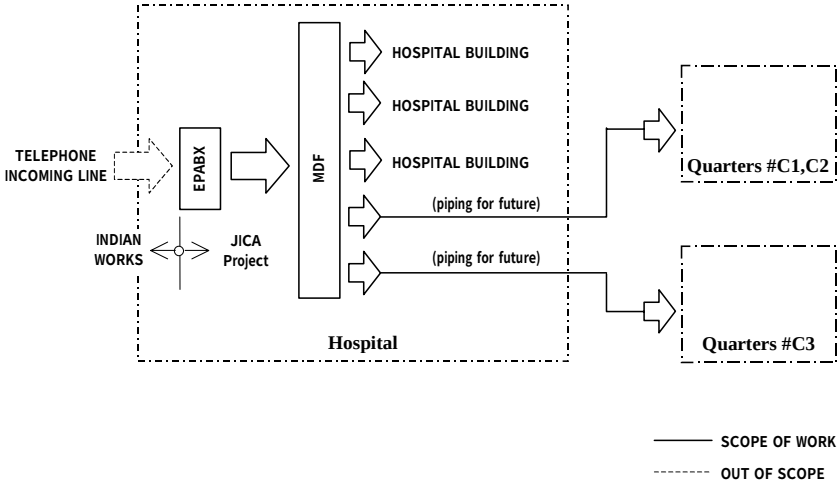


Fig. 7-7 Telephone System Diagram for CHC Anjar

(3) Internal communications

Nurse call and public address system are not included in the QRS project.

(4) Lightning protection

In order to protect the facilities from being struck by lightning, lightning rods and conductors will be installed on the roof, because no high buildings are located around the QRS project site.

(5) Water

Water from the existing deep well will be used mainly for the CHC facilities, the same as in the previous condition. Since a hospital is not operated without water, the city water will also be used to these facilities. One submersible pump and two water lift pumps will be provided, but the existing under-ground water tanks will be used for the QRS project. Three numbers of overhead water tanks made of plastic will be installed on the roof of the CHC building and the water will be supplied to the expected use point. Galvanized steel pipes, commonly used locally, will be adopted for the QRS project.

For the staff quarters, the water coming from the existing under-ground water tank will be supplied to the staff quarters. Overhead water tanks will be installed on the roof of each quarters and the water will be supplied to the expected use-points by gravity. The water flow diagram is indicated in Fig. 7-8.

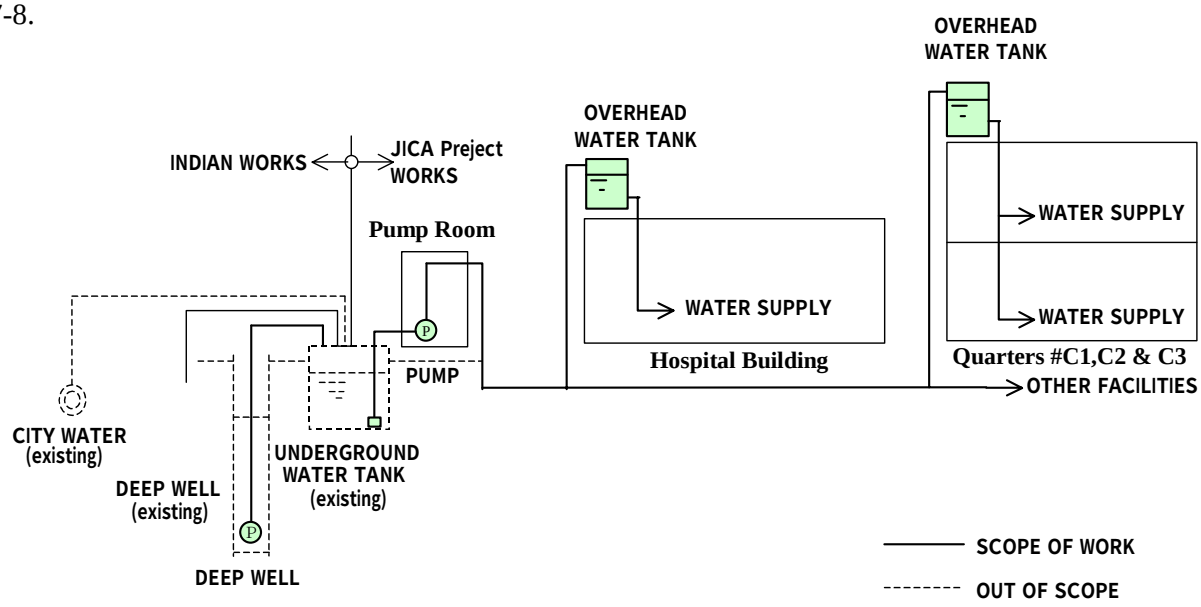


Fig. 7-8 Water Flow Diagram for CHC Anjar

(6) Drainage

The drainage from the toilets, showers, kitchen sinks etc. will be first treated by septic tank (commonly used locally) and discharged to the soak pit. The drainage from the infection area and laboratory and including organic solvent or heavy metal should be treated properly.

For the staff quarters, the drainage from the toilets, shower rooms and kitchens will be treated by septic tanks and soak pits. Drainage flow diagrams are indicated in Fig. 7-9.

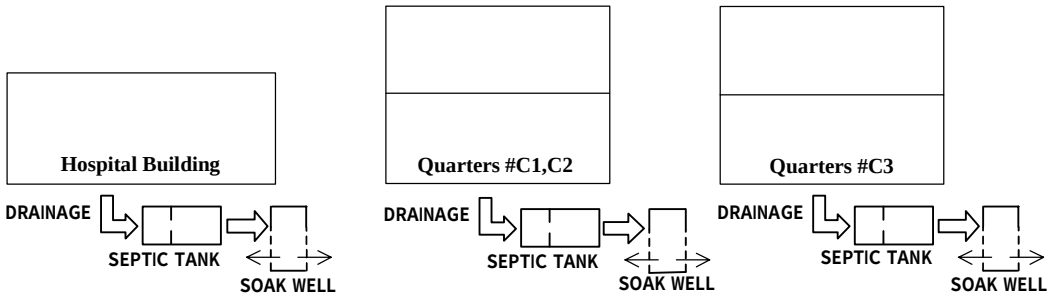


Fig. 7-9 Drainage Flow Diagram for CHC Anjar

(7) Hot water supply

Hot water will not be supplied for the QRS project, but electric power outlets with suitable capacity for electric type water heater will be prepared for future installation.

For the quarters, the shower units with supplied water will be provided but electric power outlets with suitable capacity for electric type water heaters will be installed for future installation.

(8) Sanitary fixtures

Indian type as well as Anglo Indian water closets commonly used locally will be adopted and flushing water will be supplied by tap. Urinals of wall type, lavatories, kitchen sinks and taps are to be installed. Water treated by water filter will be used in the scrub room. Drinking chilled water will be supplied after treatment by water filter.
For the staff quarters, Indian type water closets, lavatories and taps for kitchen sink are to be installed.

(9) Medical Gas

Among medical gases, oxygen and anaesthetic gas will be provided individually for the operating theatre, ICU rooms and minor operating room by using cylinders. The suction machine will be provided as a medical equipment.

(10) LP gas

Since the kitchen is not included in the QRS project, LP gas will be used in the Laboratory only. In this case, LP gas cylinders will be brought into the room and the gas will be used individually.
For the staff quarters, LP gas cylinders will be brought into the kitchen for cooking individually.

(11) Fire protection

A fire protection system, such as the installation of fire extinguishers, is not included in the QRS project. This installation work of extinguishers will be done by the Indian side.

(12) Kitchen equipment

A kitchen facility with equipment will be provided by the Indian side.

(13) Laundry equipment

Since the CHC is planning to provide the laundry section outside, laundry equipment will not be included in the QRS project.

(14) Air conditioning and ventilation

Basically, the QRS project depends on the use of natural ventilation. However, the operation theatre, ICU room and medical superintendent room will be provided with cooling equipment as required for

functions. For the cooling system, individual window type air conditioners will be adopted. Since the outside temperature in this area is not so low, heating systems are not required for the QRS project. Ceiling type circulator fans will be installed in the rooms for the patients and staffs to feel cool.

Mechanical ventilation systems will be adopted for rooms such as toilets, showers, etc. where much odour or steam is generated. The sterilizing room and electrical room, where much heat is generated, will be also ventilated mechanically.

For the C-3 staff quarters, outlets with 15 amperes for air-conditioners will be provided for future preparation. Basically, the QRS project depends on the use of natural ventilation. Mechanical ventilation will be adopted in the kitchen. Ceiling type circulator fans will be installed for each room to feel cool.

7.5.2 Site at Mundra CHC

(1) Electricity

Low voltage power of 415V for the facility in this QRS project will be supplied from the GEB to the main electrical panel. The power will be supplied from the main panel located on the wall at the entrance to the expected lighting fixtures and outlets. Incase the GEB power shut down, a diesel generator will be operated as emergency power in order to satisfy the minimum requirements for the CHC functions. The capacity of the generator is estimated at 4KVA. In case of power failures, generator power will be supplied manually to the required load such as for lighting fixtures for the operating theatre.

For light sources, high-efficiency fluorescent lamps will be principally used as in the existing facilities but white ball lamp also be used for small rooms. Emergency lights with batteries will be provided for the corridor and operating room in order to keep the minimum functions for a hospital. The main feeder diagram is indicated in Fig. 7-10.

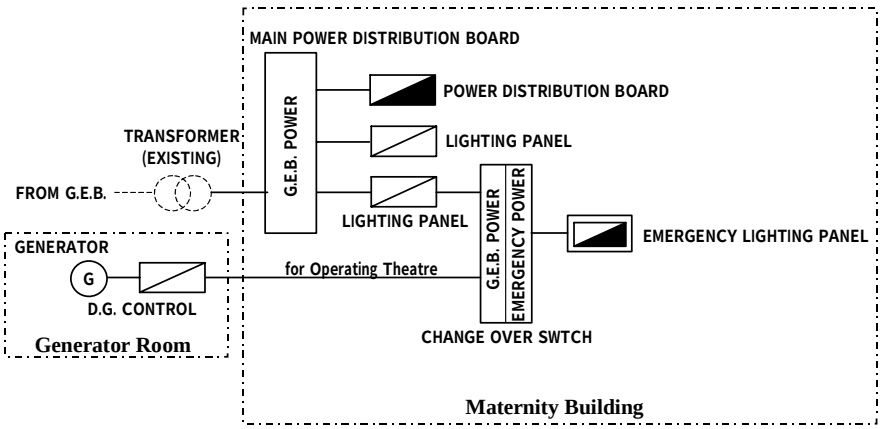


Fig. 7-10 Main Feeder Diagram for CHC Mundra

(2) Telephone

Telephone sets will be provided in the room for the doctor, nurses, operating theatre and delivery. Telephone outlets will be prepared in the wards for future extension. The telephone system diagram is indicated in Fig. 7-11.

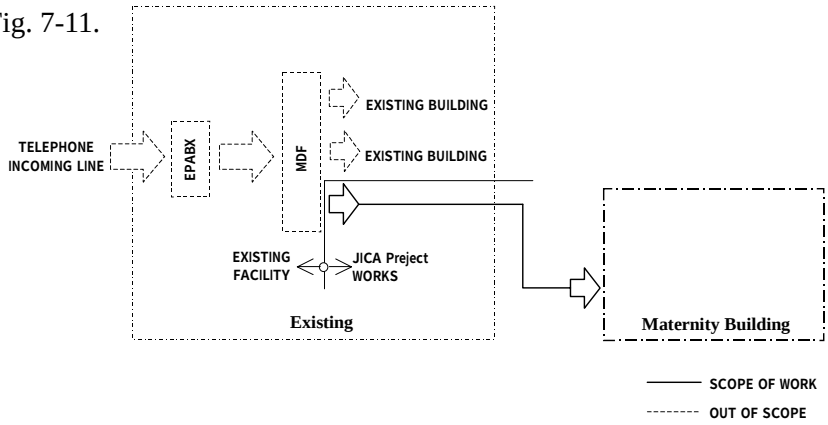


Fig. 7-11 Telephone System Diagram for CHC Mundra

(3) Internal communications

Nurse call and public address system are not included in the QRS project.

(4) Lightning protection

Since the other existing facilities include three stories, lightning protection system is not required for this maternity unit.

(5) Water

Water will be supplied from the existing overhead water tank to a new overhead cylindrical water tank made of plastic on the roof of maternity building and thereafter to the expected use-points by gravity. The water flow diagram is indicated in Fig. 7-12.

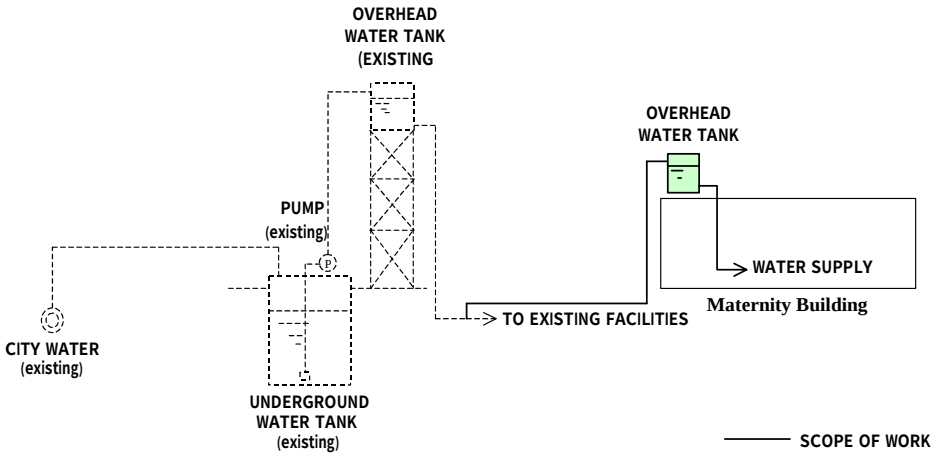


Fig. 7-12 Water Flow Diagram for CHC Mundra

(6) Drainage

The drainage from the toilets, showers, kitchen sinks etc. will be treated by septic tanks same as at CHC Anjar. The drainage flow diagram is indicated in Fig. 7-13.

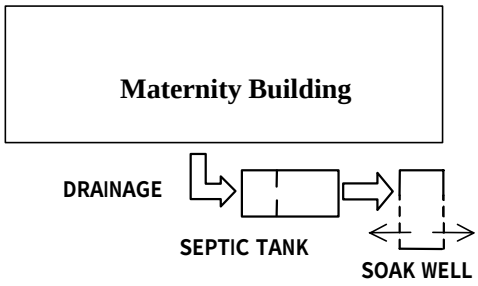


Fig. 7-13 Drainage Flow Diagram for CHC Mundra

(7) Hot water supply

Hot water will not be supplied for the maternity building, but electric power outlets with suitable capacity for electric type water heaters will be installed for future installation.

(8) Sanitary fixtures

Indian type water closets commonly used locally will be adopted and flushing water will be supplied by tap. Urinals of wall type, lavatories, kitchen sinks and taps are to be installed. Water treated by water filter will be used in the scrub room. Drinking chilled water will be supplied after treatment by water filter.

(9) Medical Gas

Among medical gases, oxygen and unaesthetic gas will be used by cylinder individually for the operating theatre. The suction machine will be provided as medical equipment.

(10) LP gas

Since, this facility is only for the maternity unit, LP gas is not included for the QRS project.

(11) Kitchen Equipment

Since, this facility is only for the maternity unit, kitchen equipment is not included for the QRS project.

(12) Laundry Equipment

Since, this facility is only for the maternity unit, laundry equipment is not included for the QRS

project.

(13) Fire protection

Basically, the fire extinguishers will be required for the QRS project, but supply and installation of fire extinguishers will be done by the Indian side.

(14) Air conditioning and ventilation

Basically, the QRS project depends on the use of natural ventilation. However, the operation theatre will be provided with cooling equipment as required for functions. For the cooling system, individual window type air conditioners will be adopted. Since the outside temperature in this area is not so low, heating systems are not required for the QRS project. Ceiling type circulator fans will be installed in the rooms for the patients and staff to feel cool.

Mechanical ventilation systems will be adopted in the rooms such as toilets, showers, etc. where much odor or steam is generated. The sterilizing room where much heat is generated will be also ventilated mechanically.

7.6 Medical Equipment Plan

Table 7-4 lists the medical equipment required for the Anjar CHC, including the equipment name, specification, and number required. This is not meant to be a complete list of all the necessary equipment for a fully functioning the CHC, as it is assumed the equipment which existed before the earthquake struck, could be re-used, including after any necessary repairs. Thus, for example, ICU monitors, incubators and anaesthetic equipment have been left of this list. They shall be installed by the GOG.

Such equipment is currently being stored by the GOG, and it's re-use is planned for this QRS project after completion of the building work. The exact technical details of the existing equipment, and whether their re-use is possible or not, is still under study by the GOG. For the existing equipment whose re-use is expected and required, but for whatever reason can not be repaired to a re-usable function, should be taken care by the GOG.

For the new building, the new equipment requested to be supplied from the GOG side are those whose use is required on a regular or daily basis for normal functioning of the CHC, and are not of any special high level or advanced nature. They have been determined on the basis that their use will be frequent, either now or in the near future. Any foreseen equipment whose expected level of use is infrequent, or whose use is complicated, including due to unavailability of consumables or spare parts, have been intentionally omitted from the list of required equipment.

Table 7-4 Medical Equipment

Sr #	Item	Specification	Q'y
Section-1 Hospital Furniture			
F-1	Steel Cupboard Big size	Size: 900Lx475Dx1,950H. 4 shelves, 5 drawers.	10
F-2	Steel Cupboard Small size	Size: 750Lx425Dx1,250H. 3 shelves, 4 drawers.	10
F-3	Steel Instrument Cupboard	Size: 900Lx475Dx1,950H. 4 partitions, Glass door,	5
F-4	Steel Table, Big	Size: 1,500Lx900Dx750H. 3 drawers on the right, 1 cabinet on the left.	1
F-5	Steel Table, Mid.	Size: 1,350Lx750Dx750H. 3 drawers on the right, 1 cabinet on the left.	10
F-6	Steel Table, Small	Size: 1,200Lx600Dx750H. 3 drawers on the left, 1cabinet on the right.	12
F-7	Wooden Stool	Size: 325Lx325Dx525H. CP Sag.	10
F-8	Revolving Chair High-back	75mm foam rubber in seat, 50mm foam rubber in back, good quality of foam rubber & resin.	2
F-9	Revolving Chair Low-back	Godrej type heavy weight stand. Plastic net filled in seat & back.	6
F-10	Chair S-type	S-type chair.	25
F-11	Bed side Steel Stool	Size: 300Lx300Dx500H.	50
F-12	Steel Rack, Big	Size: 900Lx375Dx1,800H. 6 partitions.	10
F-13	Steel Rack, Small	Size: 750Lx300Dx900H. 3 partitions.	20
F-14	Wooden Bench, small	Size: 1,200Lx300Dx450H. Top: 18mm teak wood.	10
F-15	Wooden Bench, Big	Size: 1,800Lx300Dx450H. Top: 18mm teak wood.	10
Section-2 Hospital Furniture & Appliances			
H-1	Hospital Strip Bed	Size:1,800Lx900Dx600H. Mattress: Cotton mattress 9kg with cotton cover.	35
H-2	Hospital Bed Fowler	Size: 1,980Lx900Dx600H. Mattress: 100mm foam mattress.	5
H-3	Maternity Bed with Cradle	Size: 1,950Lx900Dx500H. Cradle size: 750x380mm. Mattress: Cotton mattress 9Kg with cotton cover.	10
H-4	Bed Side Locker	Size: 400Lx400Dx800H	50
H-5	Ward Dressing Wagon	Size:900Lx600Dx750H. Body: Complete 304 grade S.S..Shelf: Three shelves	10
H-6	Bed Side Screen	Size: 2,250Lx1,650H. Three fold. Frame	10
H-7	Saline Stand	Size: 250mm dia., casting base	10
H-8	Stretcher Trolley	As per ISI No. 4036-1967 & reaffirmed 1977 with latest amendment, caster thickness as per latest amendment of ISI. i.e. 40mm	5
H-9	Invalid Wheel Chair	Size: Approximate 685mmLx1,015Dx965H .	5
H-10	Examination Table	Size: 1,800Lx500Dx825H. Top: 18 gauge CRC sheet	5
H-11	Instrument Trolley	Size: 700Lx460Dx800H. Made of complete 304 grade S.S.. Shelves: 20 gauge S.S. sheet	5
H-12	Towel Stand	Size: 900Lx375Dx900H. Body: 25mm CRC pipe,	5
H-13	Drum Stand	(1) Stand: 2 hooks, 900H. Top: 1,200Lx450D made of S.S.. (2) Stand: 4 hooks, 900H. Top: 1,200Lx300D made of S.S..	3 3
H-14	Revolving Stool	Size: 300mm dia.. top 25mm CRC pipes. Three legs 25mm dia. screw mechanism adjustable 450-675H.	10
H-15	Oxygen Cylinder trolley	Size: 150mm dia.x750H. A space moving stand with provision for gas cylinder of 153mm dia.	5
H-16	Instrument Cabinet, Double Door	Size: 900Lx450Dx1,950H. Body: 22 gauge and 20 gauge four partitions CRC sheet. Door: With four glass,	3
H-17	Labour Table	Size: 1,800Lx750Dx750H. Top: Complete 18 gauge 304 grade S.S.	2
H-18	Minor Operation Table	Size: 1,650Lx500Dx825H. Top: 18 gauge 304 grade S.S.. Mattress: 50mm foam mattress with resin cover.	1
H-19	Major Operation Table	Size: 1,800Lx750Dx750H. Top: Five sectioned, complete18 gauge 304 grade S.S. with Manual Hydraulic lift controlled by pedal.	1
H-20	Shadowless Lamp (Ceiling)	Model-CLH-6, COGNATE 700mm dome with 6 reflectors, each fitted with HALOGEN bulb and special filter glass	1
H-21	Shadowless Lamp (Mobile)	Model-MLH-19, COGNATE Indian 475mm dia., single dome with remote control, fitted with a HALOGEN bulb and special filter glass.	2
H-22	Suction Machine (type-1)	ISI specification mark No. 4533-1978.(first revision) BRAND-SANTUSTHI or equivalent)	1
H-23	Autoclave Vertical (Single Drum)	Size: 300mm dia.x300H. Made: S.S. Electric power: Heat coil with 2kW. Single drum type.	1
H-24	Autoclave Vertical (Double Drum)	Size: 300mm dia.x500H. Made: S.S. Electric power: Heat coil with 3kW. Double drum type. Size: 400mm dia.x600H. Made: S.S. Electric power: Heat coil with 4kW. Double drum type.	1 1
H-25	Electric Sterilizer (Big)	Size: 600Lx300Dx300H. Made: complete S.S. body. Automatic cut-off. Thermostat control.	3
H-26	Electric Sterilizer (Small)	Size: 300Lx150Dx100H. Made: complete S.S. body. Automatic cut-off. Thermostat control	3
H-27	Dressing Drum	ISI certification mark IS 3831-1979 round of S.S. with interior perforation of body Size: (1) 225mm dia.X225h (2) 275mm dia.x240H (3) 275mm dia.x132H	10
H-28	Bowls & Utensil Sterilizer	Size: 600Lx450Dx400H.Made: S.S. body. Auto-cut-off & thermostat control.	1
H-29	Refrigerator	Capacity: 400ltr.. Double door type.	2
H-30	X-ray Machine	100 mA with accessories. (Fixed) Make: PHILIPS, SIEMENS or equivalent	1
H-31	ECG Machine	Portable. 1 channel.	1
Section-3 Laboratory Equipment			
L-1	Binocular Microscope	Model: BPM-3 ISI mark IS-4381 & IS-8275 Well packed in box.	2
L-2	Medical Centrifuge	Capacity:4 x 15ml. Maximum speed 3,500rpm/min. 5 step speed regulator,	2
L-3	Serum Auto Analyzer	Semi automatic	1
L-4	Hemoglobinometer	Model: "TOP" (or equivalent) Hemoglobinometer square tube: having prism type comparator 14.5G-100%	2
L-5	Haemocytometer	Brand: “ROHEM” (or equivalent) Neubaur chamber-bright line, Rohem (Indian) with Indian WBC pipette & RBC pipette & Cover slip & Box.	2