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# SUSTAINABLE WATER SUPPLY AND SANITATION (SWSS) PROJECT LATRINE AND SANITATION OPTIONS MANUAL

May 5, 2010

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## **DISCLAIMER**

The views expressed in this publication do not necessarily reflect those of the United States Agency for International Development or of the United States Government.



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# ACRONYMS

BCC	Behavioral Change Communication
BoQ	Bill of Quantity
BPHS	Basic Package of Health Services
CDC	Community Development Council
CHW	Community Health Worker
CLTS	Community-led Total Sanitation
COMPRI-A	Communications for Behavioral Change Expanding Access to Private Sector Health Products and Services for Afghanistan
FHAG	Family Health Action Group
GIRoA	Government of the Islamic Republic of Afghanistan
M&E	Monitoring and Evaluation
MFI	Microfinance Institution
MoPH	Ministry of Public Health
MRRD	Ministry of Rural Rehabilitation and Development
MSH	Management Sciences for Health
NGO	Non-Governmental Organization
ODF	Open Defecation Free
O&M	Operation and Maintenance
PRT	Provincial Reconstruction Team
SSDA	Society for Sustainable Development of Afghanistan
SWSS	Afghan Sustainable Water Supply and Sanitation Project
TOR	Terms of Reference
TOT	Training of Master Trainers
USAID	United States Agency for International Development
USG	United States Government
VIP	Ventilated Improved Pit Latrine
WASH	Water, Sanitation and Hygiene
WUG	Water User Group



# 1.0 INTRODUCTION

## 1.1 OBJECTIVE OF THIS MANUAL

Poor sanitation is endemic across Afghanistan and exacts a heavy toll on public health. In response, the Ministry of Rural Rehabilitation and Development (MRRD), multiple donors, the United Nations, several implementers, and USAID are engaged in providing funding and technical leadership to sanitation programs and facility construction throughout the country. These resources are sorely needed, but money and technologies alone cannot solve the problem. Donors and implementers must agree to promote, and uniformly apply sound social development, public health, marketing, finance, and technical guidance to the health-focused planning of new investments and the delivery of sustainable sanitation services.

This Manual aims to meet these needs by serving as a practical guide for Component 2 of USAID’s Sustainable Water Supply and Sanitation Project (SWSS) and the selection of sanitation technology options to satisfy local desires and meet national needs. While this Manual is developed specifically for SWSS, it is hoped that it will be a living document for the professionals and organizations working to address fecal contamination across Afghanistan.

## 1.2 INTENDED USERS OF THIS MANUAL

This Manual has been written for both engineering and non-engineering field practitioners responsible for the design, construction, and sustainable operation of sanitation programs and facilities. It is primarily intended as a guide for all aspects of SWSS’ sanitation programs and facility improvements. The Manual is designed to be used by SWSS, its partners from across the United States Government (USG), and its Afghan collaborators to make appropriate choices and engage effectively with engineers working in the field.

## 1.3 SCOPE OF THIS MANUAL

This Manual focuses on two topics which are central to SWSS implementation: (1) sanitation technologies and (2) Community-led Total Sanitation (CLTS). But it also takes into account several aspects of the supportive enabling environment – the social support systems which determine the sustainability of sanitation investments. These include financial, institutional, and social systems for long-term operation and maintenance of facilities.

In most situations in rural Afghanistan, on-site sanitation facilities are expected to be the most appropriate, cost-effective technology, and an inexpensive option affordable to an individual household. The Manual therefore pays particular attention to on-site options for the healthy disposal of fecal sludge.

On the other hand, CLTS is a new approach to reducing fecal pollution in Afghanistan. Therefore, most of the information provided is based on what other countries have done in the field of CLTS– to be proven in communities across Afghanistan.

*Defining sanitation and measuring success.* For the purposes of this Manual, “sanitation” refers to the safe management and disposal of human excreta. It is important to understand that this involves change in community sanitation habits and interaction among members to pressure one another to maintain safe habits, not just the installation of infrastructure. This means that the success of sanitation investments cannot be measured in physical “outputs” such as the number of latrines built. Instead, the focus should be on “outcomes”, primarily the use and maintenance of latrines which generates community transformation and health impacts.

Simple numerics such as the number of people with “access to improved latrines” do not describe the impact of improved sanitation services. Simply accounting for latrines built only describes whether or not a facility exists. Facility access numbers are deficient in a number of ways:

- Sanitation facilities may be *available but inconvenient, unpleasant, or unhygienic*. This may be the result of inappropriate design or construction, inadequate management arrangements, or the unhygienic behaviors of facility users.
- Sanitation facilities may be *available, but some people have limited access* to them. For example, public facilities in market places, especially in Islamic cultures, may be used primarily by men while women and/or children are not encouraged or permitted to use them.
- There may be *no provision for the final disposal* for wastewater or excreta. Latrines may be allowed to become full and unusable, or local drains may simply relocate waste to another location where it threatens health.

## 1.4 WHAT IS REQUIRED AND CONTAINED IN THIS MANUAL

The SWSS Task Order contract signed between ARD, Inc. and USAID requires the project to deliver a Latrine Options Manual and a Sanitation Options Manual. The SWSS team has combined these two documents into a single manual because the processes to improve sanitation are inseparable from the technologies made available to people. This manual focuses on the three areas delineated by the Task Order instructions in paragraphs (2) and (3) of page 18 of the Task Order:

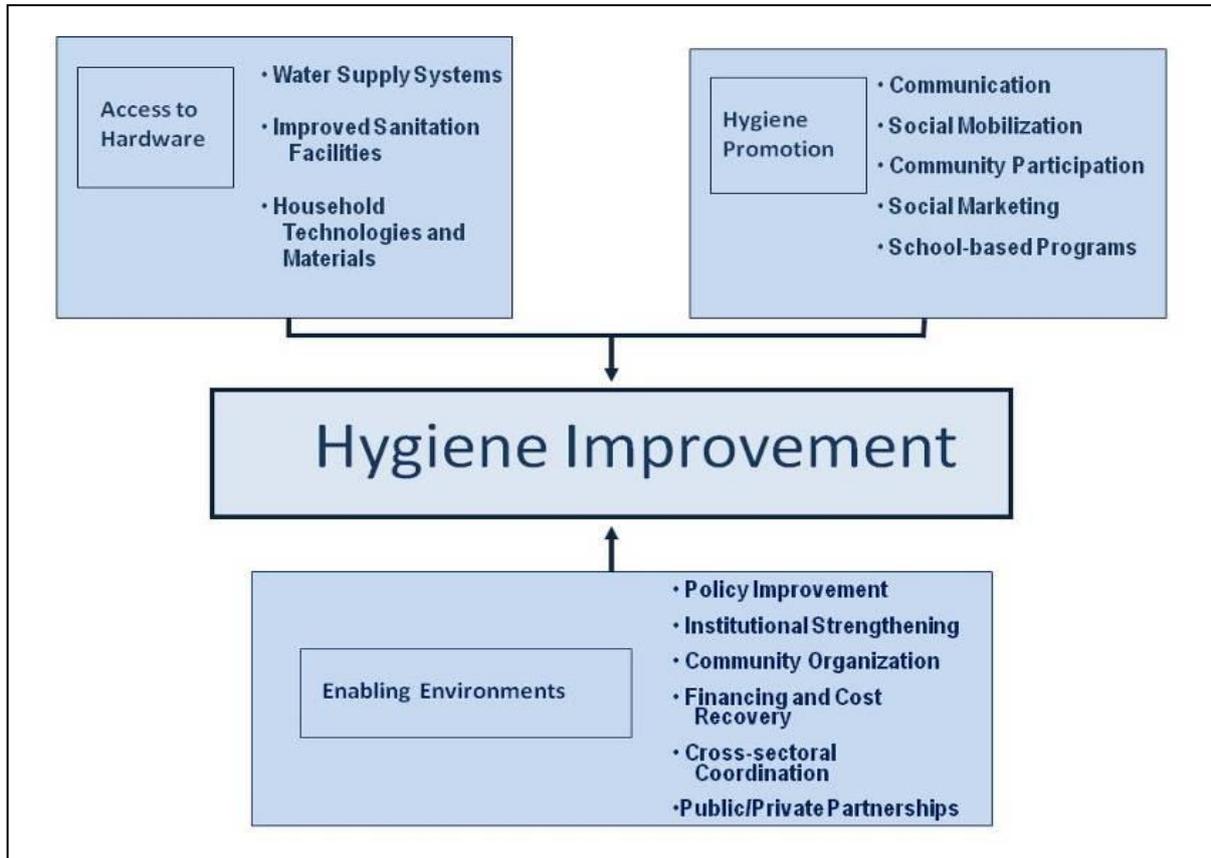
1. Review available “Latrine Options Manuals” and “Sanitation Options Manuals” and create an updated version of these that meets the needs of the SWSS project;
2. Consider all locally available options for the three levels of a latrine (superstructure, slab, and pit) to raise awareness of options for consumers (increase demand for sanitation). Following this, as consumers’ desires and ability to pay increases provide models of appropriate sanitation technologies; and
3. The manual shall include a section on operation and maintenance (O&M) training and cost recovery for each system to ensure sustainability.

## 1.5 A FRAMEWORK THAT LINKS TECHNOLOGY OPTIONS WITH SANITATION PROGRAMS

SWSS is not merely an engineering, facility construction, or technology promotion project. Instead, it is a community-based, demand-driven development project—transitioning the Afghan rural water supply and sanitation (RuWatSan) sector from a “hardware” focus on engineering and infrastructure construction into longer-term, sustainable programming that balances “hardware” with social science-based “software”. The SWSS approach is based on the application of the Hygiene Improvement Framework (HIF). The HIF was developed by USAID’s Environmental Health Project (EHP) in collaboration with leading global partners in the sector—UNICEF, the World Bank’s Water and Sanitation Program, the Water Supply and Sanitation Collaborative Council, and USAID—as a comprehensive approach for preventing diarrhea through balanced resource commitments across three essential elements: (1) Improving Access to Water and Sanitation “Hardware”; (2) Promoting Hygiene; and (3) Strengthening the Enabling Environment (see Figure 1.1).

In applying the HIF, implementation options are selected from the HIF elements to enable the adoption of three key household behaviors proven to reduce diarrhea: (1) safe disposal of feces, (2) washing hands correctly at the right times, and (3) storing and using safe water for drinking and cooking. Behavior change communication generates demand for these behaviors. Expanding infrastructure access makes it possible to perform the behaviors. Social organization supports the sustainability of the behaviors and the infrastructure.

**Figure 1.1: The Hygiene Improvement Framework (HIF)**



# 2.0 THE AFGHAN CONTEXT

## 2.1 SANITATION LEGISLATION AND STANDARDS

The lead ministry dealing with sanitation in rural areas of Afghanistan is the Ministry of Rural Rehabilitation and Development (MRRD). MRRD is responsible to ensure that the policies and plans determined under the 5-year national policy framework for the water and sanitation sector are implemented in a timely manner. MRRD takes an overall facilitation and coordination role, including policy, planning and development, resource mobilization and allocation, monitoring and evaluation, and information management. MRRD maintains close collaboration with other line ministries such as the Ministries of Public Health, Women's Affairs, Education, and Haj to maximize accelerated coverage, health impact, equitable access to services, cost-effectiveness, and efficiency in delivery of water and sanitation services.

The Water & Sanitation Department of MRRD oversees the implementation of rural water supply and sanitation (RuWatSan) projects. In general, construction of sanitation facilities is packaged with community mobilization, health and hygiene education, and repair and maintenance training to maximize health benefits and ensure sustainability. The Department accepts the use of local technology and methods, but its staff also provides engineering design services to meet more complex structural needs. Direct service delivery is outsourced to facilitating partners – NGOs and private sector contractors – who directly assist communities in implementation.

MRRD principally plays a regulatory and facilitating role, supervising and monitoring contractors' quality of works. MRRD also supports developing and strengthening a strong private sector and NGOs that can serve rural areas by providing water engineering and maintenance training. They have prepared and approved a set of engineered designs for 1, 2, 4, 6, 8, and 12 hole latrines that are presented in Appendix A of this Manual along with their corresponding bills of quantity (BoQs).

SWSS is fully aware of the important role that coordination with MRRD at the national, provincial, and district levels plays in moving the project forward. At the same time, two issues exist which limit this relationship: (1) there is no formal relationship between USAID and MRRD to guide interaction and support and (2) MRRD has very limited capacity at the provincial and district levels. The first limits the direct institutional relationship that SWSS can have with MRRD. Without a guiding government-to-government framework, SWSS does not have a roadmap for Ministry engagement. The second presents a challenge to the balance SWSS maintains between being part of the processes of institutional support and achieving our contractual obligations of service delivery and health improvement.

## 2.2 WOMEN AND SANITATION

Women are involved in the majority of activities in Afghan communities. In water and sanitation, women should be far more involved than men. When sanitation facilities do not exist or need cleaning, women suffer more than men. But, women are too often omitted from the process of deciding what facilities are selected, where they are placed, and how they are maintained.

The following steps must be taken by program implementers and local authorities to include women in the important process of improving a community's health and environment:

- Orient the male management and staff in how women's involvement helps to realize project objectives;
- Discuss with local leaders and authorities why women should be involved in the planning and management of sanitation solutions;

- Identify the female health workers, teachers, or other active women who should be included in all discussions;
- Bring together groups of women and inform them about the project and encourage their participation;
- Organize meetings at times and places suitable for women to attend;
- Make it easy for women to hear and be heard at meetings;
- To the greatest extent possible, have women and men present together and encourage the women to speak; and
- Stimulate dialogue by using participatory methodologies, discussion breaks, and small groups.

## 2.3 COMBINING LATRINES AND SANITATION IN AN OVERALL APPROACH

ARD's technical proposal for SWSS and the project's Year One Annual Plan present the project's innovative approach to hygiene improvement in the Afghan context. The approach focuses on applying best practices to achieve sustainable improvements in sanitation and hygiene behaviors by linking community development to unsubsidized household installation of sanitary facilities – expected to be mainly individual, simple, un-engineered latrines. The SWSS team is implementing this approach with full understanding that the rural water, sanitation, and hygiene (RuWatSan) experience in the last 20 years in rural Afghan has met an array of unique challenges and too often has failed to meet these challenges.

In Afghanistan, the challenges are extreme. As noted above, governmental service provision is virtually non-existent yet the negative impacts of poor hygiene are enormous. So, communities must typically take their fecal management needs in their own hands. SWSS will not focus on latrine construction by the project, although there will be cases where SWSS will undertake construction of facilities at health centers, schools, or other public locations in response to local and/or USG demands. Our focus will be on supporting communities to undertake their own solutions by creating local demand for better facilities and more hygienic use of those which already exist. This is a proven approach, but it has not been applied in the dynamic and frequently dangerous settings which prevail in much of Afghanistan. The approach – based around Community-led Total Sanitation (CLTS) – also requires patience to follow a systematic approach to community transformation. The intense dynamics of support in Afghanistan are not always supportive of such an approach to sustainable development.

To work through these challenges, SWSS builds on the local achievements of the organizations currently providing community-level health services to expand their focus on sanitation within their mandates of health improvement. In this way, the project leverages the investments and relationships of others to achieve measurable improvements in sanitation, hygiene behaviors, and health impact. The adaptation of the Hygiene Improvement Framework to Afghanistan requires attention to multiple local concerns:

1. In Afghanistan, promoting community hygiene:
  - a. *Can involve* any of a range of behavioral and social change methods, community mobilization, and social marketing
  - b. *Must involve* Shura/Malik, household, and school programs; and most vitally, community participation in problem identification and solutions
2. In Afghanistan, supporting expansion of local enabling environments:
  - a. *Can involve* any combination of community organization and the small-scale private sector

- b. *Must involve* appropriate line ministries, provincial and district authorities, sustainable financing and cost recovery, and overall appropriate institutional strengthening
3. In Afghanistan, expanding access to hardware:
- a. *Can involve* community water systems, sanitation facilities, and/or household-level technologies and materials such as household treatment technologies
  - b. *Must involve* wider and particularly more regular use of soap for handwashing

The focus of this Manual is on sanitation facilities – particularly latrines. But, it also focuses on the more important sustainable and equitable use of those facilities. For in the Afghan rural context of populations struggling to survive on only one dollar per day with a rising cost-of-living, SWSS must identify how best to mobilize communities towards hygiene improvement while considering the cultural habits, norms, and economic realities of Afghan villagers. These will determine the use of and benefits from a latrine. Steps have been taken by previous efforts, but SWSS will attempt to transform this process through its emphasis on demand creation through CLTS for local acquisition of improved facilities and commercial supply creation to meet demand over time.

### 2.3 SWSS’ INNOVATIVE APPROACH IN AFGHANISTAN

Given the amount of new latrines illustratively proposed by USAID in the SWSS Task Order (50,000), SWSS understood that a unique approach was required. These large numbers delivered in the given time period (1,000 days of implementation) is far beyond the reach of conventional, sustainable water supply and sanitation programs which focus on latrine construction in even the best of circumstances. In Afghanistan, it is a major operational challenge. In response, SWSS is introducing to the Afghan landscape the intensive demand creation concept of Community-led Total Sanitation (CLTS).

Today, CLTS is being implemented in more than 20 countries in Asia, Africa, Latin America, and the Middle East. The SWSS CLTS program is being led by ARD Team members MSH and the Society for Sustainable Development of Afghanistan (SSDA). SSDA is providing training and field support from their Kabul office based on their experience implementing CLTS in culturally similar locations of Pakistan. MSH is guiding the facilitation of CLTS in six targeted provinces through their existing network of local NGOs, Community Health Workers (CHWs), and Family Health Action Groups (FHAGs). NGOs responsible for the national Basic Package of Health Services (BPHS) will implement CLTS in communities under contract to SWSS. And SWSS engineers are incorporating community priorities into locally adapted standard engineered designs of hardware that will be provided to communities.

CLTS focuses on the behavioral change needed to ensure real and sustainable improvements: investing in community mobilization instead of hardware, and shifting the focus from latrine construction for public locations or individual households to the creation of Open Defecation Free

**The CLTS “Trigger”**

In one day, SWSS, local NGOs, and local leaders

- *Conduct participatory appraisal* and analysis.
- *Walk and map* a defecation area transect.
- *Identify* the dirtiest neighborhoods or locations.
- *Calculate* feces and medical expenses.
- *Trigger* disgust of fecal contamination.
- *Identify an ignition* moment – collective realization that, due to open defecation, all are ingesting each others’ feces and that this will continue as long as open defecation continues.

(ODF) villages. By raising awareness that, as long as even a minority continues to defecate in the open, everyone is at risk of disease. CLTS triggers the community’s desire for change, propels them into action, and encourages innovation, mutual support, and appropriate local solutions, thus leading to greater ownership and sustainability.

What characterizes CLTS is obtaining the full range of community members – leaders, groups, women, and men – to acknowledge and debate the hygiene practices of the community as a collective. Through transect walks and mapping under the guidance of trained expert facilitators who are locally-based and visit the community often, social pressure – particular shame of the fecal contamination a

community generates – “triggers” awareness of improving harmful habits. The climax of shunning open defecation is establishing ODF communities and improving one’s household place of going to the toilet. CLTS succeeds when all residents help and pressure one another to improve their latrines and places that one goes to the toilet. These have to be maintained to be clean and odor-free, free of flies (or other harmful vectors), and private. And each family must manage the feces they produce in a safe and correct manner.

## 2.4 DEFINING IMPROVED SANITATION FACILITIES IN AFGHANISTAN

It should be emphasized that despite the availability of engineered designs by MRRD and others, there is *no standard structure that one can use as a sanitation facility*. The economic context of Afghanistan precludes the uniform and widespread adoption of most of the conventional, engineered latrine designs approved by MRRD and illustrated in Appendix A. Most of these designs are simply too expensive for poor families struggling to feed their families and the cultural norms preclude an engineered latrine from being a prominent household compound structure.

This is not to say that the relatively simple pit or vault latrines illustrated in the Appendices should not be striven for. However, CLTS aims to change how people view their place to squat or sit when defecating and to make the use of a latrine of any level or technology a key that affects hygiene improvement by virtue of its *cleanliness not its title* or standard design features.

SWSS considers *the construction and use of a new facility OR the transformation from an unhygienic to a hygienic, clean toilet of any simplicity the creation of an improved place to defecate*. Our operational definition of an improved sanitation facility is a facility that:

1. Is odor-free and clean of any debris such as dirt or feces;
2. Provides privacy and contributes to community-wide public health;
3. Is free of flies which transmit feces to eyes, open wounds, exposed food, or containers;
4. Meets the cultural needs and desires of its users;
5. Is close enough to one’s place of residence or is conveniently located near a place of work or commerce;
6. Makes possible safe handling of feces and urine when the pit or vault is filling up;
7. Encourages use by women, men, and children; and
8. Has a nearby source of water and soap where washing one’s hands can be done with convenience after using, cleaning, or emptying the latrine.

This is a broader definition of an “improved” latrine than the Afghanistan norm, and it does not require construction of facilities in many cases. But it is exactly appropriate to the needs and realities of the current Afghan context. The problem is clearly illustrated in the photo below left. An acceptable hygienic solution for rural Afghanistan is illustrated in the photograph below right.

**Photo 1: Feces erupting from an unhygienic vault latrine**



**Photo 2: Hygienic household vault latrine: well maintained, no fecal spill, ventilation, screening, and liquid effluent drainage absorbed by vegetation**



# 3.0 DESIGNS AND AFGHAN COMMUNITY IDEAS

## 3.1 MAKING DECISIONS ON SUSTAINABLE SANITATION AND LATRINES

This Manual does not attempt to address all of the challenges SWSS will encounter during implementation, but it is important to take them each into consideration when deciding on programmatic and technology options. Choice needs to be approached carefully with proper reference to local conditions, the human and financial resources available, and the needs and preferences of service users. This includes ensuring that, for any choice, viable arrangements for financing, operation, maintenance, and identification of responsible parties can be established and sustained.

In order to maximize the benefits of sanitation investments, technology choice and program design need to be part of a planning process that addresses a range of factors affecting service delivery and use. This section highlights some key aspects of program design that must be considered when deciding on technologies and/or program options.

*Responding to demand.* Too many sanitation programs in Afghanistan deliver infrastructure on the basis of norms and untested assumptions about what people want and need. As a result, schemes are too often implemented where there is no demand, something that may only become apparent when new facilities are left unused or are misused so that they quickly fall into disrepair and are abandoned. Today, there is greater understanding of the need to identify and respond to demand, which means providing services people both want and are willing to pay for. This is not entirely straightforward, however, for several reasons:

- Though sanitary conditions may be poor, the demand for new facilities may be quite low;
- People tend to ask for what they know. There are many different technically appropriate, affordable options available, but too frequently people are unaware of them;
- People tend to consider their personal needs without concern for the impact of their choices on their community and environment; and
- Governmental service providers typically do not have the financial or human resources to identify or meet local demand.

For these reasons, simply responding to existing demand is usually not the best approach. Instead, it is often necessary to first advise people of potential options and the advantages of improved hygiene to generate more informed demand.

*Generating demand.* Generating demand requires good communication with the people for whom new services are being developed. Hygiene promotion and CLTS are both proven avenues to generate demand for sanitation improvement. The participatory methods of communication and engagement applied in each methodology present multiple opportunities to introduce technologies and products, explain their use and benefits, and stimulate demand for them.

*Meeting demand.* After demand is established, the task is to develop the supply to meet the demand. Latrines are being built across Afghanistan, so the “supply” side of the equation exists. Through understanding and optimizing the existing supply chains, SWSS will work to increase the efficiency and quality of suppliers to meet the heightened demand resulting from mobilization, hygiene promotion, and CLTS.

*Establishing the enabling environment for scale and sustainability.* To achieve health improvement, latrine use and hygiene improvement must become the normal practice of families and communities. A critical step in sanitation programming or technology installation is assessing how effective operation and maintenance arrangements can be put in place for each option, given the human and financial resources available locally. Generally speaking, the more complicated the technology, the greater the need for specialist personnel and equipment. Simpler technologies, such as toilets with soak pits or reusable vaults, offer better prospects for management by households or communities. Therefore, SWSS will use simple technologies whenever these are viable and acceptable to communities.

*Subsidizing capital costs of sanitation.* Subsidies have repeatedly proven to be obstacles to scale and sustainability of sanitation programs. SWSS is implementing a strategy promoting rural sanitation that focuses on ending open defecation rather than building latrines. The strategy – Community-led Total Sanitation – emphasizes both collective action and individual commitment. It aims to create demand for sanitation at the community rather than the individual level, facilitated by local leaders under the guidance of trained community mobilizers and health care providers. Their objective is to stimulate a community toward the outcome of becoming open defecation free (ODF) through their own investment in hygienic improvements and facility construction instead of relying on subsidies or other external inputs to accelerate latrine construction.

*Operation and maintenance.* Operation and maintenance of sanitation facilities consists of three items: (1) equitable use by all people, (2) hygienic conditions inside and outside the facility, and (3) arrangements for emptying or closure of the facility when the pit or vault is fecally full. In addition, financial plans must be put in place to cover all costs of operation and maintenance. Whether at a local or municipal level, it is important that roles and responsibilities for these three items are clearly established and accepted by the relevant parties. There are a variety of options for achieving this and the government should only rarely have the lead responsibility. Nongovernmental organizations, community-based organizations, or private entrepreneurs should each have a role to play and might offer human resources and/or expertise that are unavailable within government agencies. To make the best use of these organizations, it is important that contracts or Memoranda of Understanding for their involvement offer incentives for good standards of service delivery and impose sanctions where these standards are not met.

## **3.2 CONVENTIONAL ENGINEERED LATRINE DESIGNS**

MRRD is in a rather advanced state in terms of having prepared engineered designs and bills of quantity (BoQs) for a range of in-ground (pit) and above-ground (vault) latrines. MRRD has been particularly innovative and forward thinking in not only creating standard, functional designs but also preparing designs and BoQs for facilities that incorporate handwashing stations and access for the physically handicapped. SWSS staff has assembled a set of the most applicable designs and accompanying BoQs in Appendix A of this Manual. They include designs for the facilities tabulated on the following page.

<b>MRRD Latrine Designs Contained in Manual Appendix A</b>	
Dry Vault Latrine (per Annex 15, MRRD Water Supply and Sanitation Program Implementation Manual)	1-Hole Generic Pit Latrine, See page 19
1-Hole Pit Latrine with Brick Lined Pit, See page 24	1-Hole Pit Latrine with Reinforced Cement Concrete Lined Pit, See page 28
1-Hole Pit Latrine with Stone Lined Pit, See page 32	2-Hole Vault Latrine, See page 36
4-Hole Pit Latrine with Handicapped Facility, See page 42	4-Hole Vault Latrine with Handicapped Facility, See page 50
6-Hole Pit Latrine, See page 62	6-Hole Vault Latrine, See page 69
8-Hole Pit Latrine for Schools, See page 77	12-Hole Vault Latrine, See page 85
12-Hole Vault Latrine with Handicapped Facility and Wash Stand, See page 94	

MRRD states in its Implementation Manual for Rural Water Supply and Sanitation Projects that these designs are to be used as guidelines only. These will be used by SWSS not as minimum standards but instead as guides for contracting and construction. In addition, SWSS anticipates that there will be opportunities when these designs might be used “off-the-shelf” depending on conditions, need, and cost.

### 3.3 “HOME MADE” VARIETIES OF LATRINES IN THE AFGHAN CONTEXT

The conventional, engineered designs introduced in the previous section are not common in rural Afghan settings. The soil is hard to excavate and the clay topography limits porosity. Households should not be expected to have access to the resources needed to order pit or vault emptying by suction trucking (especially in remote villages) nor commonly the space to dig additional pits while covering up the filled used one to plant a tree. The most common household latrine is an above ground “vault” latrine equipped with an access port through which feces are removed. Other similarly simple designs exist. The simple designs were compiled by UNICEF in collaboration with the Water and Sanitation Sector Group of Afghanistan. This informal co-operation body consisted of UNICEF, the World Health Organization (WHO), the Danish Committee for Aid to Afghan Refugees (DACAAR), the Swedish Committee for Afghanistan (SCA), and MRRD.

In 1998, the Group and regional authorities joined together to agree on a standard set of specifications for household latrines. The latrines are described below. Their engineered designs and standard Bills of Quantity (BoQs) are presented in Appendix C.

#### 3.3.1 Appropriate methods of excreta disposal

Geological formations in Afghanistan differ from region to region. The type of the soil varies from hard rock to sandy to clay, and the water level varies from 3 meters to over 50 meters below ground level. Keeping in mind the various traditions and practices, two types of latrines are recommended for Afghanistan: (1) “Dry” or night soil systems and (2) “Wet” or sewerage systems.

*“Dry” latrines* constitute the lowest-cost option. They are also the only possibility in localities where water supplies are limited and solid materials such as leaves, mud, or stone are used for anal cleaning. The simple pit latrine is widely used but the VIP (Ventilated Improved Pit) latrine represents a marked improvement: smells and fly problems are greatly reduced, and the latrines can be put closer to houses, thus more accessible, especially for children. To eliminate flies and bad smell, any dry latrine can be improved to a Ventilated Improved Pit (VIP) latrine by adding a ventilation pipe to carry away odors and keeping the inside dark so that flies in the pit are attracted by light and travel up the vent pipe.

Three types of dry latrines (vault and pit) are used in Afghanistan: (1) vault latrines (double and single), (2) simple pit latrines, and (3) VIP latrines.

In a simple, single pit latrine, the pit is used until it is full. Then, the pit is sealed and either a tree is planted over the sealed pit to make use of the nutritional value of the fecal material or the feces are allowed to decompose for at least six months before reuse. Even after this time, there is still risk for survival of helminth (worm) eggs in the feces, so great care must be taken to ensure its safe handling. The degraded feces can be taken out in the form of an odorless, dark grey powder and used as fertilizer. Handwashing with soap after fecal handling must be emphasized.

A double vault latrine consists of two adjacent boxes built of brick or stone and lined with cement. While one side is in use, the other is sealed. When the first pit is filled, it is sealed for a minimum of six months while the other box is filled. After 6 months, the decomposed feces in the full box can be used for fertilizer. Handwashing with soap must be emphasized to reduce risk of worm egg infestation and other public health hazards.

*“Wet” type latrines* are applicable where water is available and used for anal cleansing. A pour-flush or water-seal latrine is the best option when water is available and used for anal cleansing. They are a feasible and hygienic option for many communities. In these types, the latrine slab or latrine pan insert in the hole has a gooseneck, typically made of plastic or ceramics. Two to three liters of water are required for flushing after each defecation. The excreta are collected in a covered and sealed pit. Water from a container is poured into the latrine pan to flush the excreta into the pit. Some amount of water always remains in the gooseneck to maintain a water seal, keeping odors in and flies out of the pit. A large container of water must be kept near the latrine for flushing and cleaning.

The latrine may have one or two soakaway pits. It is advisable to build two pits. For a family of five or six members, each soakaway pit is one meter in diameter and one meter deep. Only one pit is used at any time by blocking the inlet of the Y-shaped drain leading to the second pit (as shown in Appendix C). One pit will fill up to the drain outlet level in about two years. The excreta should remain in the covered pit undisturbed for about two years to decompose. After that time, the odorless contents of the pit can be used as fertilizer with adequate assurance of public health as described above. The latrine can thus be used as long as one wants by using each pit alternately.

### 3.3.2 Afghan Adaptations of Standard Designs

In most cases, elevated vault or simple pit latrines as shown earlier in Photo 2 tend to be the most common types built by households adjacent to the outer walls of rural compounds. Another common type of place to defecate in rural Afghanistan is a simple hole in a private section of a walled compound. Many of these tend to be al fresco and exposed to the stars. But, they can be clean, hygienic, and functional as household members squat balancing themselves on a piece of wood or dirt ledge near the hole. Feces are then taken from a covered access port to nearby mounds either to be dried in the sun for use in compound gardens or provided to collectors who fill sacks with them on donkeys or wheel barrows. This rural “operation and management” system presents unique challenges to SWSS in achieving ODF communities, sensitively supporting technologies, and ensuring the widespread adoption of hygienic behaviors – particularly handwashing with soap at critical post-fecal-contact times for household members and/or feces collectors.

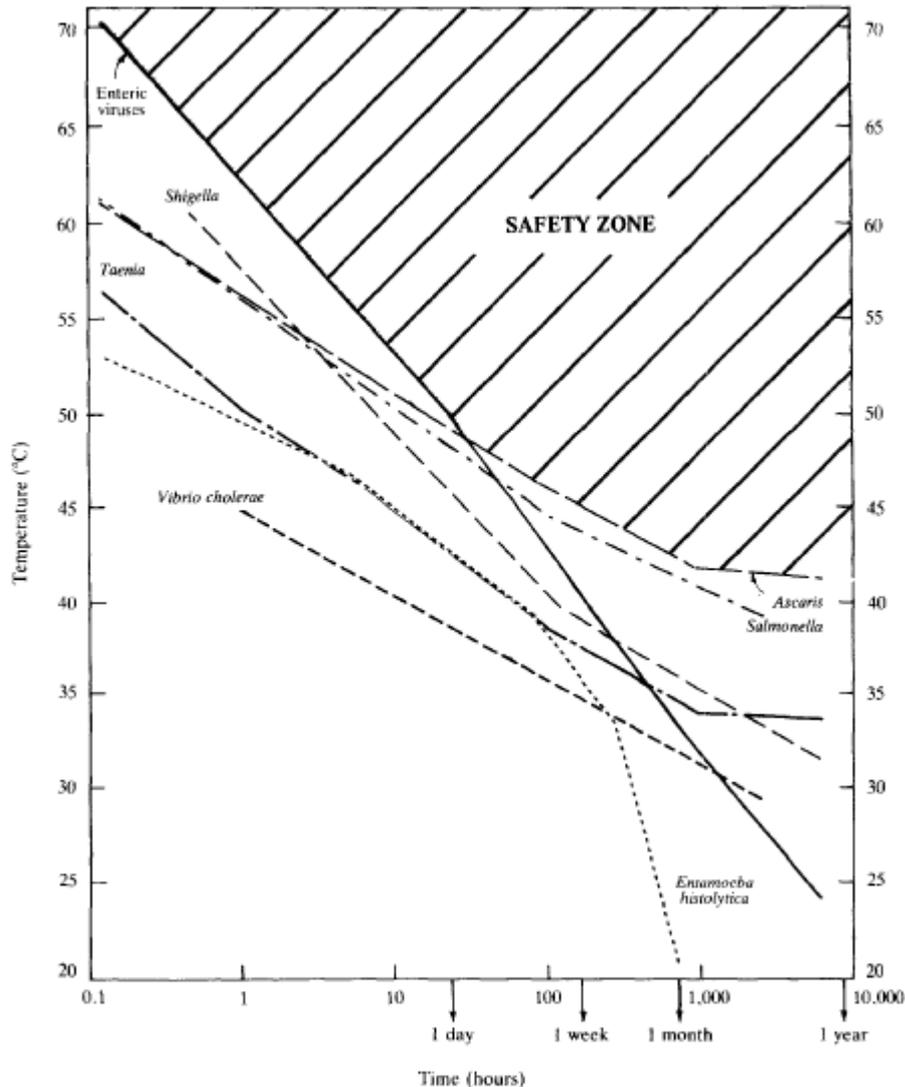
**Photo 3 – A hygienic vault latrine in Eskalif from which dried feces are collected**



It can clearly be seen that sanitary solutions in rural Afghan communities take many shapes and sizes. And, the important message that SWSS carries forward is clear: *simple technologies exist in rural Afghanistan which meet the needs of households, are practical and affordable to construct, and support the health and hygiene objectives of the project.*

### 3.4 RISKS OF FECAL REUSE

Fecal reuse is common in Afghanistan and should be considered a public health risk under all circumstances – dry, wet, old, or new. Under no circumstances – not even after 6 months or longer of sealed storage – should decomposed feces be considered safe. As illustrated in the following graph, a wide range of human pathogens survive in feces for over one year even at very high temperatures.



From Sanitation and Disease: Health Aspects of Excreta and Wastewater Management, Richard Feachem, David Bradley, Henda Garelick, and Duncan Mara; World Bank Studies in Water Supply and Sanitation (1983), page 79.

To ensure that environmental and agricultural benefits are obtained from decomposed feces, it is critical that strict hygiene regimens be followed. Utensils should be cleaned with soap and dried in the sun, all areas around latrine access ports must be kept clear of feces, latrine vaults must be completely sealed to prevent animals and children from frolicking in the fecal material, and handwashing with soap must be diligently practiced after handling of any fecal material. Without these precautions, fecal reuse creates public health hazards.

### 3.5 INNOVATION IN OPERATION AND MAINTENANCE: MOBILIZING THE VALUE CHAIN

Value chain analysis is a proven approach to evaluating and responding to the market potential for product delivery. It is a necessary step toward understanding the effective placement of products and the gaps in private sector operation which an external project can strengthen. It has only recently been applied to the water, sanitation, and hygiene sector as a way to identify and characterize the income generation possibilities that exist within the small-scale commercial sector that support the provision of services to the poor.

The goal of value chain analysis under SWSS is to evaluate and potentially tap the business opportunities created by a growing demand by rural, poor households for products which support diarrheal disease prevention. Sanitation products may include, but are not limited to, skilled masons, commercial manufacture of latrine slabs, latrine cleaning services, or excreta removal services. Value chain analysis is new to the RuWatSan sector in Afghanistan, but it can be reasonably expected to identify viable opportunities where SWSS can promote and support the small-scale private sector through technical assistance or facilitating its access to financial products.

To begin understanding the value chain, the SWSS team will carry out a market assessment in a small number of locations where viable markets for sanitation products are estimated to exist. Team member Arc Finance offers expertise in this area and will be programmed to conduct this work. The market assessment includes quantitative surveys, focus groups, and key informant interviews. The assessment will identify whether there is an appetite among the existing small-scale private sector to link their normal business operations to the promotion and purchase of sanitation products. The market assessment will also identify relevant customer preferences and behaviors. These are expected to include mechanisms currently used by rural communities to access sanitation products, types of service providers, pricing structures, as well as understanding of and interest in the link to sanitation products. If it is determined that there is interest in commercial product provision within the existing private sector, the market assessment will outline recommendations on potential market segments which would be most attracted to available products and the best partners in financing and demand creation for a pilot test of a product. The market assessment will result in a feasibility report and an action plan to guide project staff on subsequent project activities.

### 3.6 INNOVATIONS TOWARD SUSTAINABLE SANITATION FINANCING

Based on preliminary research and discussions with practitioners in Afghanistan, there appear to be a range of sustainable financing options available to support sanitation facility improvements. The type of financing option differs depending on what needs to be financed, what type of financial service is needed, and the region in which the project is located. Some of the financing options are geared at developing local entrepreneurial capacity and build on existing programs. As a general rule: the safer the region, the larger the range of sustainable financing options.

**Sanitation Financing.** When households build individual latrines, money is often needed to pay for the improvement or installation of the new facility. Money can be obtained through an *individual loan to a household* to pay for the materials and/or services (e.g. slab, masonry) needed to improve the latrine. Typically these types of loans are “House Improvement Loans” but some financial institutions in Afghanistan also give “Latrine Installation Loans” to individuals or groups. Alternatively, money could be obtained through an *individual loan provided to an entrepreneur* such as a mason whose business is to mix and lay concrete, or to a hardware supplier of latrine bowls and slabs. The entrepreneur would use the loan to buy the needed products and tools and would charge villagers for services rendered. If the latrines or other improvements are for a community of people, then a loan may not be the best financial product to support latrine construction. In this case, a *community fund or savings product* would likely be the most appropriate financial product.

**Can poor people in Afghanistan pay for sanitation improvements?** The capacity of poor, rural households to pay for sanitation facilities and other improvements is always questioned. But in

Afghanistan, there are a number of water and/or sanitation services that poor people already pay for, including the following:

- Mirab or Wakil: water manager (usually for irrigation canals and water ways)
- Chah kan: well digger
- Karez kar: canal builder
- Gilkar: mason
- Naldawan: plumber
- Tashnab kash: latrine pit emptier
- Saqaw: water supplier/transporter

Payment takes a variety of forms ranging from cash to crops, labor, or other in-kind offerings. People make these payments in different capacities – sometimes as individuals and sometimes as a part of a community.

**Pro-poor Afghan financing mechanisms.** The types of financing mechanisms available to the rural poor in Afghanistan depend on the type of financing entity. Some of these are in the *formal sector*, meaning that they are regulated in some way – such as banks, microfinance institutions (MFIs) and credit unions. Depending on their legal status, they provide a range of financial services including loans, savings, remittances, insurance etc. The formal financial institutions tend to have branches in urban centers and to be located in safer parts of the country where it is easier for them to operate. There are a few formal sector operators that have outreach to rural areas, and those that do typically work through self-help groups which they have developed and trained.

Other financial entities operate in the *informal sector*. These include community-based self-help groups and co-operatives that manage village-level revolving funds. There is also the “Baitul Maal” which is a uniquely Afghan “community chest” that can be tapped when a village has a communal need that must be financed. In the most remote and least safe areas of the country, these are usually the only financing options available.

In rural Afghanistan, there is also an elaborate system of informal individual credit – not tied to any type of financing entity – that is available from shopkeepers, more wealthy members of the community, as well as friends and relatives. This credit primarily serves as “income smoothing” while farmers wait for the harvest to come in and, depending on who provides the credit, can be very cheap or very expensive. Poor people regularly mortgage land, livestock, or jewelry to these creditors to carry them through lean months. Almost every rural Afghan has some kind of a debt to someone or is lending money to someone.

Each of these financing mechanisms has advantages and disadvantages depending on perspective. The formal mechanisms provide a safe place to store money, and the cost of borrowing money is transparent and constant because it is subject to regulation. But, these mechanisms are not available all over the country. On the other hand, informal mechanisms are more familiar to rural villagers and are often the only mechanisms available in certain parts of Afghanistan. However, because of the recent instability in the country, some of the more traditional ways of local financial management have been forgotten or politicized, and there is significant work needed to ensure that these systems function in a fair and equitable way.

Based on this preliminary information, SWSS will work to establish sustainable financing for sanitation improvements by (1) tapping the existing financing mechanisms set up by formal sector institutions so as to leverage the investment of other organizations, and (2) engage with the traditional informal systems where they are the most viable option.

# APPENDIX A: MRRD TYPICAL DESIGNS AND BILLS OF QUANTITY FOR LATRINE OPTIONS

## MRRD TYPICAL DESIGNS AND BILLS OF QUANTITY FOR LATRINE OPTIONS

The typical drawings and bills of quantity (BoQs) are intended only as a guide for the community and partner organization team. When, eventually, a decision is taken as to which particular scheme is preferred by a community then further details on the drawings and BoQs, which are particular to the scheme and site condition shall be developed by the engineer.

The BoQs are to be read in conjunction with the typical drawings and work specifications.

The following water supply options are presented in order in part – B:

<b>MRRD Latrine Designs Contained in Manual Appendix A</b>	
Dry Vault Latrine (per Annex 15, MRRD Water Supply and Sanitation Program Implementation Manual)	1-Hole Generic Pit Latrine
1-Hole Pit Latrine with Brick Lined Pit	1-Hole Pit Latrine with Reinforced Cement Concrete Lined Pit
1-Hole Pit Latrine with Stone Lined Pit	2-Hole Vault Latrine
4-Hole Pit Latrine with Handicapped Facility	4-Hole Vault Latrine with Handicapped Facility
6-Hole Pit Latrine	6-Hole Vault Latrine
8-Hole Pit Latrine	12-Hole Vault Latrine
12-Hole Vault Latrine with Handicapped Facility and Wash Stand	



## DRY VAULT LATRINE (continued)

<b>BoQ for Dry Vault Latrine</b>				
Item	Unit	Quantity	Cost/ Unit	Total Cost
Excavation	m <sup>3</sup>	1.00		
Stonemasonry with soil mortar	m <sup>3</sup>	3.66		
Mudwork for wall and roof	m <sup>3</sup>	5.60		
Soil-straw plaster	m <sup>2</sup>	3.35		
Wooden board/bushes for roof slab	m <sup>2</sup>	2.25		
Round wood with 12cm diameter, 2m length	No.	3.00		
Round wood with 8cm diameter, 1.20m length	No.	3.00		
PVC pipe 6" diameter non-pressure	m	3.00		
Wire mesh screen	m <sup>2</sup>	0.09		
Reinforced Cement Concrete (RCC) slab 110 x 110 x 5cm	No.	1.00		
Reinforced Cement Concrete (RCC) vault manhole frame with cover plate	m <sup>3</sup>	0.21		
<b>TOTAL COST</b>				

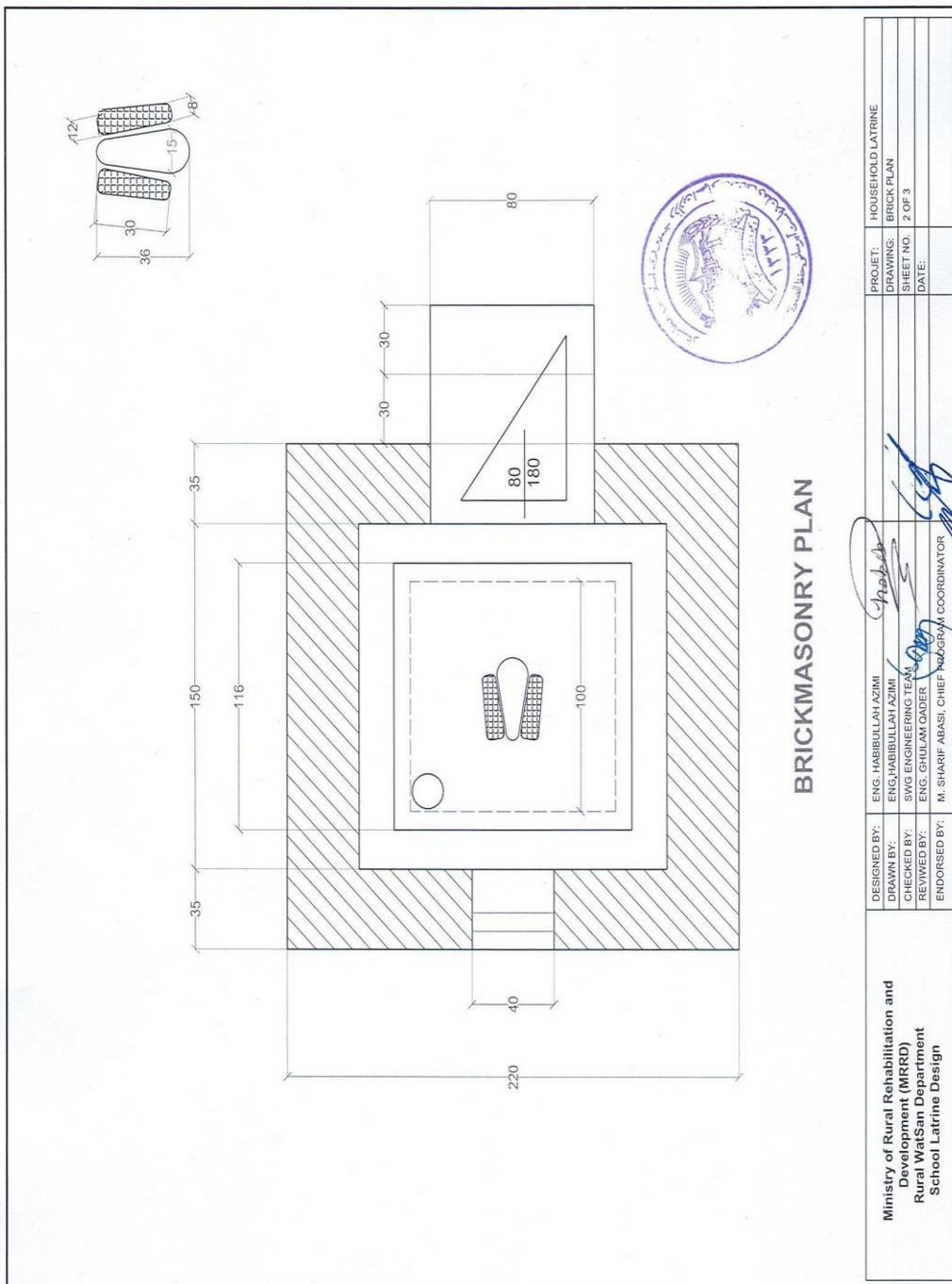
### Work Specifications for Dry Vault Latrine

1. Latrine super structure and vault masonry will be constructed from local materials. Materials for components including reinforced concrete slab, concrete vault manhole, ventilated PVC pipe with wire mesh, etc. need to be imported.

<b>BoQ for Dry Vault Latrine – No-cost Community Contribution</b>				
Item	Unit	Quantity	Cost/ Unit	Total Cost
Laborer	person	6.55	0	0
Skilled laborer	person	3.55	0	0
Excavation	m <sup>3</sup>	1.00	0	0
Stonemasonry with soil mortar	m <sup>3</sup>	3.66	0	0
Mudwork for wall and roof	m <sup>3</sup>	5.60	0	0
Soil-straw plaster	m <sup>2</sup>	3.35	0	0
Straw	kg	14.00	0	0
Bushes/Straw mat	m <sup>2</sup>	2.25	0	0
Stone	m <sup>3</sup>	3.66	0	0
<b>TOTAL COST</b>				<b>0</b>

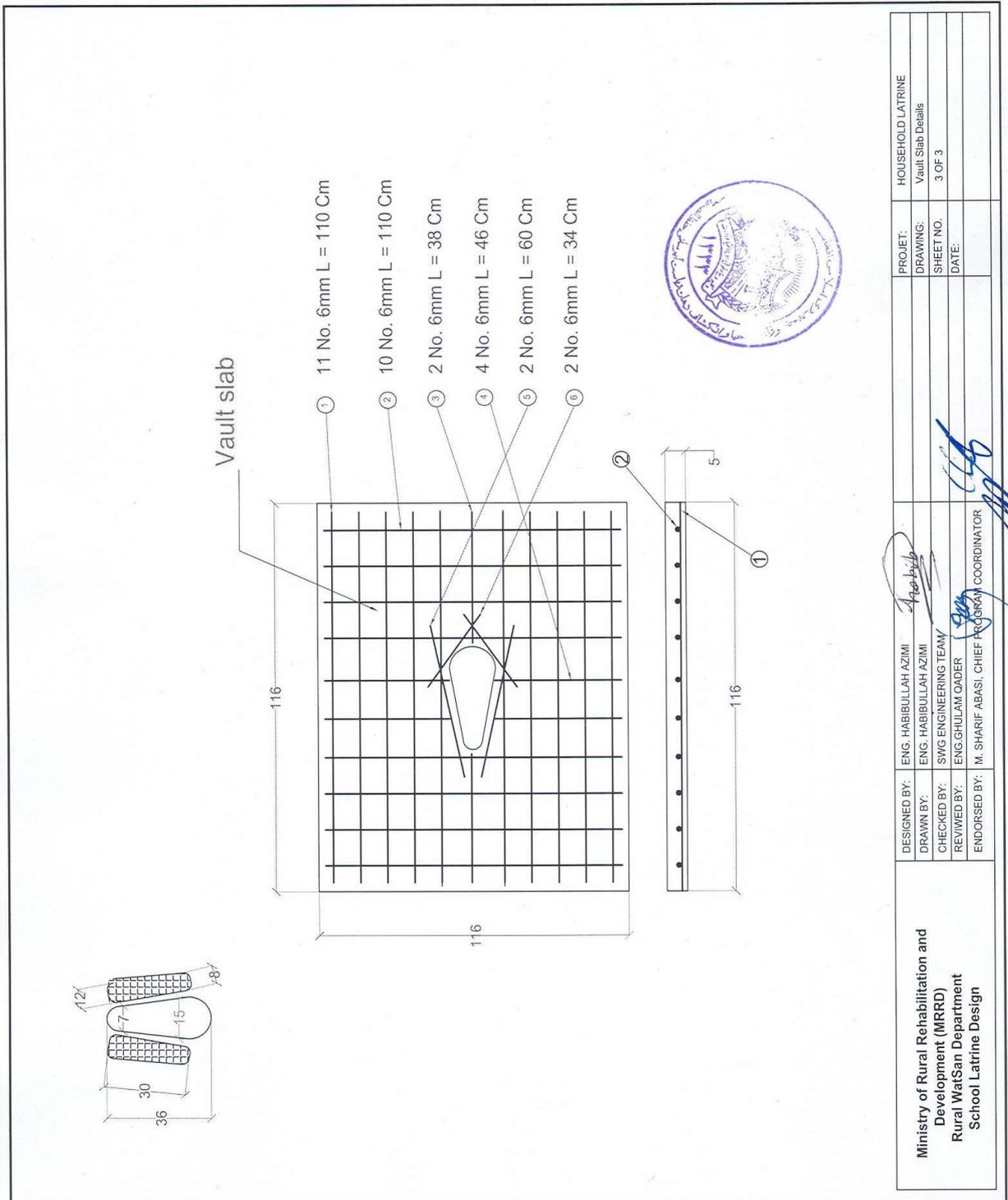


# 1 - Hole Generic Pit Latrine (continued)

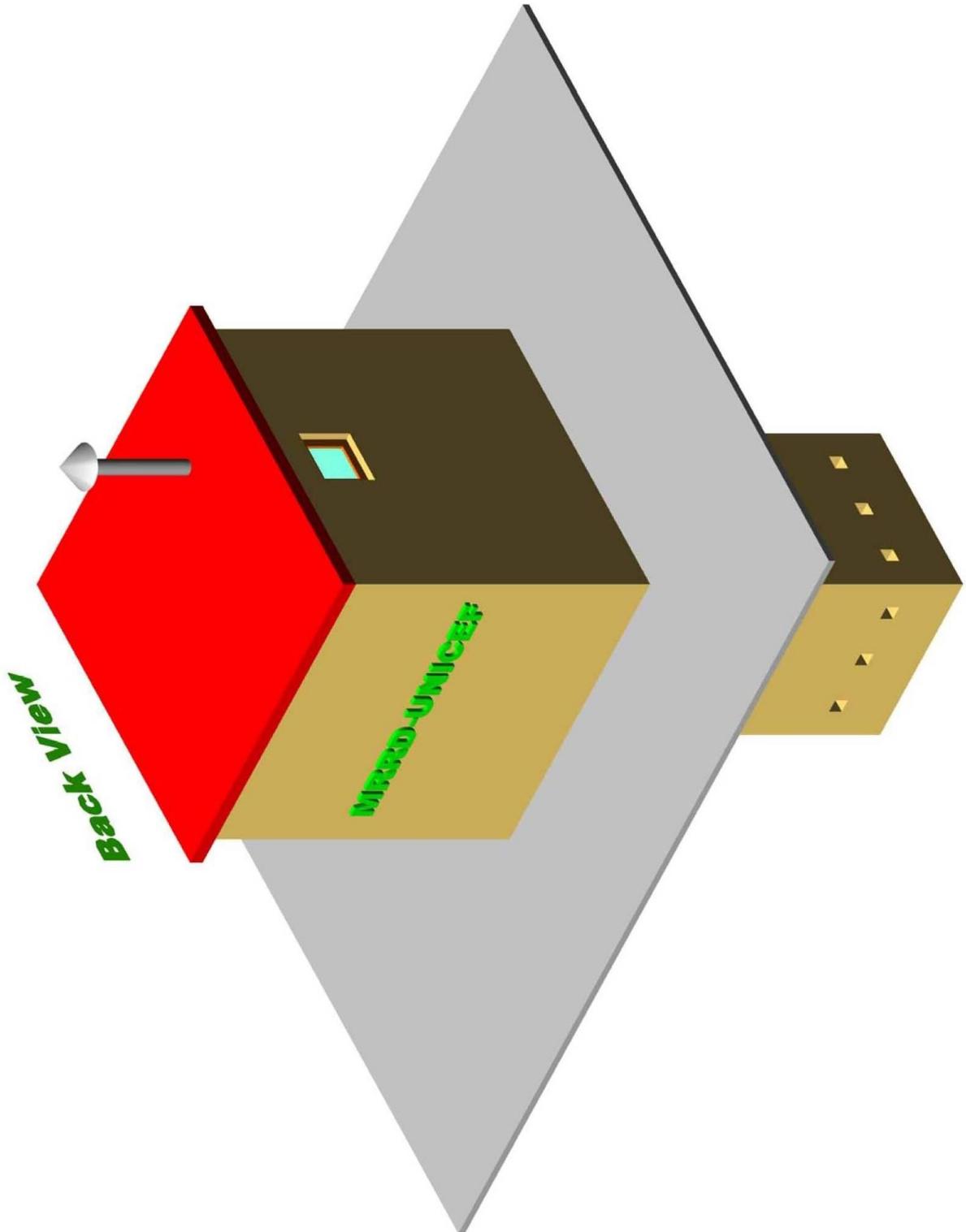


Ministry of Rural Rehabilitation and Development (MRRD) Rural WaSan Department School Latrine Design	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT:	HOUSEHOLD LATRINE
	DRAWN BY:	ENG. HABIBULLAH AZIMI	DRAWING:	BRICK PLAN
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.:	2 OF 3
	REVIEWED BY:	ENG. GHULAM QADIR	DATE:	
	ENDORSED BY:	M. SHARIF ABASHI, CHIEF PROGRAM COORDINATOR		

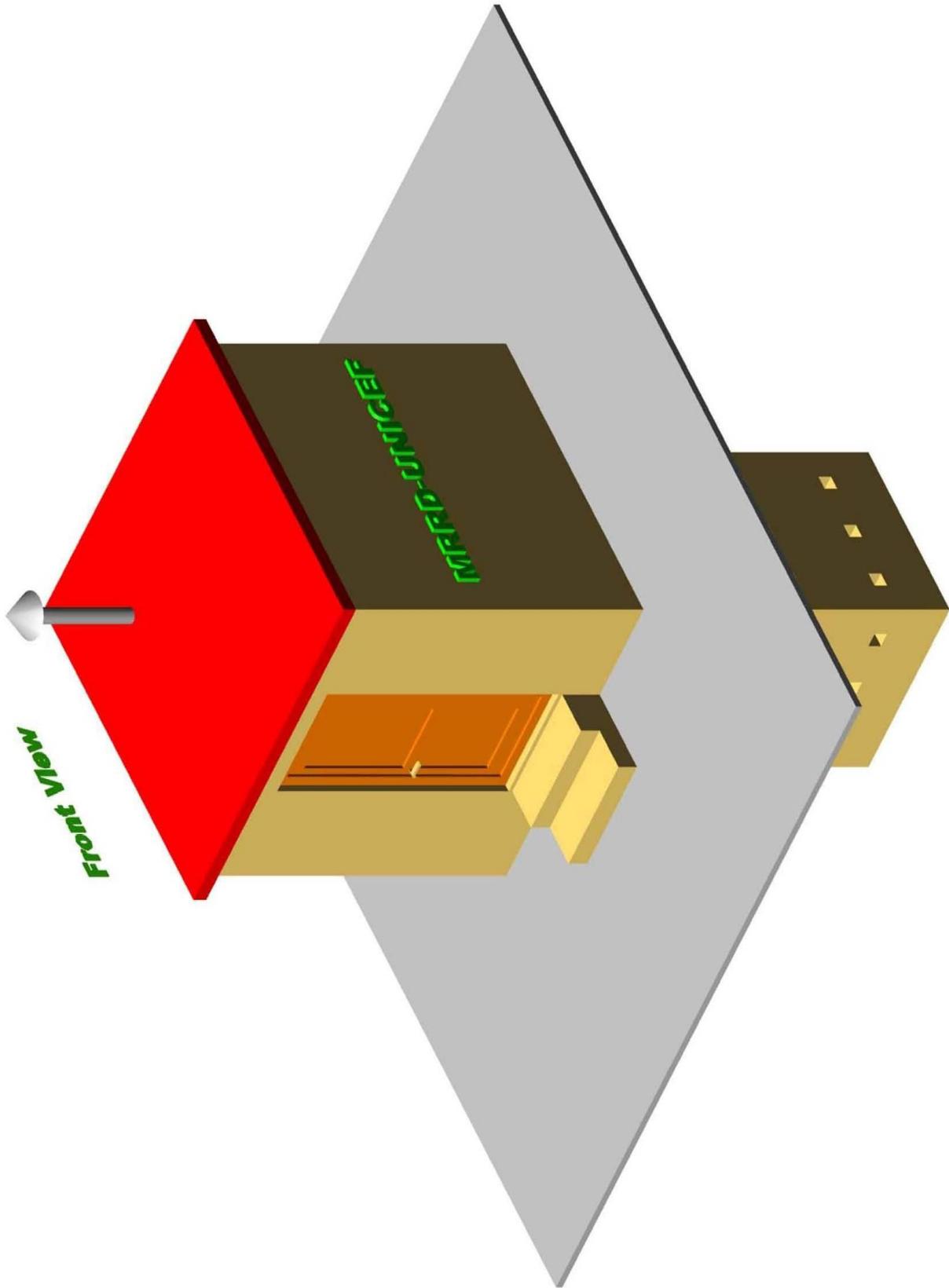
# 1 - Hole Generic Pit Latrine (continued)



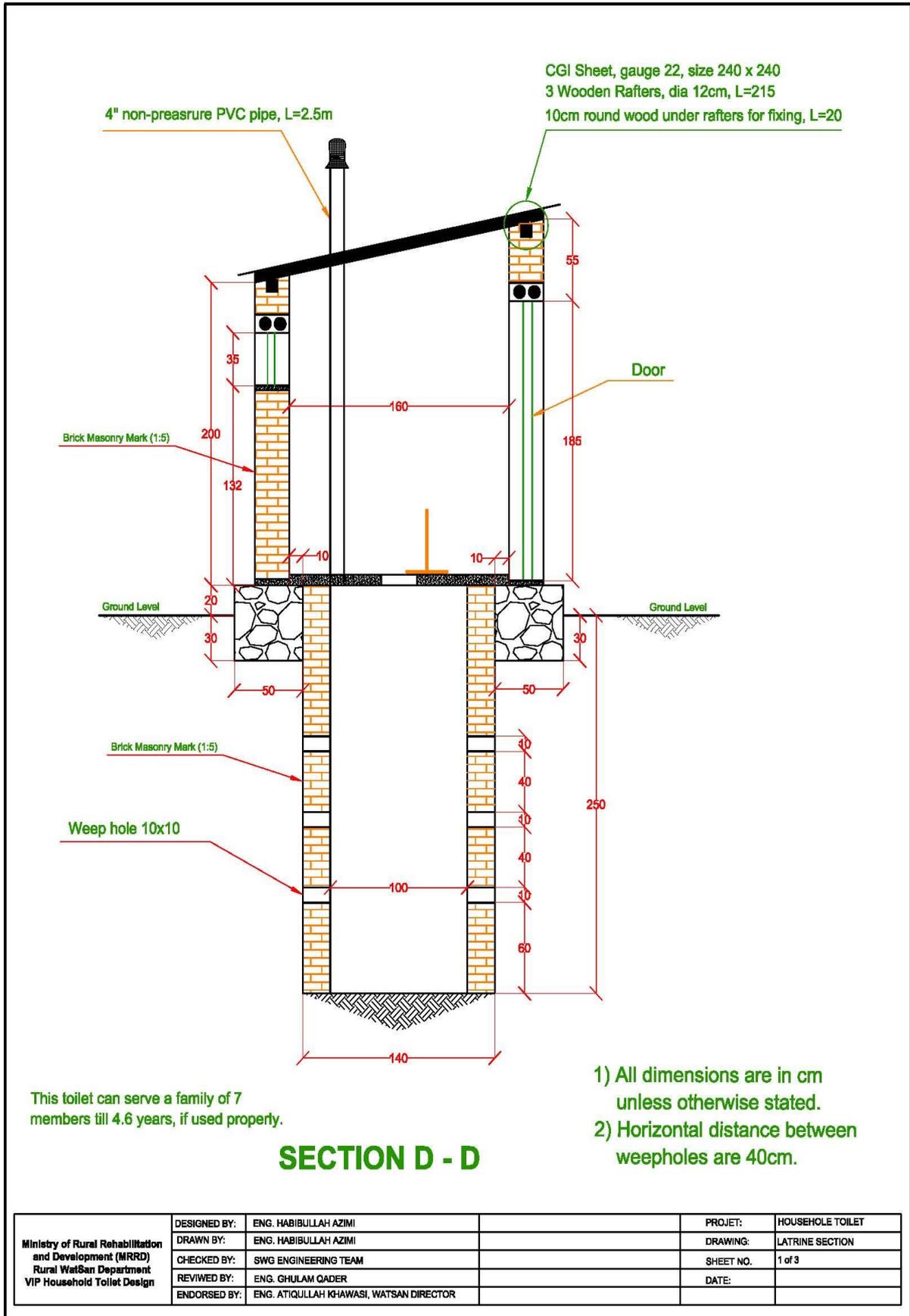
1 - Hole Generic Pit Latrine (continued)



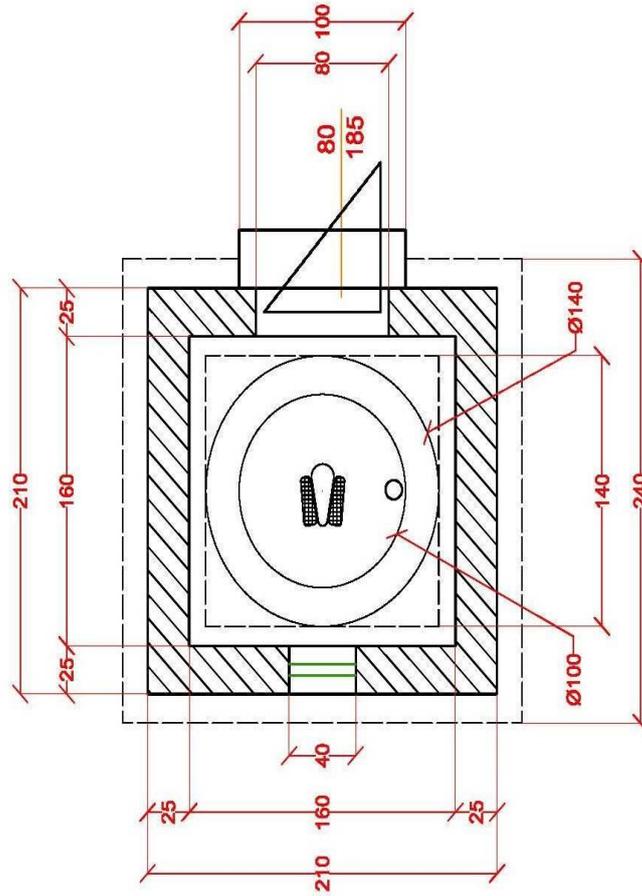
1 - Hole Generic Pit Latrine (continued)



# 1 - Hole Pit Latrine – Brick Lined Pit



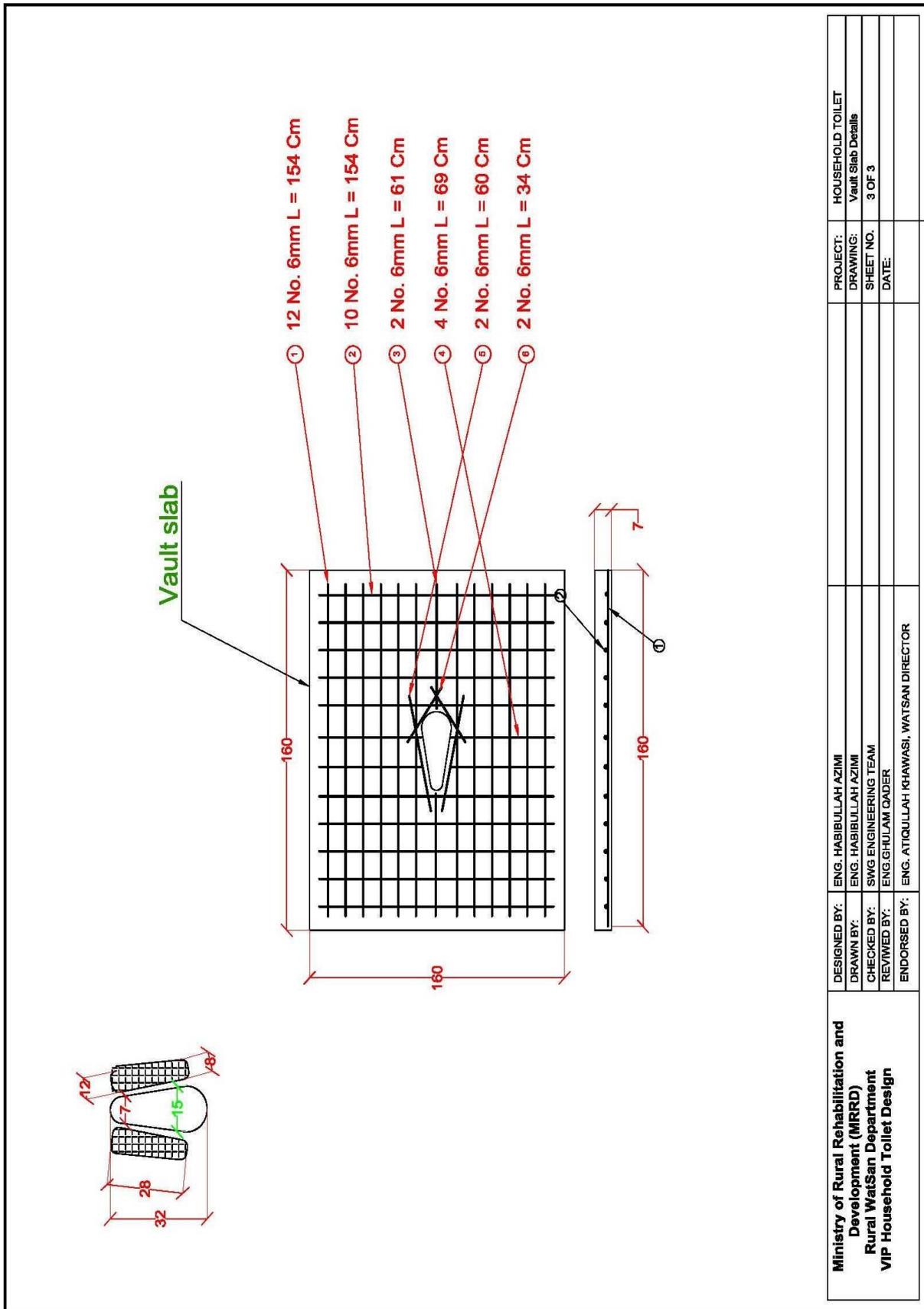
# 1 - Hole Pit Latrine – Brick Lined Pit (continued)



## BRICKMASONRY PLAN

<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> Rural WatSan Department VIP Household Toilet Design	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT:	HOUSEHOLD TOILET
	DRAWN BY:	ENG. HABIBULLAH AZIMI	DRAWING:	BRICK MASONRY PLAN
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.:	2 OF 3
	REVISED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	ENG. ATIQULLAH KHAWASI, WATSAN DIRECTOR		

# 1 - Hole Pit Latrine – Brick Lined Pit (continued)





د کجود یا رغونې او برابرتیا وزارت  
وزارت اجاوا کشفیات او سات

د افغانستان اسلامي جمهوریت  
جمهوری اسلامی افغانستان

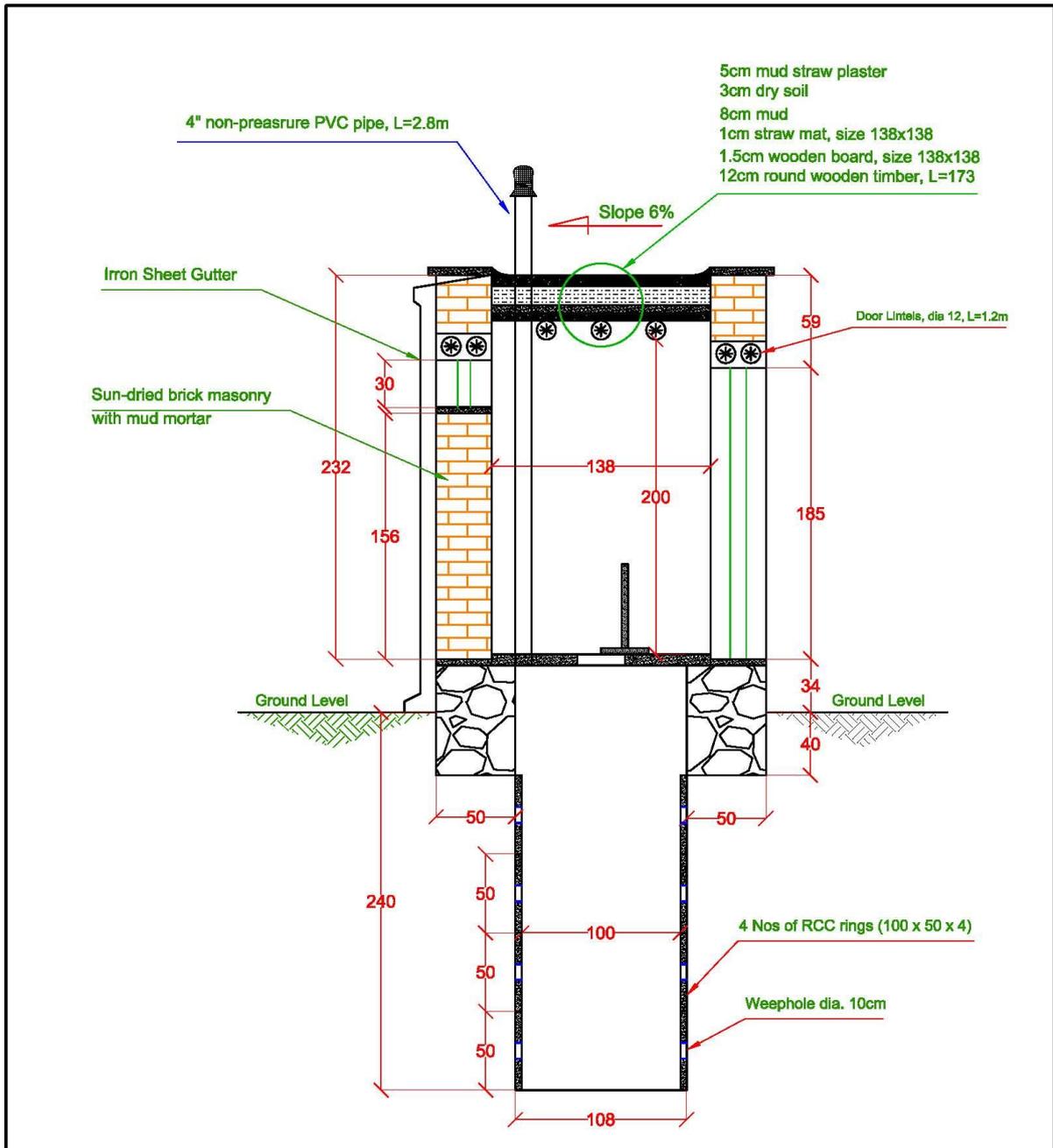


Islamic Republic of Afghanistan  
Ministry of Rural Rehabilitation and Development  
Rural WatSan Department

BoQ For 1Set Household Pit Latrine (2m deep) walls with sun-dried bricks

No شماره	Activities فعالیت ها	Unit واحد	Quantity مقدار	Unit Cost in Af\$ قیمت فی واحد به افغانی	Total Cost in Af\$ قیمت مجموعی به افغانی	Remarks ملاحظات
1	Excavation in medium soil کندنکاری در زمین متوسط	M3	3.36			
2	Stone Masonry of wall foundation (M:300) (1:4) سنگ کاری تهاپ دیوار (1:4)	M3	1.83			
3	Pointing of Stone Masonry هنگاف کاری	M2	1.76			
4	Pit with Burnt Brick Masonry, mortar (1:5) خشت کاری چاه با خشت پخته (1:5)	M3	0.69			
5	Walls with sun-dried Brick Masonry, mortar خشت کاری دیوار با خشت خام	M3	3.18			
6	Door and window دروازه و کلکین	M2	1.62			
7	Oil Painting رنگ روغنی	M2	1.62			
8	Plastering of walls پلسترکاری دیوار ها	M2	28.77			
9	Painting of walls (30% plastic) رنگمالی دیوار ها	M2	28.77			
10	Slab RCC سلب میخدار	M3	0.15			
11	CGI Sheet, gauge 22, size 220 x 220 آهن چادر گنج 22 به سایز	M2	5.06			
12	Wooden Rafter dia 12cm, L=195cm چوب دستک به قطر و طول	M	6.00			
13	Round wood under each rafter, dia 8cm, L=20cm چوب کونه تحت چوب دستک	M	1.20			
14	J-hook or L-hook پنج جی مانند یا ال مانند جهت محکم کردن آهن چادر و چوب دستک	No	10.00			
15	Ventilation Pipe PVC 6in with cowl and screen پایپ تهویه پلاستیکی 4 اینچ یا کلاک و جالی سیپی	M	2.80			
Sub Total						

# 1 - Hole Pit Latrine – Reinforced Cement Concrete (RCC) Ring Lined Pit



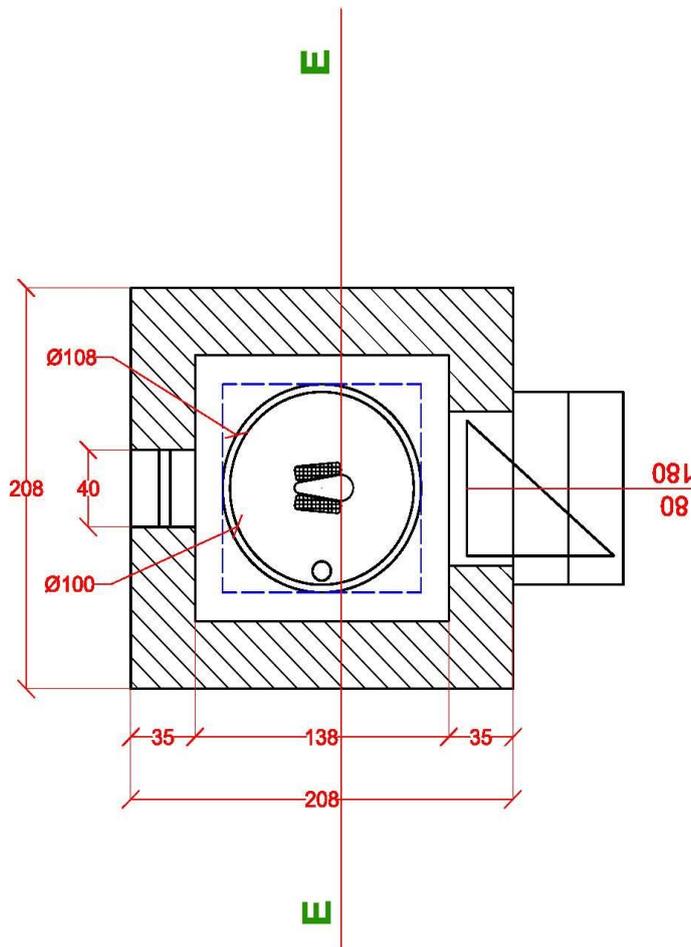
Note: All dimensions are in cm unless otherwise stated.

Note: This toilet can serve a family of 7 members till 4.48 years, if used properly.

Ministry of Rural Rehabilitation and Development (MRRD) Rural WaSan Department School Latrine Design	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT:	HOUSEHOLE LATRINE
	DRAWN BY:	ENG. HABIBULLAH AZIMI	DRAWING:	LATRINE SECTION
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.	1 of 3
	REVIEWED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	ENG. ATIQULLAH KHAWASI, WATSAN DIRECTOR		

# 1 - Hole Pit Latrine – Reinforced Cement Concrete (RCC) Ring Lined Pit

(Continued)

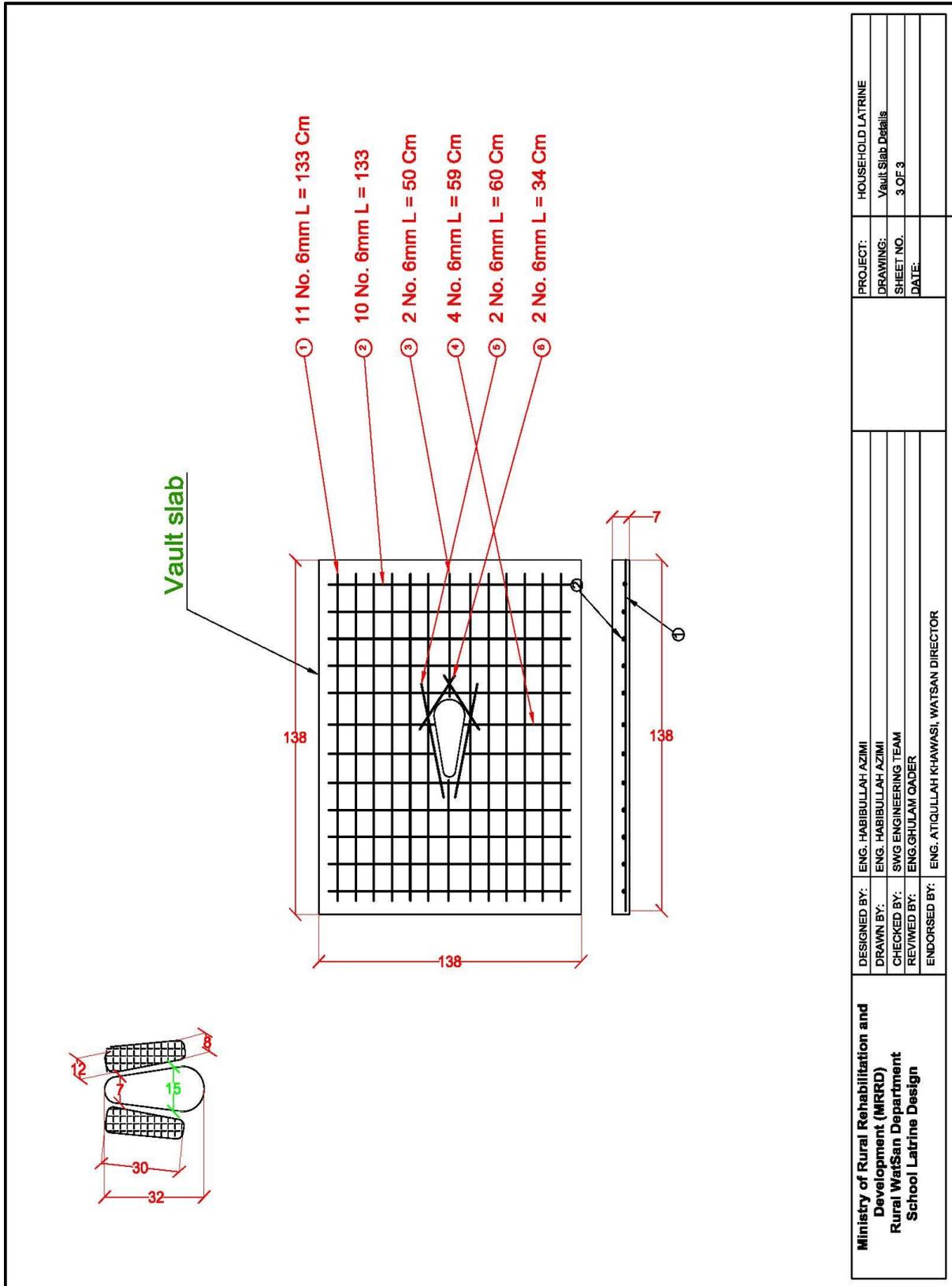


## BRICKMASONRY PLAN

<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> Rural WatSan Department School Latrine Design	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT:	HOUSEHOLD LATRINE
	DRAWN BY:	ENG. HABIBULLAH AZIMI	DRAWING:	BRICK MASONRY PLAN
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.:	2 OF 3
	REVISED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	ENG. ATIQUILLAH KHAWASI, WATSAN DIRECTOR		

# 1 - Hole Pit Latrine – Reinforced Cement Concrete (RCC) Ring Lined Pit

(Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> Rural WatSan Department School Latrine Design	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT: HOUSEHOLD LATRINE DRAWING: Vault Slab Details SHEET NO. 3 OF 3 DATE:
	DRAWN BY:	ENG. HABIBULLAH AZIMI	
	CHECKED BY:	SWG ENGINEERING TEAM	
	REVIEWED BY:	ENG. GHULAM QADER	
	ENDORSED BY:	ENG. ATIQULLAH KHAWASI, WATSAN DIRECTOR	



د کليو د بيارغونې او برابرتيا وزارت  
وزارت ايجيا و انکشاف و دات

د افغانستان اسلامي جمهوريت  
جمهوری اسلامی افغانستان



**Islamic Republic of Afghanistan**  
**Ministry of Rural Rehabilitation and Development**  
**Rural WatSan Department**

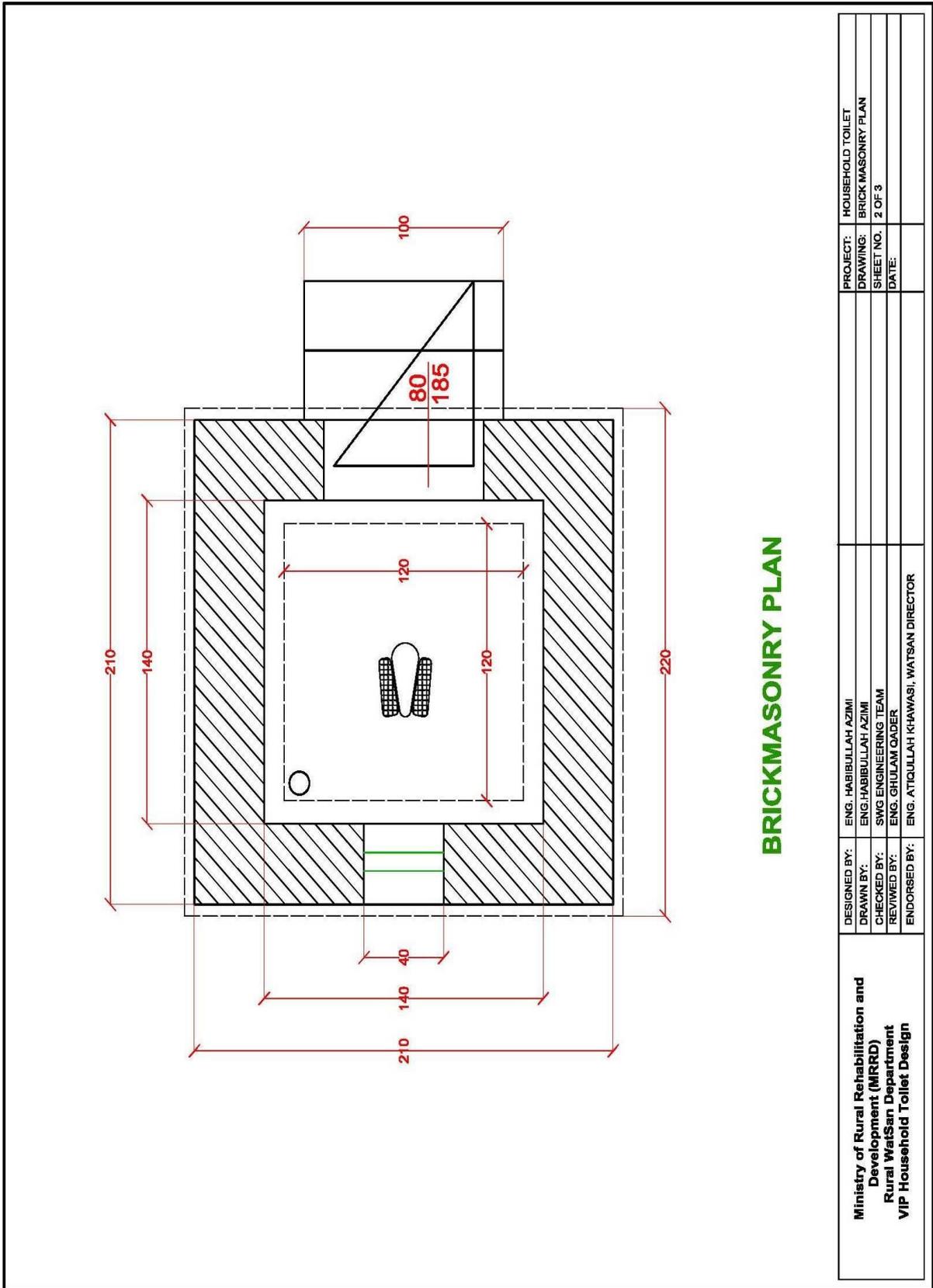
**BoQ For 1Set Household Pit Latrine (2.4m deep) , pit with rings**

No شماره	Activities فعاليت ها	Unit واحد	Quantity مقدار	Unit Cost in Afs قيمت في واحد به افغالي	Total Cost in Afs قيمت مجموعي به افغالي	Remarks ملاحظات
1	Excavation in medium soil کندنکاري در زمين متوسط	M3	3.14			
2	Stone Masonry with soil mortar سنگ کاري با مصالح گل	M3	2.38			
3	RCC Rings for pit, size 100x50x4 رينگ کانکريتي براي چاه مبرز	No	4.00			
4	PCC plate size 25x50x4 or burnt brick for roof edges خرن لب بام	No	17.00			
5	Sun-dried brick work for walls with soil mortar خشت کاري ديوارها با خشت خام	M3	4.40			
6	Plastering of walls with mud and straw پلمسترکاري ديوارها با کاه گل	M2	31.20			
7	Painting of walls رنگمالي يا سفيد کاري ديوارها	M2	31.20			
8	Wooden Door, size 80x185 دروازه چوبي به سايز	No	1.00			
9	Wooden Window, size 30x40 کلکين به سايز	No	1.00			
10	Oil painting of door and window رنگمالي دروازه و کلکين با رنگ روغني	M2	1.60			
11	RCC slab, size 138x138x0.07 سلب سيخدار به سايز	No	0.13			
12	Door and window lintels سرطاق دروازه و کلکين	M	3.80			
13	Wooden timber for ceiling, dia 12 cm, L=173 چوب دستک سقف	No	3.00			
14	Wooden board , size 138x138 with thickness 1.5 cm تخته سقف به سايز	No	1.00			
15	Bush or Straw mat for ceiling, size 138x138 with 1 cm thickness بور يا براي سقف	No	1.00			
16	Iron Sheet Gutter ناوه بام	M	2.66			
17	5cm straw plaster for roof کاه گل بام	M2	1.90			
18	Ventilation Pipe PVC 6in with cowel and screen پايپ تهويه پلاستيکي 4 انچ با کلاهک و جالي سيمي	M	2.80			
<b>Sub Total</b>						



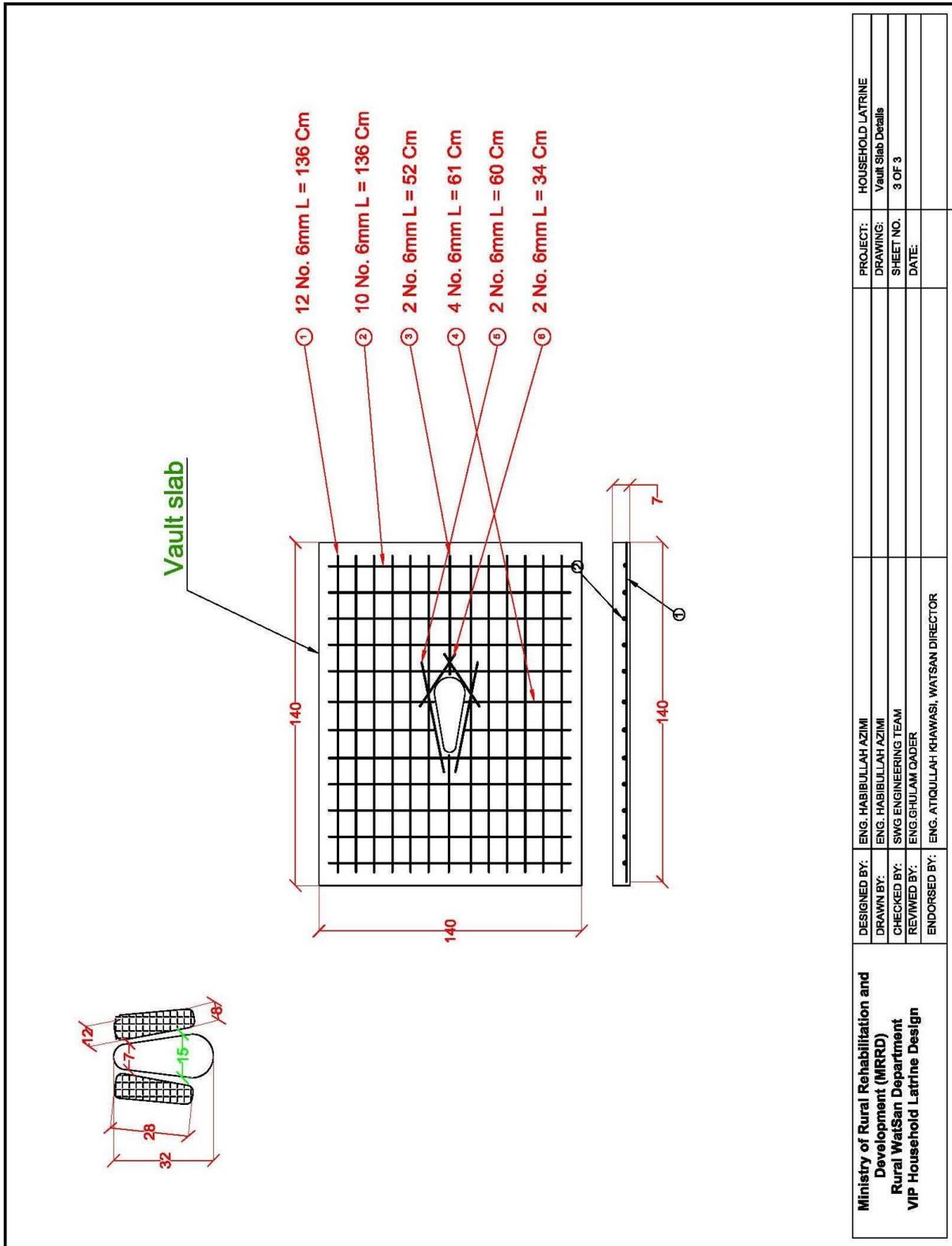
# 1 - Hole Pit Latrine – Stone Masonry Lined Pit

(Continued)



# 1 - Hole Pit Latrine – Stone Masonry Lined Pit

(Continued)





و کھو دیا ر فوننی او پرا تیا وزارت  
وزارت اسیا و انکشاف دلت

د افغانستان اسلامي جمهوریت  
جمهوری اسلامی افغانستان

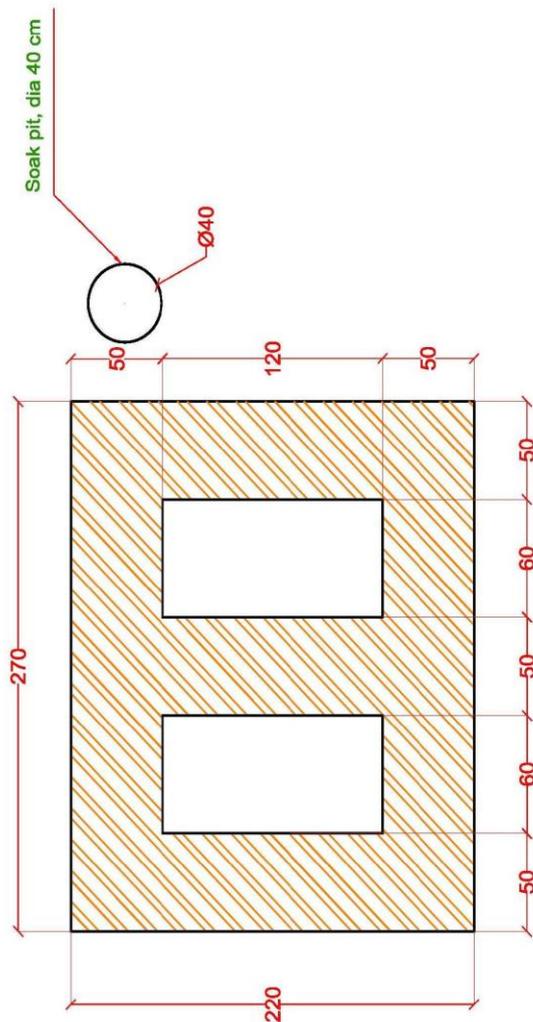


Islamic Republic of Afghanistan  
Ministry of Rural Rehabilitation and Development  
Rural WatSan Department

BoQ For 1Set Household Pit Latrine (2.6m deep) , pit with stone

No شماره	Activities بیت ها فعال	Unit واحد	Quantity مقدار	Unit Cost in Afs قیمت فی واحد به افغانی	Total Cost in Afs قیمت مجموعی به افغانی	Remarks ملاحظات
1	Excavation in medium soil ی در زمین متوسط کنکار	M3	12.58			
2	Stone Masonry with Mark 1:4 or soil mortar ی با مصالح گل سنگ کار	M3	8.99			better be done with cement mortar.
3	Pointing of outside stone masonry with cement mortar هنگلف کاری سنگ کاری بیرونی با مصالح سمنتی	M2	2.24			inside pointing is ignored.
4	PCC plate size 25x50x4 or burnt brick for roof ridges خرن لب بام	No	18.00			Quantity is for PCC plate.
5	Sun-dried brick work for walls with soil mortar خشت کاری دیوارها با خشت خام	M3	4.70			
6	Plastering of walls with mud and straw پلمتر کاری دیوارها با کاه گل	M2	31.20			
7	Painting of walls رنگمالی یا سفید کاری دیوارها	M2	31.20			
8	Wooden Door, size 80x185 دروازه چوبی به سایز	No	1.00			
9	Wooden Window, size 30x40	No	1.00			
10	Oil painting of door and window رنگمالی دروازه و کلکین با رنگ روغنی	M2	1.60			
11	RCC slab, size 140x140x0.07 بخدار به سایز سلب س	No	0.14			
12	Door and window lintels سرطاق دروازه و کلکین	M	3.80			
13	Wooden timber for ceiling, dia 12cm, L=179 چوب دمسک سقف	No	3.00			
14	Wooden board , size 140x140 with thickness 1.5cm تخته سقف به سایز	No	1.00			
15	Bush or Straw mat for ceiling, size 140x140 with 1cm thickness بوریا برای سقف	No	1.00			
16	Iron Sheet Gutter ناوه بام	M	2.80			
17	5cm straw plaster for roof کاه گل بام	M2	4.41			
18	Ventilation Pipe PVC 6in with cowl and screen پایپ تهویه پلاستیکی 4 انچ با کلاهک و جالی سیمی	M	2.85			
<b>Sub Total</b>						

## 2 - Hole Vault Latrine

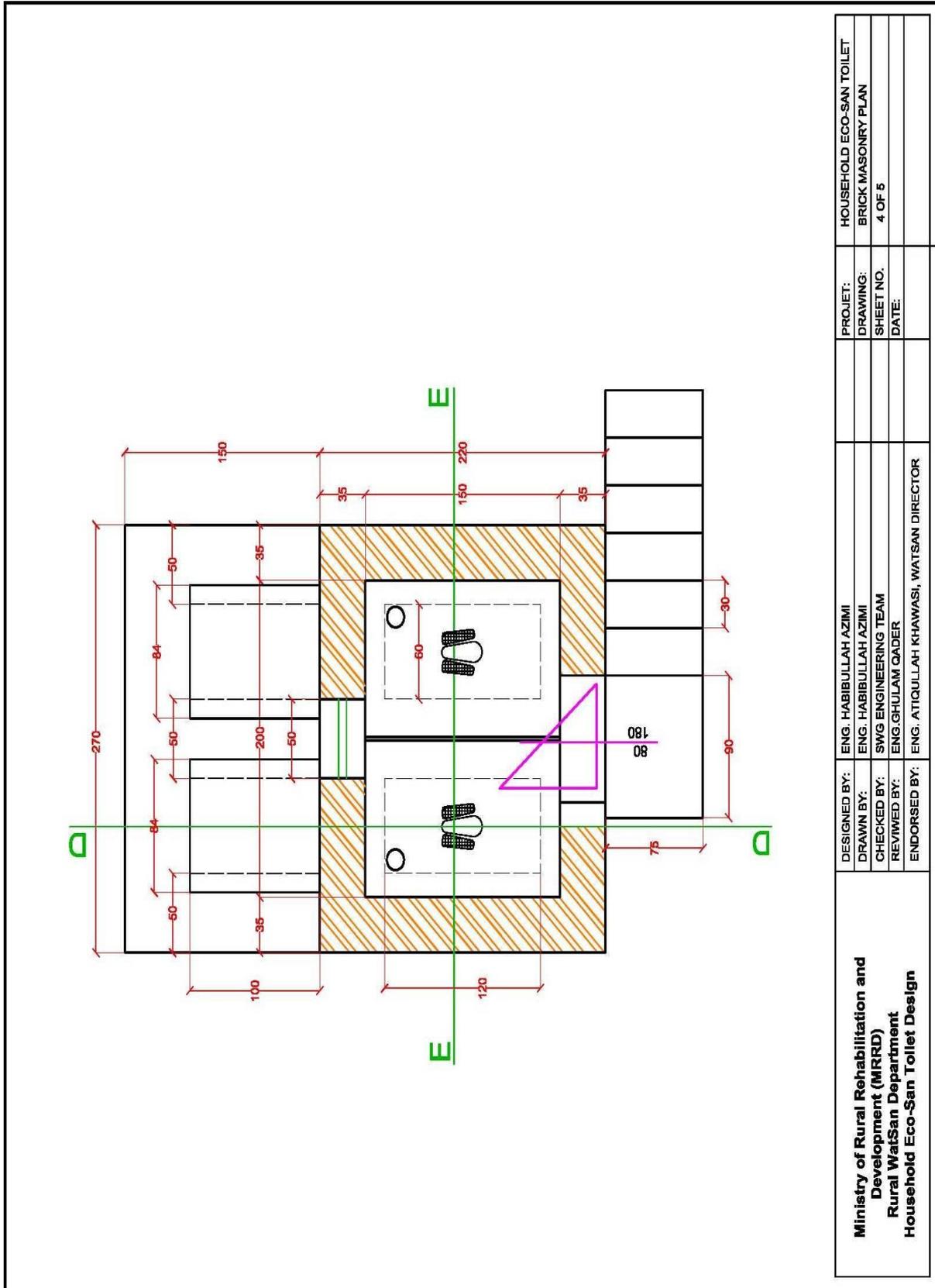


### EXCAVATION PLAN

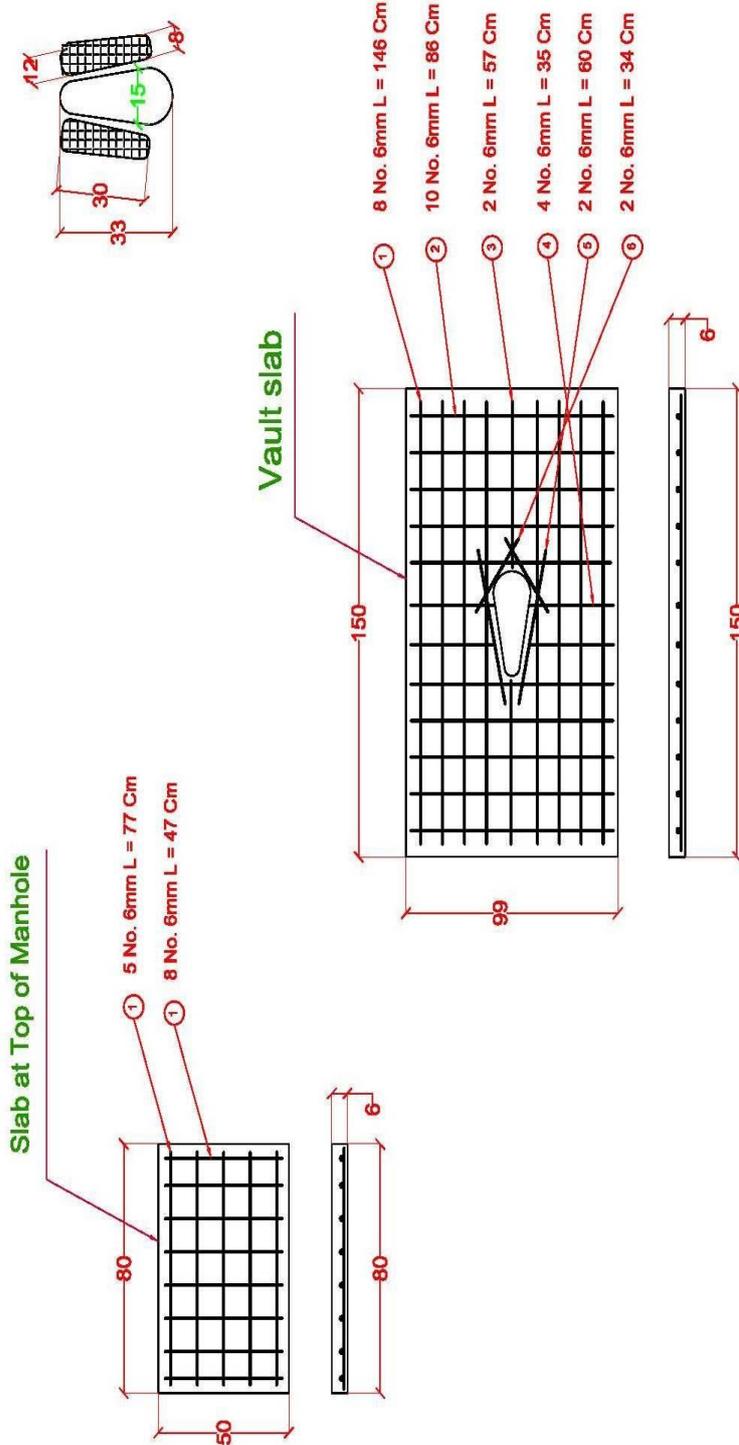
<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WatSan Department</b> <b>Household Eco-San Toilet Design</b>	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT:	HOUSEHOLD ECO-SAN TOILET
	DRAWN BY:	ENG. HABIBULLAH AZIMI	DRAWING:	EXCAVATION PLAN
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.	1 OF 5
	REVIEWED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	ENG. ATIQULLAH KHAWASI, WATSAN DIRECTOR		



## 2 - Hole Vault Latrine (Continued)



## 2 - Hole Vault Latrine (Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WatSan Department</b> <b>Household Eco-San Toilet Design</b>	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT:	HOUSEHOLD ECO-SAN TOILET
	DRAWN BY:	ENG. HABIBULLAH AZIMI	DRAWING:	Vault Slab Details
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.	5 OF 5
	REVISED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	ENG. ATIQULLAH KHAWASI, WATSAN DIRECTOR		



د کليو د بيارغونې او پراختيا وزارت  
وزارت اسیا واکشاف و دات

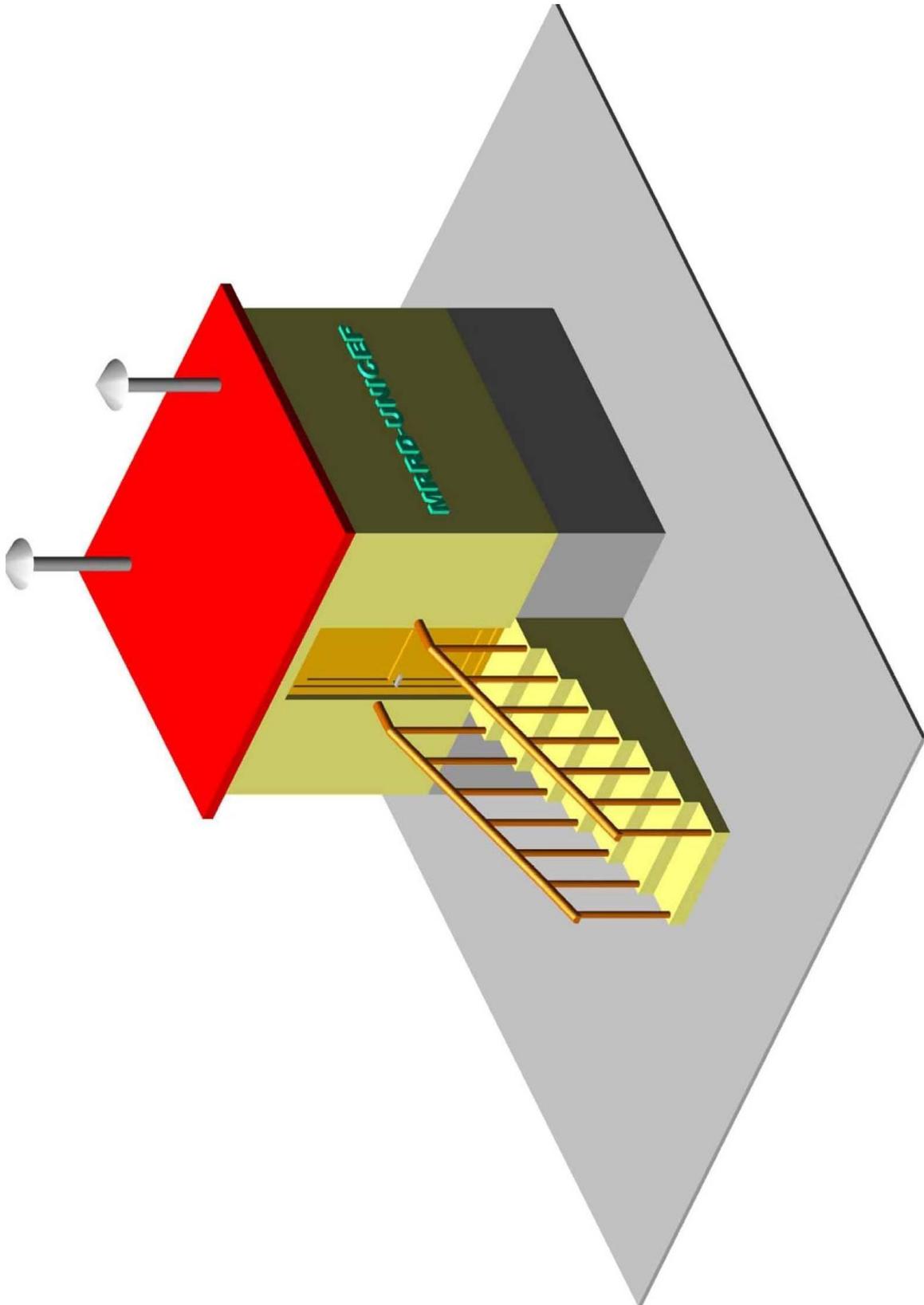
د افغانستان اسلامي جمهوریت  
جمهوری اسلامی افغانستان



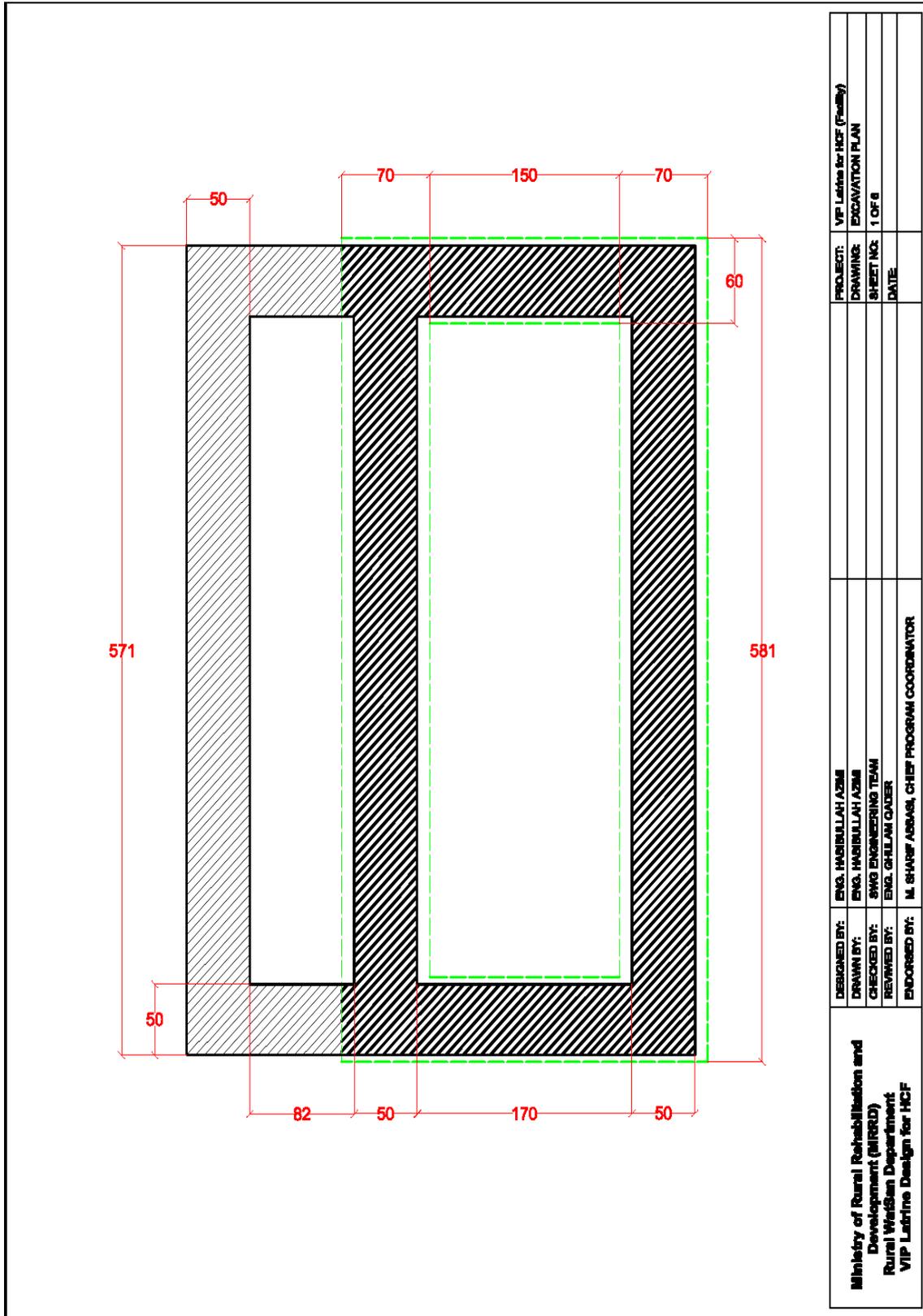
Islamic Republic of Afghanistan  
Ministry of Rural Rehabilitation and Development  
Rural WatSan Department  
BoQ For 1Set Household Eco-San Toilet

No شماره	Activities بیت هافعل	Unit واحد	Quantity مقدار	Unit Cost in Af\$ قیمت فی واحد به افغانی	Total Cost in Af\$ قیمت مجموعی به افغانی	Remarks ملاحظات
1	Excavation in medium soil ی در زمین متوسط کندنکار	M3	2.03			
2	Stone Masonry (1:4) or with soil mortar ی با مارک سنگ کار 1:4 و یا هم با مصالح گل	M3	10.87			
3	Pointing of stone masonry هنگف کاری	M2	24.04			
4	Shuttering قالب بندي	M2	4.07			
5	PCC plate size 25x50x4 or burnt brick for roof edges خرن لب بام	No	17.00			
6	Sun-dried brick work for walls with soil mortar خشت کاری دیوارها با خشت خام	M3	5.67			
7	Plastering of walls with mud and straw پلمتر کاری دیوارها با کاه گل	M2	23.52			
8	Painting of walls رنگمالي یا سفیده کاری دیوارها	M2	23.52			
9	Wooden Door, size 80x185 دروازه چوبی به ساینز	No	1.00			
10	Wooden Window, size 35x50 کلکین به ساینز	No	1.00			
11	Oil painting of door and window رنگمالي دروازه و کلکین با رنگ روغنی	M2	1.65			
12	RCC slab for vault and top of manhole بخدار سلب س	M3	0.23			
13	PCC as slab of manholes, stair and on stone masonry کانکریت بدون سیخ	M3	0.24			
14	Door and window lintels سرطاق دروازه و کلکین	M	3.60			
15	Wooden timber for ceiling, dia 12 cm, L=185 چوب دستک سقف	M	7.40			
16	Wooden board, size 150x200 with thickness 1.5 cm تخته سقف به ساینز	No	1.00			
17	Bush or Straw mat for ceiling, size 150x200 with 1cm thickness بوریا برای سقف	No	1.00			
18	GI Pipe with 2" dia. پایپ جستی قطر 2 انچ	M	3.00			
19	GI Elbow with 2" dia. زانو خم جستی	No	4.00			
20	GI Tee (2" x 2") سه دهن جستی	No	1.00			
21	Iron Sheet Gutter ناوه بام	M	3.40			
22	5cm straw plaster for roof کاه گل بام	M2	3.00			
23	Ventilation Pipe PVC 6in with cowl and screen پایپ تهویه پلاستیکی 4 انچ با کلاهک و جالی سیمی	M	5.80			
Sub Total						

## 2 - Hole Vault Latrine (Continued)

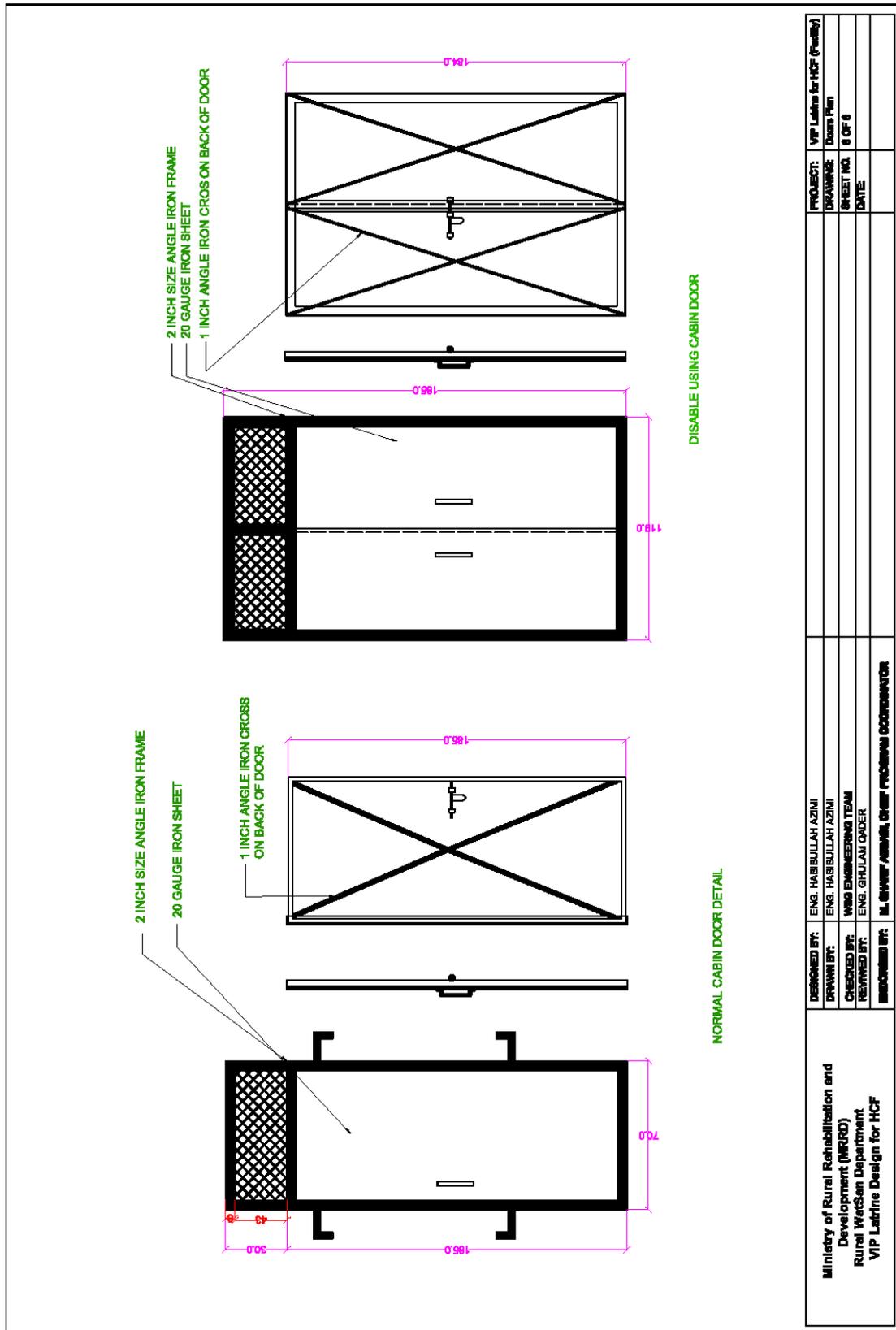


## 4 - Hole Pit Latrine With Handicapped Facility

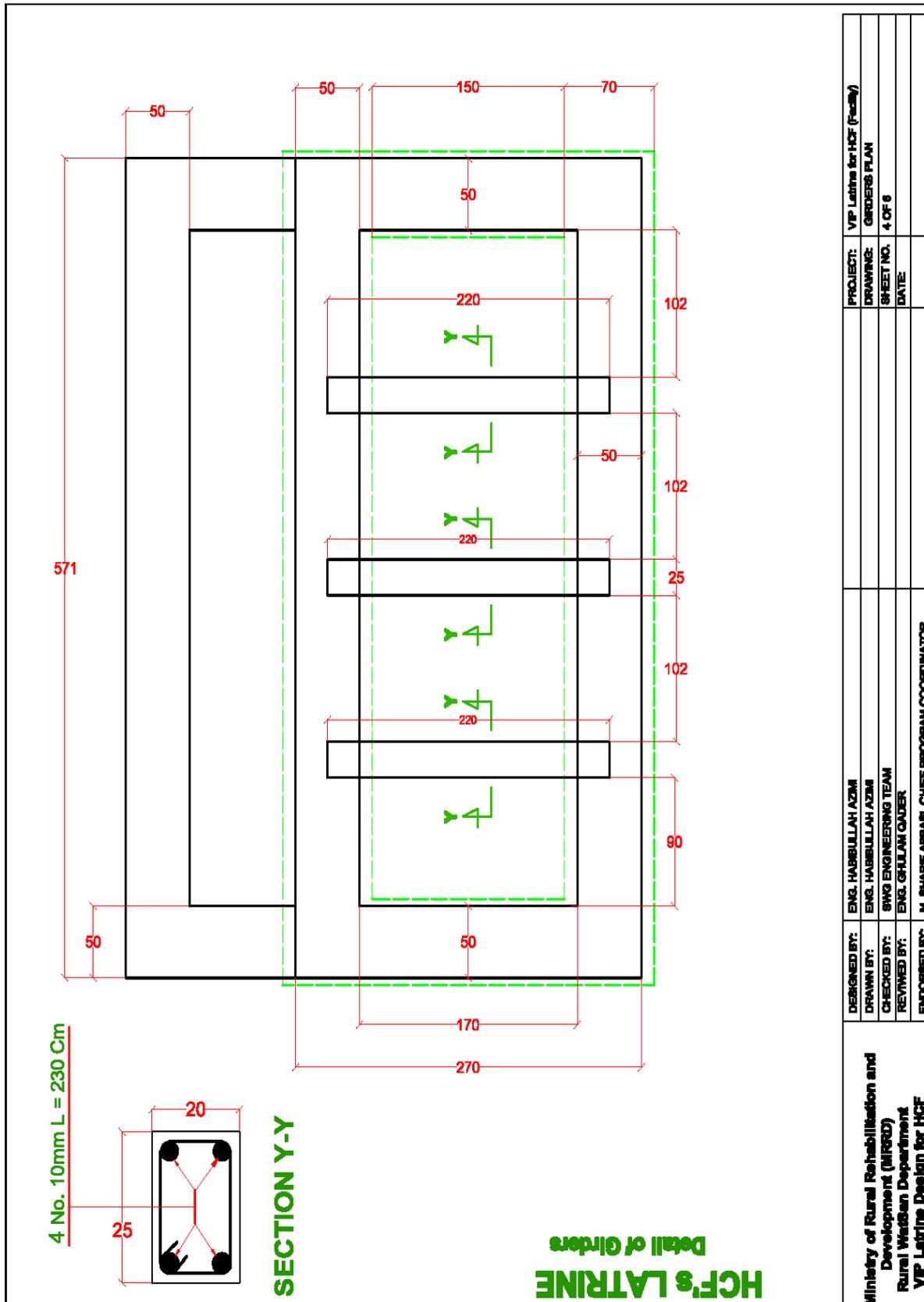




## 4 - Hole Pit Latrine With Handicapped Facility (Continued)

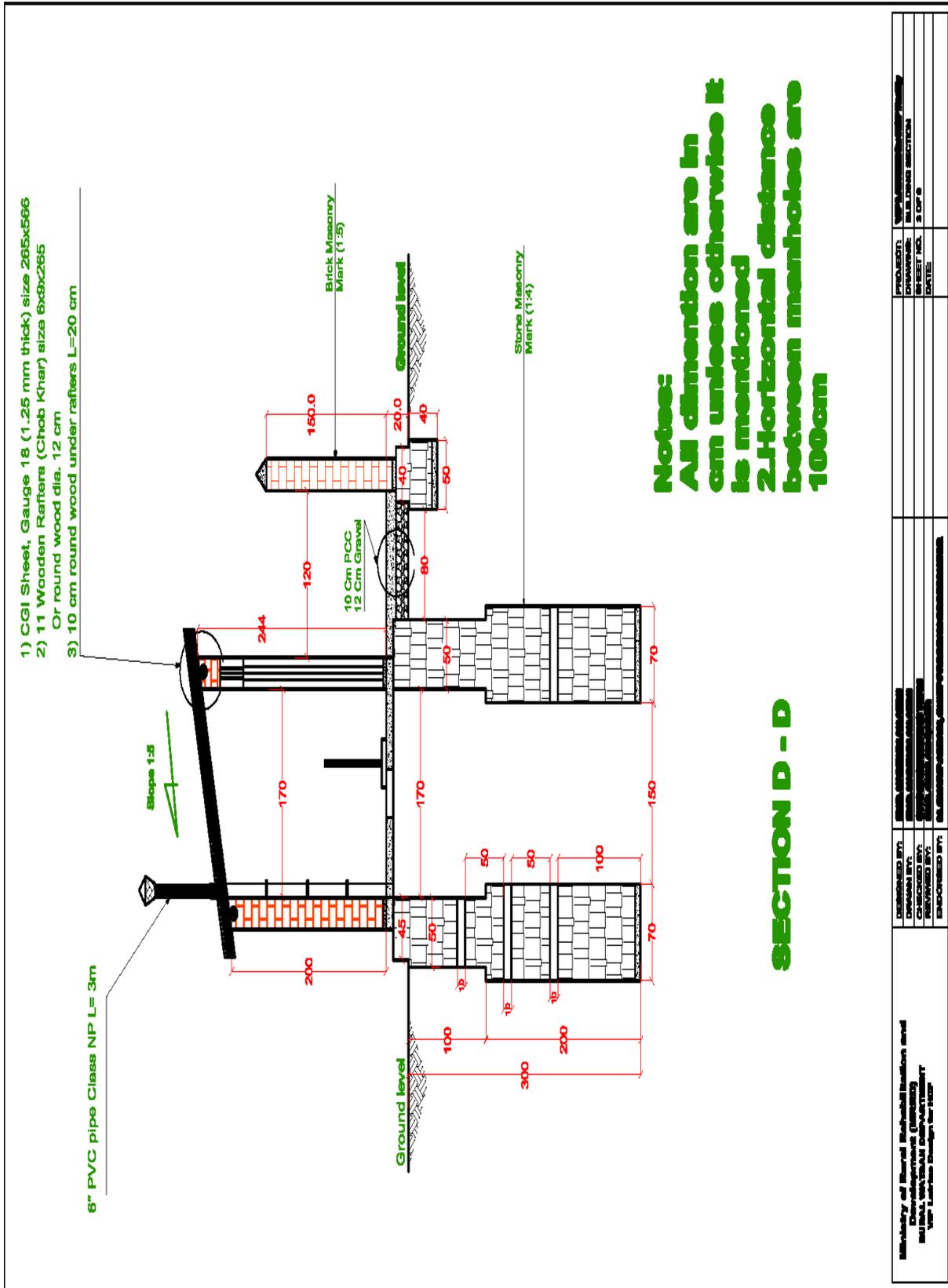


## 4 - Hole Pit Latrine With Handicapped Facility (Continued)



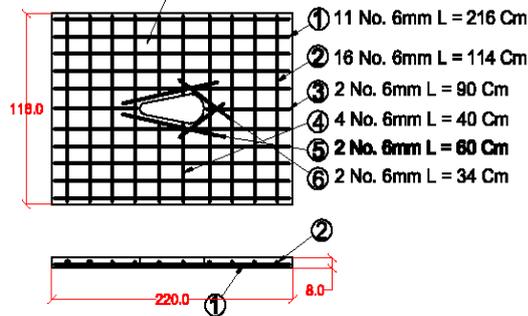


## 4 - Hole Pit Latrine With Handicapped Facility (Continued)

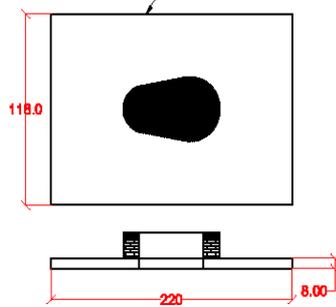


## 4 - Hole Pit Latrine With Handicapped Facility (Continued)

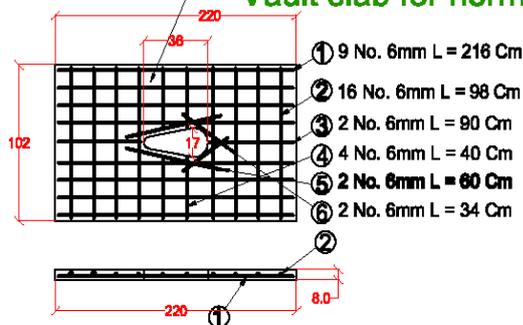
Vault slab for disable using cabin



Vault slab for disable using cabin



Vault slab for normal using cabin



Ministry of Rural Rehabilitation and Development (MRRD) Rural Waikhan Department VIP Latrine Design for HCF	DESIGNED BY:	ENR. HABIBULLAH AZAM	PROJECT:	VIP Latrines for HCF (Handily)
	DRAWN BY:	ENR. HABIBULLAH AZAM	DRAWING:	VAULT SLAB DETAILS
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.	6 OF 6
	REVIEWED BY:	ENR. GHILLAN CAJDER	DATE:	
ENDORSED BY:	MR. ISHAF ABRARI, CHIEF PROGRAM COORDINATOR			

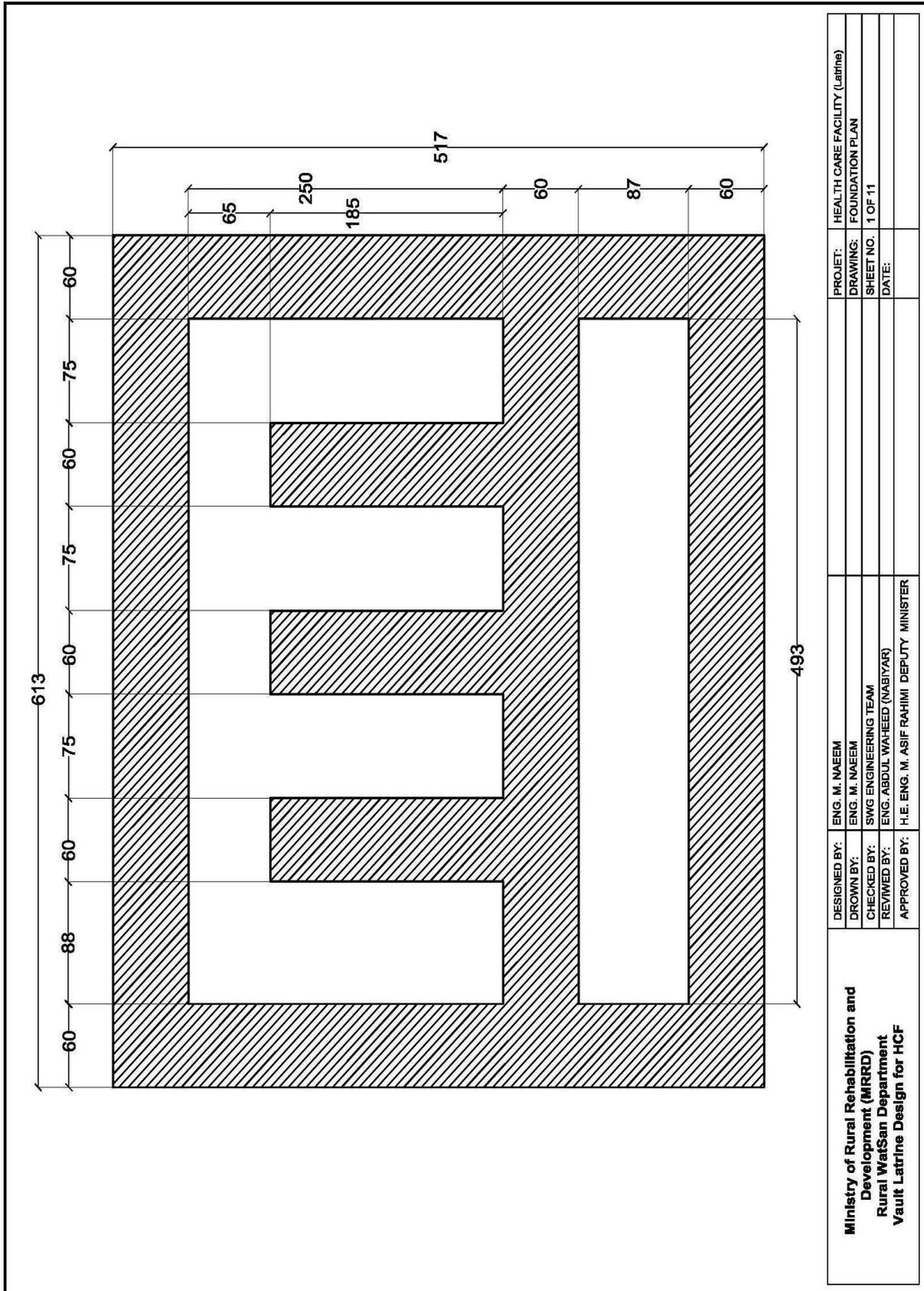


**Islamic Republic of Afghanistan**  
**Ministry of Rural Rehabilitation and Development**  
**Rural WatSan Department**

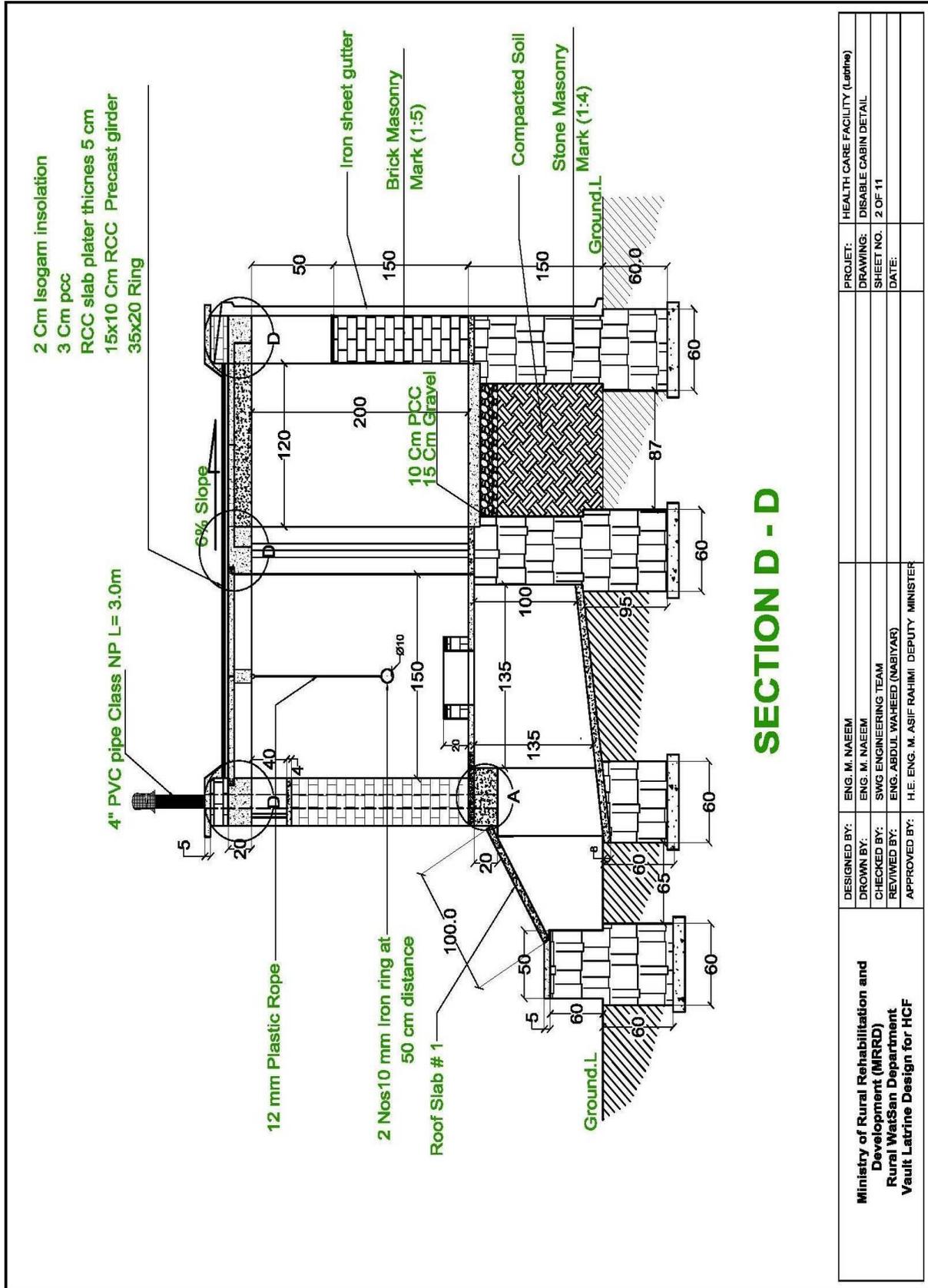
**BoQ For 1Set Direct Pit Latrines (4 rooms) for HCF**

No شماره	Activities بیت ها فعال	Unit واحد	Quantity مقدار	Unit Cost (Afs.) ی واحد به افغانی قیمت ف	Total Cost in Figure ی قیمت مجموعه به افغان	Total Cost in words قیمت مجموع به حروف	Remarks ملاحظات
1	Excavation in medium soil ی در زمین متوسط کنده کار	M3	52.03				
2	Stone Masonry (M:300) (1:4) ی سنگ کار	M3	30.21				
3	Pointing of Stone Masonry ی انگاف کار	M2	49.95				
4	Brick Masonry (M:250) (1:5) ی خشت کار	M3	11.00				
5	Shuttering ی قالب بند	M2	13.68				
6	Reinforced beam بیم سیخدارب	M3	0.33				
7	Slab RCC یخدارمطب س	M3	0.84				
8	Plastering of Wall 1:3 ی پلستر کار	M2	125.29				
9	Metal Doors and Windows ین فلزی دروازه و کاک (مطابق نقشه)	M2	7.10				
10	Oil Painting ی رنگ روغن	M2	7.10				
11	Painting (30% plastic) ی رنگ مال (پلاستیک 30% ف)	M2	125.29				
12	Ventilation pipe (PVC 6") بپ تهویه شش انچ پ	M	12.00				
13	PCC mark 200 بیت عادی کانکر	M3	0.83				
14	GI sheet gage 22 بچ آهن چادر گ-22	M2	14.99				
15	Round wood under each rafter dia. 10cm L=20 cm چوب گرد تحت چوب سقف	M	4.4				
16	Wooden Rafter size 6x9x265 (Or round wood dia. 12 cm) چوب خار یا چوب گرد به قطر سنتی 12	M	29.15				
17	Wooden Lintels for doors, 2 dia 10cm lintels over each door سراطق دروازه ها	M	10				
18	Hooks for cloth چنگک برای لباس	No	12.00				
19	J-hook or L-hook بیچ ال متند یا جی مانند	No	30.00				
20	Window screens ی کلکین حاجل	M2	0.84				
Sub Total							

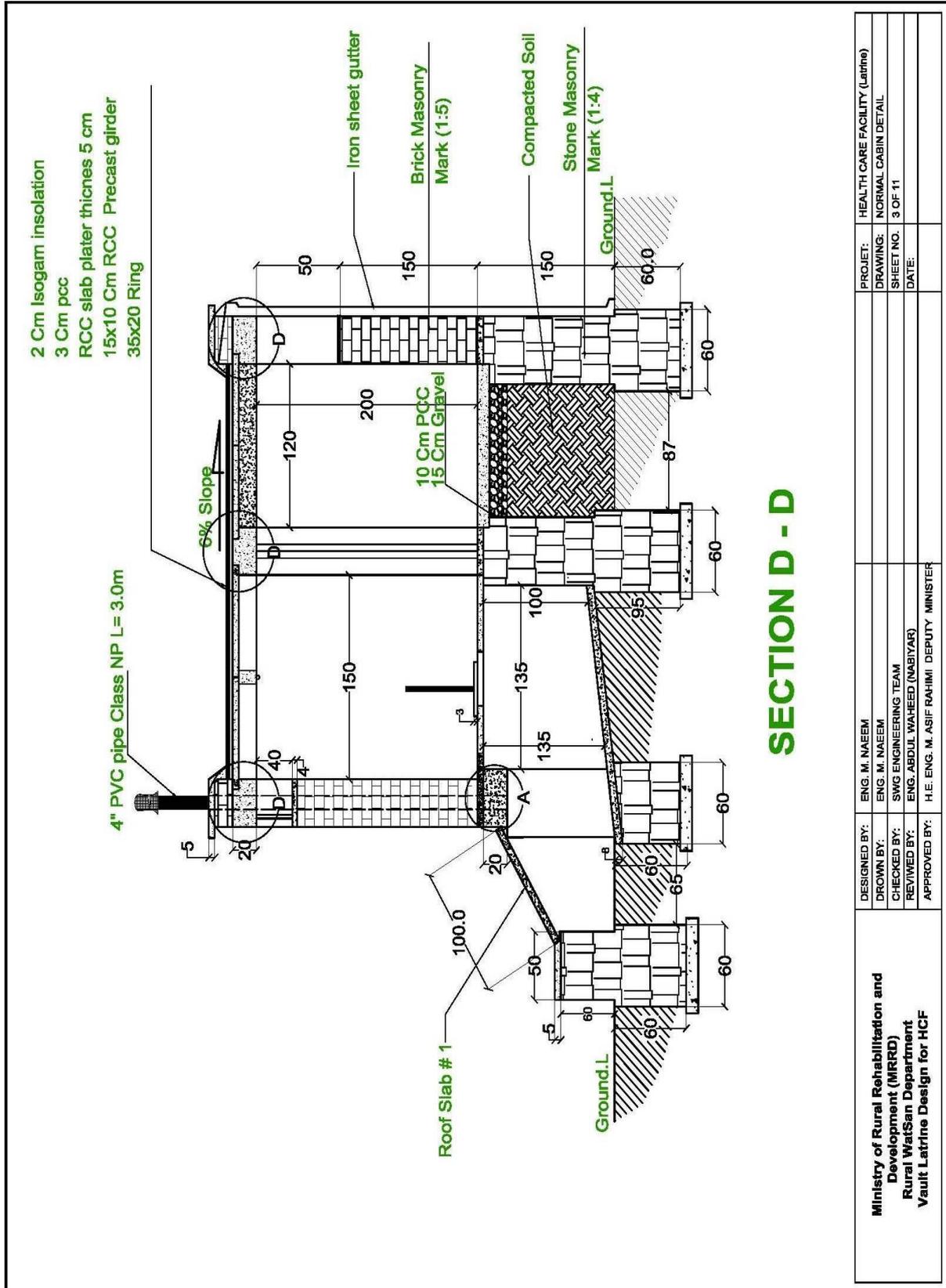
## 4 - Hole Vault Latrine With Handicapped Facility



## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



- 2 Cm Isogam insulation
- 3 Cm pcc
- RCC slab plater thicnes 5 cm
- 15x10 Cm RCC Precast girder
- 35x20 Ring

4" PVC pipe Class NP L= 3.0m

6% Slope

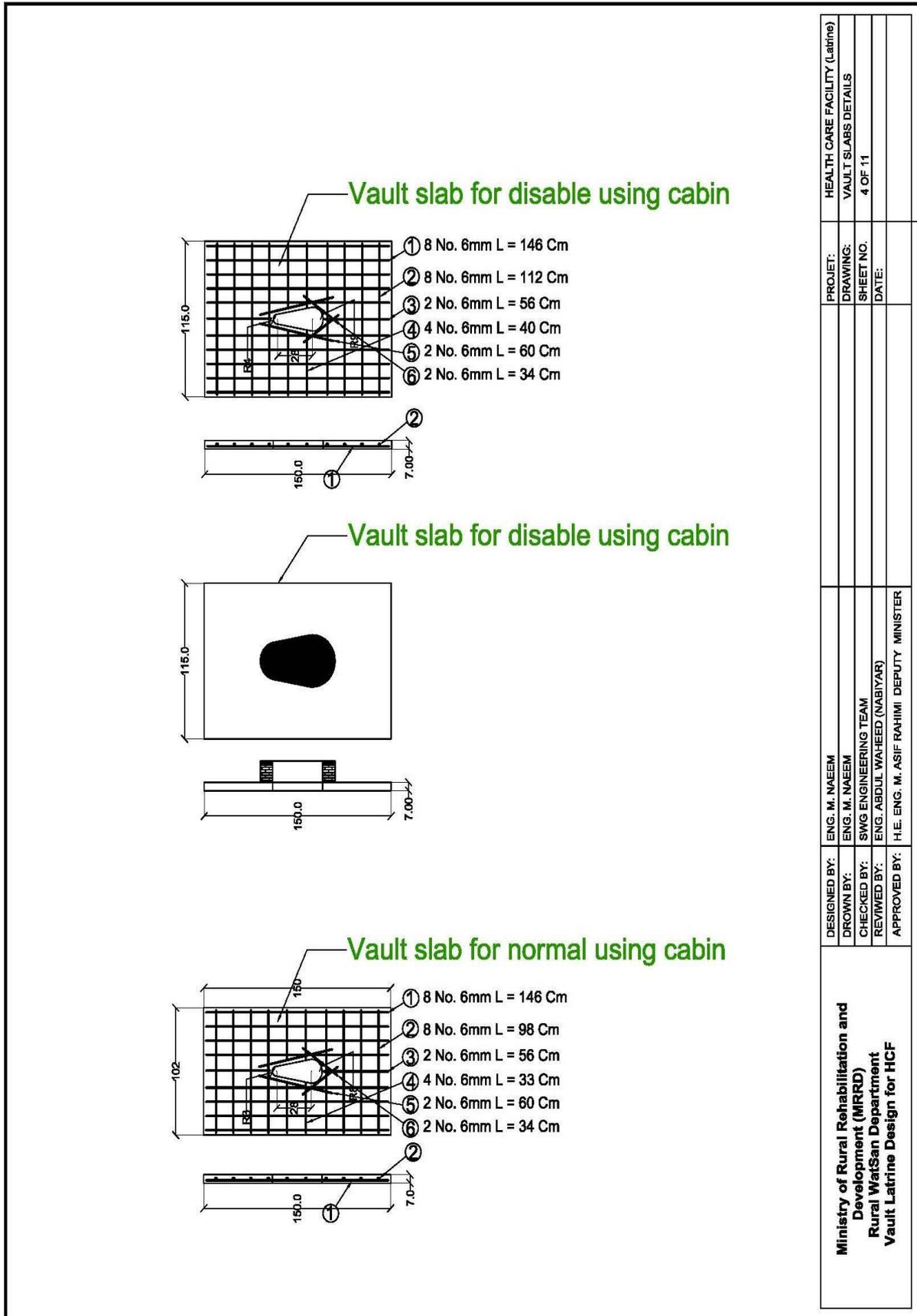
Roof Slab # 1

Ground.L

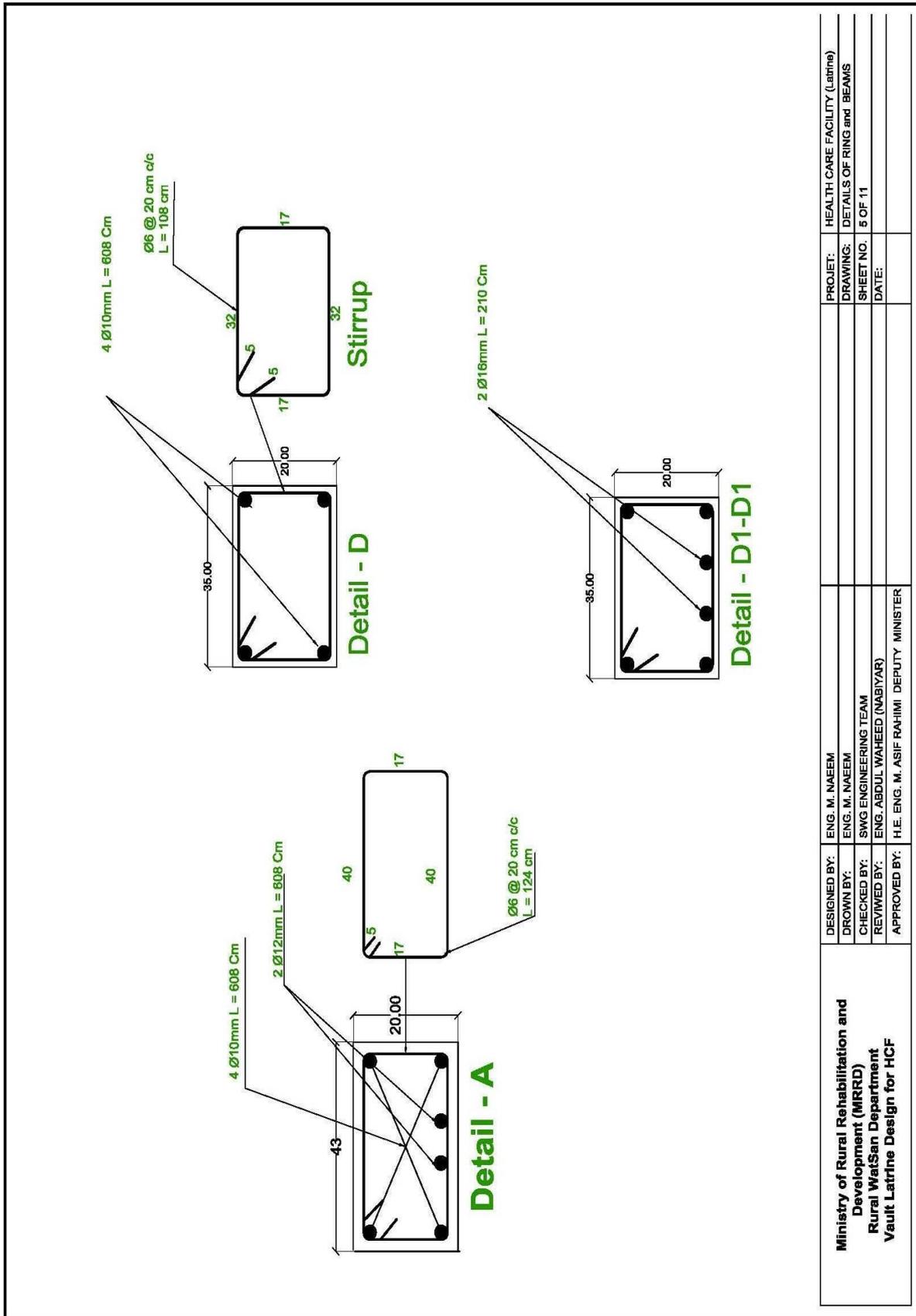
Ground.L

	DESIGNED BY: ENG. M. NAEEM	PROJECT: HEALTH CARE FACILITY (Latrine)
	DRAWN BY: ENG. M. NAEEM	DRAWING: NORMAL CABIN DETAIL
	CHECKED BY: SWG ENGINEERING TEAM	SHEET NO. 3 OF 11
	REVISED BY: ENG. ABDUL WAHEED (NABIYAR)	DATE:
	APPROVED BY: H.E. ENG. M. ASIF RAHIMI DEPUTY MINISTER	
<b>Ministry of Rural Rehabilitation and Development (MRRKD)</b> <b>Rural WatSan Department</b> <b>Vault Latrine Design for HCF</b>		

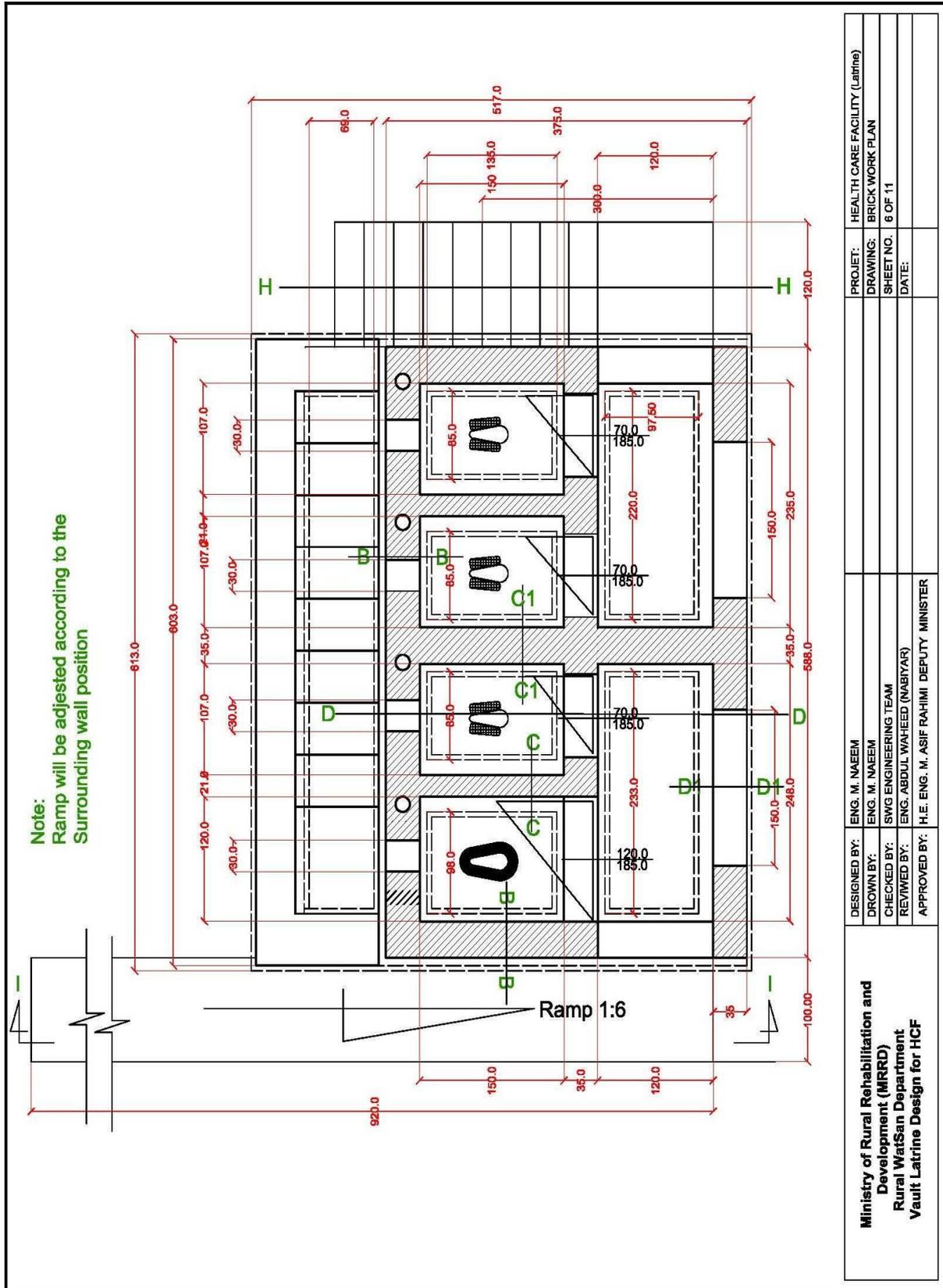
## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



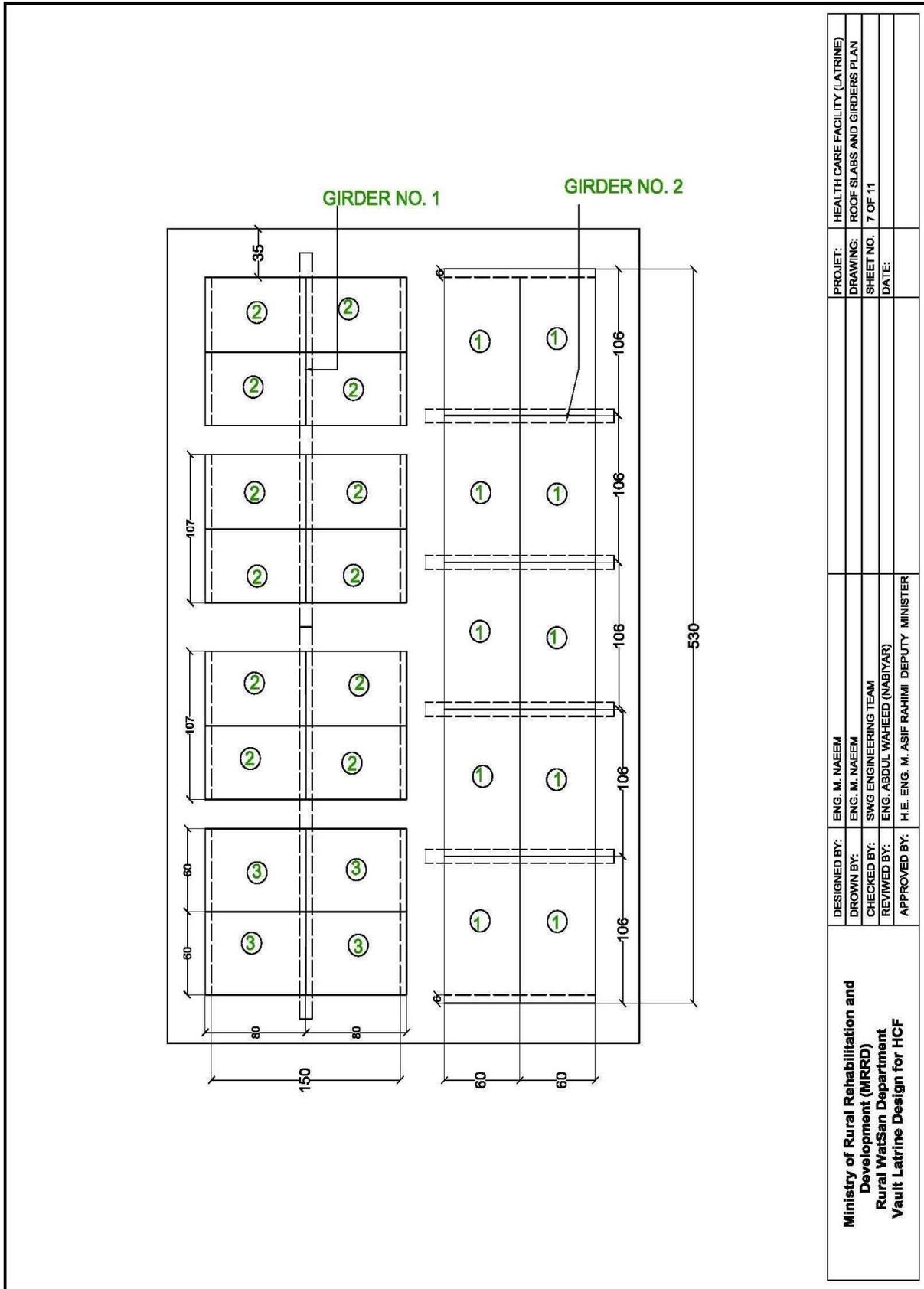
## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



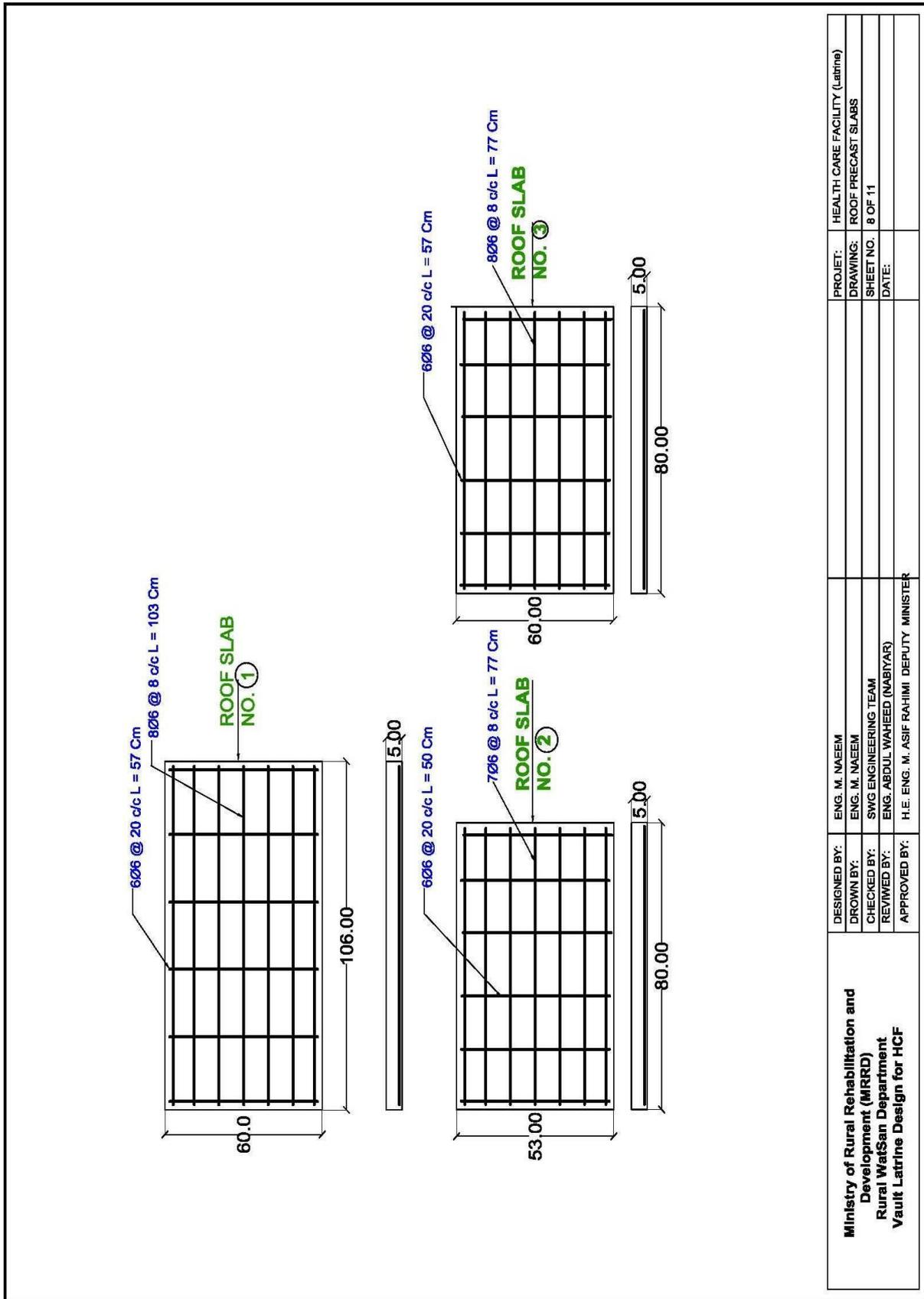
## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



## 4 - Hole Vault Latrine With Handicapped Facility (Continued)

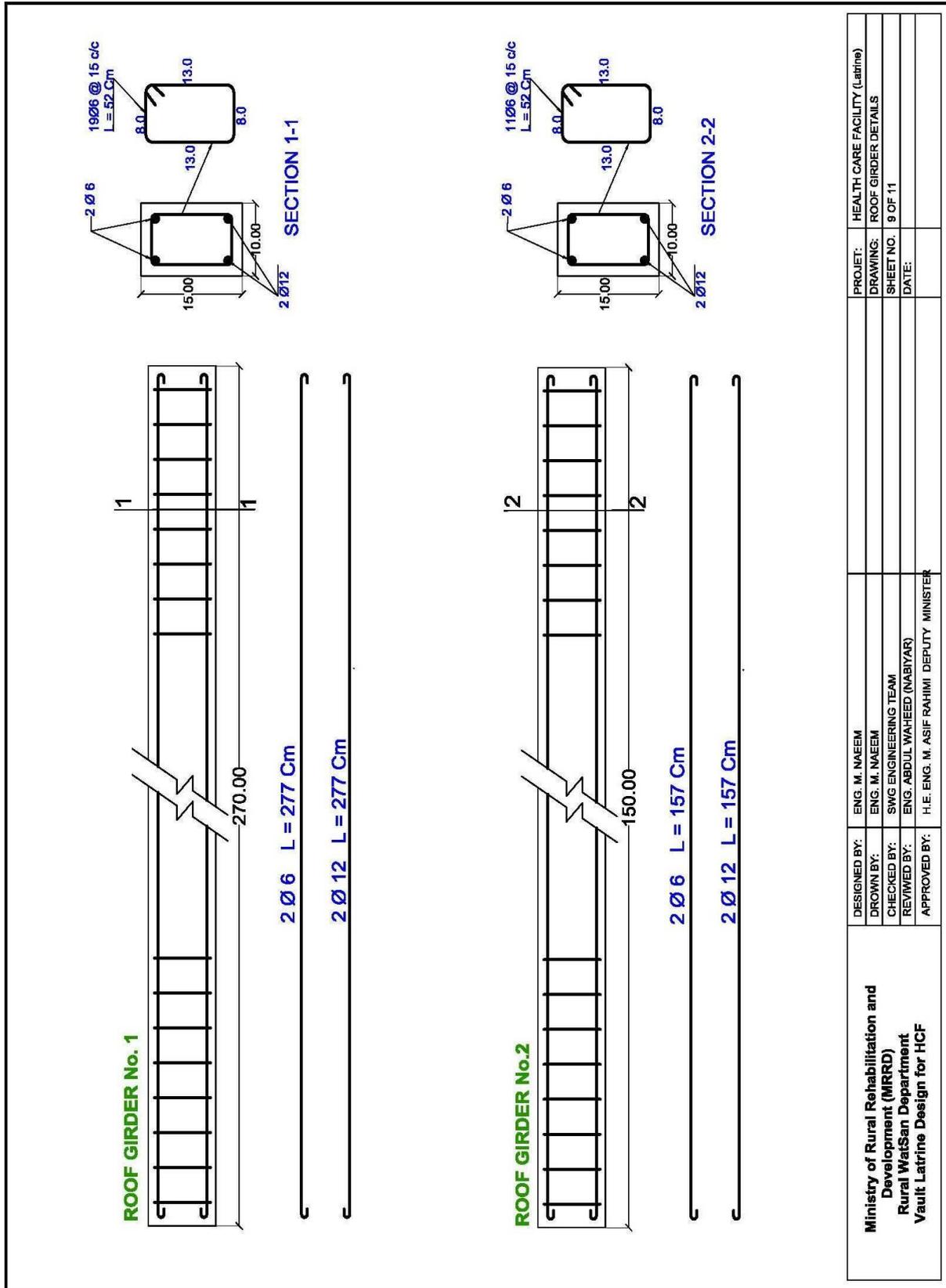


## 4 - Hole Vault Latrine With Handicapped Facility (Continued)

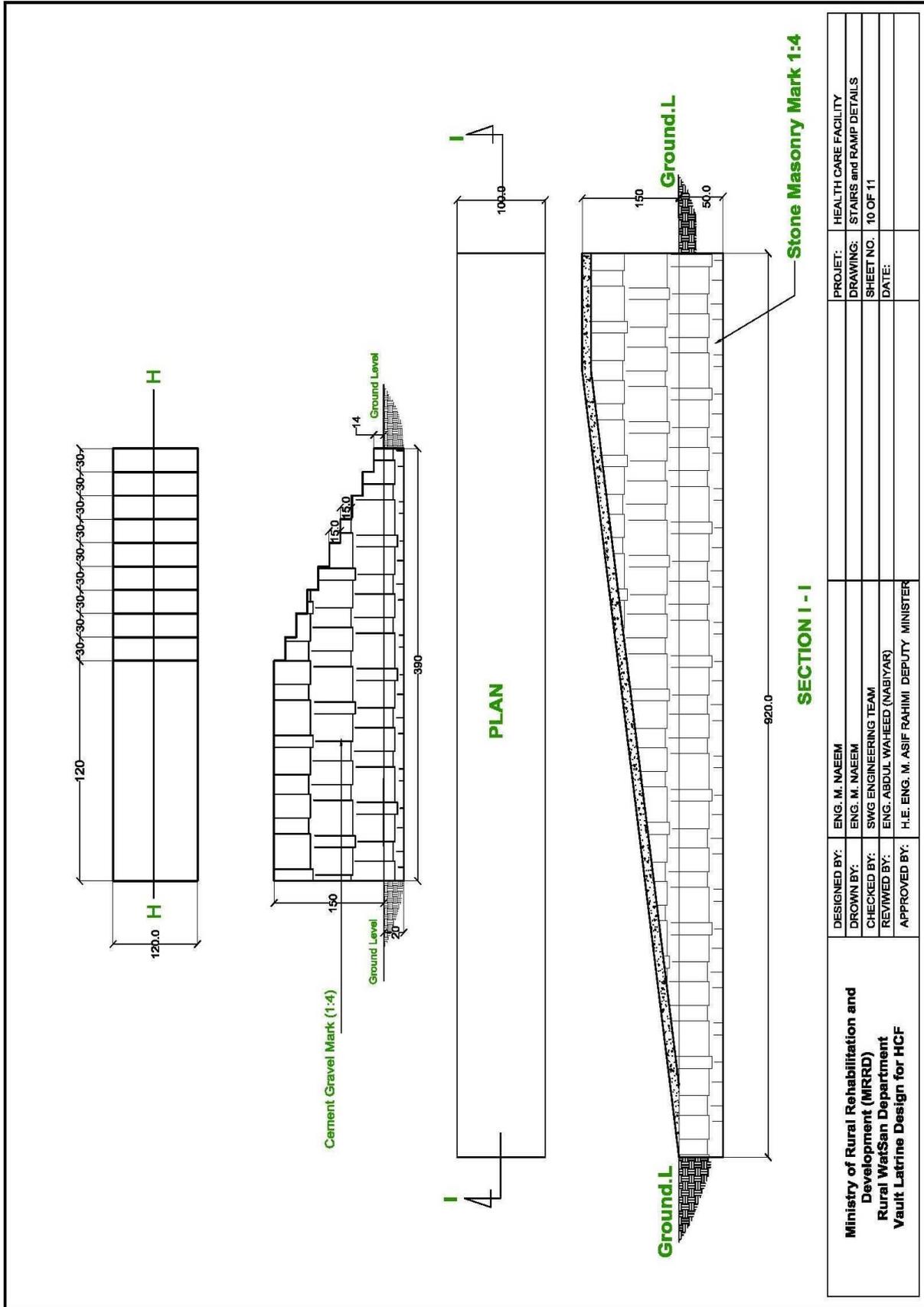


<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WaterSan Department</b> <b>Vault Latrine Design for HCF</b>	DESIGNED BY:	ENG. M. NAEEM	PROJECT:	HEALTH CARE FACILITY (Latrine)
	DRAWN BY:	ENG. M. NAEEM	DRAWING:	ROOF PRECAST SLABS
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.	8 OF 11
	REVIEWED BY:	ENG. ABDUL WAHEED (NABHYAR)	DATE:	
	APPROVED BY:	H.E. ENG. M. ASIF RAHIMI DEPUTY MINISTER		

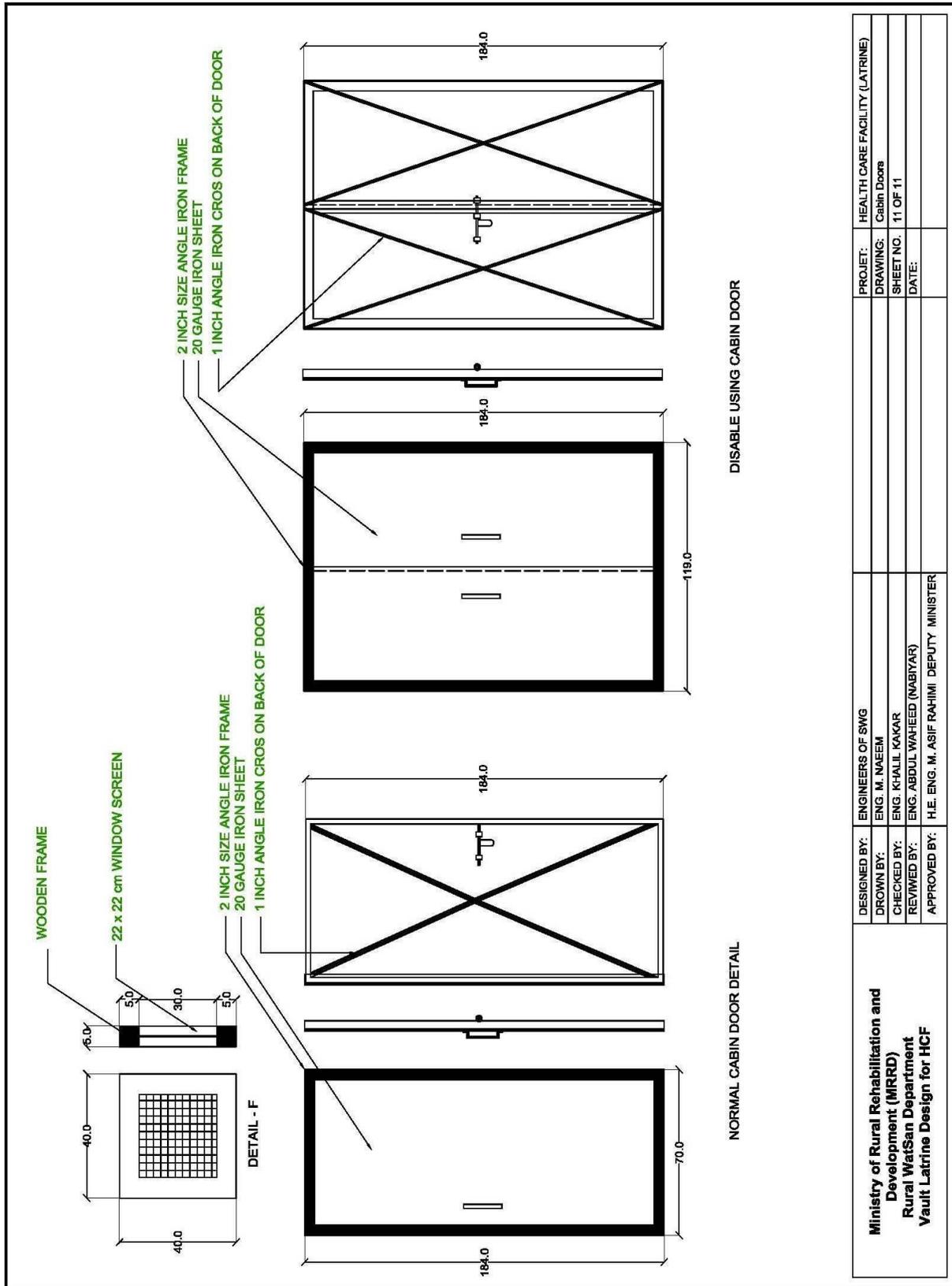
## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



## 4 - Hole Vault Latrine With Handicapped Facility (Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WatSan Department</b> <b>Vault Latrine Design for HCF</b>	DESIGNED BY:	ENGINEERS OF SWG	PROJECT:	HEALTH CARE FACILITY (LATRINE)
	DRAWN BY:	ENG. M. NAEEM	DRAWING:	Cabin Doors
	CHECKED BY:	ENG. KHALIL KAKAR	SHEET NO.:	11 OF 11
	REVISED BY:	ENG. ABDUL WAHEED (NABIYAR)	DATE:	
APPROVED BY:	H.E. ENG. M. ASIF RAHIMI, DEPUTY MINISTER			



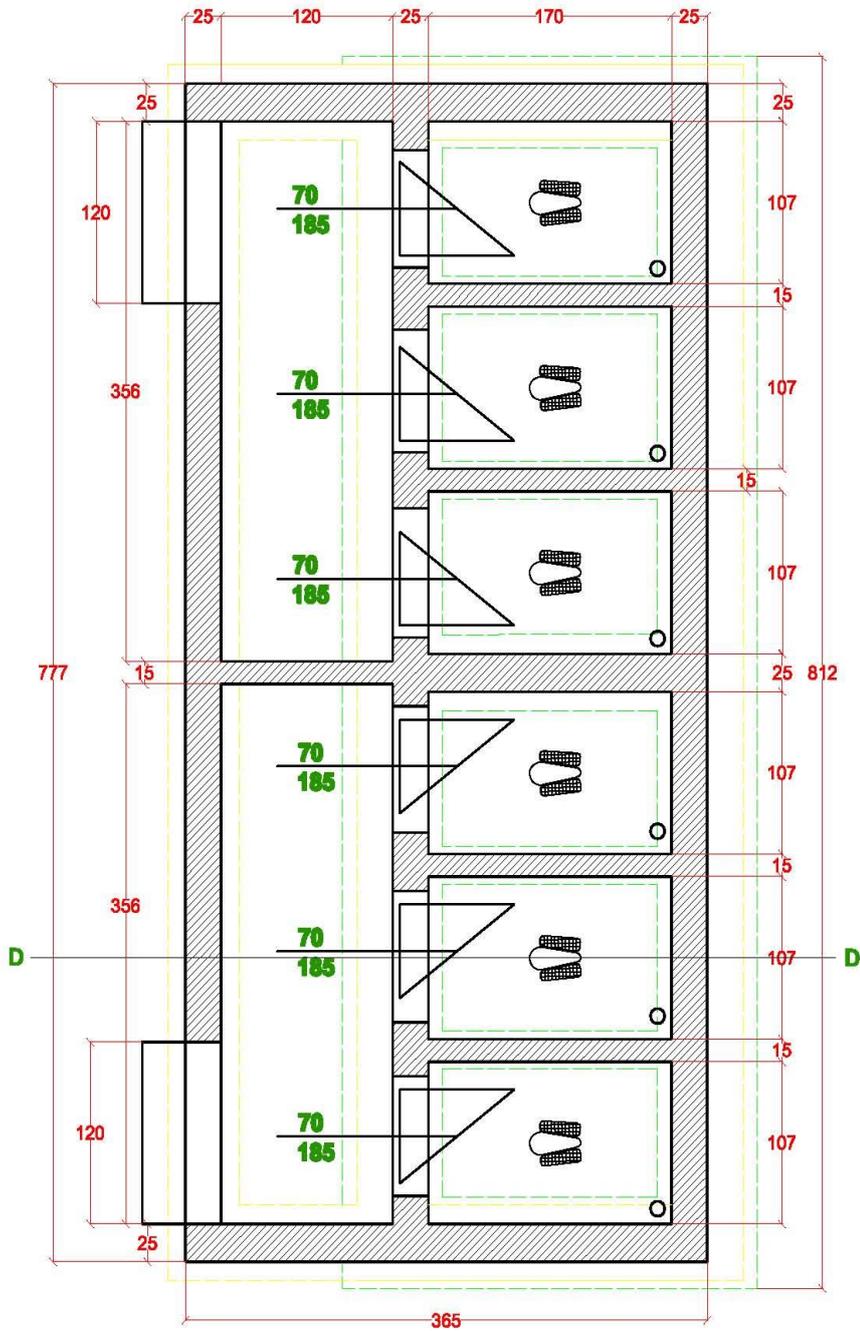
**Islamic Republic of Afghanistan**  
**Ministry of Rural Rehabilitation and Development**  
**Rural WatSan Department**

**BoQ For 1 set Vault Latrines (4 rooms) for Clinic**

No شماره	Activities بیت ها فعال	Unit واحد	Quantity مقدار	Unit Cost (Afs.) بیمت فی واحد به افغانی	Total Cost in Figure بیمت مجموعه به افغانی	Total Cost in words بیمت مجموع به حروف	Remarks ملاحظات
1	Excavation ی گندنکار	M3	16.95				
2	Stone Masonry (M:300) (4:1) ی با مارک و مخلوط مینگ کار	M3	47.30				
3	Pointing of Stone Masonry (1:3) ی با مخلوط انگاف کار	M2	69.00				
4	Brick Masonry (M:250) (5:1) ی با مارک و مخلوط خشت کار	M3	19.72				
5	Shuttering ی قالب بند	M2	51.30				
6	Reinforced beams and Girders بیم ها و گادر های سیدخاراب	M3	2.10				
7	Slab RCC یخدار سلب س	M3	1.70				
8	Plastering of Wall (Mark:400) 1:3 ی با مارک و مخلوط پلمتر کار	M2	113.80				
9	Metal Doors and Windows بین فلزی دروازه و کلک (مطابق نقشه)	M2	6.74				
10	Oil Painting ی رنگ روغن	M2	6.74				
11	Painting (70% plastic) ی رنگ مال 70% پلاستیک ف	M2	113.80				
12	Compacted Soil خاک تپک شده	M3	8.10				
13	Compacted river stone 15 cm یایی سنگ تپک شده در	M3	1.00				
14	Ventilation pipe (PVC Dia 10cm or 4") بپ تهویه چهار انچ پ	M	12.00				
15	Isogam for roof یزوگام پوشش بام	M2	22.00				
16	PCC mark 200 (1:6) بیت بدون سیخ با مارک و مخلوط کانکر	M3	2.60				
17	Rope for Disabled بسمان برای معیوبین	M	2.50				
18	Hinge for Disabled (10cm Dia) قبضه	No	2.00				
19	Hooks چنگگ	No	12.00				
20	Window screens ی کلکین ماجال	M2	0.49				
21	Iron Sheet Gutter ناوه	M	3.80				
<b>مجموع قیمت برای یک بیت میرز</b>							

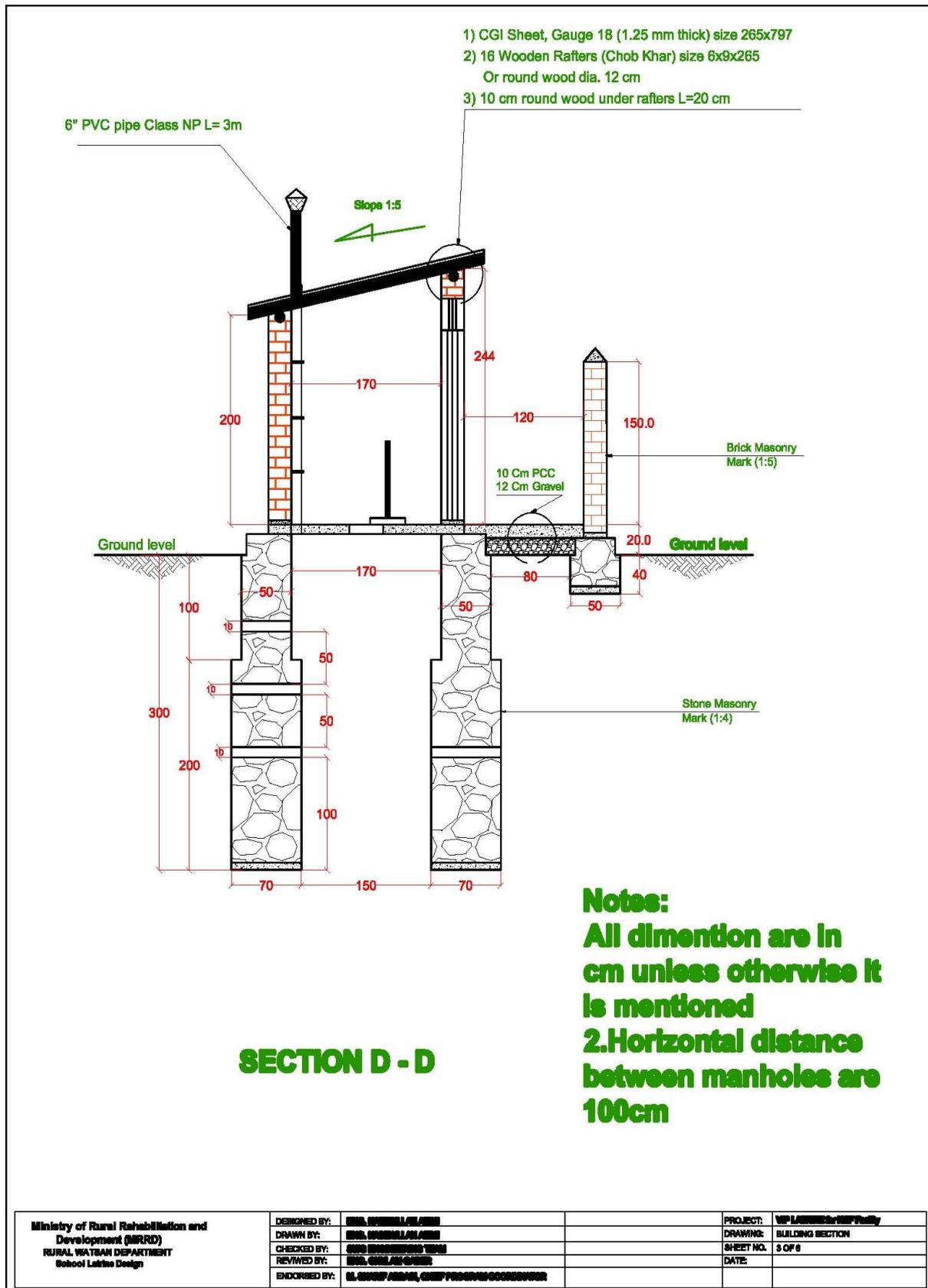


## 6 - Hole Pit Latrine (Continued)

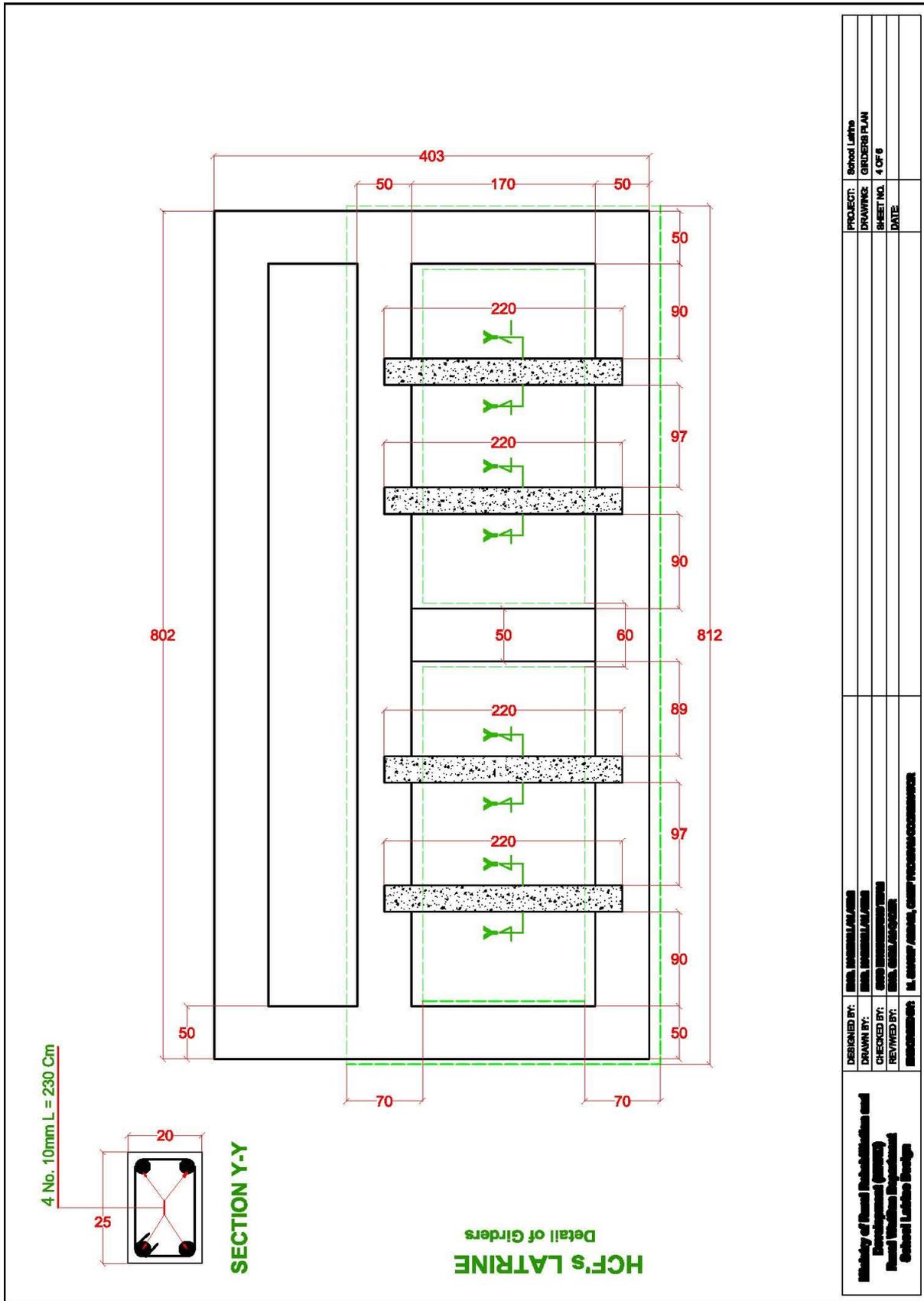


	PROJECT: School Latrine DRAWING: BRICK MASONRY PLAN SHEET NO. 2 OF 6	
	DESIGNED BY: ENR. USHAKI/AF/AM DRAWN BY: ENR. USHAKI/AF/AM CHECKED BY: ENR. USHAKI/AF/AM REVISED BY: ENR. USHAKI/AF/AM APPROVED BY: ENR. USHAKI/AF/AM	DATE:
<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural Water Resources</b> <b>Latrine Design</b>	<b>Dr. Ghafoor Ahmad, Chief Technical Coordinator</b>	

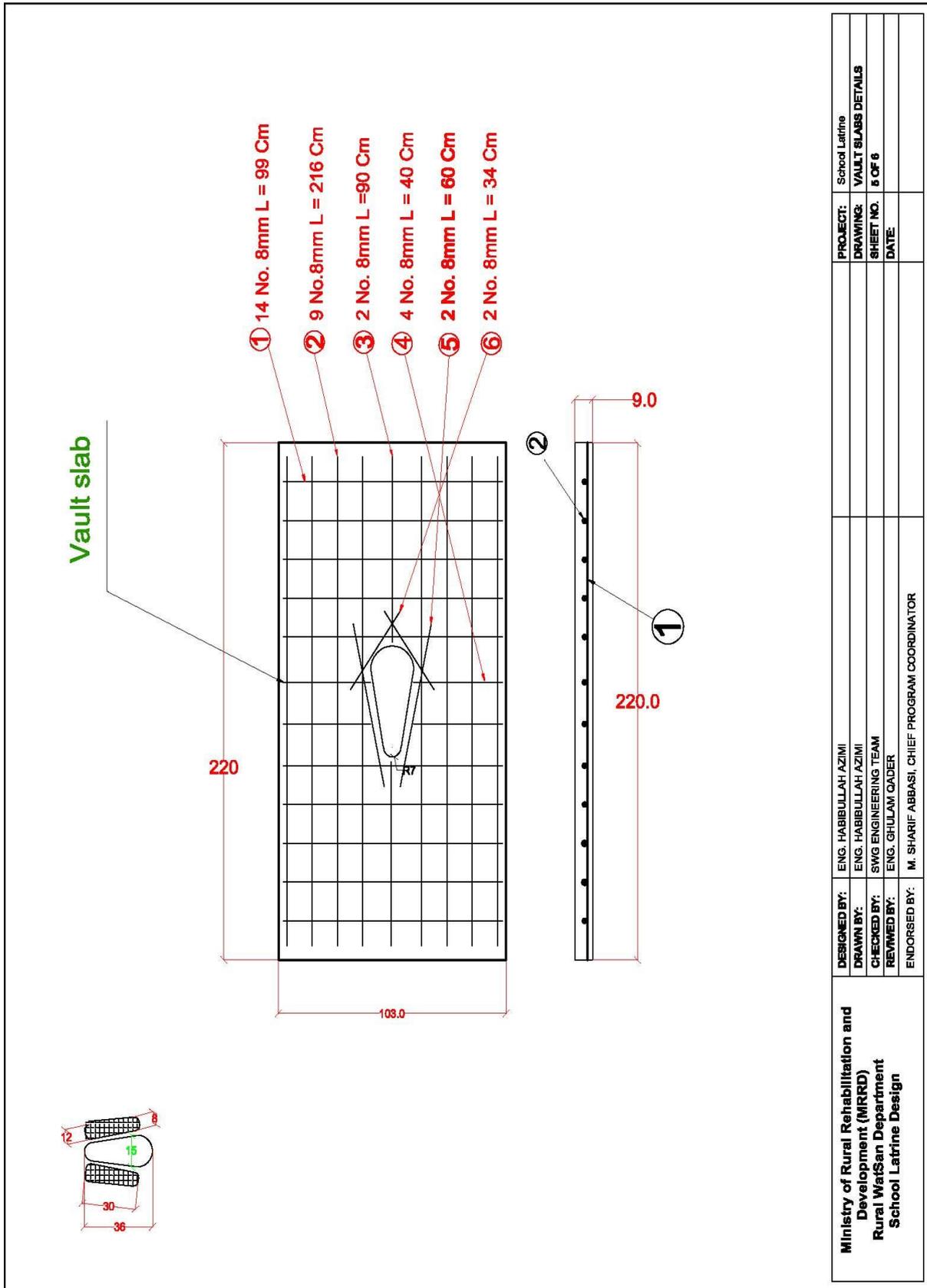
## 6 - Hole Pit Latrine (Continued)



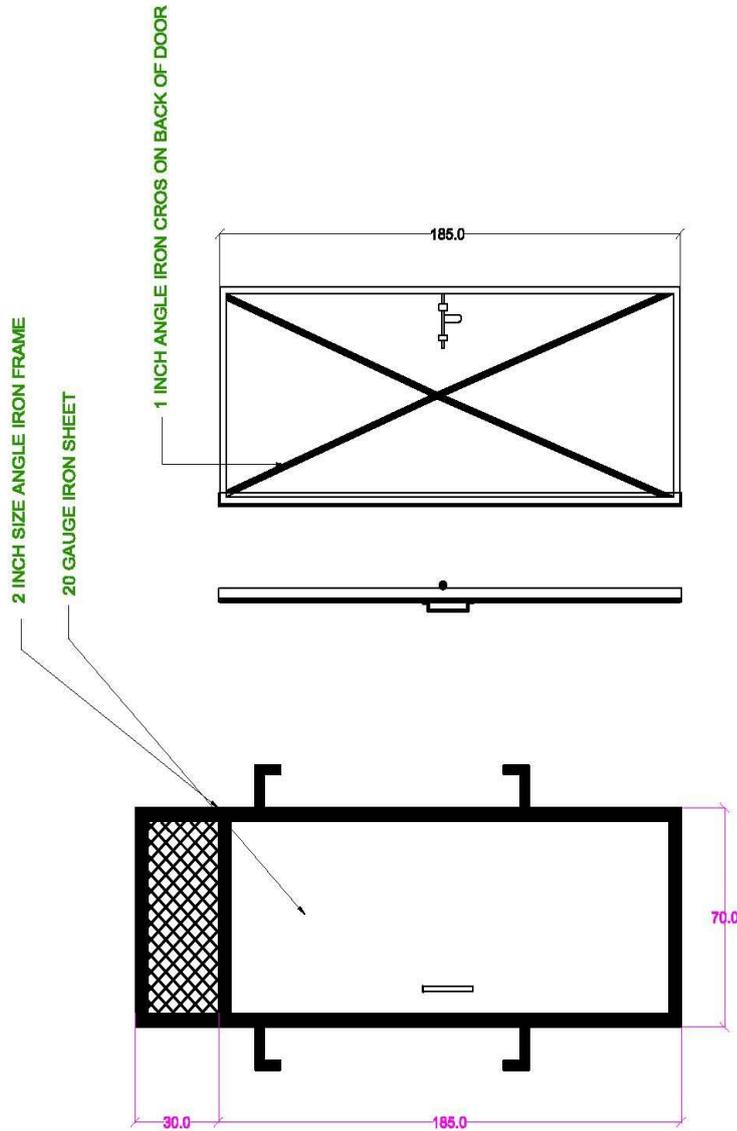
## 6 - Hole Pit Latrine (Continued)



## 6 - Hole Pit Latrine (Continued)



## 6 - Hole Pit Latrine (Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> Rural WatSan Department School Latrine Design	DESIGNED BY:	ENG. HABIBULLAH AZIMI	PROJECT:	School Latrine (Facility)
	DRAWN BY:	ENG. HABIBULLAH AZIMI	DRAWING:	Doors Plan
	CHECKED BY:	WSG ENGINEERING TEAM	SHEET NO.	6 OF 6
	REVISED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	M. SHARIF ABBASI, CHIEF PROGRAM COORDINATOR		



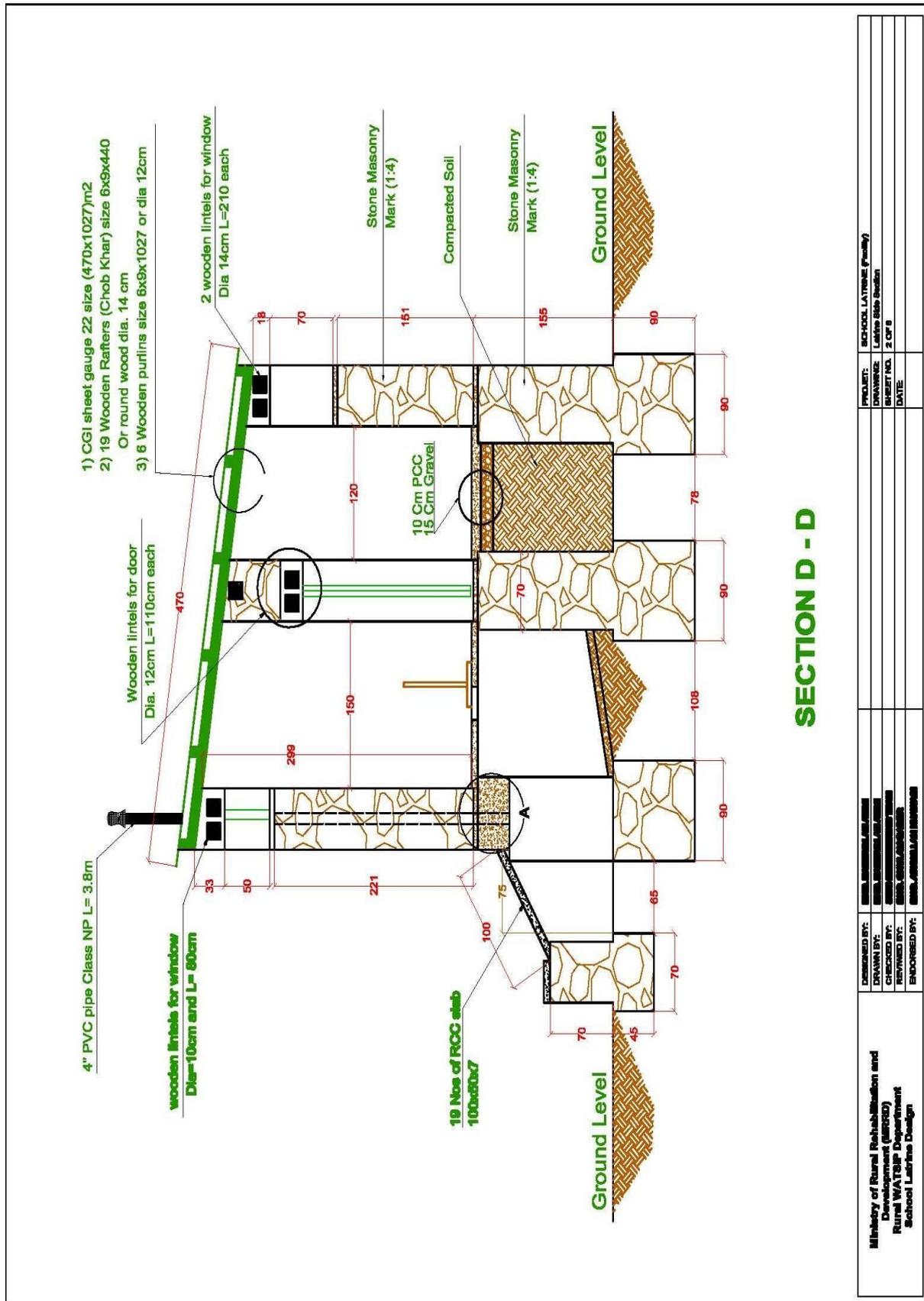
**Islamic Republic of Afghanistan**  
**Ministry of Rural Rehabilitation and Development**  
**Rural WatSan Department**

**BoQ For 1Set Direct Pit Latrines (6 rooms) for Schools**

No شماره	Activities بیت ها/فعالیت	Unit واحد	Quantity مقدار	Unit Cost (Afs.) ی واحد به افغانی قیمت ف	Total Cost in Figure ی قیمت مجموعه به افغان	Total Cost in words قیمت مجموع به حروف	Remarks ملاحظات
1	Excavation in medium soil ی در زمین متوسط کنده کار	M3	72.59				
2	Stone Masonry (M:300) (1:4) ی سنگ کار	M3	42.33				
3	Pointing of Stone Masonry ی انگاف کار	M2	74.37				
4	Brick Masonry (M:250) (1:5) ی خشت کار	M3	12.87				
5	Shuttering ی قالب بند	M2	19.32				
6	Reinforced beam بیم سبخدارب	M3	0.44				
7	Slab RCC بخدار سلب س	M3	1.21				
8	Plastering of Wall 1:3 ی پلستر کار	M2	151.78				
9	Metal Doors and Windows بین فلزی دروازه و کلک (مطابق نقشه)	M2	9.03				
10	Oil Painting ی رنگ روغن	M2	9.03				
11	Painting (30% plastic) ی رنگ مال (30% پلاستیک ف)	M2	151.78				
12	Ventilation pipe (PVC 6") پپ تهویه نش انچ پ (6 اینچ)	M	18.00				
13	PCC mark 200 بیت عدی کنکر	M3	1.08				
14	GI sheet gage 18 پچ آهن چادر گ-18	M2	21.12				
15	Round wood under each rafter dia. 10cm L=20 cm چوب گرد تحت چوب سقف	M	6.4				
16	Wooden Rafter size 6x9x265 (Or round wood dia. 12 cm) چوب خار یا چوب گرد به قطر 12 سانتی	M	42.4				
17	Hooks for cloth چنگ برای لباس	No	18.00				
18	J-hook or L-hook پپچ ال ساند یا جی ساند	No	40.00				
19	Window screens ی کلکین هاجال	M2	1.26				
<b>Sub Total</b>							

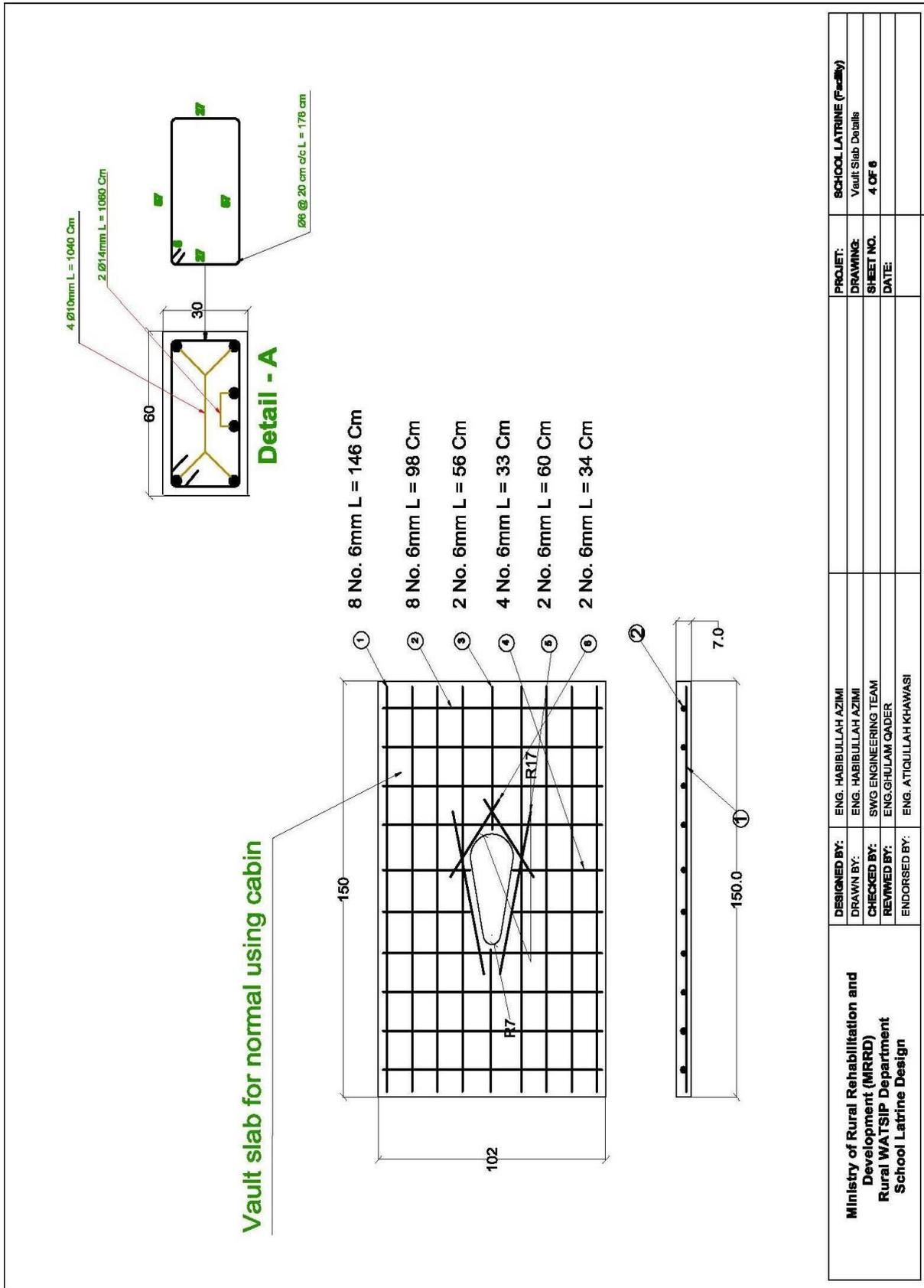


## 6 - Hole Vault Latrine with Full Roofing (Continued)

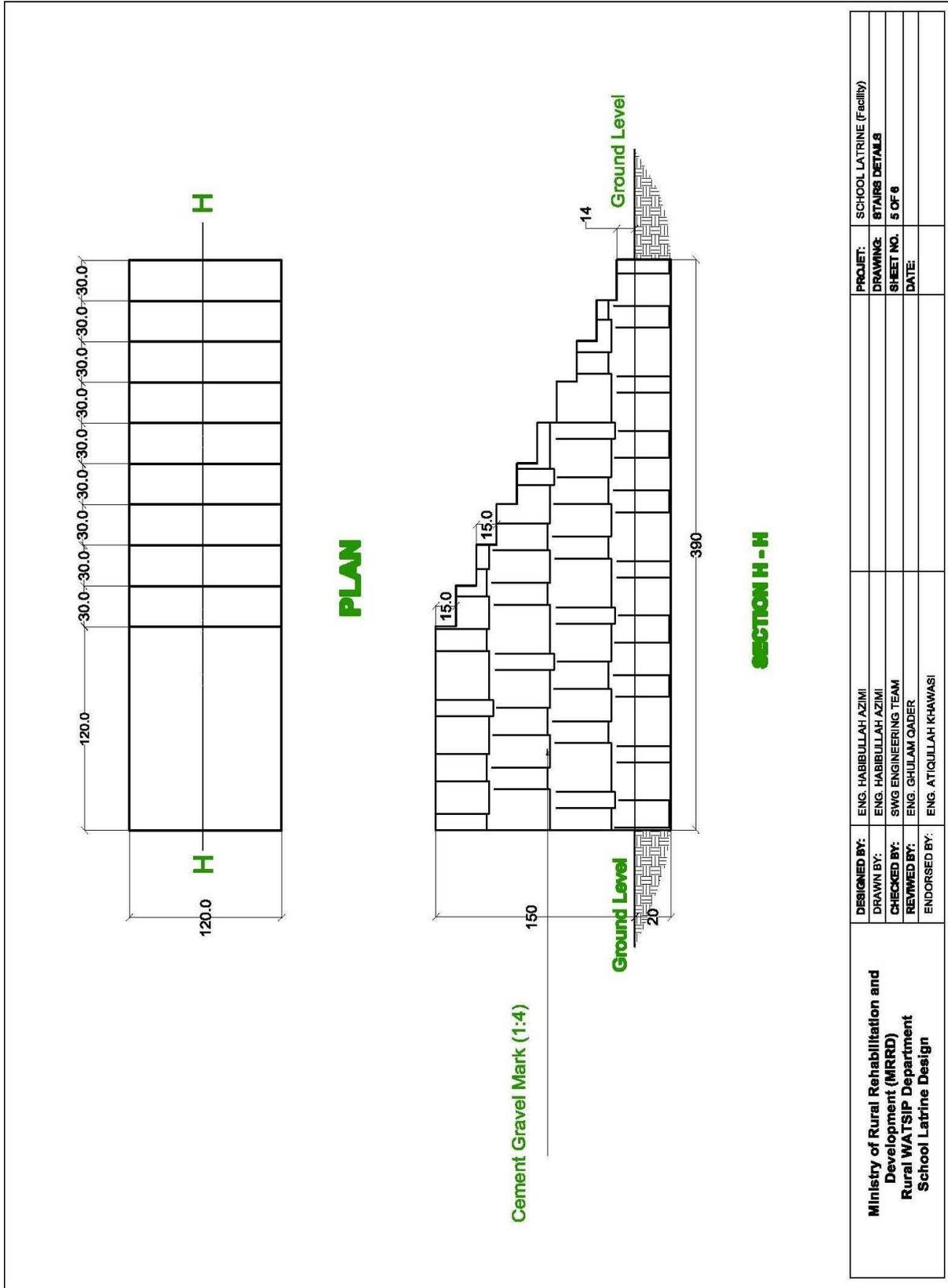




## 6 - Hole Vault Latrine with Full Roofing (Continued)

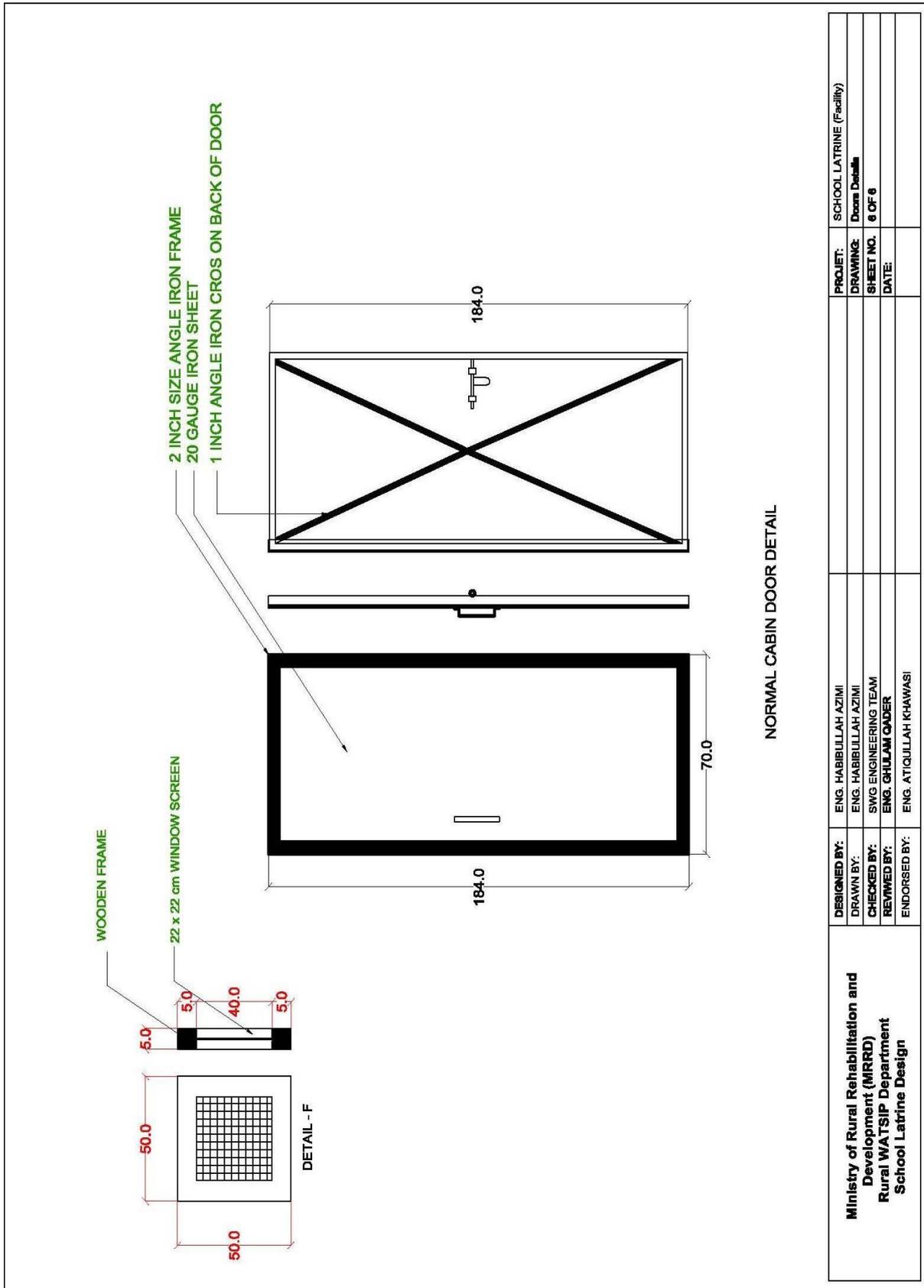


## 6 - Hole Vault Latrine with Full Roofing (Continued)



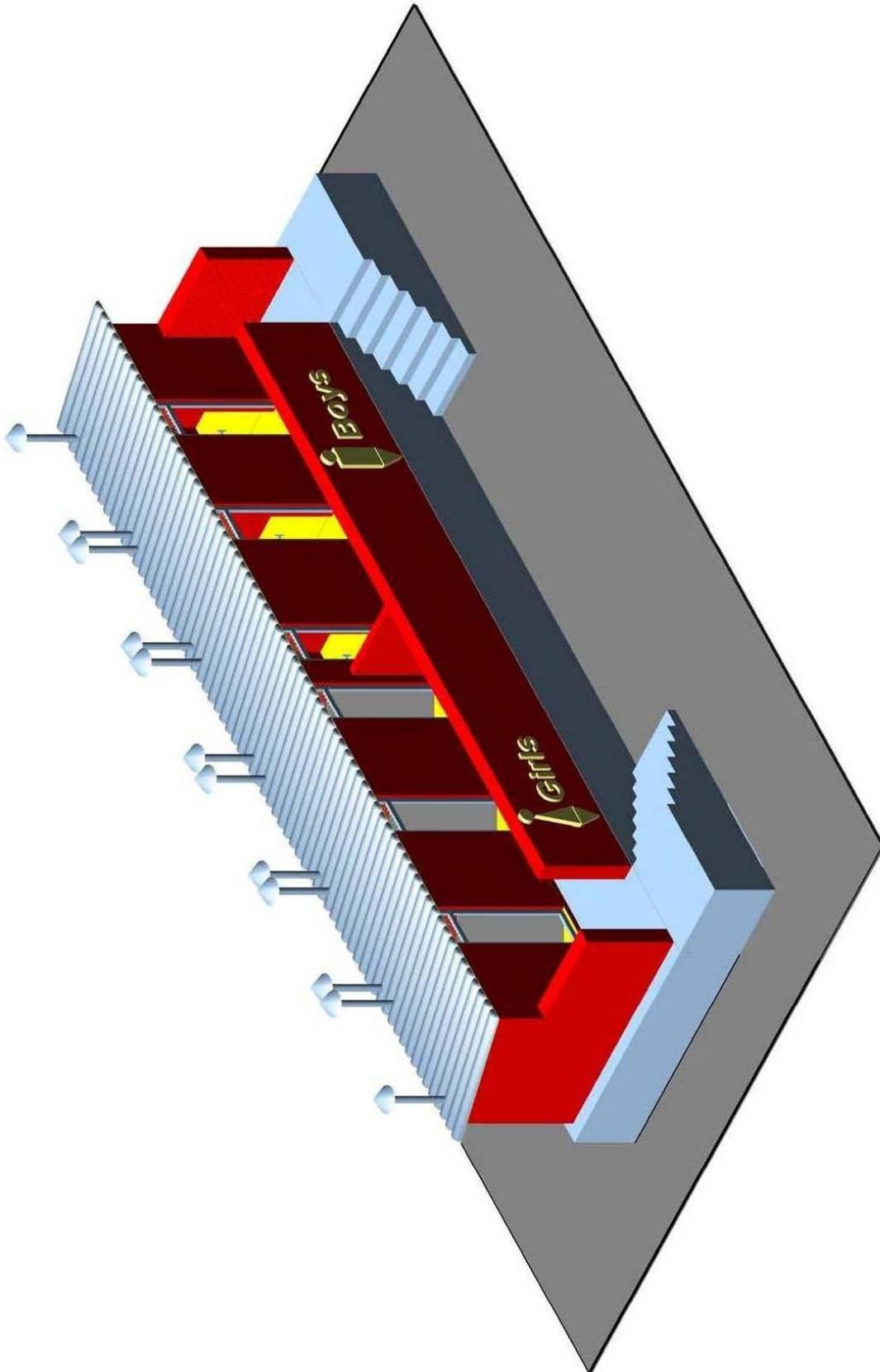
<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WATSIP Department</b> <b>School Latrine Design</b>	<b>DESIGNED BY:</b>	ENG. HABIBULLAH AZIMI	<b>PROJECT:</b>	SCHOOL LATRINE (Facility)
	<b>DRAWN BY:</b>	ENG. HABIBULLAH AZIMI	<b>DRAWING:</b>	STAIRS DETAILS
	<b>CHECKED BY:</b>	SWG ENGINEERING TEAM	<b>SHEET NO.:</b>	5 OF 6
	<b>REVIEWED BY:</b>	ENG. GHULAM QADER	<b>DATE:</b>	
	<b>ENDORSED BY:</b>	ENG. ATIQULLAH KHAWASI		

## 6 - Hole Vault Latrine with Full Roofing (Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WATSIP Department</b> <b>School Latrine Design</b>	<b>DESIGNED BY:</b> ENG. HABIBULLAH AZIMI <b>DRAWN BY:</b> ENG. HABIBULLAH AZIMI <b>CHECKED BY:</b> SWG ENGINEERING TEAM <b>REVIEWED BY:</b> ENG. GHULAM QADER <b>ENDORSED BY:</b> ENG. ATIQUILLAH KHAWASI	<b>PROJECT:</b> SCHOOL LATRINE (Facility) <b>DRAWING:</b> Doors Details <b>SHEET NO.:</b> 6 OF 6 <b>DATE:</b>
--	--	--

**6 - Hole Vault Latrine with Full Roofing (Continued)**





د کليو د پياوړتيا وزارت  
وزارت اسیا واکشاف وابت

د افغانستان اسلامي جمهوریت  
جمهوری اسلامی افغانستان



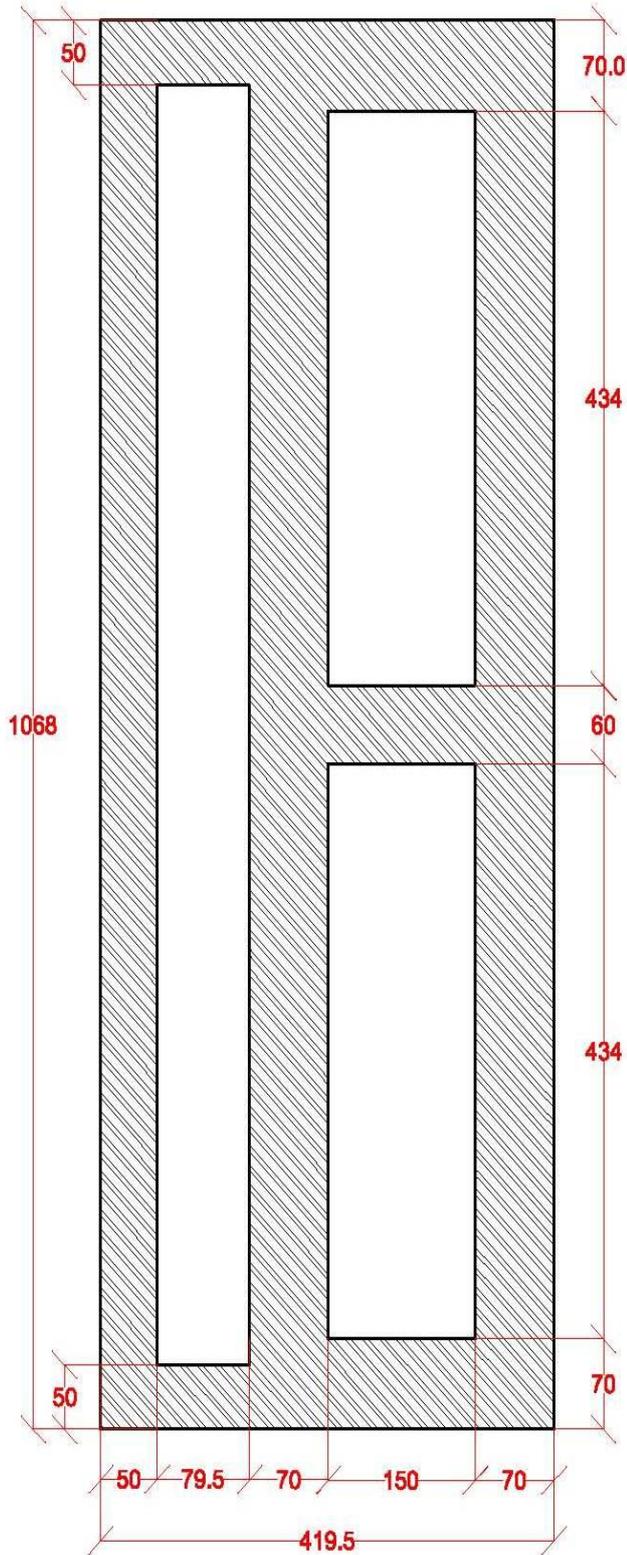
Islamic Republic of Afghanistan  
Ministry of Rural Rehabilitation & Development

**Rural WatSan Department**

BoQ For Vault Latrine (6 rooms) with CGI Sheet Roof in schools

No شماره	Activities بیت فعال	Unit واحد	Quantity مقدار	Unit Cost (Afs.) بیمت فی واحد به افغانی	Total Cost in Figure بیمت مجموعه به افغانی	Total Cost in words بیمت مجموع به حروف	Remarks ملاحظات
1	Excavation in medium soil ی در زمین متوسط کندن	M3	34.53				
2	Stone Masonry (M:300) (1:4) ی با مصالح و مارکسنگ کار	M3	146.00				
3	Pointing of Stone Masonry ی با مخلوطانگاف کار (1:3)	M2	349.00				
4	RCC Ring-Beam with shuttering بیم سبخار معه قلب بندی آنر	M3	2.00				
5	Roof CGI Sheet guage 24 with wooden beams بچی پوش بام با آهن چادر گیچ فی 24 معه ملحقات آن مطابق نقشه	M2	45.00				
6	Door lintels سر طاق دروازه ها مطابق نقشه	M	19.60				
7	Window lintels بیم ها مطابق نقشه سر طاق کلک	M	21.00				
8	Short woods under rafters L=20cm ی مغز دیوار جهت محکم کاری چوب سقف به طول چوب ها	No	38.00				
9	Metal Doors and Windows بیم دروازه و کلک (مطابق نقشه)	M2	9.27				
10	Oil Painting ی رنگ روغن	M2	9.27				
11	Compacted Soil خاک تپک شده	M3	11.70				
12	Compacted river stone 15cm پایه سنگ تپک شده در	M3	1.35				
13	Ventilation pipe (PVC Dia 10cm or 4") پپ تهویه چهل انچ پ	M	22.80				
14	PCC (mark 200) (1:6) بیم بنون سیخ یا مخلوط و مارک کاتکر	M3	2.20				
15	Window screens ی کلکین هاجل	M2	1.22				
<b>Total</b>							

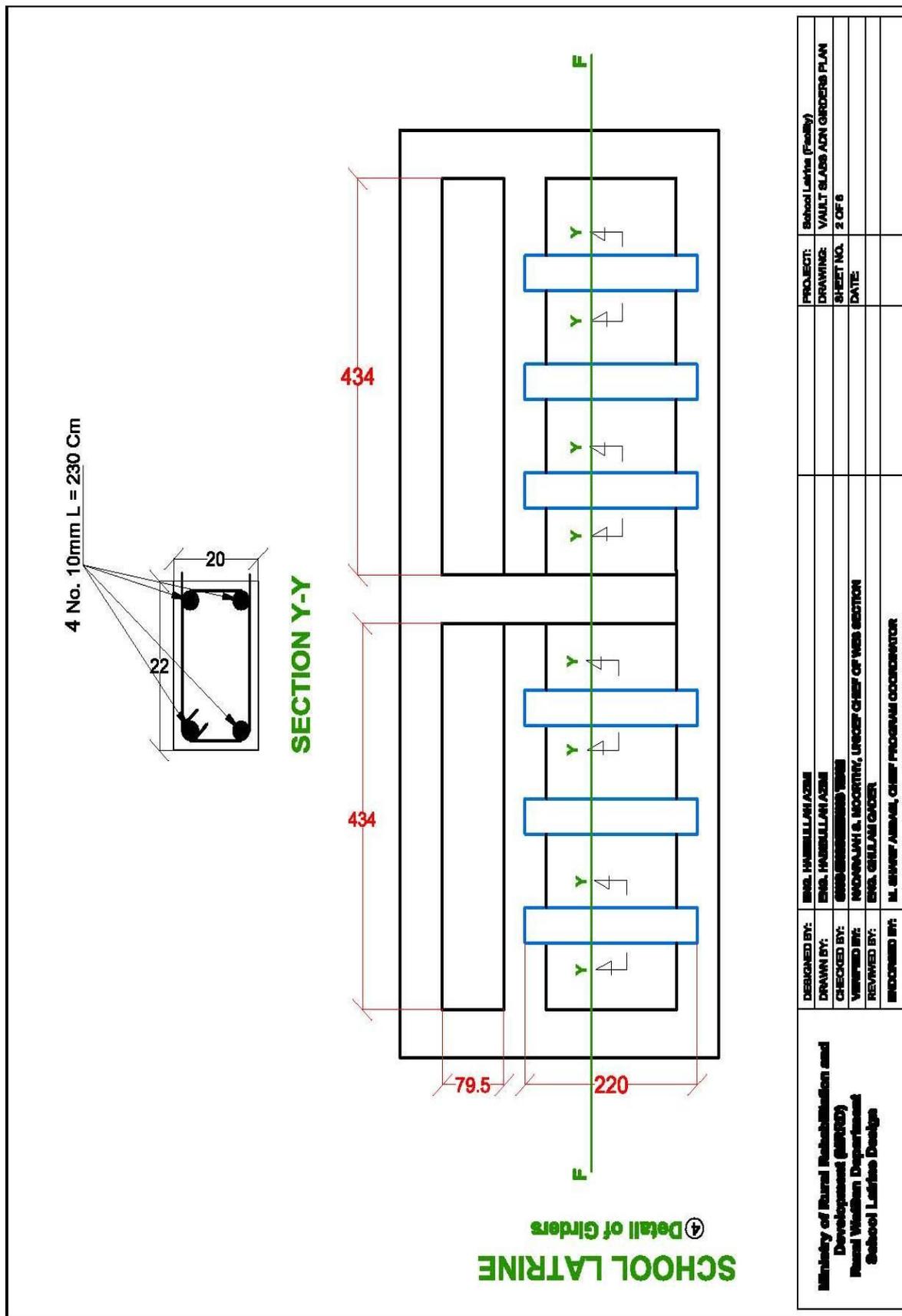
## 8 - Hole Pit Latrine for Schools



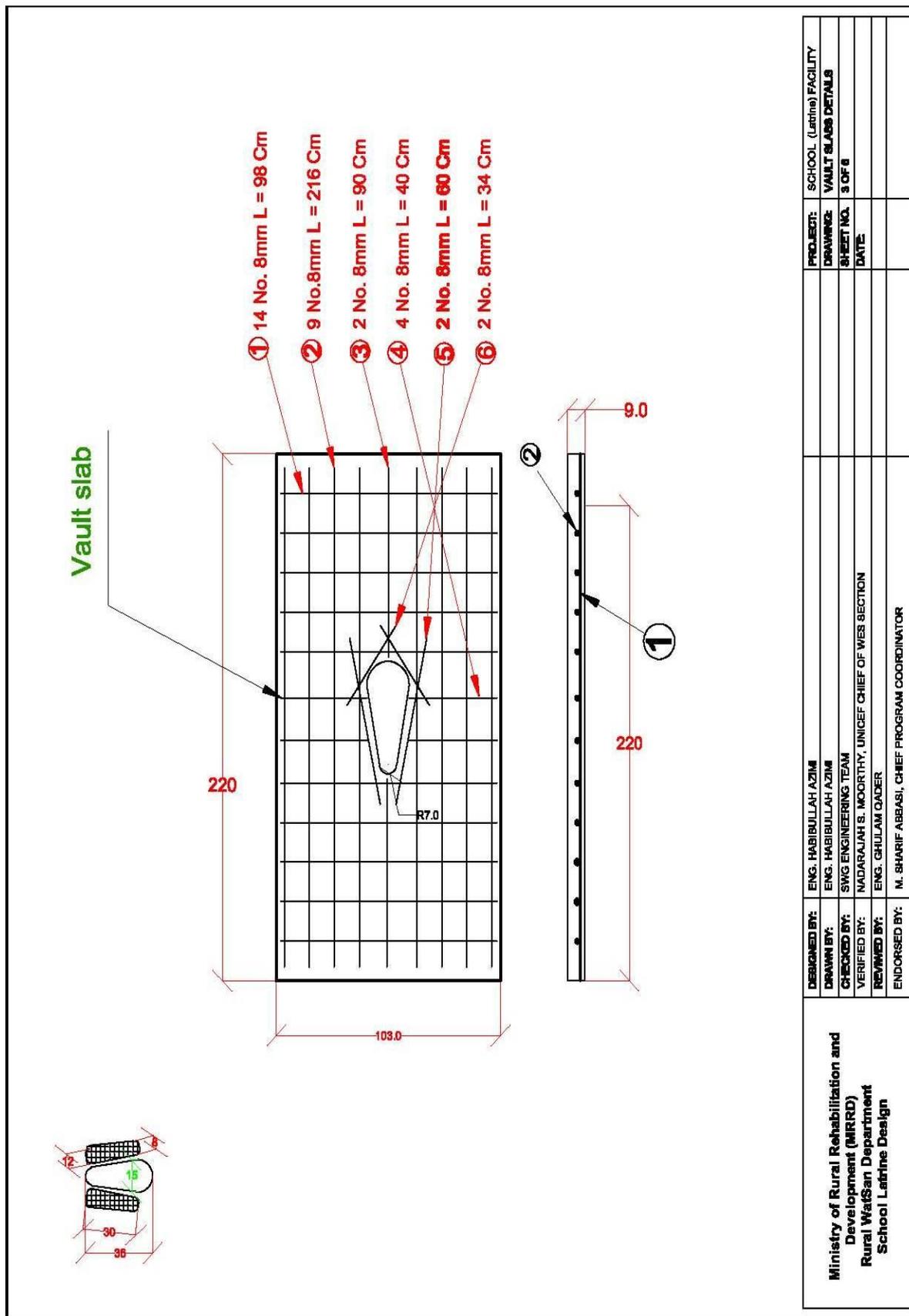
### EXCAVATION PLAN

	<b>PROJECT:</b>	SCHOOL (Latrine) FACILITY
	<b>DRAWING:</b>	FOUNDATION PLAN
	<b>SHEET NO.:</b>	1 OF 8
	<b>DATE:</b>	
<b>DESIGNED BY:</b>	<b>DR. MOHAMMAD ALI JAWAD</b>	
<b>DRAWN BY:</b>	<b>MR. MOHAMMAD ALI JAWAD</b>	
<b>CHECKED BY:</b>	<b>MR. MOHAMMAD ALI JAWAD</b>	
<b>VERIFIED BY:</b>	<b>NADARAJAH S. MOORTHY, UNICEF CHIEF OF WES SECTION</b>	
<b>REVIEWED BY:</b>	<b>MR. MOHAMMAD ALI JAWAD</b>	
<b>ENDORSED BY:</b>	<b>M. SHARIF ABBASI, CHIEF PROGRAM COORDINATOR</b>	
<b>Ministry of Rural Rehabilitation and Development (MRRD) Rural Water Supply and Sanitation Department School Latrine Study</b>		

## 8 - Hole Pit Latrine for Schools (Continued)

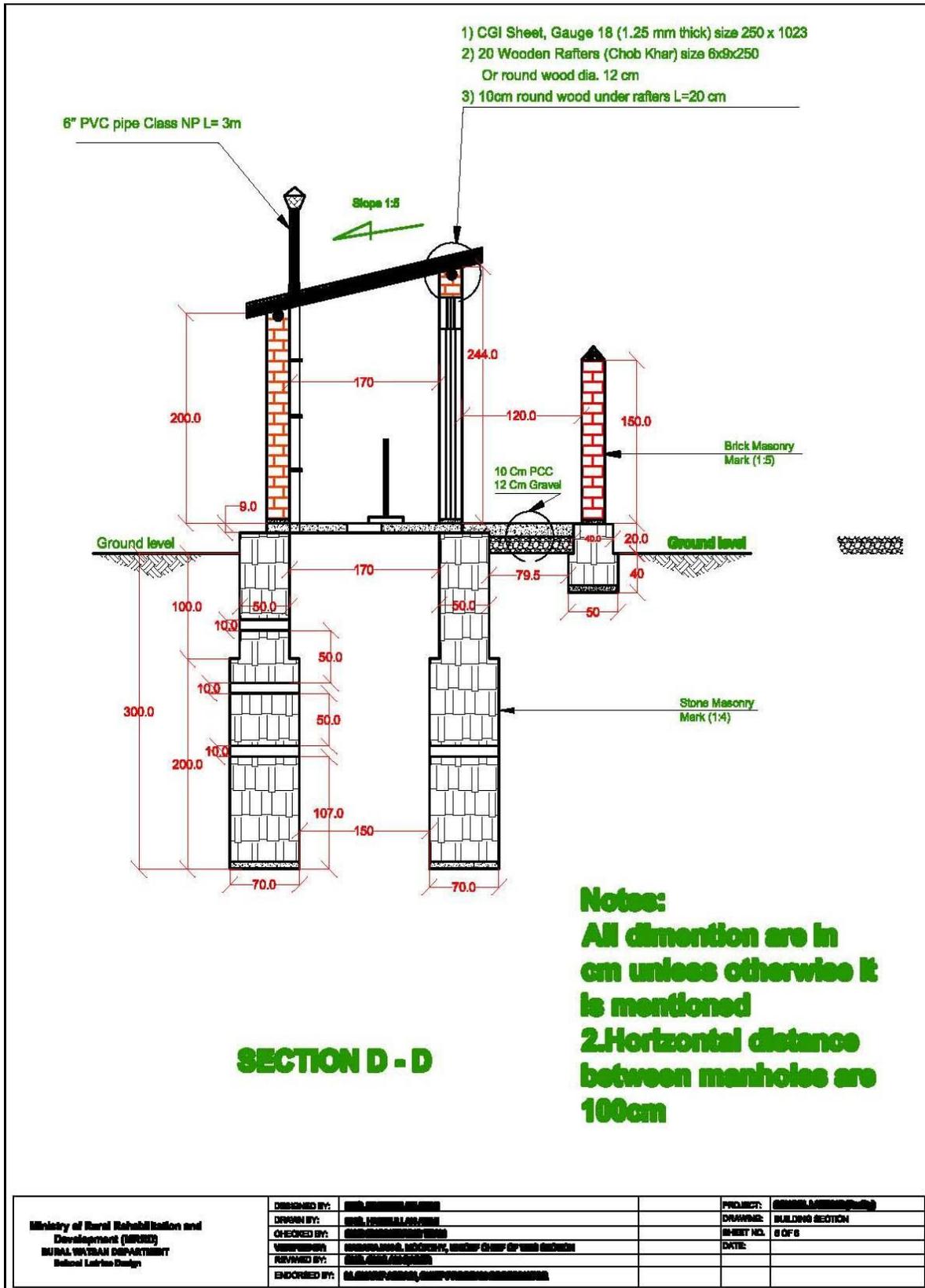


## 8 - Hole Pit Latrine for Schools (Continued)

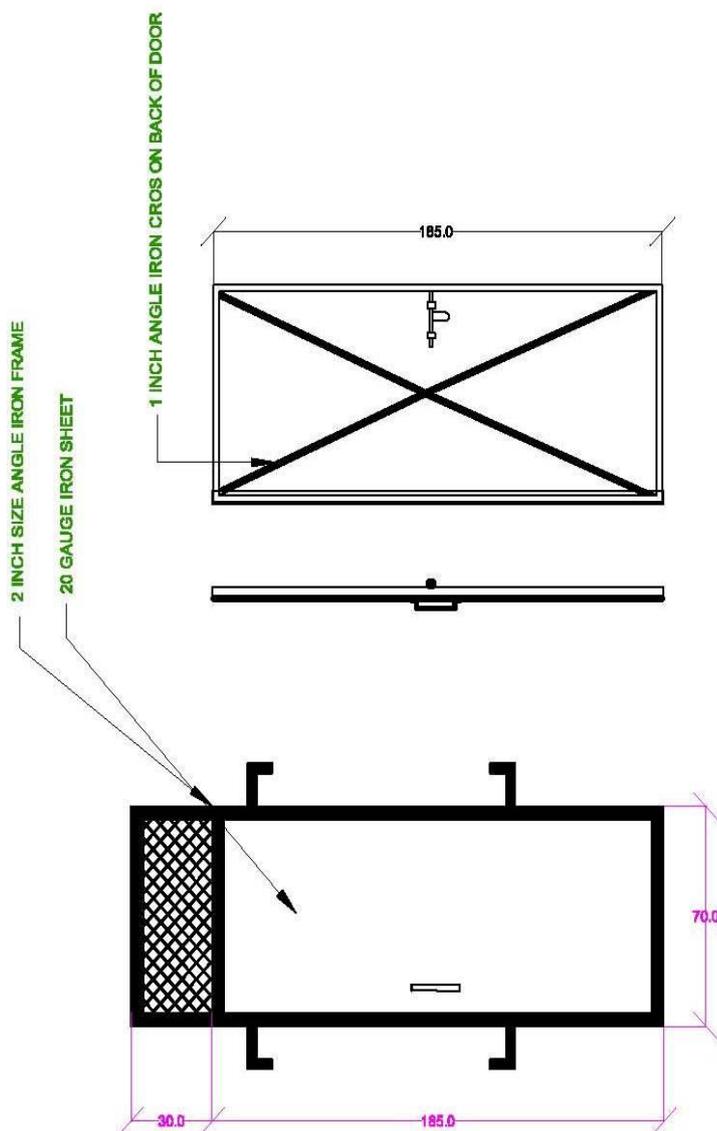




## 8 - Hole Pit Latrine for Schools (Continued)

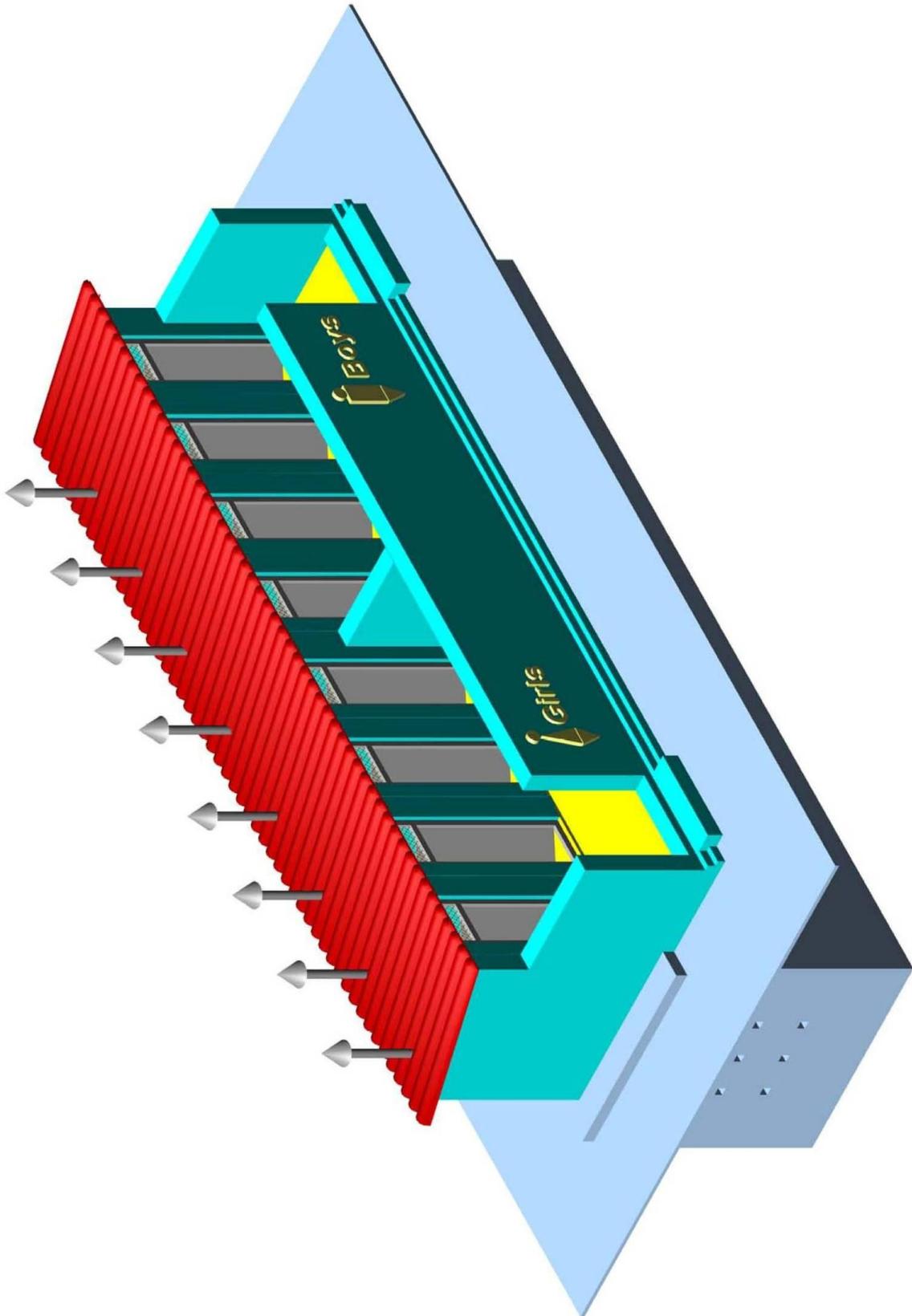


## 8 - Hole Pit Latrine for Schools (Continued)



	DESIGNED BY: ENG. HABIBULLAH AZMI	PROJECT: School Latrines (Faculty)	
	DRAWN BY: ENG. HABIBULLAH AZMI	DRAWING: Doors Plan	
	CHECKED BY: WABO ENGINEERING TEAM	SHEET NO. 6 OF 8	
	VERIFIED BY: MADARJAHIL M. MORTYNY, USER CHIEF OF HIS SECTION	DATE:	
	REVIEWED BY: ENG. GHULAM QADER		
	ENDORSED BY: M. SHAFIQ AHMAD, CHIEF PROGRAM COORDINATOR		
Ministry of Rural Rehabilitation and Development (MRRD) Rural Wa/San Department School Latrine Design			

## 8 - Hole Pit Latrine for Schools (Continued)





**Islamic Republic of Afghanistan**  
**Ministry of Rural Rehabilitation and Development**  
**Rural WatSan Department**

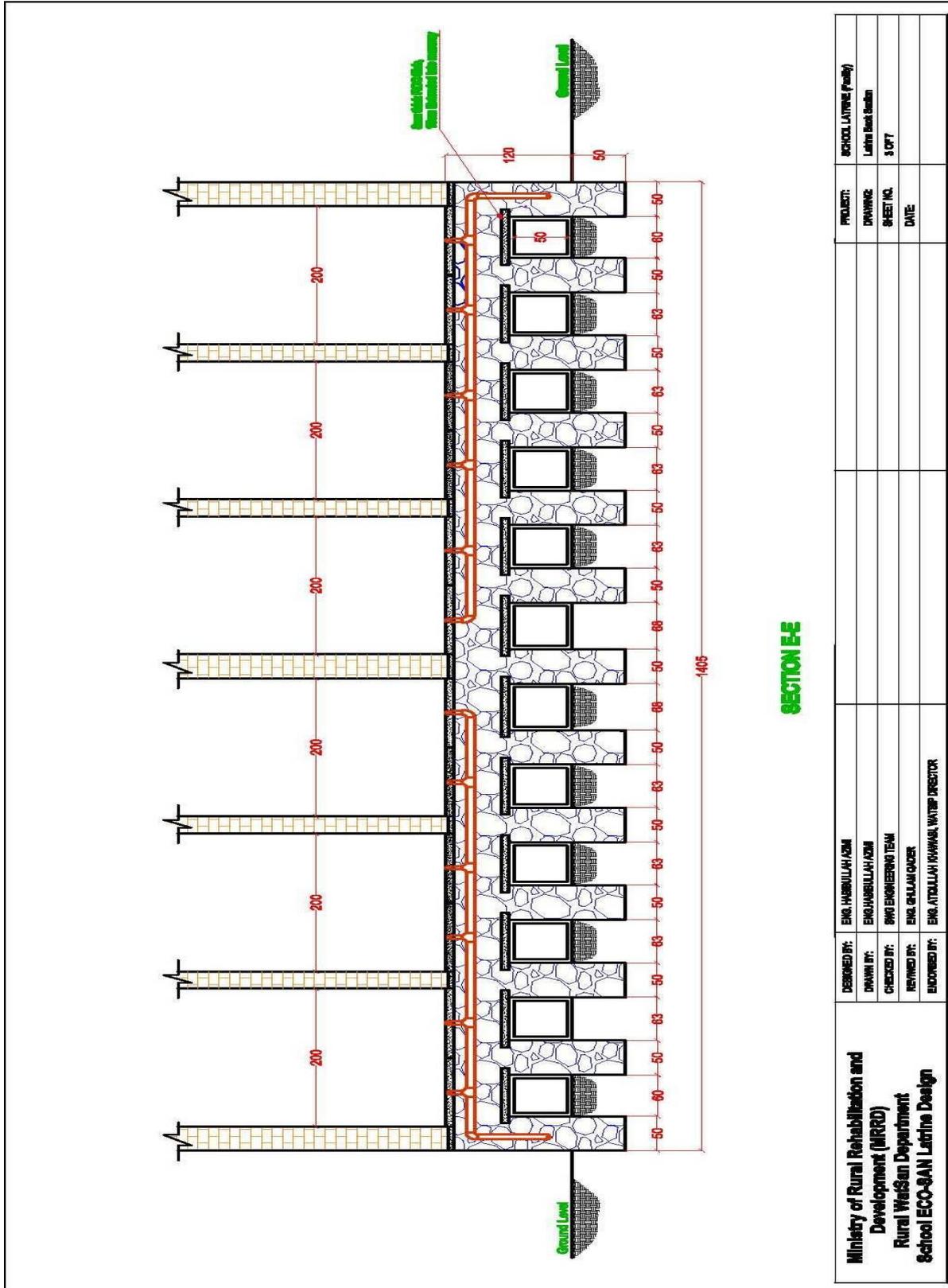
**BoQ For 1Set Direct Pit Latrine (8 rooms) for School**

No شماره	Activities بیت مافعال	Unit واحد	Quantity مقدار	Unit Cost (Afs.) ی واحد به افغانی قیمت ف	Total Cost in Figure ی قیمت مجموعه به افغان	Total Cost in words قیمت مجموع به حروف	Remarks ملاحظات
1	Excavation in medium soil ی در زمین متوسط کنده کار	M3	95.37				
2	Stone Masonry (M:300) (1:4) ی سنگ کار	M3	53.74				
3	Pointing of Stone Masonry ی انگاف کار	M2	79.12				
4	Brick Masonry (M:250) (1:5) ی خشت کار	M3	15.87				
5	Shuttering ی قالب بند	M2	26.31				
6	Reinforced beam بیم سیخدارب	M3	0.58				
7	Slab RCC بخدار سلب س	M3	1.62				
8	Plastering of Wall 1:3 ی پلستر کار	M2	179.56				
9	Metal Doors and Windows بین فلزی دروازه و کلک (مطابق نقشه)	M2	12.04				
10	Oil Painting ی رنگ روغن	M2	12.04				
11	Painting (30% plastic) ی رنگ مال 30% پلاستیک ف	M2	179.56				
12	Ventilation pipe (PVC 6") بپ نهویه شش انچ 6"	M	24.00				
13	PCC mark 200 بیت عادی کنکر	M3	1.36				
14	GI sheet gage 22 بیج آهن چادر گ-22	M2	25.57				
15	Round wood under each rafter چوب گرد تحت چوب سقف	No	40				
16	Wooden Rafter size 6x9x250 (Or round wood dia. 12 cm) چوب خار یا چوب گرد به قطر 12 سانتی	No	20				
17	Hooks for cloth چنگگ برای لباس	No	24.00				
18	J-hook or L-hook پیچ ال مانند یا جی مانند	No	45.00				
19	Window screens ی کلکین ماچال	M2	1.68				
<b>Sub Total</b>							



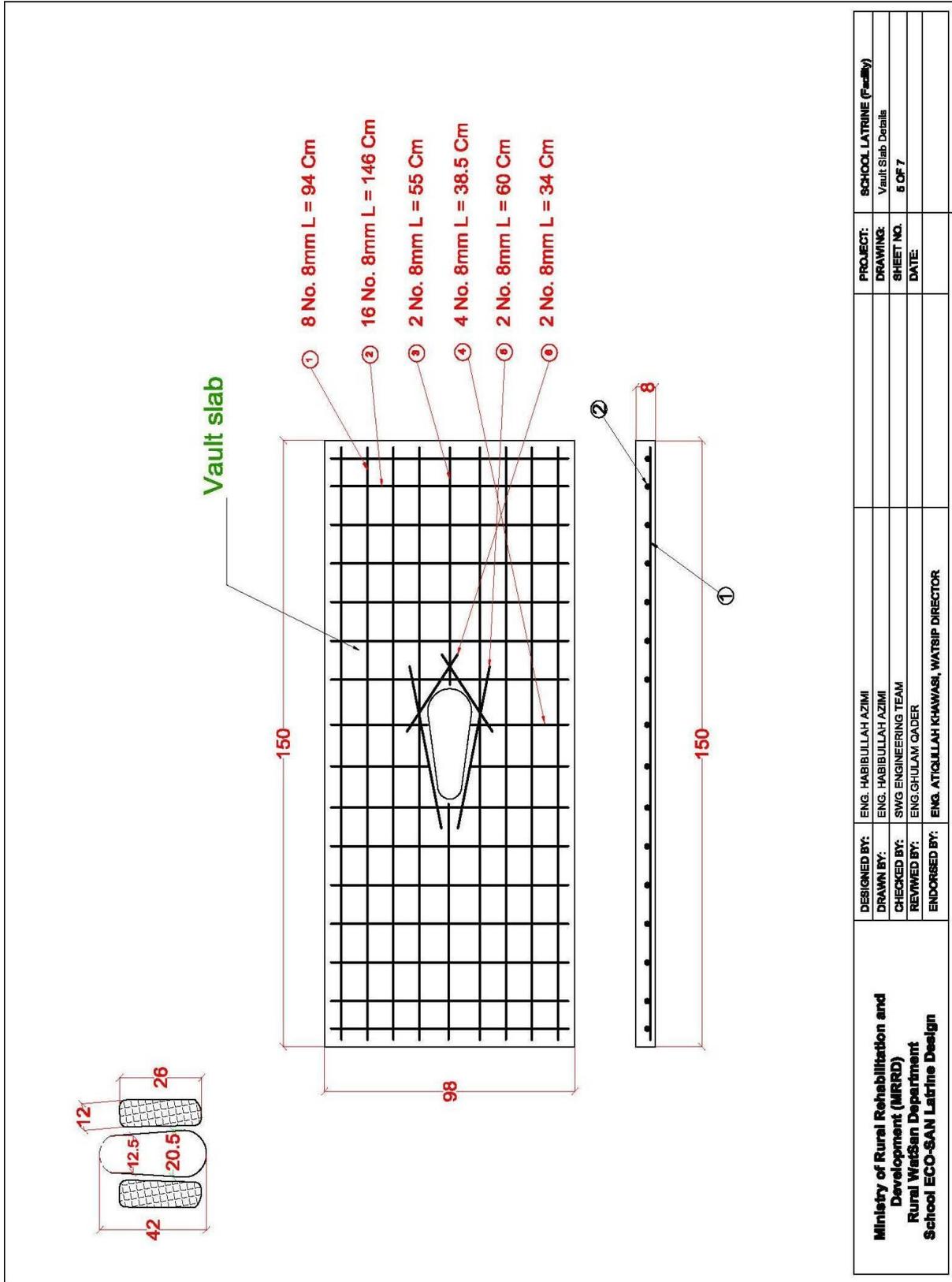


## 12 - Hole Vault Latrine (Continued)

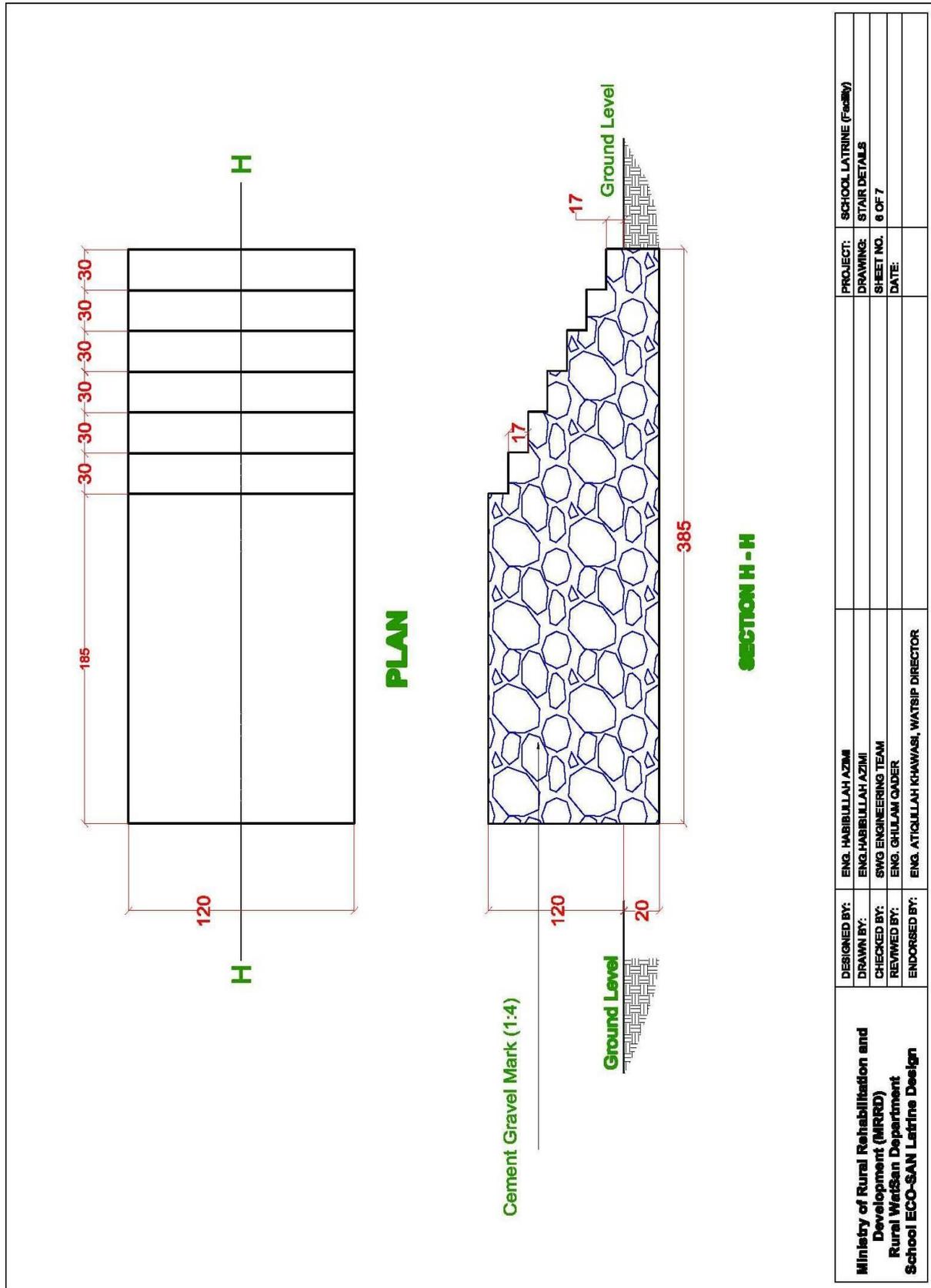




## 12 - Hole Vault Latrine (Continued)

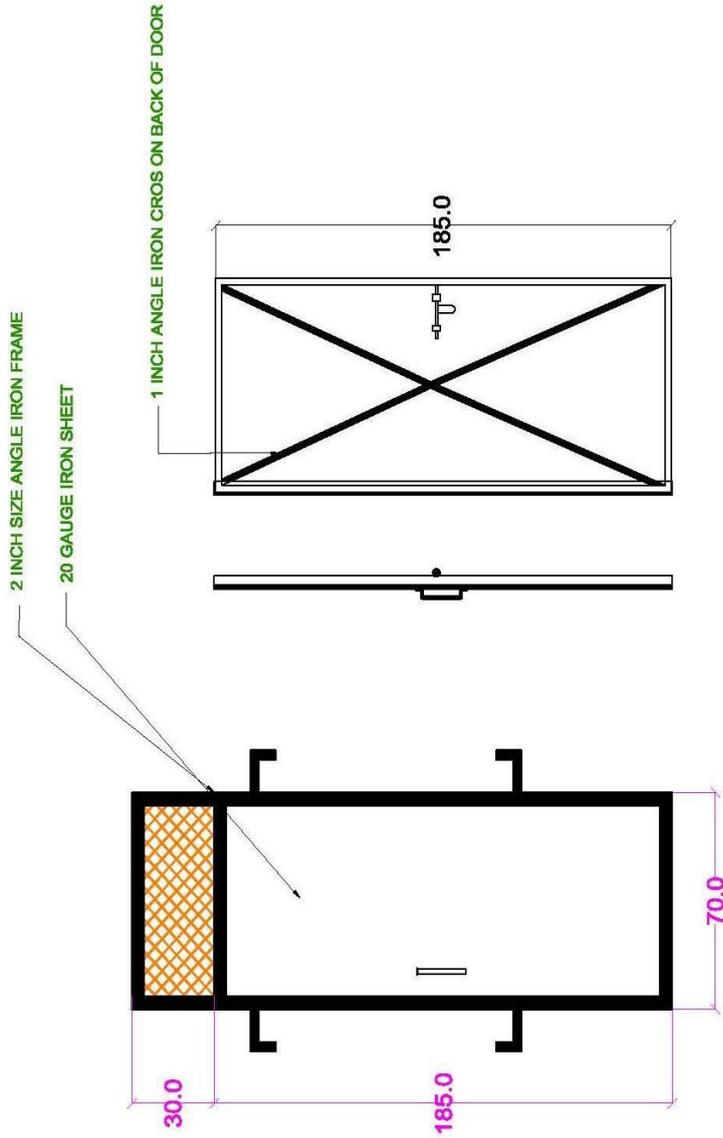


## 12 - Hole Vault Latrine (Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural Water Department</b> <b>School ECO-SAN Latrine Design</b>	DESIGNED BY:	ENG. HABIBULLAH AZMI	PROJECT:	SCHOOL LATRINE (Faculty)
	DRAWN BY:	ENG. HABIBULLAH AZMI	DRAWING:	STAIR DETAILS
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.:	6 OF 7
	REVIEWED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	ENG. ATIQULLAH KHAWASI, WATSIP DIRECTOR		

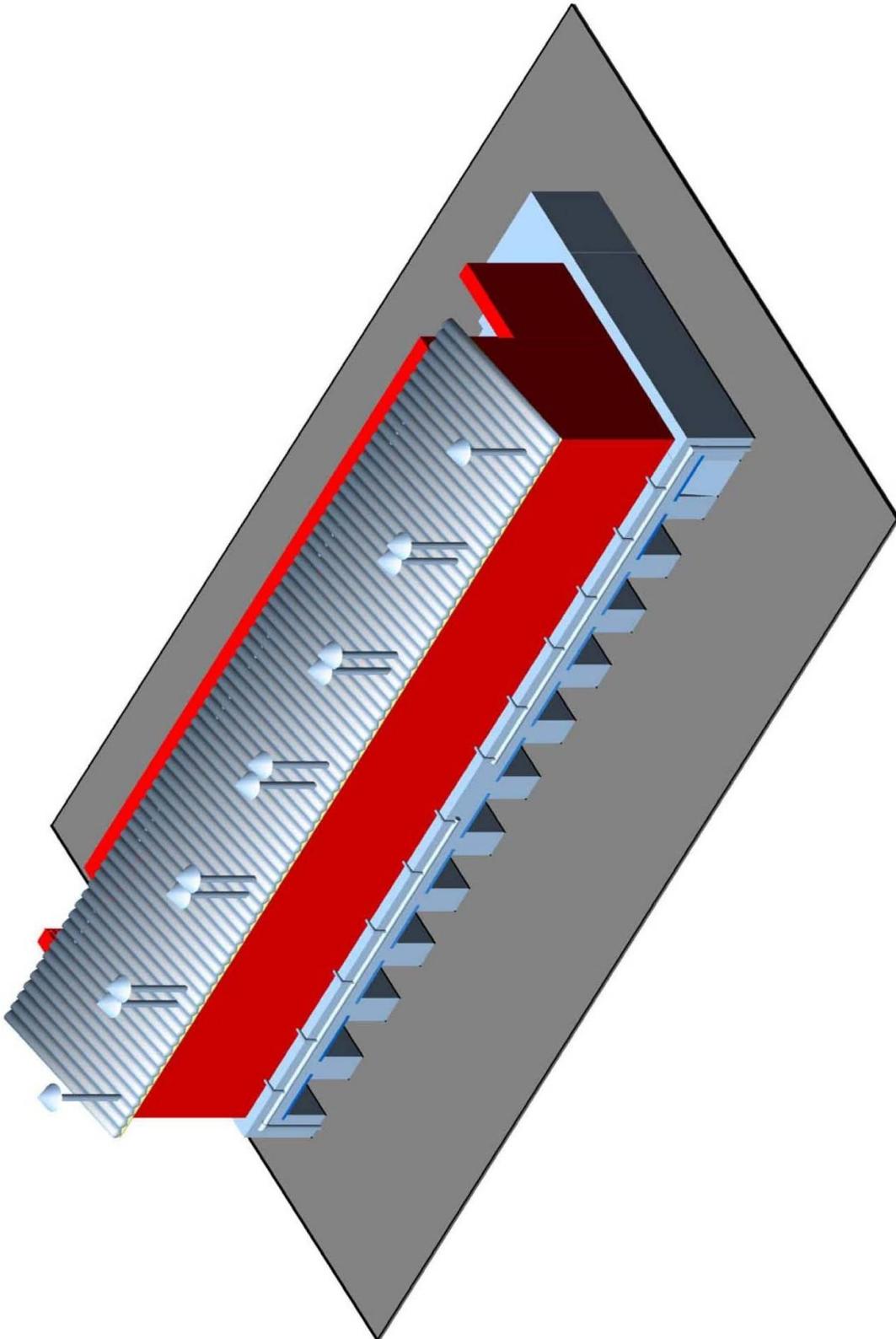
## 12 - Hole Vault Latrine (Continued)



NORMAL CABIN DOOR DETAIL

<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WaSaSan Department</b> <b>School ECO-SAN Latrine Design</b>	DESIGNED BY:	ENG. HABIBULLAH AZMI	PROJECT:	SCHOOL LATRINE (Facility)
	DRAWN BY:	ENG. HABIBULLAH AZMI	DRAWING:	DOOR DETAILS
	CHECKED BY:	SWG ENGINEERING TEAM	SHEET NO.:	7 OF 7
	REVIEWED BY:	ENG. GHULAM QADER	DATE:	
	ENDORSED BY:	ENG. ATICULLAH KHAWASI, WATSIP DIRECTOR		

## 12 - Hole Vault Latrine (Continued)





د کليو د بيارغونې او پراختيا وزارت  
وزارت ايجيا و انکشاف د ملت

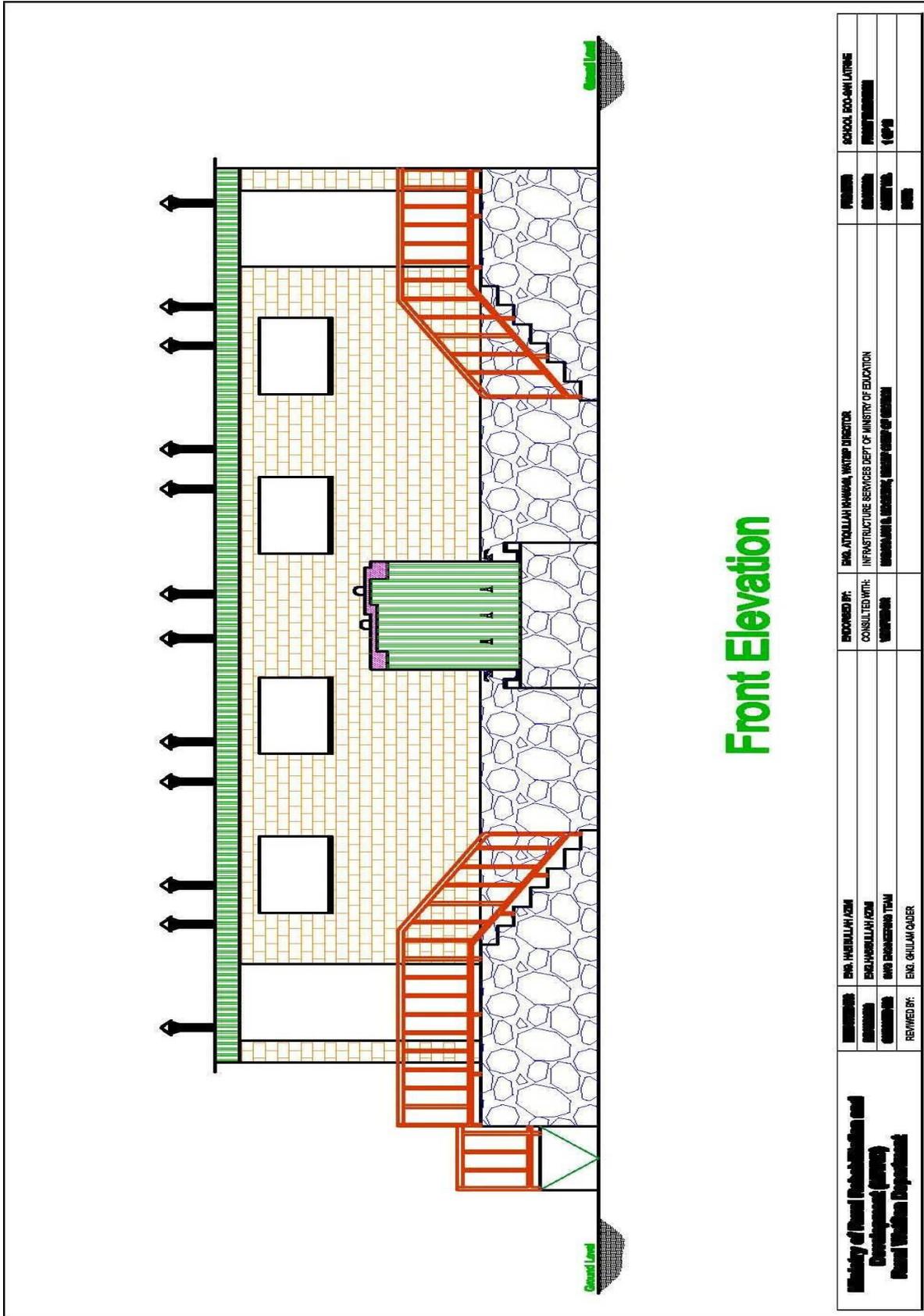
د افغانستان اسلامي جمهوريت  
جمهوری اسلامی افغانستان



Islamic Republic of Afghanistan  
Ministry of Rural Rehabilitation and Development  
Water Supply and Irrigation Department  
BoQ of Eco-San Latrine for Schools

No شماره	Activities بیت ها/فعال	Unit واحد	Quantity مقدار	Unit Cost (Afs.) بیت فی واحد به افغانی	Total Cost in Figure بیت مجموعا به افغانی	Total Cost in words بیت مجموع به حرفی	Remarks ملاحظات
1	Excavation in medium soil ی د زمین متوسط کنده کار	M3	16.38	200	3276		
2	Stone Masonry (M:300) (1:4) ی با مصالح و مارکسنگ کار	M3	60.70	3000	182100		
3	Pointing of Stone Masonry ی با مظهرطادگانه کار	M2	88.00	100	8800		
4	Brick Masonry (M:250) (1:5) ی با مصالح و مارکسنگ کار	M3	39.00	4000	156000		
5	Slab RCC for vault and manholes with shuttering بخدا مہ فلای بندیسلب س	M3	1.82	9000	16380		
6	Plastering of interior faces of walls (Mark: 400) 1:3 ی داخل عبارت با مارکپلستر کار	M2	345.00	300	103500		
7	Plastering of exterior faces of walls (mark 400) 1:3 ی خارج عبارت با مارکپلستر کار	M2	92.00	300	27600		
8	Metal doors and windows with screen بڼ های طری مہ جالی دروازه ها و کلک(مطابق نقشه)	M2	9.57	2100	20097		
9	Oil Painting of doors and windows ی د کار دروازه ها و کلکن هارنگ روغن	M2	9.57	250	2392.5		
10	Painting of interior walls (50% plastic) ی سطح داخلی دیوارها رنگمال 0.50 پلاستیک ف	M2	345.00	250	86250		
11	Weather shield painting of exterior faces of walls ی سطح خارجی دیوارها توسط وینر شیلدرنگمال	M2	92.00	250	23000		
12	Compacted Soil 95cm thick خاک نیک شده به ضخامت 95 سانت	M3	12.35	390	4816.5		
13	Compacted river stone 12cm بایی به ضخامتسنگ نیک شده در 2 سانت	M3	1.00	620	620		
14	Vent. pipe with clamp (PVC Dia 4") L=2.7m دب نهریبه چهارانچ به طول 2.7 متر	M	32.40	120	3888		
15	PCC (mark 150) بیت بدون سبج با مارک کانکر 150	M3	2.45	5500	13475		
16	Hooks for hanging clothes چنگک لباس	No	18.00	20	360		
17	Wooden Rafters, dia 12cm L= 3.8m چوب سقف بظر 2 ق و طول سانت 3.8 متر	M	91.20	200	18240		
18	Wooden Purlins, dia 12cm L= 14m چوب سقف بظر 2 ق و طول سانت 14 متر	M	98.35	200	19670		
19	J-hook or L-hook بج بشکل چنگک جی و ال برای محکم کاری آهن چادر و چوب سقف	No	60.00	20	1200		
20	Round wood under rafters, dia 10 cm L=14m چوب بظر 0 ق و طول سانت 14 یوان متر در متر د	M	14.00	150	2100		
21	CGI Sheet gauge 22 size 405x1435 for roof بج آهن چادر با 22 گ	M2	58.00	320	18560		
22	GI Pipe Dia. 3" بابب جسنی به قطر 3 انچ	M	17.60	450	7920		
23	GI Pipe Dia. 2" بابب جسنی به قطر 2 انچ	M	4.80	280	1344		
24	GI Elbow Dia. 2" زانی خم 2 انچ	No	12.00	90	1080		
25	Cast iron Tee (3x3x2)inch ی به قطر های سه دهن چودن	No	12.00	350	4200		
26	GI Elbow Dia. 3" زانی خم 3 انچ	No	2.00	180	360		
27	Wooden lintel of doors & windows ی برای دروازه ها و کلکن ها فران نقشه مطابق چوب	M	46.80	200	9360		
<b>Sub Total</b>					<b>736589</b>		

**12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand**

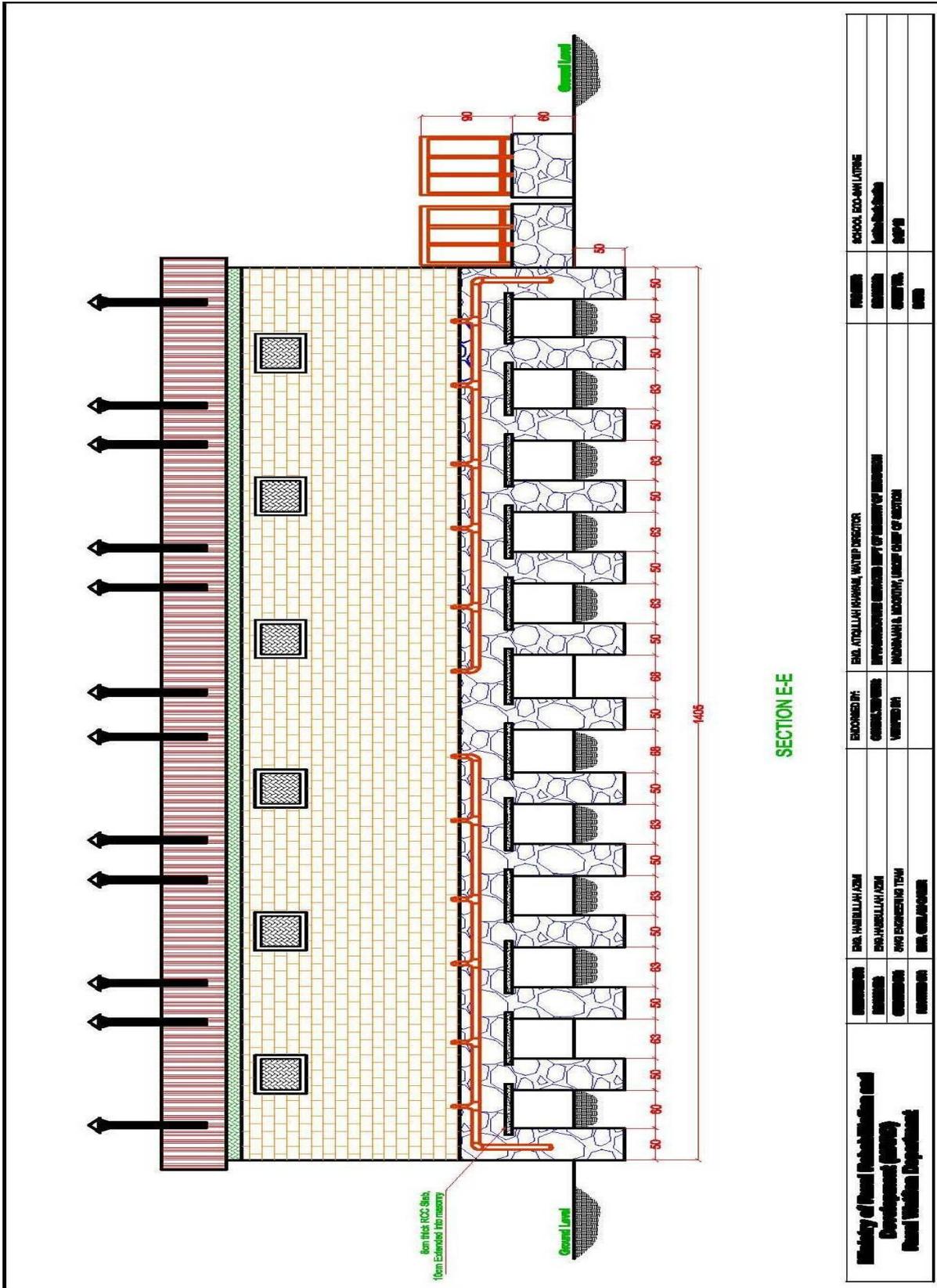


**Front Elevation**

<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural Water Services Department</b>		<b>DESIGNED BY:</b> ENR. ATULLAH KHANNAH, WATSP DIRECTOR INFRASTRUCTURE SERVICES DEPT OF MINISTRY OF EDUCATION MOHAKHAMA, KANDAHAR PROVINCE OF AFGHANISTAN	<b>PROJEC:</b> SCHOOL EDUCATION LATRINE KANDAHAR PROVINCE 1407/18
<b>REVISIONS:</b> NO. 01 DATE: 1407/18	<b>ENR. HASIBULLAH AZAM</b> ENR. HASIBULLAH AZAM ENR. INGENEERING TEAM	<b>CONSULTED WITH:</b> WATERWORKS MOHAKHAMA, KANDAHAR PROVINCE OF AFGHANISTAN	<b>DATE:</b> 1407/18
<b>REVIEWED BY:</b> ENR. GHULIAM QADER			

# 12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand

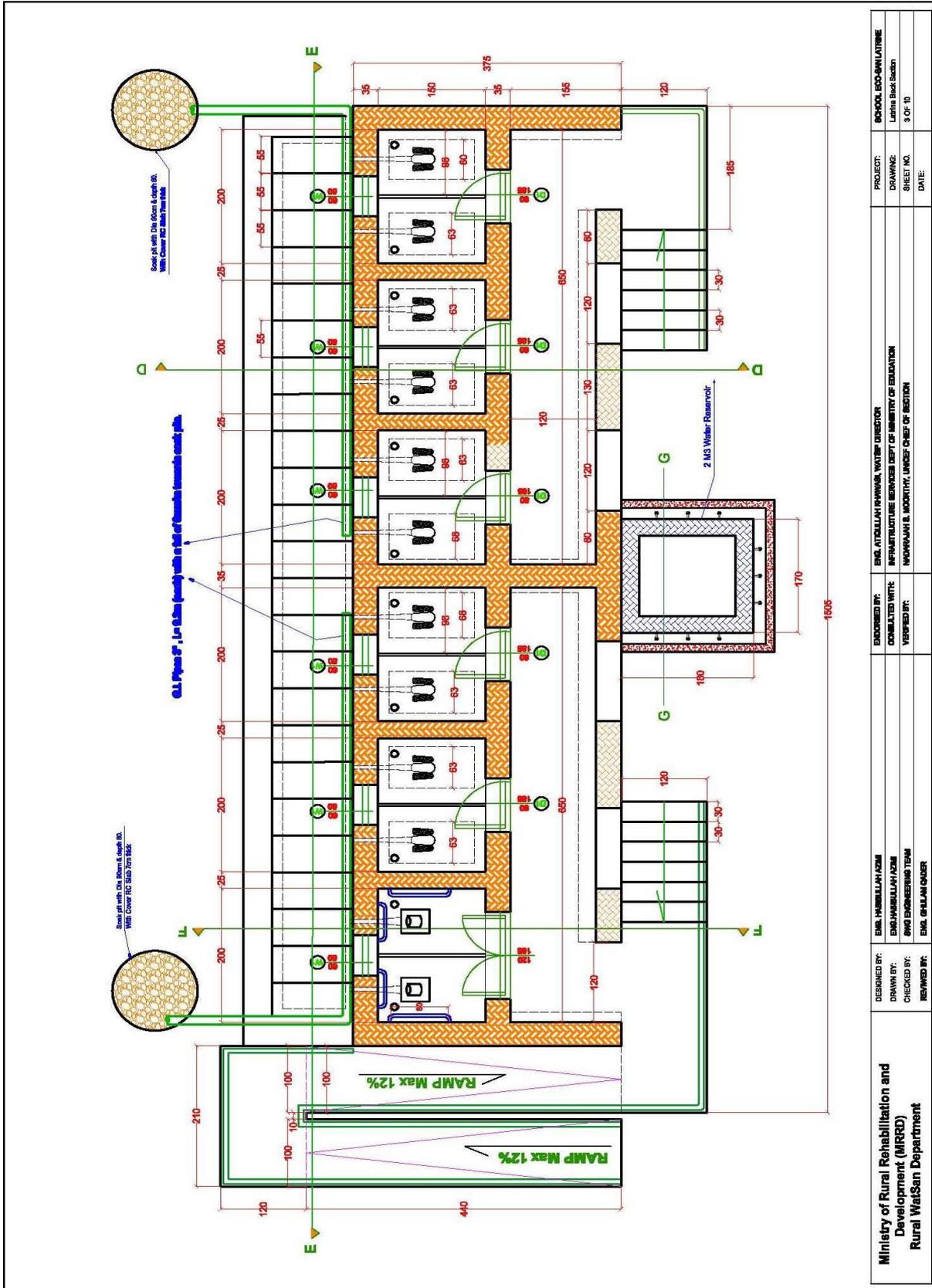
(Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural Rehabilitation Department</b>		DESIGNED BY:	ENR. ATULLAH KHAN, WATER DESIGNER	PROJECT:	SCHOOL ECO-SANITATION
		CONSULTANT:	INTERNATIONAL CENTER FOR WATER AND SANITATION	OWNER:	MRRD
APPROVED BY:	ENR. HADULLAH ZOMI	DATE:	08/20/10	SCALE:	AS SHOWN
DESIGNED BY:	ENR. HADULLAH ZOMI	DATE:	08/20/10	SCALE:	AS SHOWN
APPROVED BY:	ENR. HADULLAH ZOMI	DATE:	08/20/10	SCALE:	AS SHOWN

# 12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand

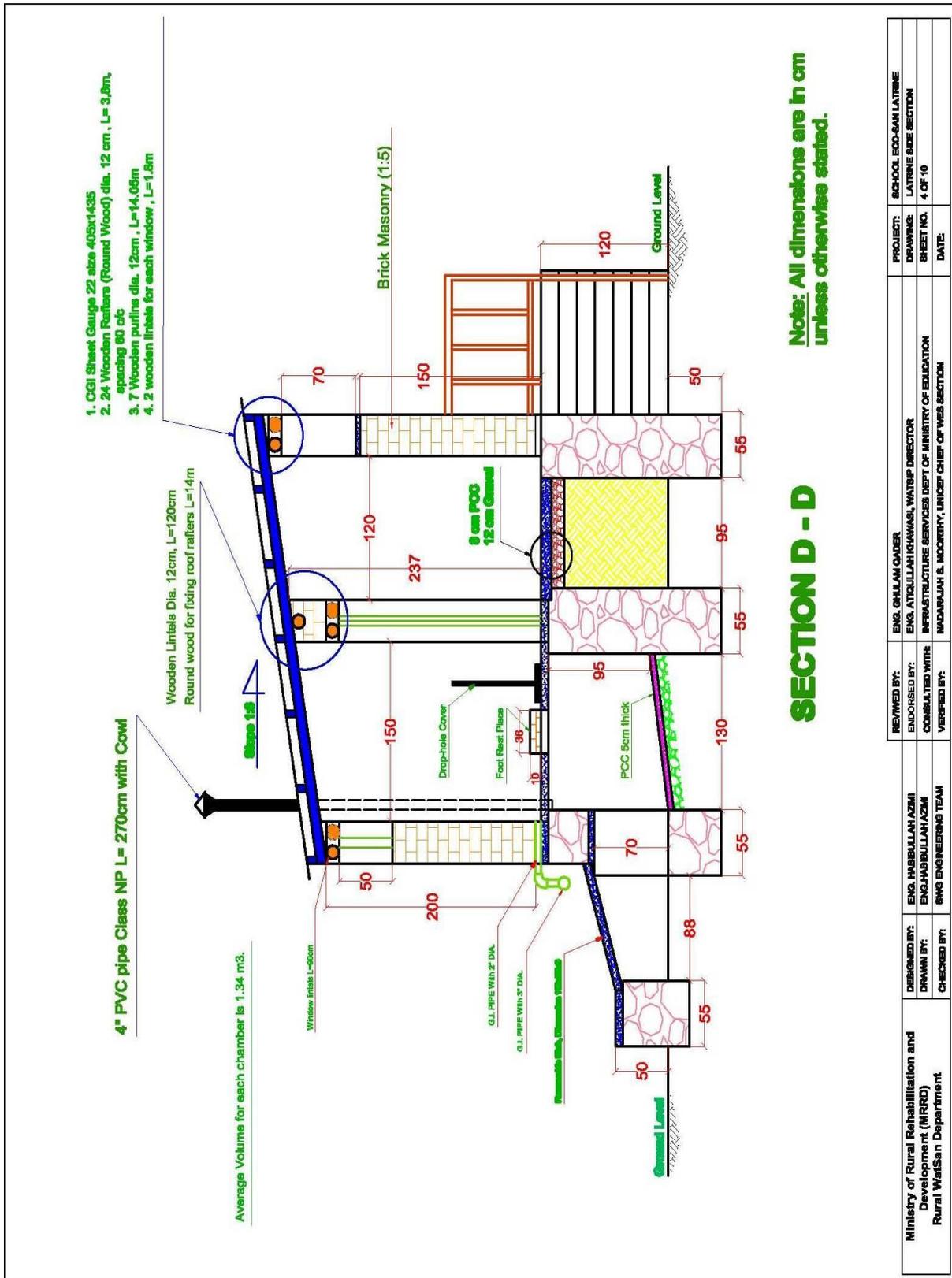
(Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> Rural Watsan Department	DESIGNED BY:	ENR. HAMBULLAH AZAM	ENDORSED BY:	ENR. ATULLAH NAWAZ, WATER DIRECTOR	PROJECT:	SCHOOL ECO-SANITATION
	DRAWN BY:	ENR. HAMBULLAH AZAM	COMPLETED WITH:	INFRASTRUCTURE SERVICES DEPT. OF MINISTRY OF EDUCATION	DRAWING:	Latrine Block Section
	CHECKED BY:	ENR. ENGINEERING TEAM	VERIFIED BY:	MOHAMMAD B. MOHAMMAD, UNDER CHIEF OF SECTION	SHEET NO.:	3 OF 10
	REVIEWED BY:	ENR. GHULAM QADIR			DATE:	

# 12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand

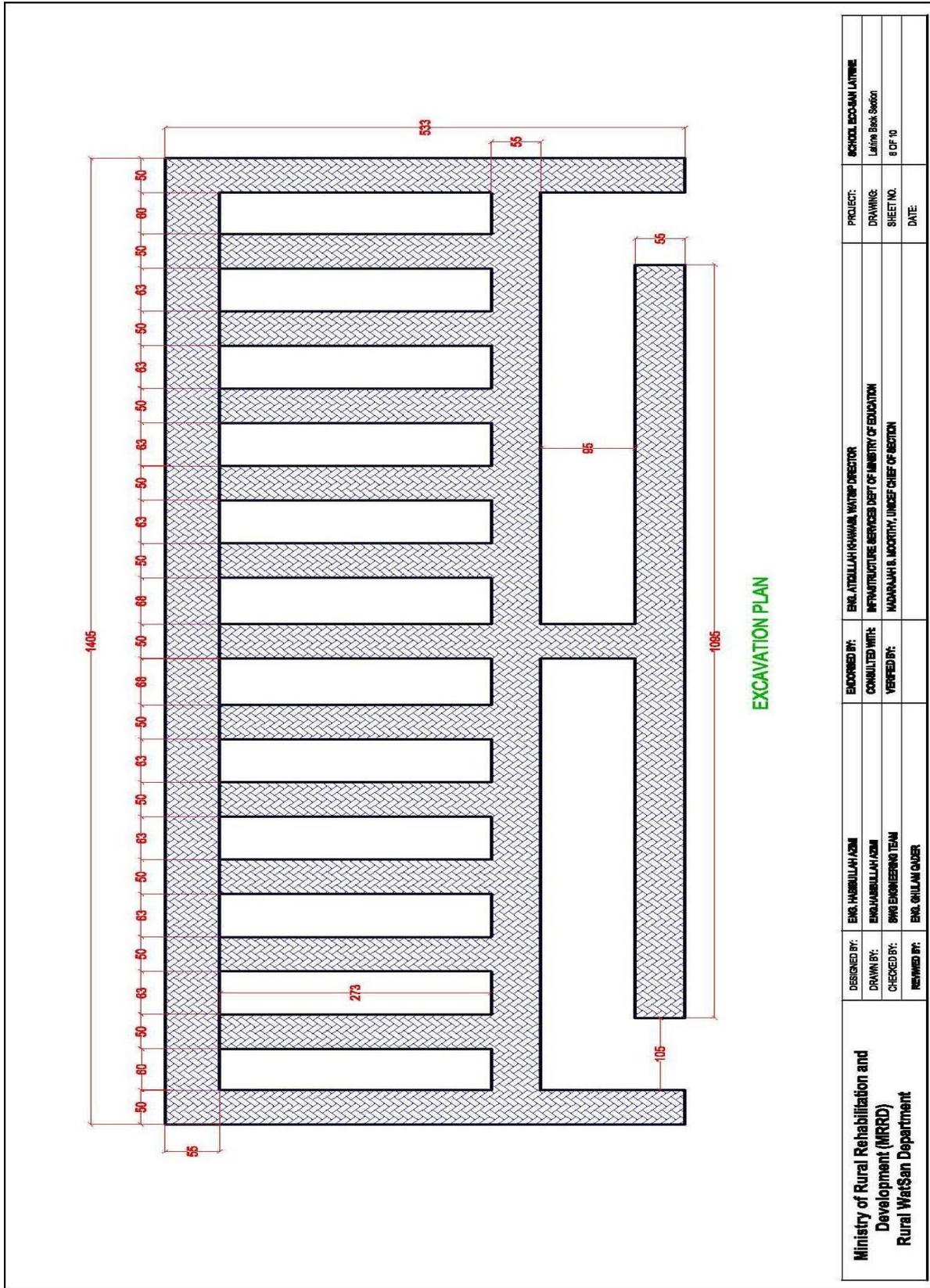
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# 12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand

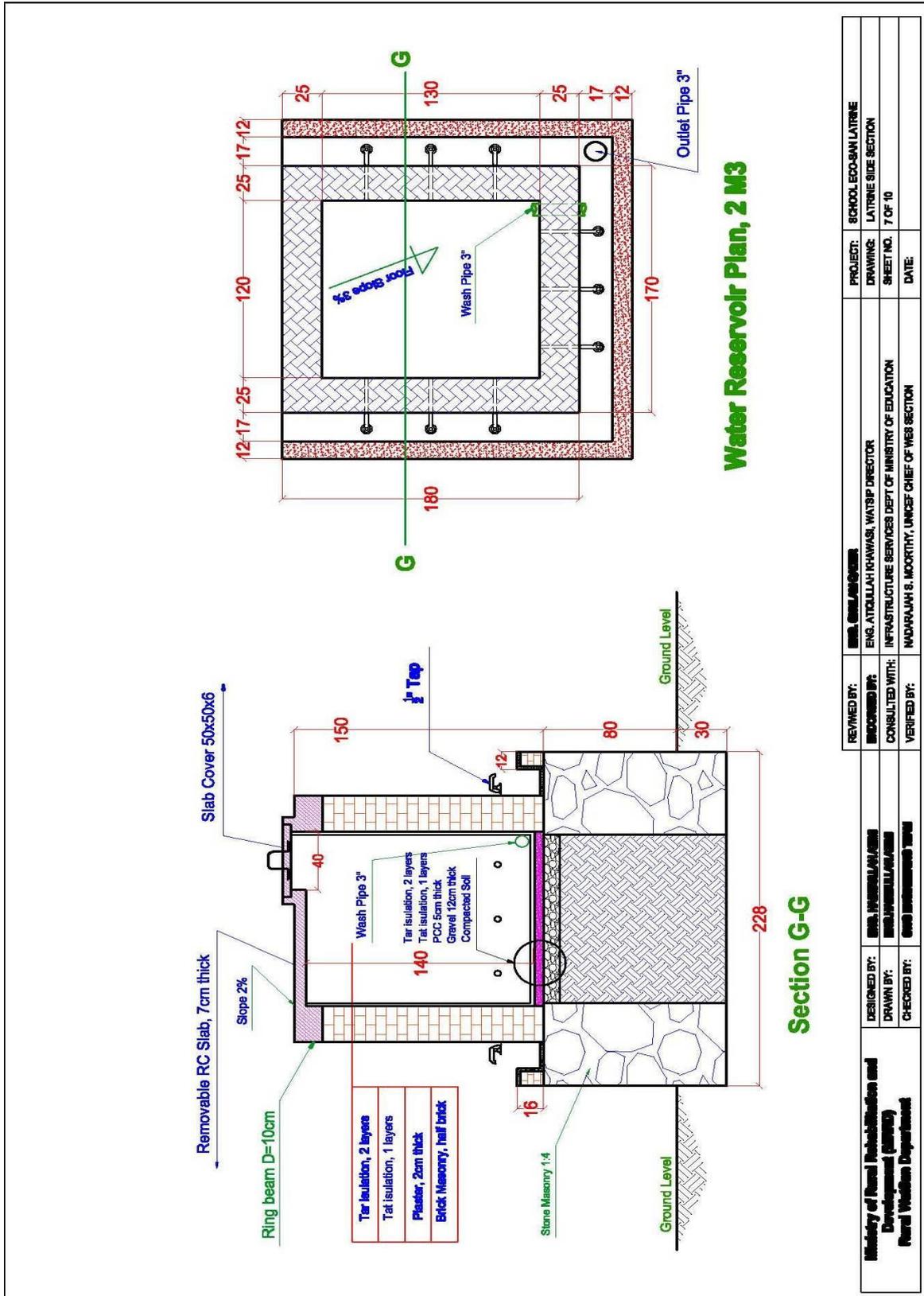
(Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural WatSan Department</b>	DESIGNED BY:	ENG. HABIBULLAH AZAM	ENDORSED BY:	ENG. ATULLAH HAHWAN, WATER DIRECTOR	PROJECT:	SCHOOL ECC-SAN LATRINE
	DRAWN BY:	ENG. HABIBULLAH AZAM	CONSULTED WITH:	INFRASTRUCTURE SERVICES DEPT OF MINISTRY OF EDUCATION	DRAWING:	Latrine Block Section
	CHECKED BY:	BMS ENGINEERING TEAM	VERIFIED BY:	MAJMAH H. MOHTY, UNICEF CHIEF OF SECTION	SHEET NO.	8 OF 10
	REVIEWED BY:	ENG. SHULAM CAUSER			DATE:	

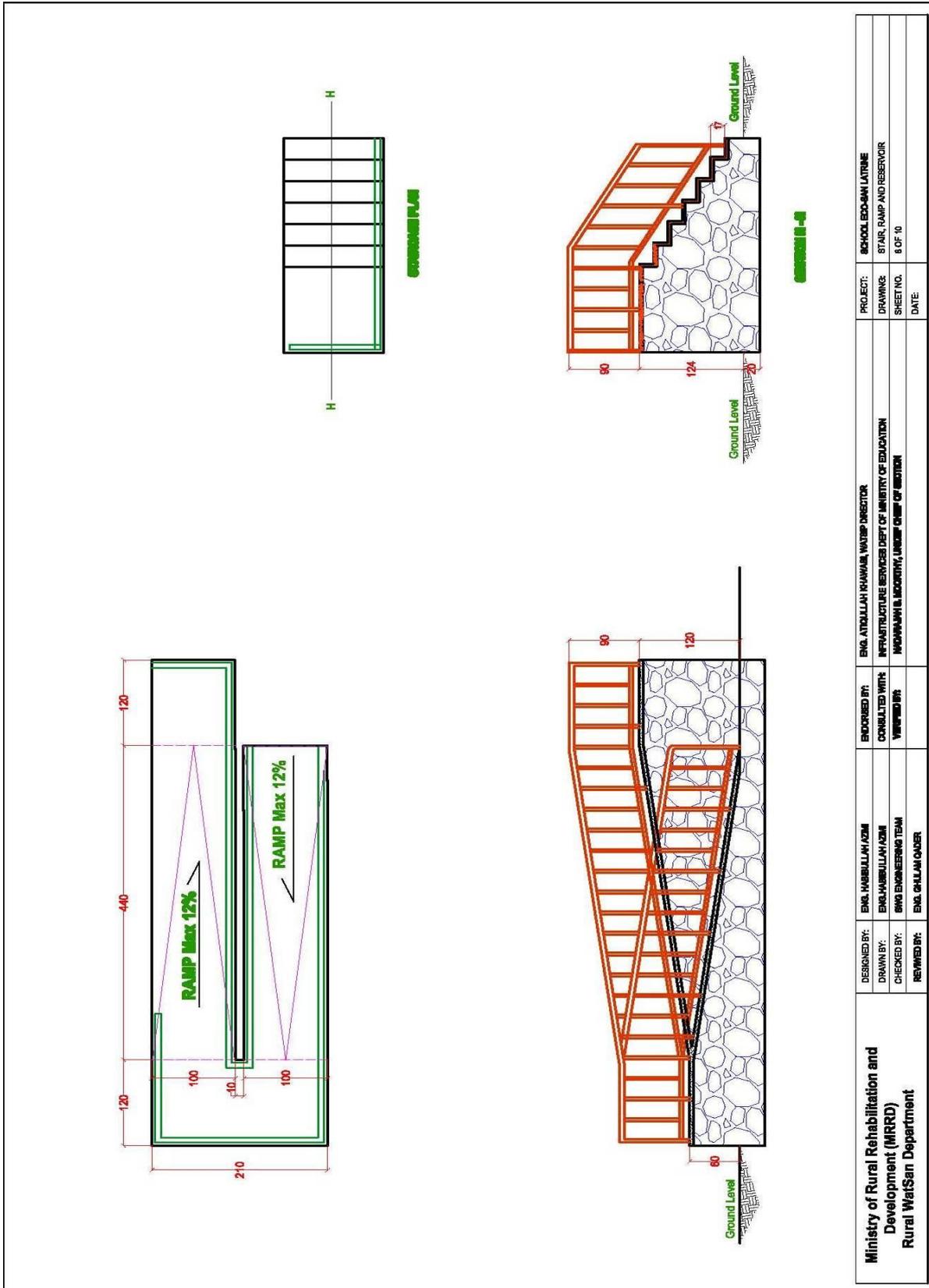
# 12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand

(Continued)



# 12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand

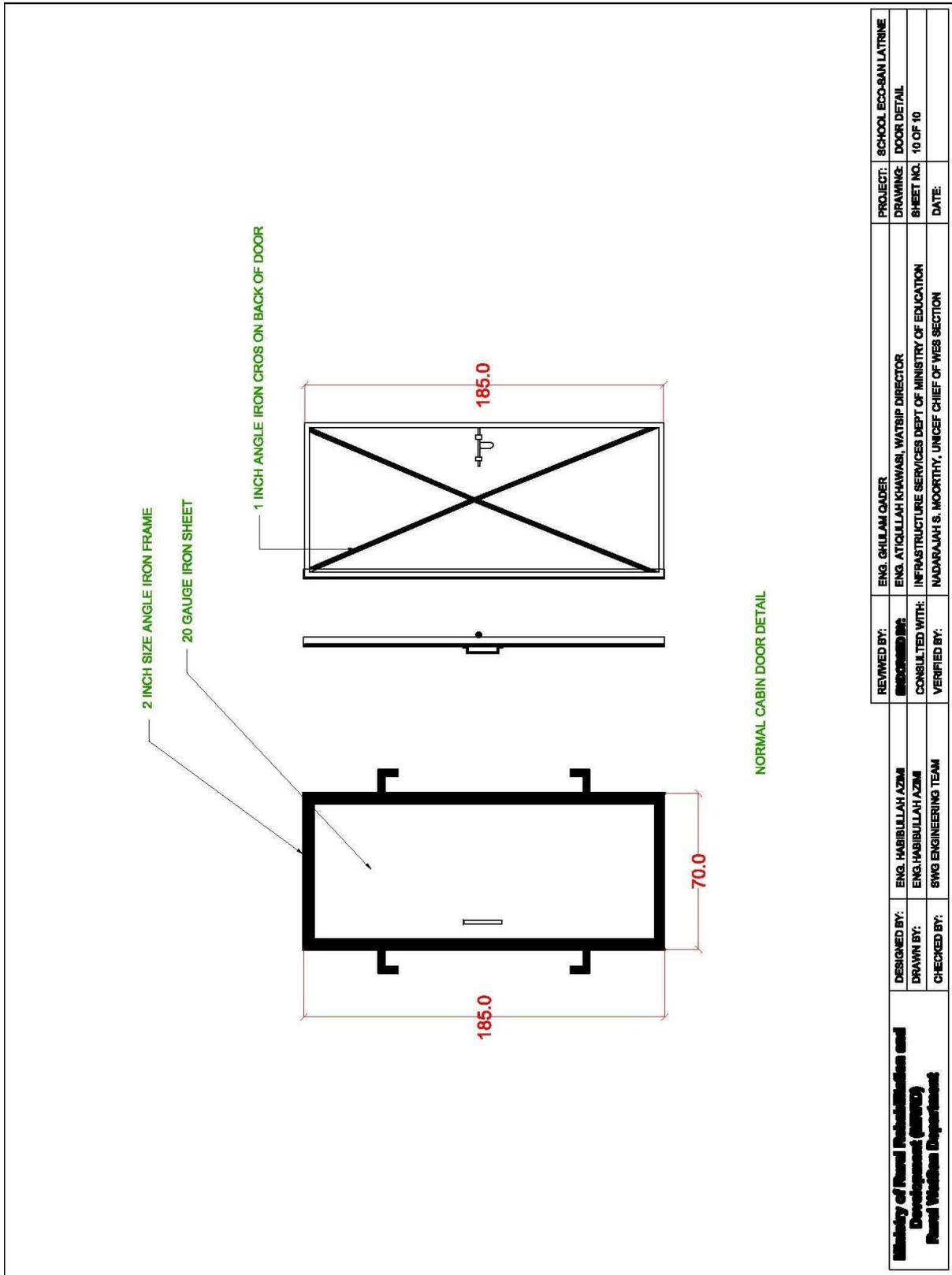
(Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> Rural WatSan Department	DESIGNED BY:	ENG. HABIBULLAH AZAM	ENDORSED BY:	ENG. ATTOULLAH KHANJAL, WATER DIRECTOR	PROJECT:	SCHOOL EDOGAN LATRINE
	DRAWN BY:	ENG. HABIBULLAH AZAM	CONSULTED WITH:	INFRASTRUCTURE SERVICES DEPT OF MINISTRY OF EDUCATION	DRAWING:	STAIR, RAMP AND RESERVOIR
	CHECKED BY:	ENG. ENGINEERING TEAM	VERIFIED BY:	MUHAMMAD M. MURPHY, UNDER CHIEF OF SECTION	SHEET NO.	8 OF 10
	REVIEWED BY:	ENG. GHILLAH QANER			DATE:	

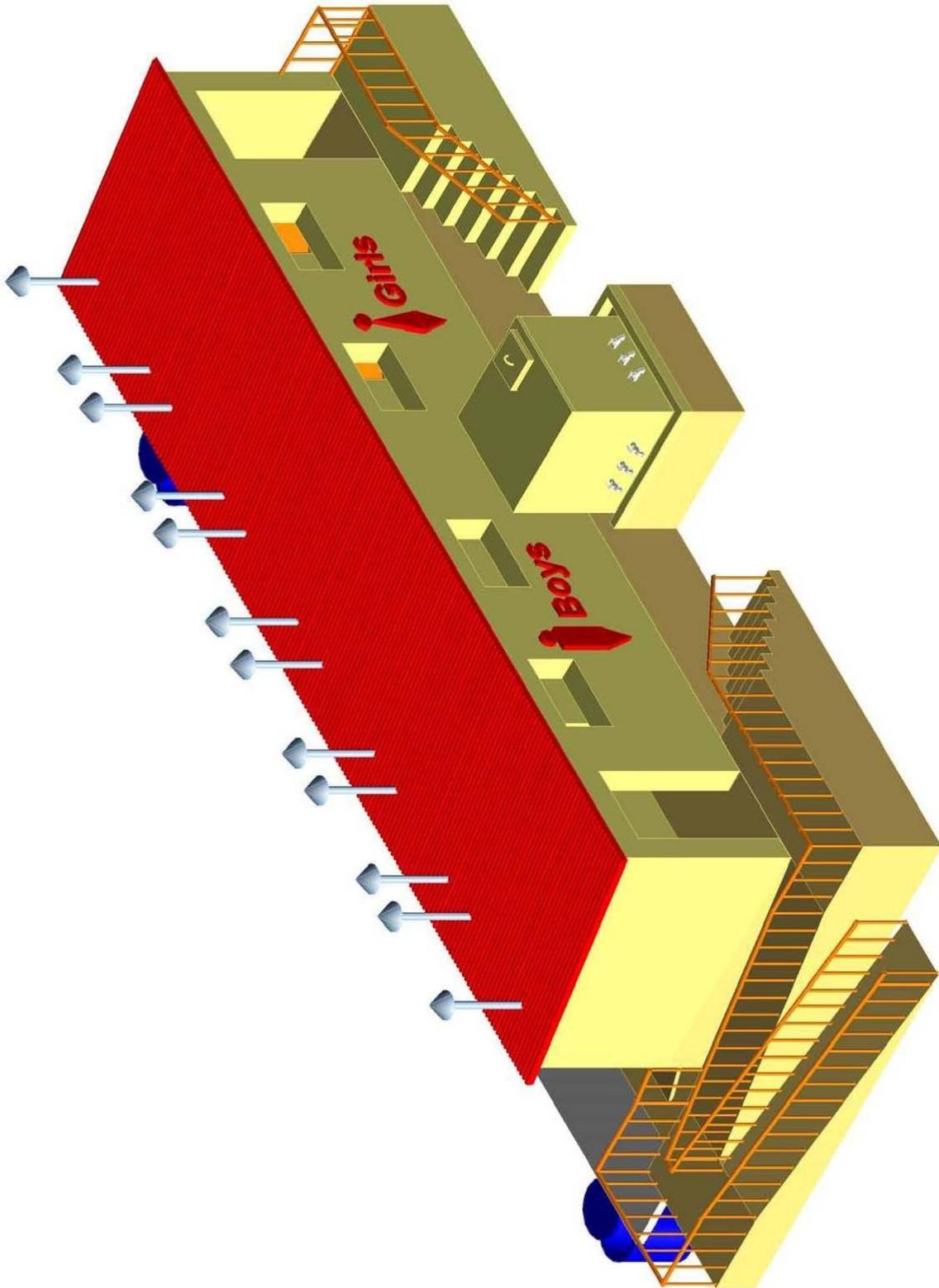
# 12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand

(Continued)



<b>Ministry of Rural Rehabilitation and Development (MRRD)</b> <b>Rural Water Services Department</b>	DESIGNED BY:	ENG. HABIBULLAH AZAM	REVIEWED BY:	ENG. GHULAM QADER	PROJECT:	SCHOOL ECO-SAN LATRINE
	DRAWN BY:	ENG. HABIBULLAH AZAM	CONSULTED WITH:	ENG. ATULLAH KHAWABI, WATSIP DIRECTOR	DRAWING:	DOOR DETAIL
	CHECKED BY:	SWG ENGINEERING TEAM	VERIFIED BY:	INFRASTRUCTURE SERVICES DEPT OF MINISTRY OF EDUCATION	SHEET NO.:	10 OF 10
				NADARAH S. MOORTHY, UNICEF CHIEF OF WEB SECTION	DATE:	

**12 - Hole Vault Latrine with Handicapped Access/Service and Wash Stand**  
**(Continued)**





د کليو د پياوړتيا او وياړتيا وزارت  
وزارت اسیا وکلیتشاف و دولت

د افغانستان اسلامي جمهوریت  
جمهوری اسلامی افغانستان



Islamic Republic of Afghanistan  
Ministry of Rural Rehabilitation and Development  
Water Supply and Irrigation Department  
BoQ of Eco-San Latrine for Schools

No شماره	Activities بڼه فعاله	Unit واحد	Quantity مقدار	Unit Cost (Afs.) بعت فی واحد په افغانۍ	Total Cost in Figure بعت مجموعه په افغانۍ	Total Cost in words بعت مجموع په حروف	Remarks ملاحظات
1	Excavation in medium soil ی در زمین متوسط کنندګان	M3	26.60				
2	Stone Masonry (M:300) (1:4) ی با مصالح و مارکسنگ کار (1:4)	M3	89.00				
3	Pointing of Stone Masonry ی با مصلوحاتګان کار (1:3)	M2	111.00				
4	Brick Masonry (M:250) (1:5) ی با مصالح و مارکسخت کار (1:5)	M3	41.00				
5	RCC concrete with shuttering بڼه سېخداڼ مڼه قالب بندي کونکي	M3	2.90				
6	Plastering of interior faces of walls (Mark: 400) 1:3 ی داخل عمارت با مارک پلستر کار 1:3	M2	150.00				
7	Plastering of exterior faces of walls (mark 400) 1:3 ی خارج عمارت با مارک پلستر کار 1:3	M2	87.00				
8	Metal doors and windows with screen بڼه های طری مڼه چالي دروازه ها و کلک (مطابق نقشه)	M2	10.68				
9	Oil Painting of doors and windows ی در کار دروازه ها و کلکین هارنگ روغن	M2	10.68				
10	Painting of interior walls (50% plastic) ی سطح داخلی دیوارها رنگمال 50% پلاستیک ف	M2	150.00				
11	Weather shield painting of exterior faces of walls ی سطح خارجی دیوارها بشمول توسط ویند شیلډ رنگمال	M2	87.00				
12	Compacted Soil 95cm thick خاک ټوپک شده په ضخامت 95 سانت	M3	12.35				
13	Compacted river stone 12cm باني په ضخامت سنگ ټوپک شده در 12 سانت	M3	1.70				
14	Vent. pipe with clamp (PVC Dia 4") L=2.7m بڼه نېره چوارانچ په طول ب 2.7 متر	M	32.40				
15	PCC (mark 100) بڼه ټوپک سېخ با مارک کانکر 100	M3	3.00				
16	Hooks for hanging clothes چډګګ لباس	No	18.00				
17	Wooden Rafters, dia 12cm L= 3.8m چوب سقف بطن 2 ټوک و طول 3.8 سانت متر	M	91.20				
18	Wooden Purlins, dia 12cm L= 14m چوب سقف بطن 2 ټوک و طول 14 سانت متر	M	98.35				
19	J-hook or L-hook بڼه یشک چډګګ جی و ال برای محکم کاری آهن چدن و چوب سقف	No	168.00				
20	Round wood under rafters, dia 10 cm L=14m چوب بطن 10 ټوک و طول 14 سانت متر در مین د	M	14.00				
21	CGI Sheet gauge 22 size 405x1435 for roof بڼه آهن چدن بام با ګ 22	M2	58.00				
22	GI Pipe Dia. 3" باني جستي په قطر 3 انچ	M	18.60				
23	GI Pipe Dia. 2" باني جستي په قطر 2 انچ	M	6.00				
24	GI Elbow Dia. 2" زانو خم 2 انچ	No	12.00				
25	Cast iron Tee (3x3x2)inch ی په قطرهای سه دهن چودن	No	10.00				
26	GI Elbow Dia. 3" زانو خم 3 انچ	No	4.00				
27	Wooden lintel of doors & windows ی برای دروازه ها و کلکین ها قران نقشه مطابق چوب	M	46.80				
28	Tap 1/2" بڼه دهن ټپم انچ برای ذخیره آب ټپ	No	9.00				
29	GI pipe 1/2" بڼه جستي ټپم انچ برای ذخیره آب ټپ	M	2.70				
30	Tat Insulation for reservoir 1 layer بڼه کاری داخل ذخیره ټپم توسط ټات بصورت یک لایه	M2	7.15				
31	Tar Insulation for reservoir 2 layers بڼه کاری داخل ذخیره ټپم بصورت دو لایه	M2	7.15				
32	Handrail بڼه و رمپکناره ل	M	20.80				
33	Handsupport for disabled بڼه برای معلولين دستنگ	M	2.80				
<b>Sub Total</b>							

# APPENDIX B: TECHNICAL SPECIFICATIONS FOR LATRINE CONSTRUCTION IN AFGHANISTAN

# **TECHNICAL SPECIFICATIONS FOR LATRINE CONSTRUCTION IN AFGHANISTAN**

## **1. EXCAVATIONS**

Excavations in the earth should be dug as per the drawing provided and as approved by the RRD engineer. All of the works in the project must be measured and carried out in compliance with the attached designs and drawings.

## **2. FOUNDATIONS and MASONRY**

Masonry stone wall foundations around the pavement must be made in cement sand mortar 1:4 in mix. The stones/blocks used in all foundation works should be hard and durable, and they should be wetted before using in work and hammered or rammed well during placing them in layers.

## **3. RCC SLAB**

The construction of the RCC slab shall be provided as per the dimensions in construction drawings. Generally the concrete mix for slabs of latrine floor should be 1 cement: 2 sand: 4 broken stone (maximum size 20 mm) with just enough water to provide a stiff but workable mix - this is equivalent to 250 Kg/sq. cm. strength. The slabs should be released from its mould after 24 hours and stored for at least 7 days in damp conditions under Hessian or preferably immersed in water.

## **4. CONCRETE MIXES**

### **4.1. Quality of water**

Water for concrete should be clean and free from oil, alkaline, vegetable or other organic impurities. In general water that is fit to drink is suitable for concrete.

### **4.1-a Curing**

As soon as the concrete has set (within a few hours) the floor slab should be flooded with a few centimeters of water for several days. More than this will put too much hydrostatic pressure on the concrete, which may not be strong enough to support it. When first flooding the slab, care must be taken that the discharge flow does not erode the fresh concrete. If the slab is being poured over a period of several days, the surface of each section must be covered with a tarpaulin and constantly wetted. For curing the slabs, rim of the slab should have a low wall (of brick or dirt) around the edge of it, about 20cm high. The slab itself should be covered with several centimeters of sand, which is then thoroughly wetted using several buckets of water. The slab is then covered using a plastic or canvas, tarpaulin, straw mats or several layers of banana tree leaves. The slab is rewetted at least three times per day for a week, after which the surface can be cleared off and forms stripped away. During the second week, the slab should be thoroughly wetted one time per day.

### **4.2 Cement**

Cement for concrete mix should be ordinary portland cement, the most common cement for general engineering works.

### **4.3 Aggregate**

Aggregates should be hard, strong, non-porous, irregular, angular, clean and free from clay, loam, vegetable and other organic materials. Clay or dirt coating on aggregates prevents adhesion of cement to aggregate, slows down the setting and hardening of cement (concrete) and reduces the strength of concrete. Angular and roughly cubical particles are ideal. River gravel makes the best coarse aggregate. The size of aggregate is governed by the nature of the work.

### **4.4 Sand**

Sand for concrete works should be angular shape grains free from dust and clay and it is recommended that the sand be obtained from old abandoned river beds. This quality of sand is

usually considered to be the best. The sand used for mortars should consist of sharp (angular) grains of various sizes.

## **5. CONCRETE**

All ingredients are first thoroughly dry-mixed together, using shovels and trowels until the mix is of a uniform color and consistency. Water is added slowly, a small quantity at a time. Each time water is added, the mix is thoroughly “turned over” a few times with shovels. Water is added until the mortar or concrete is at the desired consistency. It is particularly important when mixing and pouring concrete that it be done in a continuous operation, without long delays caused by lack of materials. Concrete should never be mixed on the ground. A mixing pad of brick, slate, concrete or even a CGS sheet should be made. It should be large enough to allow mixing of convenient-sized batches without overflowing. The plain concrete used in latrine works should be grade 150. The minimum quantity of cement used per one cubic meter will not be less than 250kg and the total aggregates strength must be about 1800kg and should not include more than 40% of fine aggregates.

### **5.1. General requirements of concrete**

Concrete must be made when needed. After lying for over 45 minutes, a fresh batch should be made - this also goes for plaster. Curing of plaster should be continuously done: twice a day for the first week and once a day during the second week. The general principle of quality concrete must be applied correctly in the field. Quality concrete starts during mixing and is only the starting point for successful construction jobs.

### **5.2 Placing concrete**

The concrete should be placed in layered thickness as this will enable proper consolidation to be done. Concrete shall not be dropped from such a level as to cause segregation. In filling columns, the concrete should be poured into the moulds and constantly tamped and puddled with a rod to expel air bubbles. The work must not stop until the column is completed.

### **5.3 Compacting concrete**

The purpose of compaction is to expel as much as possible air bubbles from the concrete mass. Voids will reduce the strength of concrete. Over-compaction is equally bad as it will cause segregation. Hand compaction is recommended to carry out by rod tamping and hammering on the outset of the moulds. In all cases, compaction should cease when cement past (scum) starts to appear on the upper surface of the concrete. All scum formed should be removed. Sprinkling loose cement on the surface of the slab (to absorb excess water) is not good: such a layer will easily crack, crumble, and powder.

## **6. PLASTER WORKS**

All internal/external surfaces should be plastered with cement sand mortar 1: 3 mix and varied from 10mm to 25mm thick.

## **7. FLOOR PAVEMENT FINISHING**

Floor pavement surfaces are trowelled to a smooth hard finish with a wooden flat and a steel trowel. Over-toweling of finish should be avoided. Two separate trowels are required, the first being used as soon as a surface has hardened sufficiently - between an hour or two after placing and when excess of water has disappeared from the surface.

At this stage no more work should be done than is necessary to smooth and thoroughly compact the surface and final finishing should not be attempted. As the surface hardens, toweling should be repeated at intervals until the required degree of finish is obtained. All high and low spots should be corrected doing toweling with a wooden float. The final toweling should be finished before the initial setting takes place.

## **8. METAL ROOF TRUSSES**

Roof trusses made of mild steel or light metal alloy are used in many countries. They may be supplied

in standard sizes from spans of about 5m upwards, or may be fabricated locally to specific requirements. With suitable purlins they are placed 2.5-3 m apart when carrying tiles and 3-3.5 m apart when carrying light corrugated iron sheet.

### **9. CORRUGATED GALVANIZED IRON SHEET ROOFING**

Slope of the roof sheet of the toilets have been considered as 15% (1 in 6.5) for which 20 gauge (1.00 mm thick) sheets can be used. For slopes flatter than 1 vertical: 2 horizontal, the end lap shall be 20 cm. Likewise, the minimum lap of sheets with ridges, hips, and valleys shall be 20 cm. Laying of the bottom sheets should be done first before working up towards the ridge.

Sheets shall be fixed to the purlins or other roof members such as hips or valley rafters with galvanized J or L hook bolts and nuts, 8 mm diameter with bitumen and GI 'limpet' (dome) washers. There shall be a minimum of three hook bolts placed at the ridges of corrugations in each sheet on every purlin and their spacing shall not exceed 30 cm. Coach screws shall not be used for fixing sheets to purlins.

Holes in CGI sheets shall be drilled and not punched in the ridges of corrugations and shall preferably be made on the ground. The holes in the washers shall be the exact diameter of the hook bolts or seam bolts. The nuts shall be tightened from above.

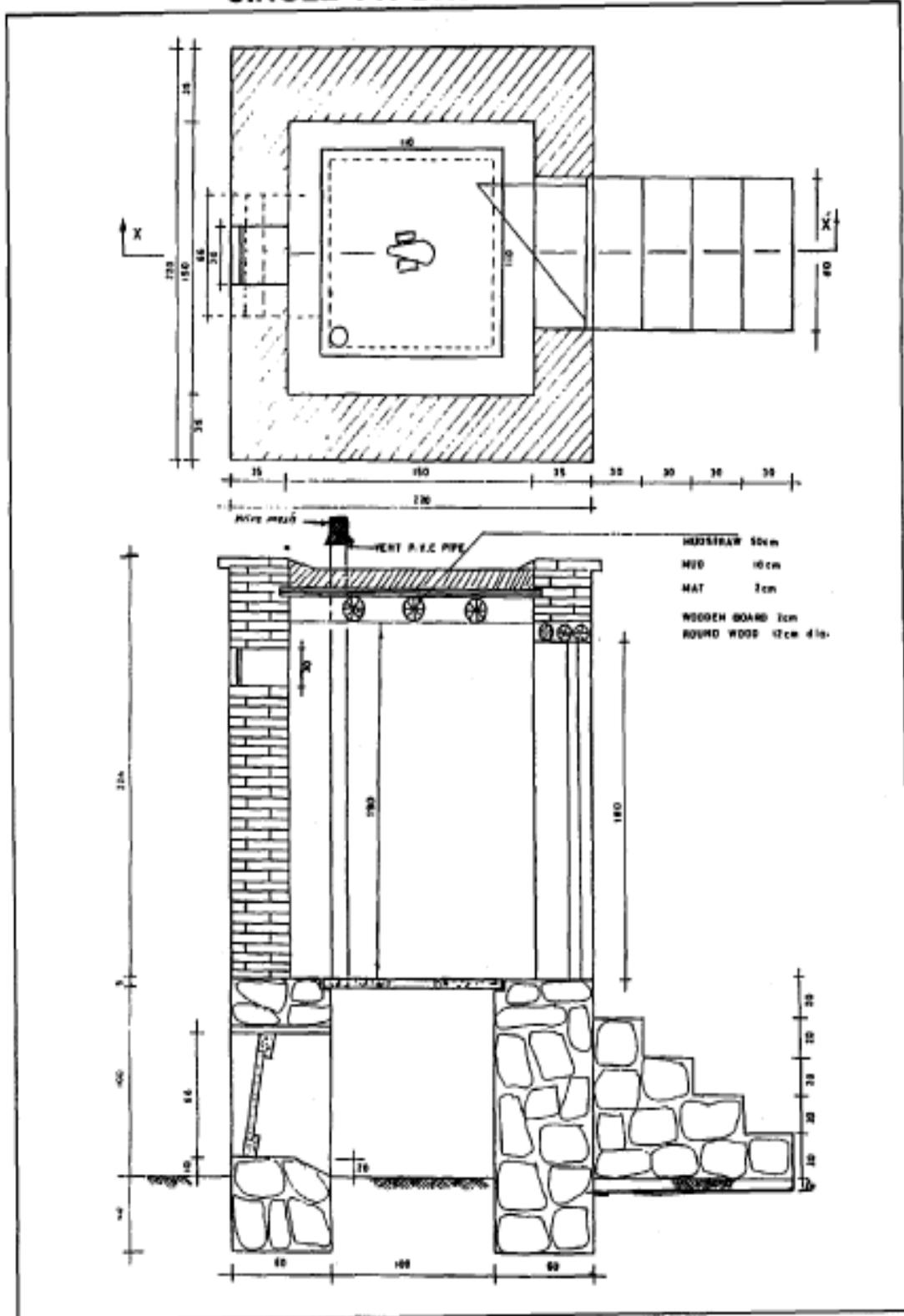
Gutters should be fixed with a fall of 8 mm/m to roofs. Down pipes should be 75-250 mm diameter. J or L hook bolts and nuts – 8mm diameter.

# APPENDIX C: SIMPLE HOUSEHOLD LATRINE DESIGNS AND BILLS OF QUANTITY

(FROM “COMMUNITY HANDPUMP WATER  
SUPPLY AND SANITATION GUIDE FOR  
AFGHANISTAN”, WATER AND SANITATION  
SECTOR GROUP, AFGHANISTAN, 1999)

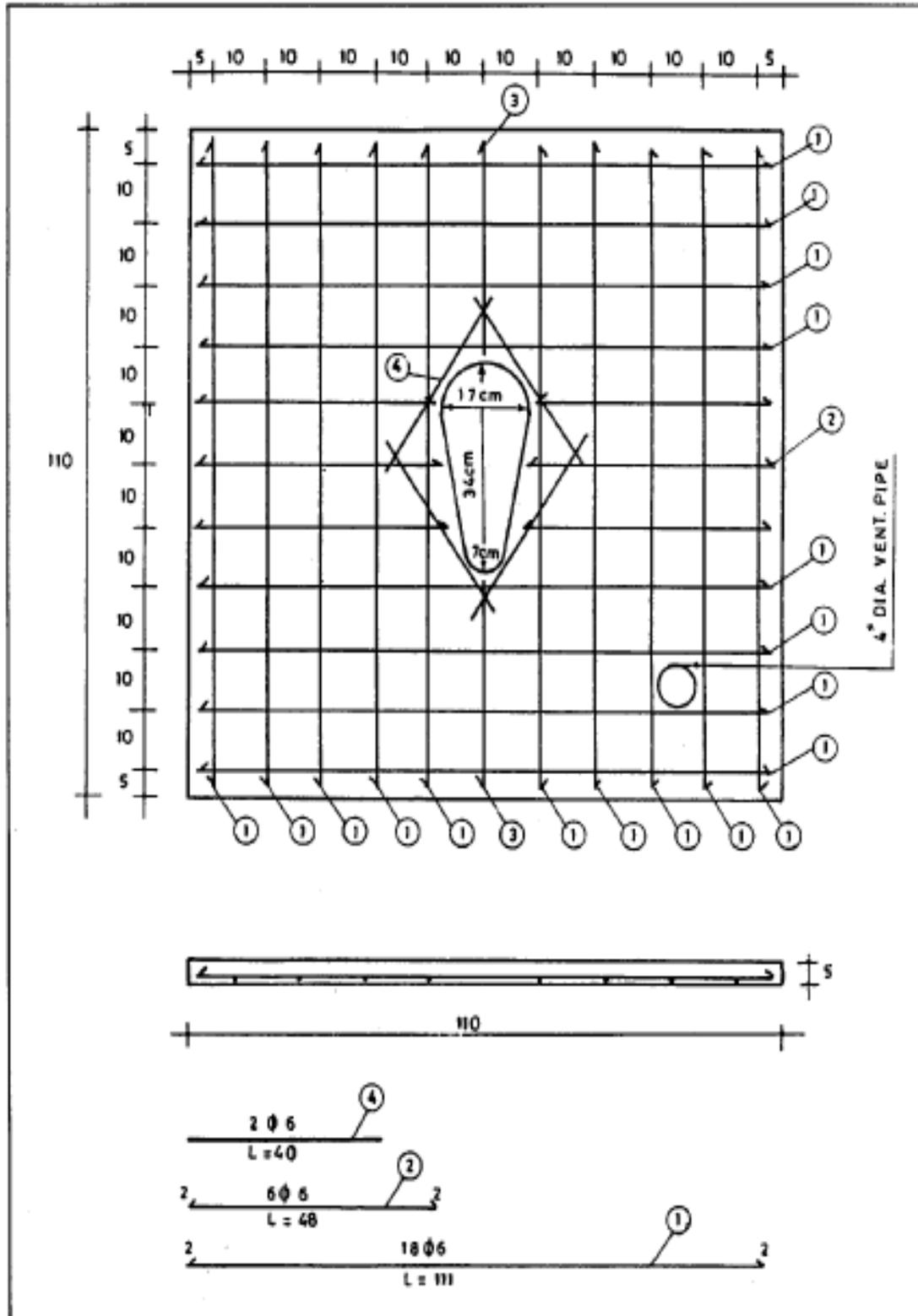
# 1 - Hole Vault Latrine

## SINGLE PIT DRY VAULT LATRINE



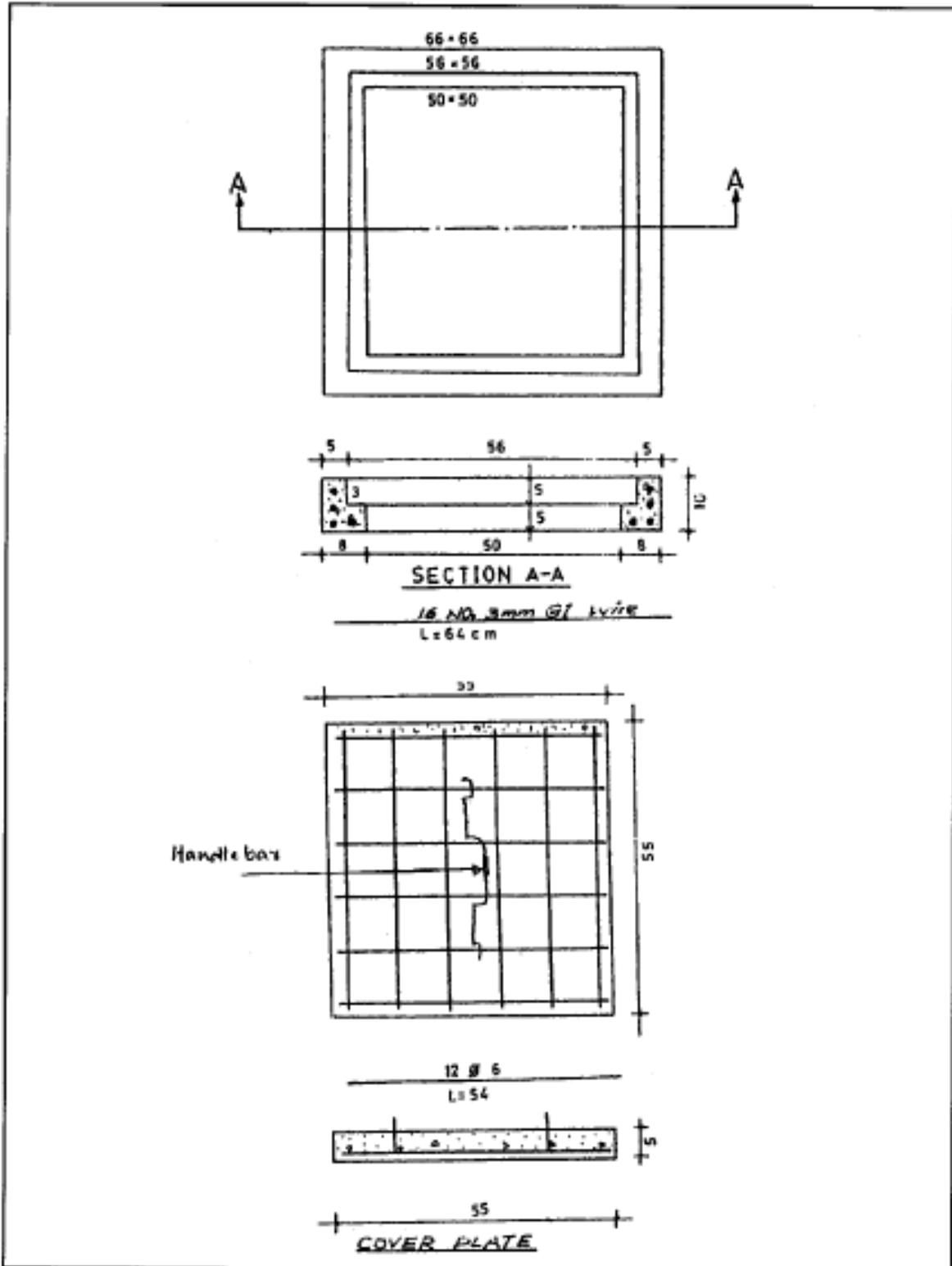
# 1 - Hole Vault Latrine (Continued)

## LATRINE SLAB REINFORCEMENT



# 1 - Hole Vault Latrine (Continued)

## BOTTOM MANHOLE CONCRETE FRAME



## Bill of Quantity Single Vault Dry Latrine

List	Particular Items	No.	L (m)	W (m)	H (m)	Quantity m <sup>3</sup>	Remarks
1	<b>EXCAVATION</b>						
	Wall foundation	4	1.600	0.600	0.300	1.152	
	Stair slit		1.200	0.800	0.100	0.096	
	<b>Total</b>					<b>1.248</b>	
2	<b>STONE MASONRY</b>						
	Vault wall	4	1.600	0.600	1.400	5.376	
	Stairs		0.300	0.800	0.900	0.216	
	Stairs		0.300	0.800	0.700	0.168	
	Stairs		0.300	0.800	0.500	0.120	
	Stairs		0.300	0.800	0.300	0.072	
	Vault manehole deduct	(1)	0.660	0.660	0.800	(0.261)	
	<b>Total</b>					<b>5.680</b>	
3	<b>BRICK WORK SUPPER STRUCTURE</b>						
	Deduction door	(1)	0.800	0.350	1.800	(0.504)	
	Deduction (opening)	(1)	0.300	0.350	0.300	(0.032)	
	<b>Total</b>					<b>5.260</b>	
4	<b>(MUD+STRAW PLASTER</b>						
	Room inside wall surfaces	4	1.500		1.800	11.400	m <sup>2</sup>
	Out side room walls	4	2.200		2.240	19.712	m <sup>2</sup>
	Roof surface	1	2.200		2.200	4.840	m <sup>2</sup>
	Door Sides	2	1.800	0.350		1.260	m <sup>2</sup>
	Opening Sides	4	0.350	0.300		0.420	m <sup>2</sup>
	<b>Total</b>					<b>37.632</b>	m <sup>2</sup>
	Door deduction	2	0.800		1.800	2.880	
	Opening deduction	2	0.300		0.300	0.180	
	<b>Total</b>					<b>3.060</b>	m <sup>2</sup>
						<b>34.572</b>	m <sup>2</sup>
5	<b>WOOD WORK</b>						
	Door		1.800		0.800	1.440	m <sup>2</sup>
6	<b>ROUND WOOD</b>						
	L= 1.85      d= 10 cm	3					
	L= 1.10      d= 8 cm	3					
7	<b>WOODEN BOARD</b>		1.500	1.500	0.020	0.045	m <sup>3</sup>
8	<b>MAT</b>		1.500	1.500		2.250	m <sup>2</sup>
9	<b>MUD WORK</b>		1.500	1.500	0.100	0.225	m <sup>3</sup>

## R.C.C. slab for single vault dry latrine Measurement Detail and Bill of Quantities

S No	Particular Items	No.	Length (m)	Width (m)	Height (m)	Quantity (m) <sup>3</sup>	Remarks
1	<u>R.C.C. Work</u>						
	Vault Slab	1	1.10	1.10	0.05	0.0605	(1.02) <sup>2</sup> =1.21m <sup>2</sup>
	Deduction(opening vol.)					-0.002	
	Foot place	2	0.30	0.10	0.05	0.003	
	<b>Total</b>					<b>0.0615</b>	

### Estimation of construction Material and Manpower As per standards of Ministry of Public Work of Afghanistan.

#### 1- REINFORCED CONCRETE

M:150

Volume	=	0.06 x1.01	=	0.062 m3
Cement	=	0.062 x325	=	20.15 Kg
Sand&gravel	=	0.062 x1.005	=	0.062 m3
Skilled laborer	=	1.21 x0.15	=	0.18 person
Laborer	=	1.21 x0.30	=	0.36 person
Steel bar 6mm	=	18x 1.11	=	19.98 m
		6x0.48	=	2.88 m
		2x0.40	=	0.80 m
		4x0.40	=	1.60 m
			<b>Total</b>	<b>25.26 m</b>
		25.26 x0.22	=	5.56 Kg
Steel 6mm	=	5.56 x1.05	=	5.84 Kg
Skilled laborer	=	5.84 x13/1000	=	0.076 person

4"dia non pressure PVC pipe, L=3m

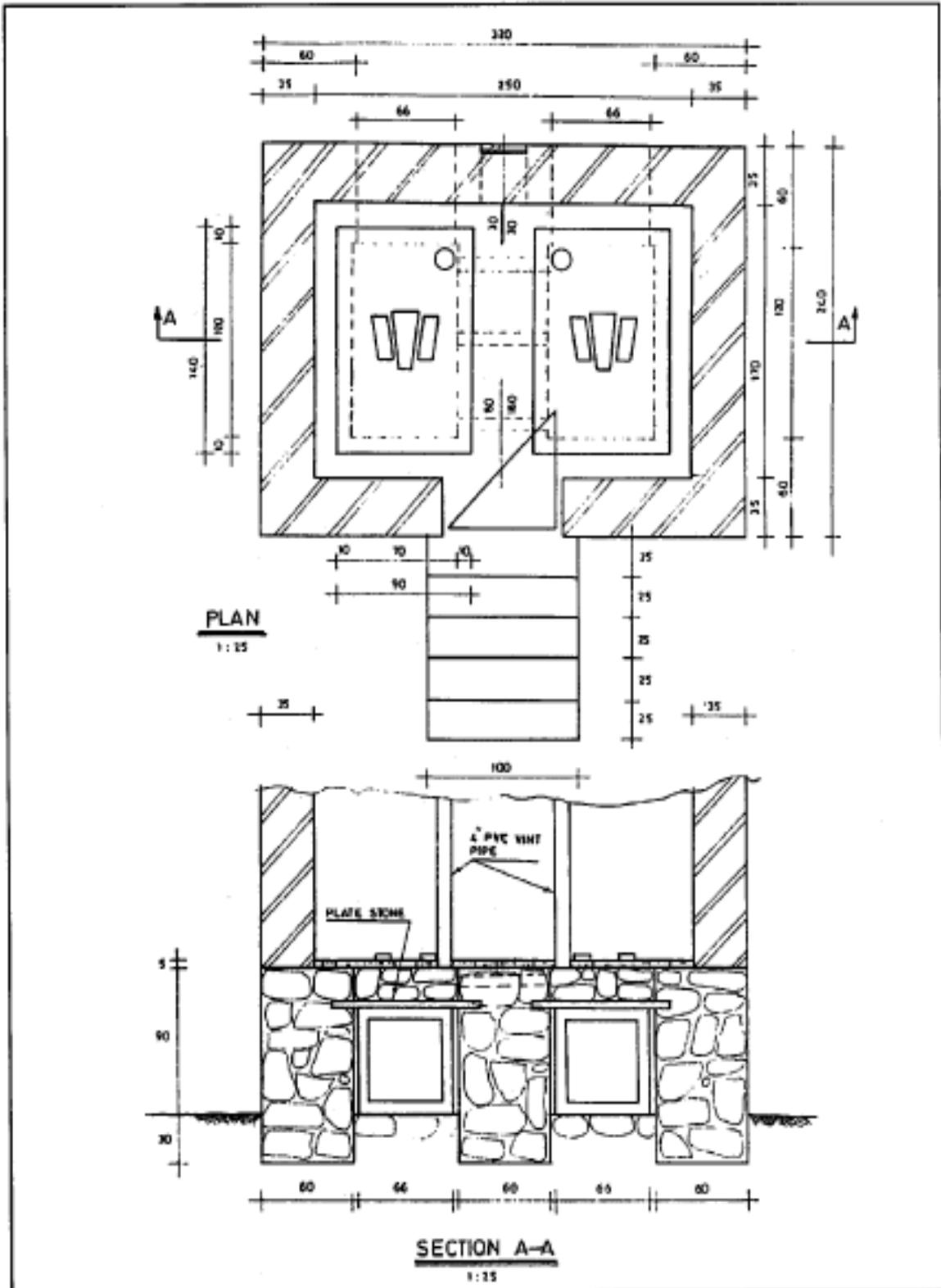
#### **Abstract:**

Cment	=	20.15 Kg
Sand & Gravel	=	0.062 m3
Skilled laborer	=	0.256 person
laborer	=	0.36 person
Steel 6mm	=	5.84 Kg
4"dia non pressure (pvc)	=	3 m

## 2 - Hole Vault Latrine

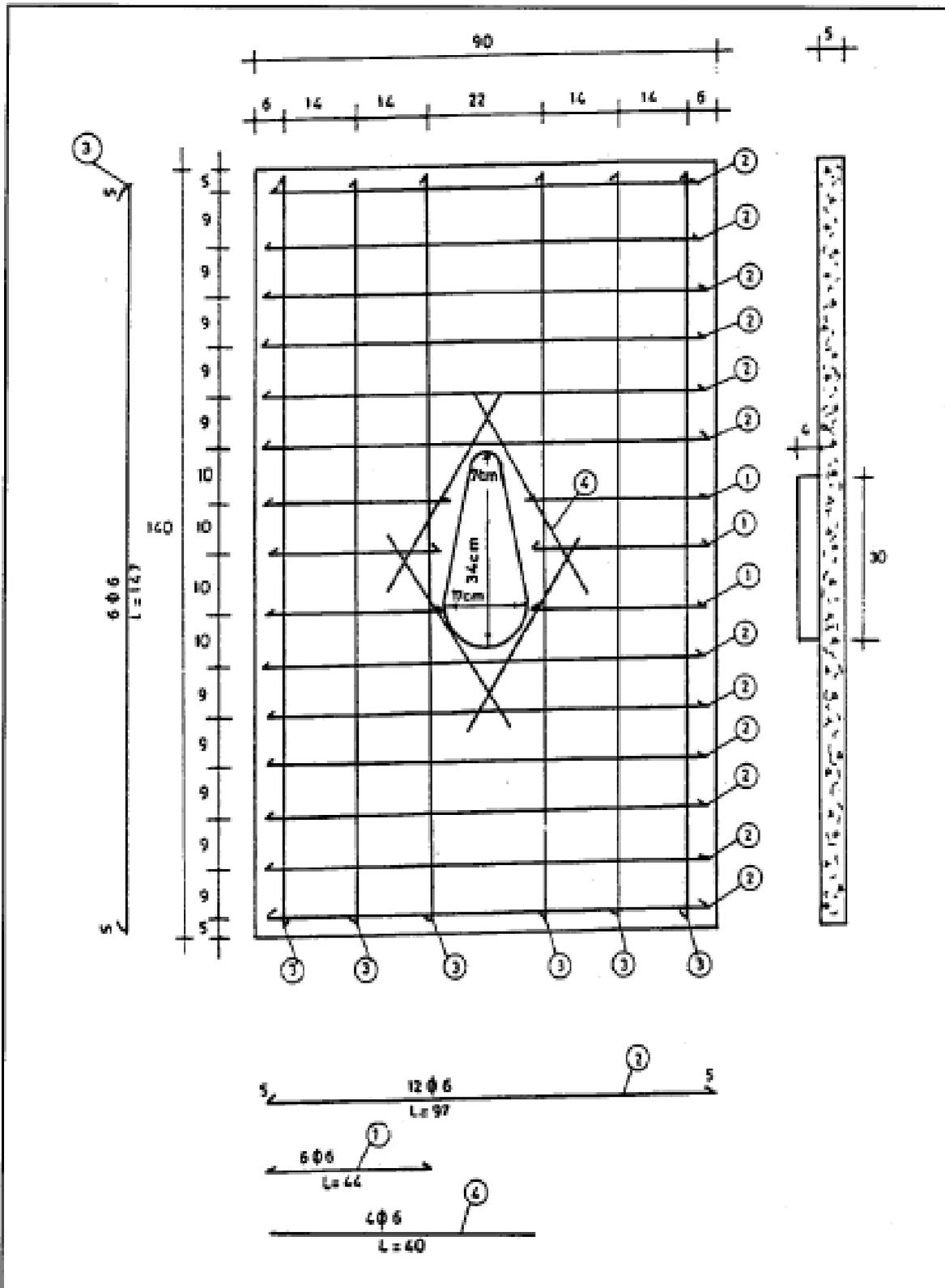
(see also Appendix A, page 36 for MRRD design)

### **DOUBLE VAULT SURFACE (DRY) LATRINE**



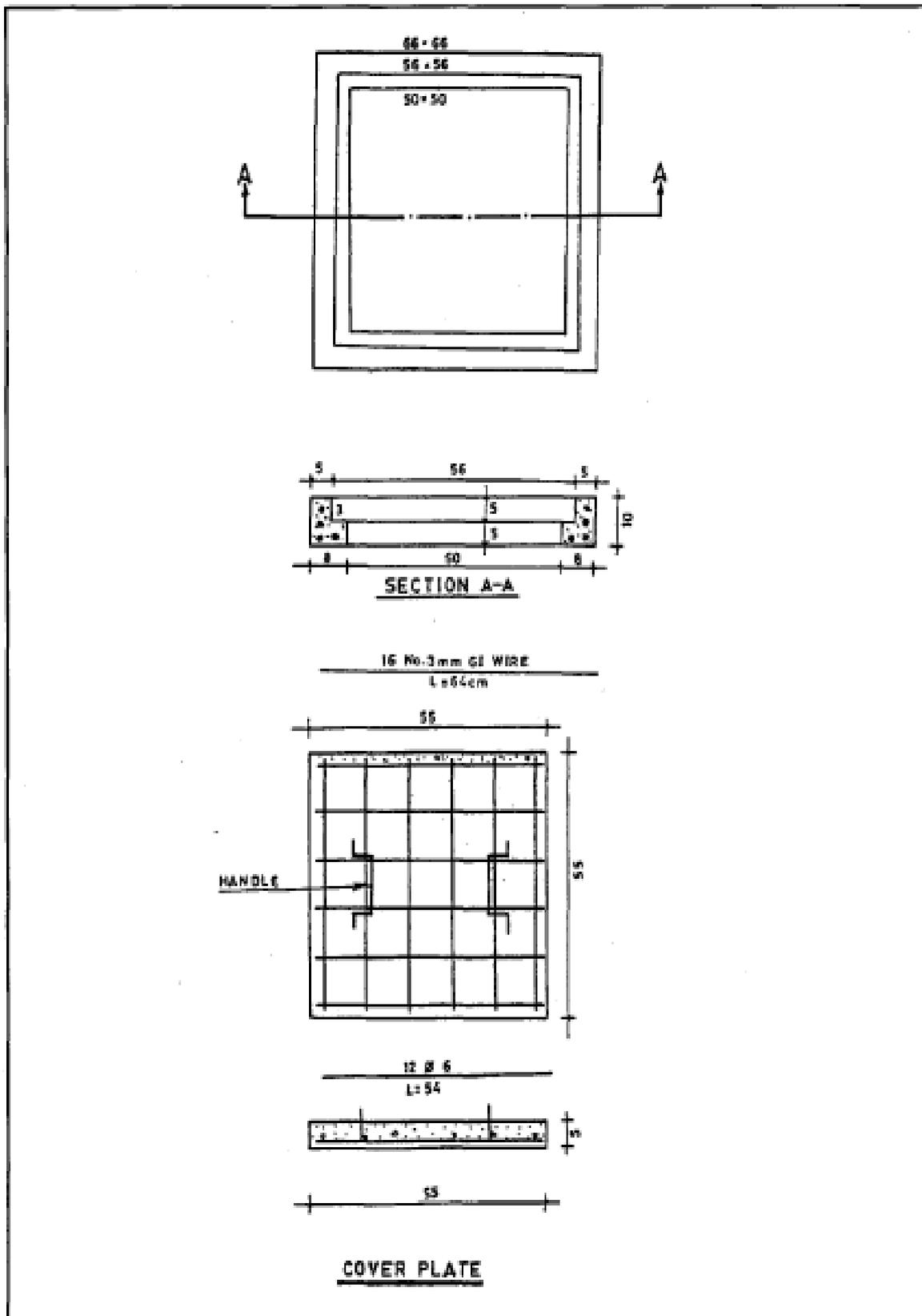
## 2 - Hole Vault Latrine (Continued)

### DOUBLE VAULT DRY LATRINE SLAB



## 2 - Hole Vault Latrine (Continued)

### **DRY VAULT M.H. FRAME**

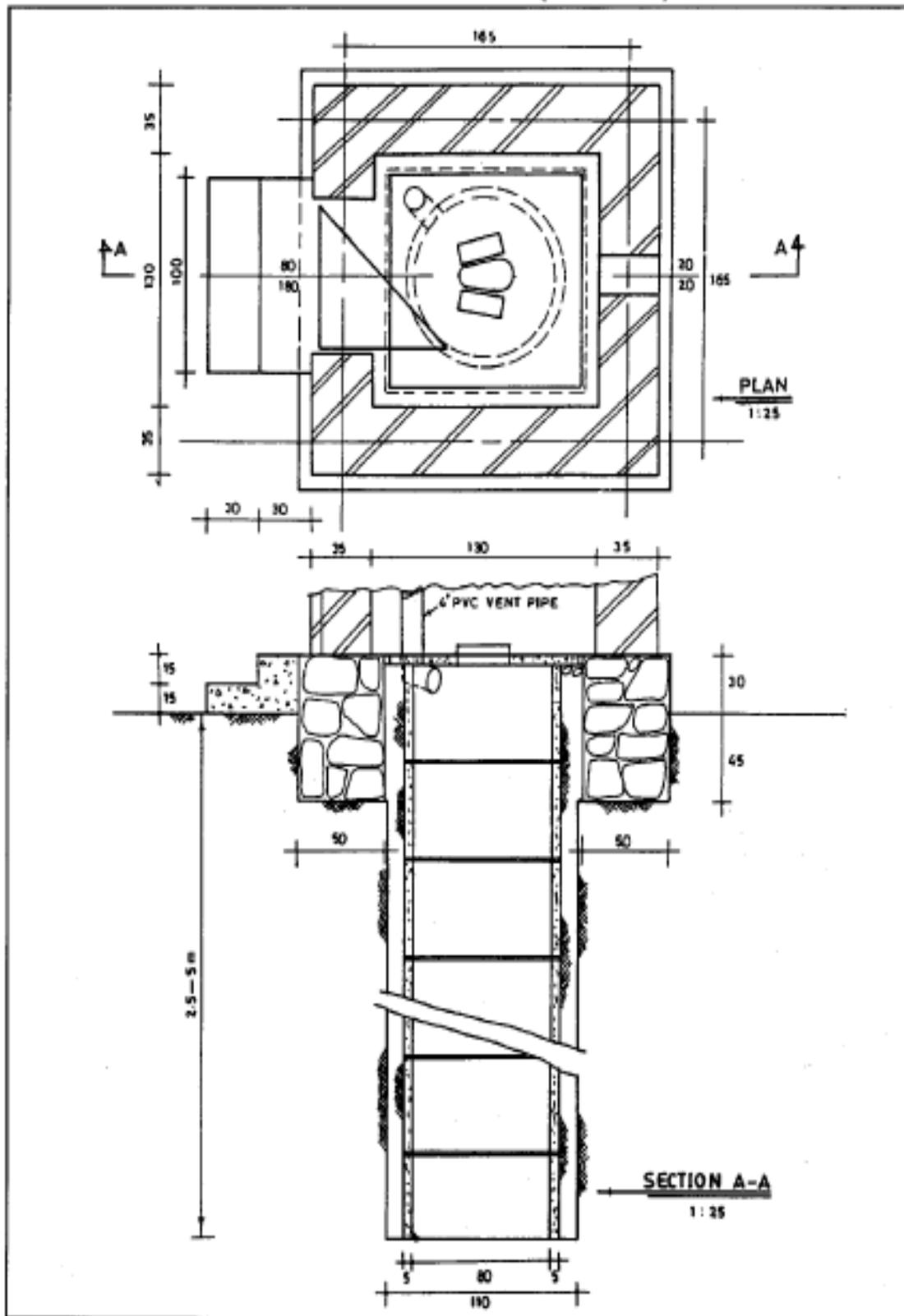


## Bill of Quantity Double Vault Dry Latrine

List	Particular Items	No.	L (m)	W (m)	H (m)	Quantity m <sup>3</sup>	Remarks
<b>1</b>	<b>EXCAVATION</b>						
	Long wall foundation	2	2.600	0.600	0.300	0.936	
	Short walls foundation	2	1.800	0.600	0.300	0.648	
	Partition wall foundation	1	1.200	0.600	0.300	0.216	
	Stair	1	1.250	1.000	0.100	0.125	
	<b>Total</b>					<b>1.925</b>	
<b>2</b>	<b>STONE MASONRY</b>						
	Vault long walls	2	2.600	0.600	1.200	3.744	
	Vault short walls	2	1.800	0.600	1.200	2.592	
	Partition wall	1	1.200	0.600	1.200	0.864	
	Stair	1	1.000	0.250	1.050	0.263	
	Stair	1	1.000	0.250	0.860	0.215	
	Stair	1	1.000	0.250	0.670	0.168	
	Stair	1	1.000	0.250	0.480	0.120	
	Stair	1	1.000	0.250	0.290	0.073	
	Vault man hole deduction	(2)	0.660	0.660	0.600	(0.523)	
	<b>Total</b>					<b>7.515</b>	
<b>3</b>	<b>BRICK WORK</b>						
	Long walls	2	2.850	0.350	2.250	4.489	
	Short walls	2	2.050	0.350	2.250	3.229	
	Deduction door	(1)	0.800	0.350	1.800	(0.504)	
	Opening	(1)	0.300	0.350	0.300	(0.032)	
	<b>Total</b>					<b>7.182</b>	
<b>4</b>	<b>(MUD+STRAW) PLASTER</b>						
	Room inside wall surface		8.400		1.900	15.960	
	Room out side wall surface		11.200		2.250	25.200	
	Section of wall at door		3.600		0.350	1.260	
	Roof surface		2.500		1.700	4.250	
	Door Sides	2	1.800	0.350		1.260	
	Opening Sides	3	0.300	0.350		0.315	
	Door deduction	(2)	0.800		1.800	-2.880	
	Opening deduction	(2)	0.300		0.300	-0.180	
	<b>Total</b>					<b>45.185</b>	m <sup>2</sup>
<b>5</b>	<b>WOOD WORK</b>						
	Door		1.800		0.800	1.440	m <sup>2</sup>
	Round wood	6	2.100				d = 10 cm
	Door lintel	3	1.100				d = 8 cm
	Wooden board		2.500	1.700	0.010	0.043	m <sup>3</sup>
	Mat		2.500	1.700		4.250	m <sup>2</sup>
<b>6</b>	<b>MUD WORK</b>						
			2.500	1.700	0.100	0.425	m <sup>3</sup>

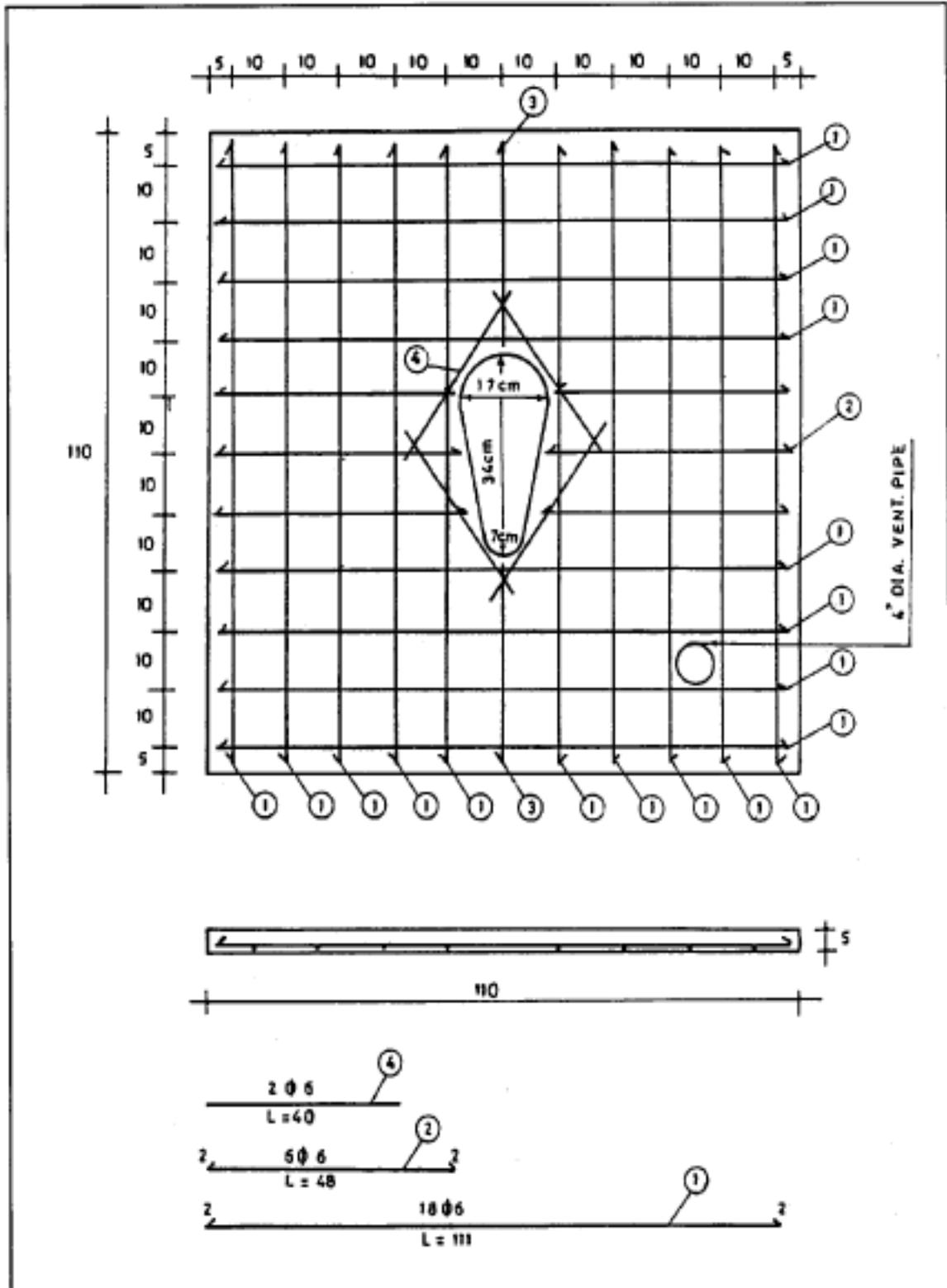
# 1 - Hole Ventilated Improved Pit (VIP) Latrine

## VENTILATED IMPROVED PIT (SINGLE) LATRINE



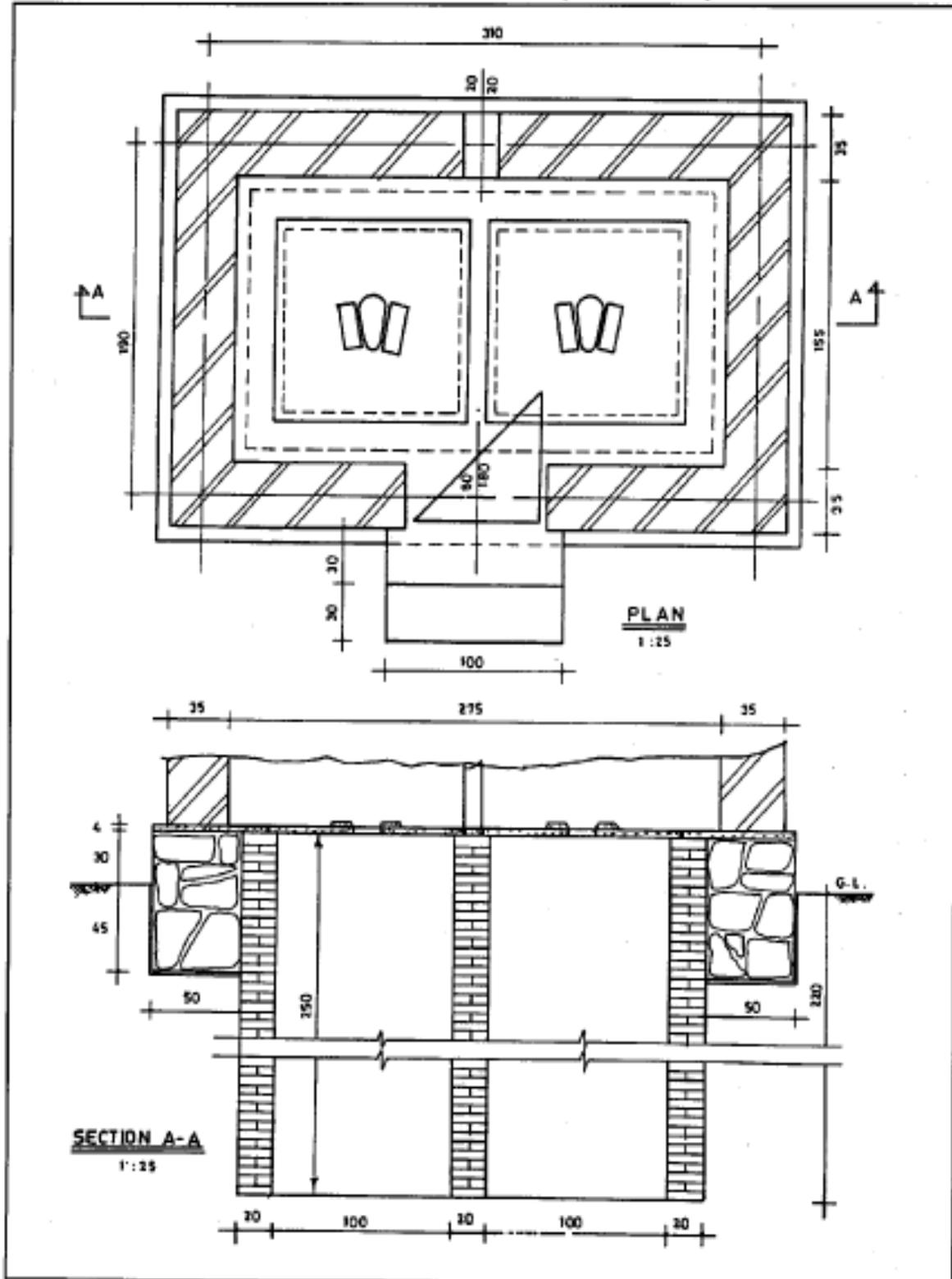
# 1 - Hole Ventilated Improved Pit (VIP) Latrine (Continued)

## LATRINE SLAB REINFORCEMENT



## 2 - Hole Ventilated Improved Pit (VIP) Latrine

### VENTILATED IMPROVED PIT (DOUBLE) LATRINE



## Specification and Bill of Quantity Ventilated Improved Pit (Single) Latrine

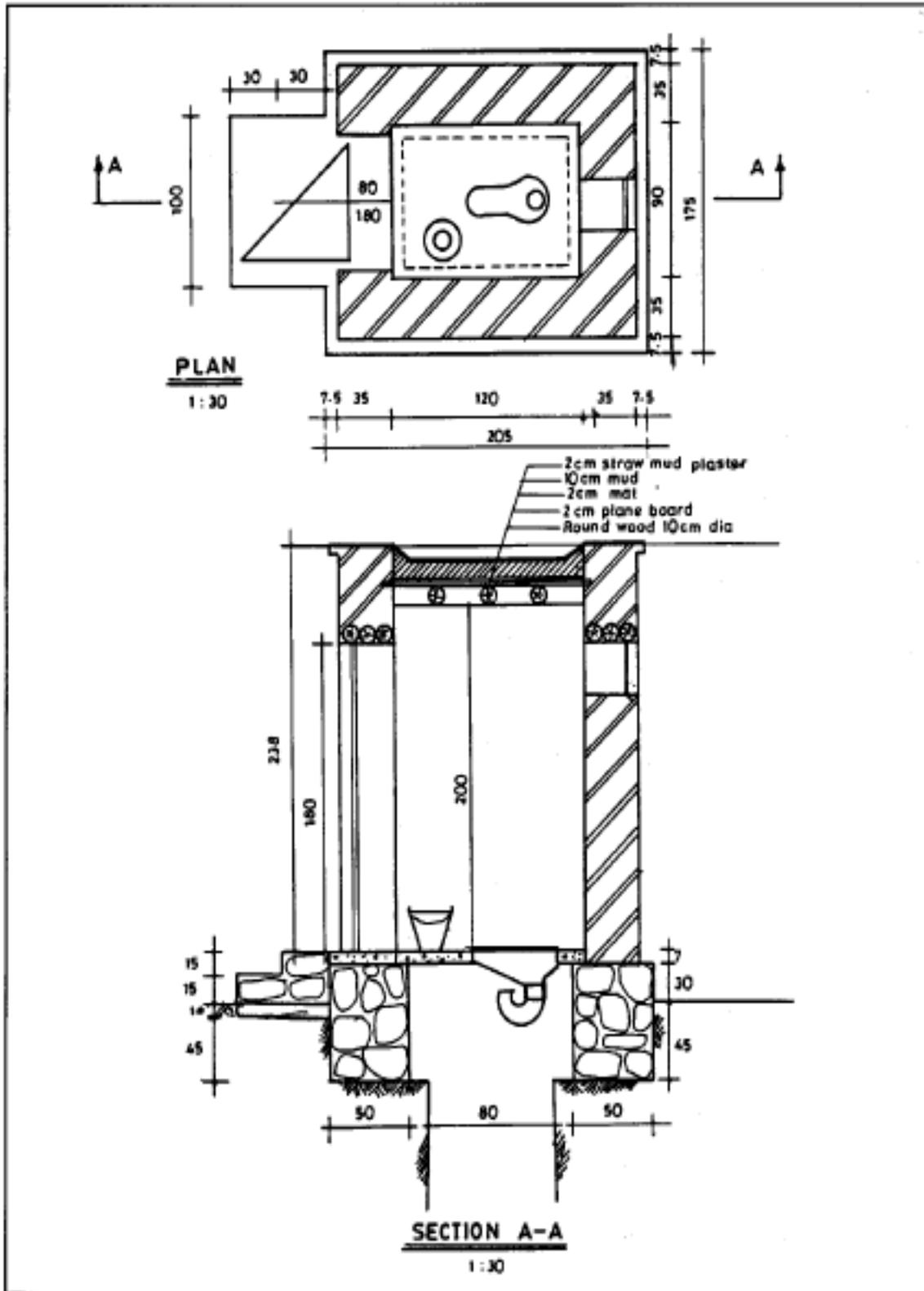
List	Particular Items	No.	L (m)	W (m)	H (m)	Quantity m <sup>3</sup>	Remarks
1	<b>EXCAVATION</b>						
	Walls Foundation	4	1.850	0.600	0.450	1.485	
	Pit	1			5.000	4.750	
	Stair Foundation	1	1.000	0.600	0.100	0.060	$A= p(1.102294=0.95$
	<b>Total</b>					<b>6.295</b>	
2	<b>STONE MASONRY</b>						
	Foundation walls	4	1.850	0.500	0.750	2.490	
	stair	1	1.000	0.300	0.150	0.045	
	do	1	1.000	0.600	0.150	0.090	
	<b>Total</b>					<b>2.615</b>	
3	<b>BRICK WORK</b>						
	Room Walls	4	1.850	0.380	2.000	4.620	
	Door (deduction)	1	0.800	0.380	1.800	(0.500)	
	Opening (deduction)	1	0.500	0.380	0.300	(0.030)	
	<b>Total</b>	1				<b>4.090</b>	
4	<b>(MUD+STRAW) PLASTER</b>						
	Room inside	4	1.300		2.100	10.920	sqm
	Room outside	4	2.050		2.380	19.510	
	Top of roof		2.050	2.050		4.200	
	Door deduction	2	0.600	1.800		(2.880)	
	Opening deduction	2	0.200	0.200		(0.160)	
	<b>Total</b>					<b>31.570</b>	
5	<b>WOOD WORK</b>						
	Door	1	0.800		1.800	1.440	
	Floor round wood	4	1.800				d=10cm
	Mat	1	1.300	1.300		1.690	
	Door lintel round wood	3	1.000				d=8cm
	Wooden board		1.300	1.300		1.690	sqm
6	<b>MUD WORK</b>	2	0.800		2.100	3.780	
	Top of roof		1.850	1.850	0.100	0.270	
	<b>Total</b>					<b>0.270</b>	
7	<b>F.C.C. WORK</b>						
	Rings for pit lining					0.660	$A= p(4(0.92-0.62)=0.133^2=0.66$
	Floor of door	1	0.800	0.600	0.040	0.018	
	Top of stairs		1.000	0.600	0.040	0.024	
	<b>Total</b>					<b>0.700</b>	
8	<b>R.C.C. WORK</b>						
	Latrine floor slab	1	1.100	1.100	0.040	0.048	
	Opening (deduction)		1.100		0.040	(0.002)	$A=0.041m^2$
	Foot Piece	2	0.300	0.100	0.040	0.002	
	<b>Total</b>					<b>0.048</b>	

## Specification and Bill of Quantity Ventilated Improved Pit (Double) Latrine

List	Particular Items	No.	L (m)	W (m)	H (m)	Quantity m3	Remarks
<b>1</b>	<b>EXCAVATION</b>						
	Foundation long wall	2	3.100	0.500	0.450	1.400	
	Foundation short wall	1	1.600	0.500	0.450	0.850	
	Pit		2.600	1.400	2.200	8.000	
	Stair foundation		1.000	0.800	0.100	0.080	
	<b>Total</b>					<b>10.310</b>	
<b>2</b>	<b>STONE MASONRY</b>						
	Foundation long wall	2	3.100	0.500	0.450	1.400	
	Foundation short wall	2	1.600	0.500	0.450	0.850	
	Stair	1	1.000	0.300	0.150	0.135	
	Stair	1	1.000	0.800	0.150		
	<b>Total</b>					<b>2.385</b>	
<b>3</b>	<b>BRICK WORK (Unburnt)</b>						
	Room Long Walls	2	3.100	0.350	2.000	4.340	
	Room Short Walls	2	1.600	0.350	2.000	2.860	
	Deduction door		0.800	0.350	1.800	(0.500)	
	Deduction opening		0.200	0.350	0.200	(0.014)	
	<b>Total</b>					<b>6.486</b>	
<b>4</b>	<b>(MUD + STRAW) PLASTER</b>						
	Room inside Long Walls	2	2.750		2.100	11.550	
	Room inside Short walls	2	1.550		2.100	6.510	
	Room out side L. W.	2	3.450		2.380	16.420	
	Room out side Sh. W.	2	2.250		2.380	10.710	
	Door sides	2	1.800	0.350		1.260	
	Opening sides	3	0.200	0.350		0.210	
	Top of roof		3.450	2.250		7.760	
	Door deduction	2	0.800		1.800	(2.880)	
	Opening deduction	2	0.200		0.200	(0.080)	
	<b>Total</b>					<b>61.460</b>	m2
<b>5</b>	<b>WOOD WORK</b>						
	Door		0.800		1.800	1.440	m2
	Round wood	8	1.900				d=10 cm
	Round wood for door lintel	3	1.000				d= 8 cm
	Wooden board		2.750	1.550		4.260	m2
	Mat		2.750	1.350		4.260	m2
<b>6</b>	<b>MUD WORK</b>						
	Top of roof		3.100	1.900	0.100	0.590	
	<b>Total</b>					<b>0.590</b>	
<b>7</b>	<b>R.C.C. WORK</b>						
	Latrine floor slab	2	1.100	1.100	0.040	0.097	
	<b>Total</b>					<b>0.097</b>	
<b>8</b>	<b>P.C.C WORK</b>						
	Latrine floor		3.100	1.550	0.040	0.180	
	Floor of door		0.800	0.500	0.040	0.016	
	floorplate (deduction)	2	1.100	1.100	0.040	(0.097)	
	Top of stair		1.000	0.800	0.040	0.024	
	<b>Total</b>					<b>0.133</b>	
<b>9</b>	<b>Brick work for pit lining(Burnt)</b>						
	Pit lining		2.600	1.400	2.500	9.100	m2
	Cavity (deduction)	2	1.000	1.000	2.500	(5.000)	
	<b>Total</b>					<b>4.100</b>	

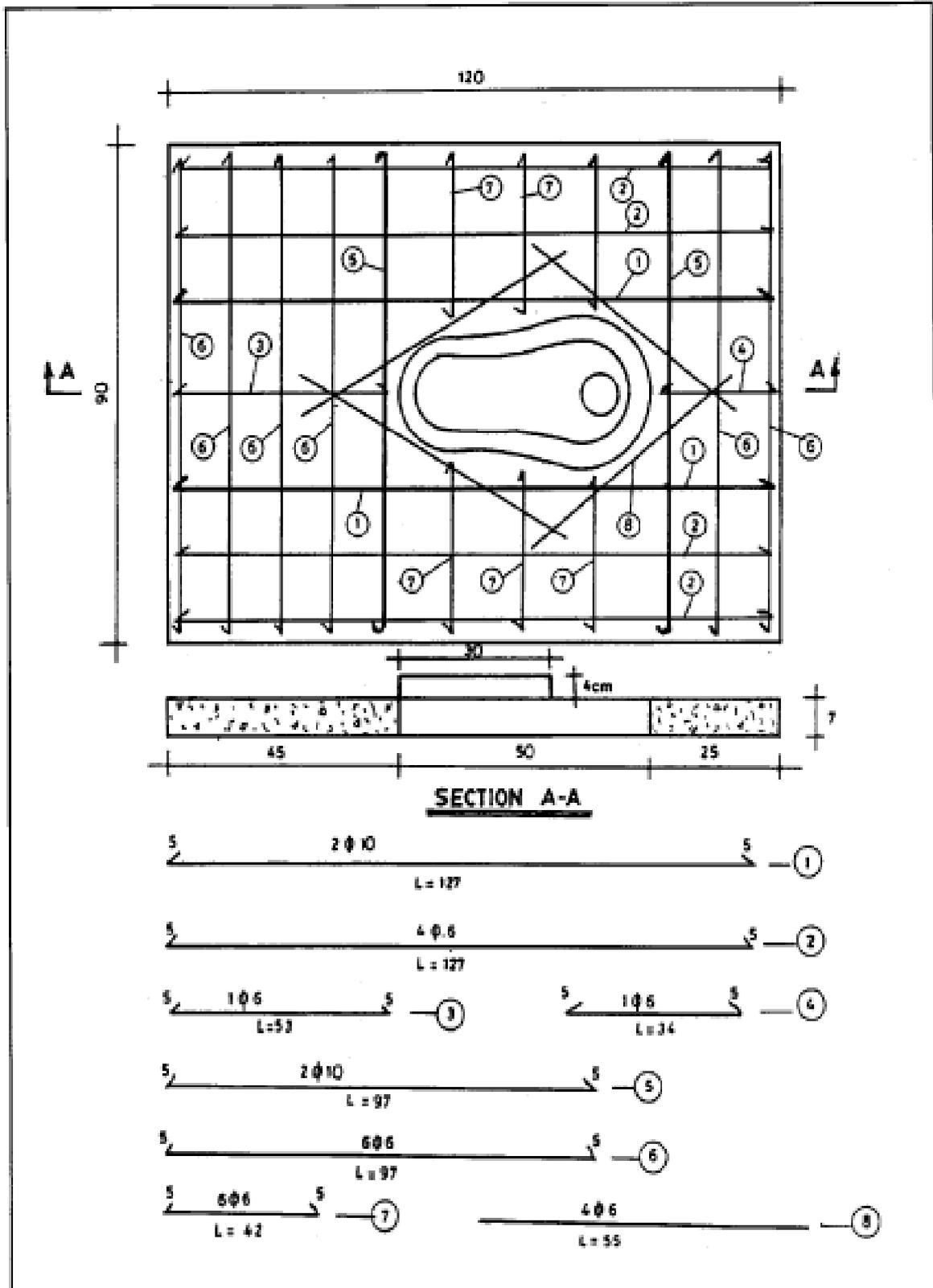
# 1 - Hole Water Seal Latrine

## WATER SEAL SINGLE PIT LATRINE



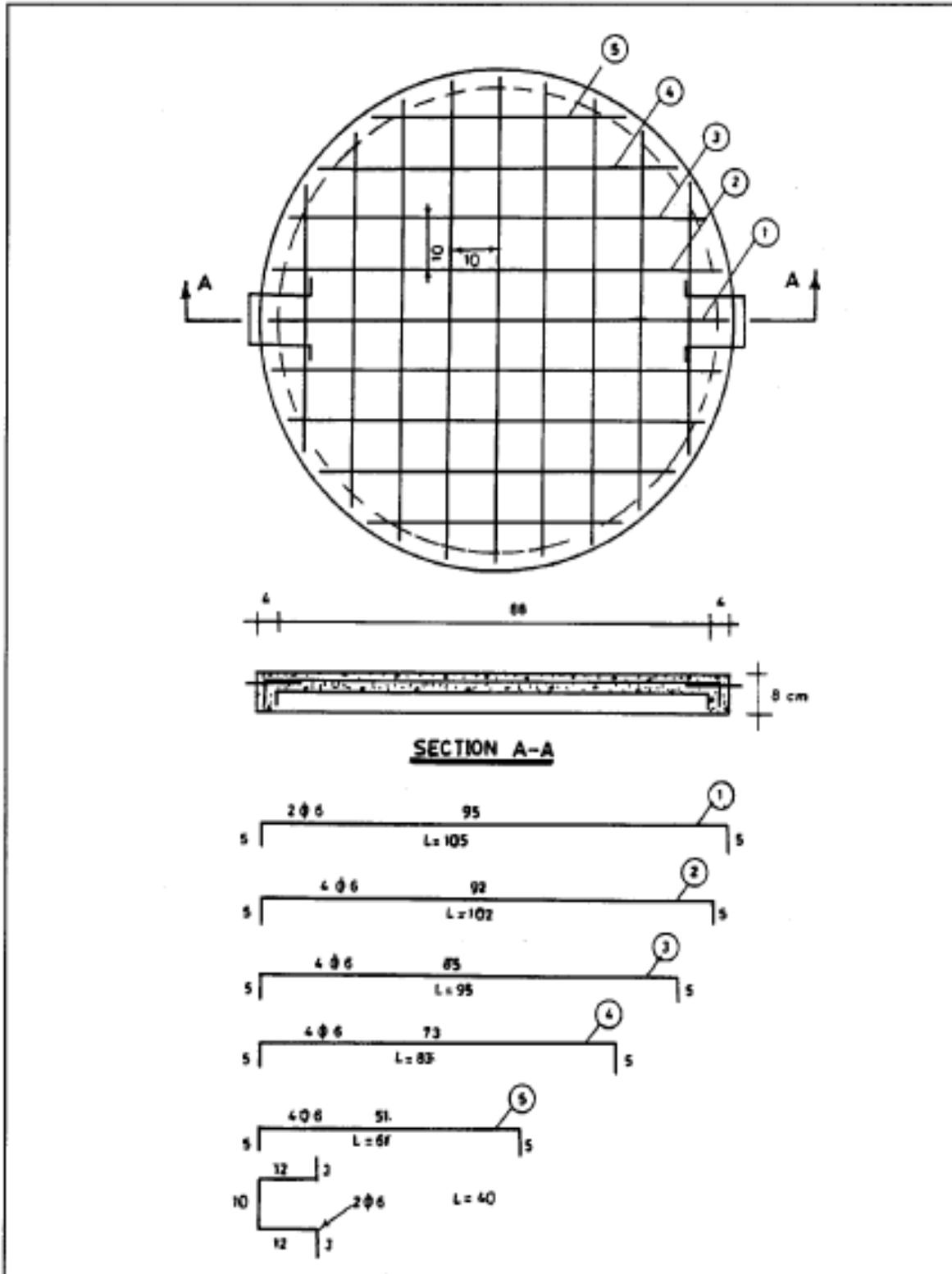
1 - Hole Water Seal Pit Latrine (Continued)

**WATER SEAL LATRINE SLAB**



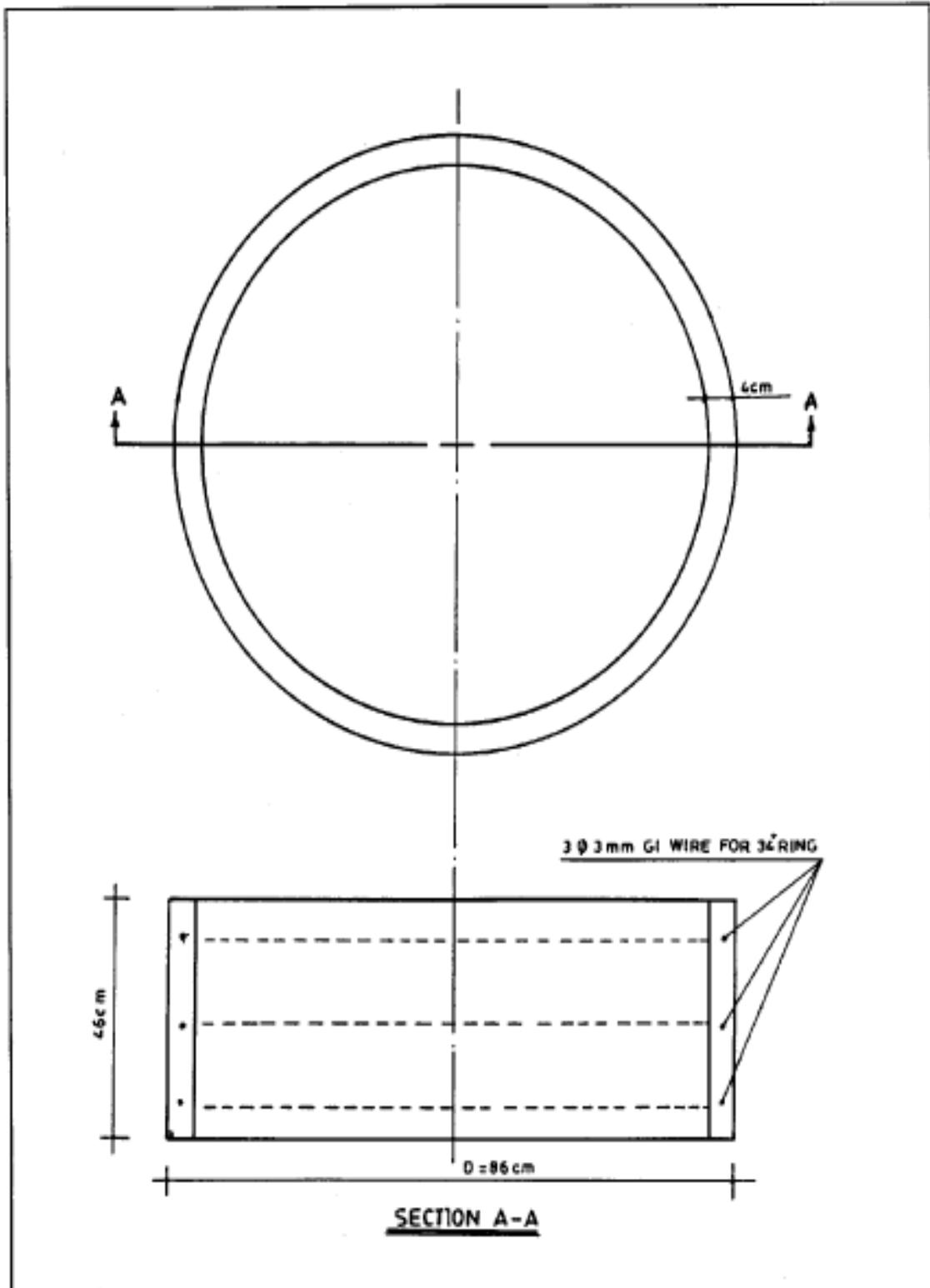
# 1 - Hole Water Seal Pit Latrine (Continued)

## PIT COVER DETAIL



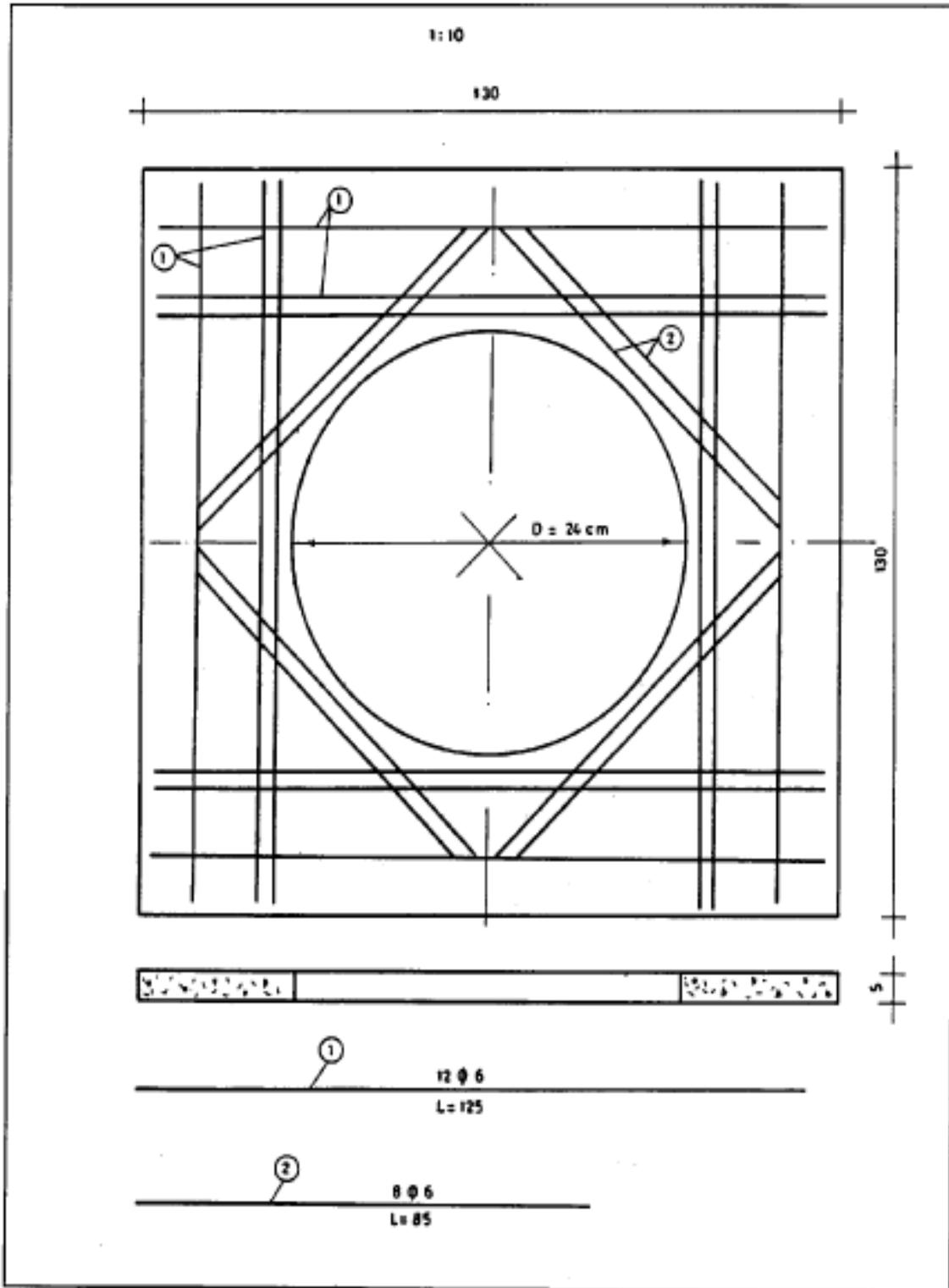
## 1 - Hole Water Seal Pit Latrine (Continued)

### CONCRETE RING



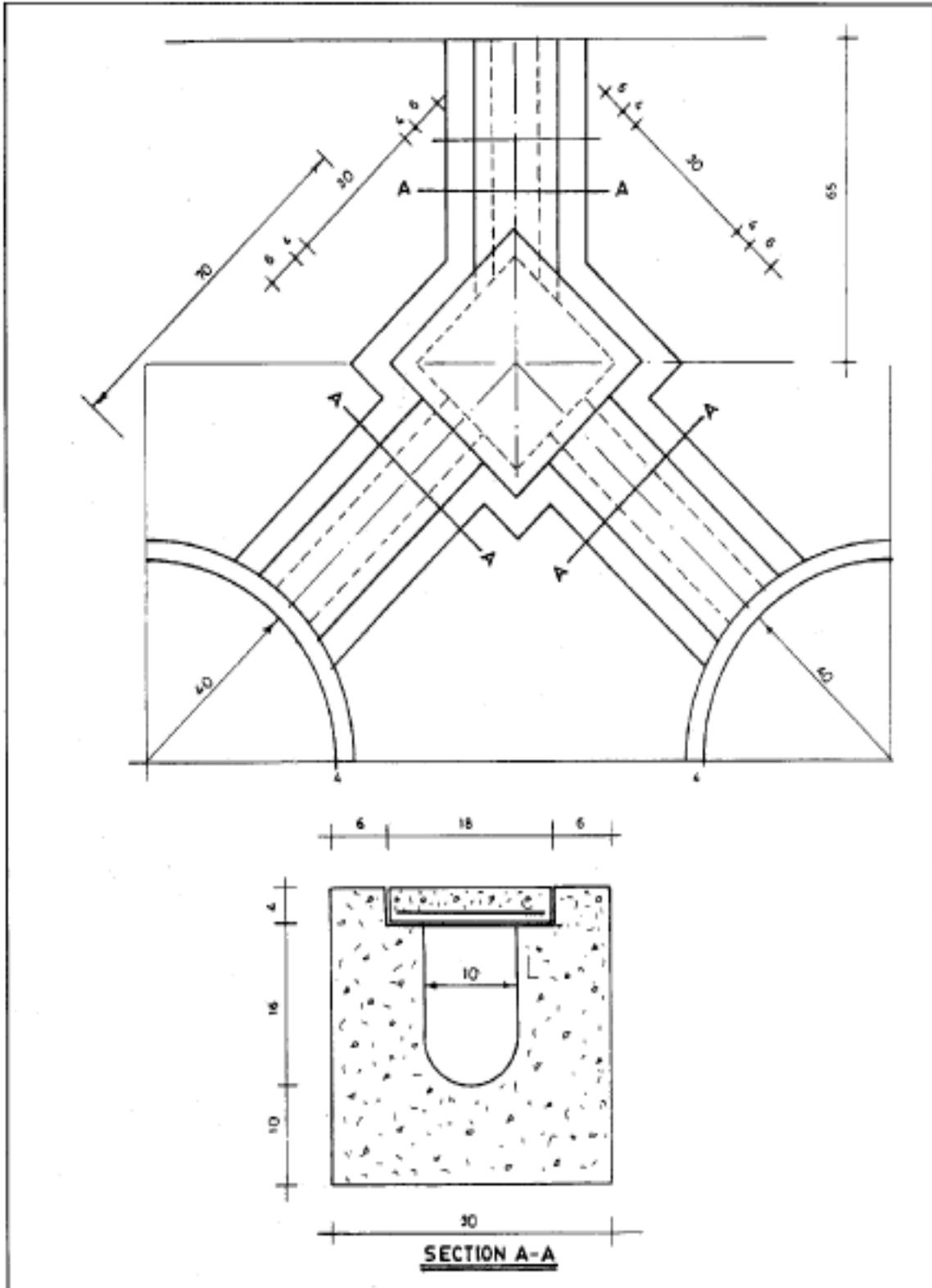
# 1 - Hole Water Seal Pit Latrine (Continued)

## REDUCING SLAB DETAIL



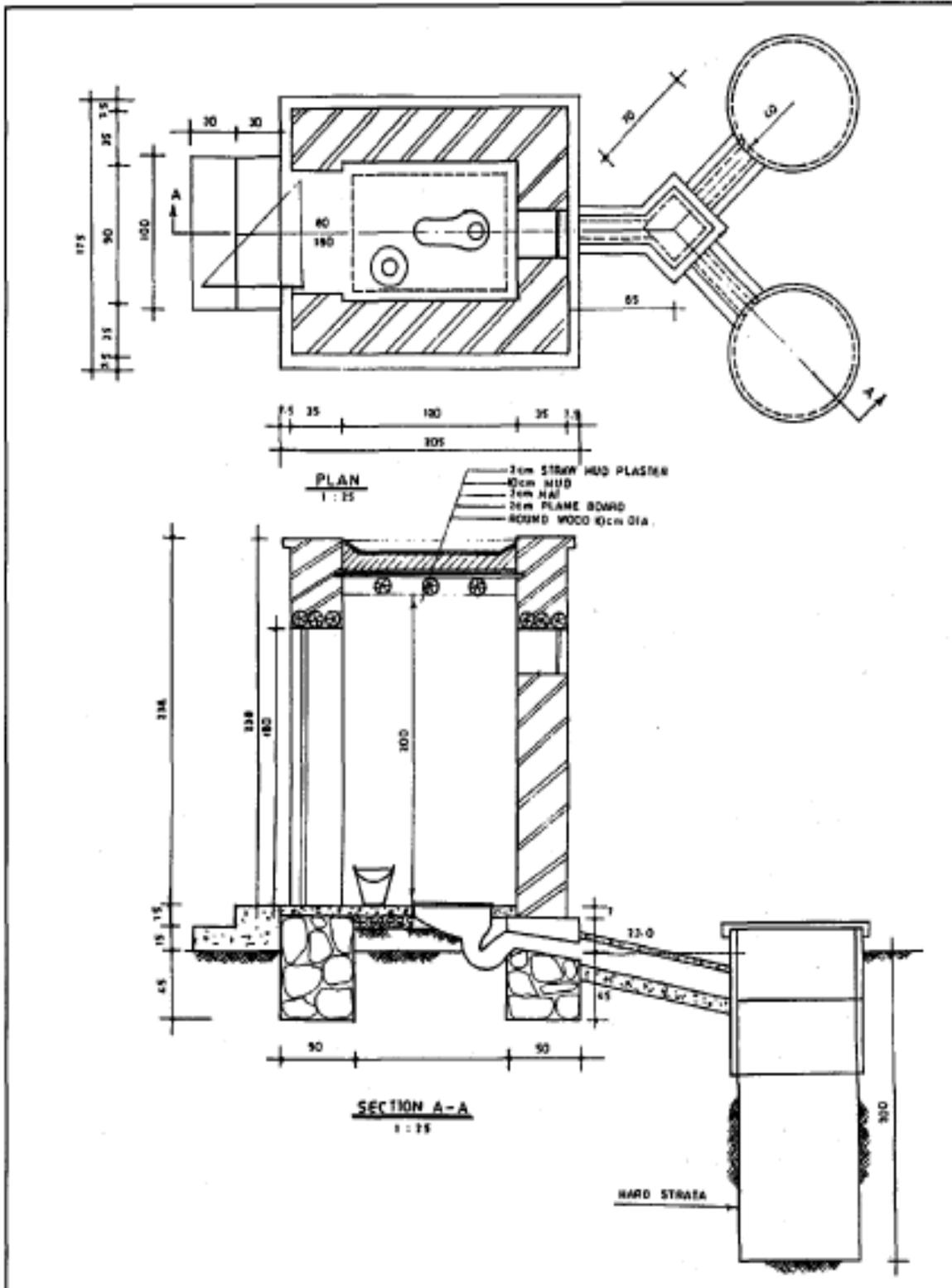
## 1 - Hole Water Seal Pit Latrine (Continued)

### DOUBLE PIT WATER SEAL DRAINAGE DETAIL



# 1 - Hole Water Seal Pit Latrine (Continued)

## DOUBLE VAULT WATER SEAL LATRINE



## Bill of Quantity Water Seal Double Pit Latrine

List	Particular Items	No.	L (m)	W (m)	H (m)	Quantity m <sup>3</sup>	Remarks
1	<b>EXCAVATION</b>						
	Foundation long wall	2	1.850	0.500	0.450	0.700	
	Foundation short wall	2	1.250	0.500	0.450	0.560	
	Pit	2		0.500	1.700	1.700	$A = \pi(0.5)^2 \times H = 0.5$
	Pit	2	1.300	1.300	0.300	1.000	Square base for reduction slab
	Stairs foundation	1	1.000	0.600	0.100	0.060	
	Drainage foundation		0.850	0.300	0.300	0.060	
	Drainage foundation	2	0.700	0.300	0.000	0.130	
	<b>Total</b>					<b>4.210</b>	
2	<b>STONE MASONRY</b>						
	Foundation long wall	2	1.850	0.500	0.750	1.180	
	Foundation short wall	2	1.250	0.500	0.750	0.940	
	Stairs	1	1.000	0.300	0.150	0.045	
	Stairs	1	1.000	0.600	0.150	0.090	
	<b>Total</b>					<b>2.230</b>	
3	<b>BRICK WORK</b>						
	Room long wall	2	1.850	0.350	2.350	2.580	
	Room short wall	2	1.250	0.350	2.350	2.080	
	Door deduction		1.600	0.800	0.350	(0.500)	
	Opening deduction		0.900	0.300	0.350	(0.090)	
	<b>Total</b>					<b>4.130</b>	
4	<b>BURNT BRICK WORK</b>						
	Drainage flume		2.050	0.200	0.150	0.605	70=70+65=205 cm
	<b>Total</b>					<b>0.605</b>	
5	<b>(MUD+STRAW) PLASTER</b>					0.108	
	Room inside	2	1.200		2.100	5.040	
	Room inside	2	0.900		2.100	3.780	
	Room outside	2	2.050		2.350	9.780	
	Room outside	2	1.750		2.350	8.330	
	Top of roof		1.750		2.050	3.580	
	Door (deduction)	2	0.800		1.800	(2.880)	
	Opening (deduction)	2	0.300		0.300	(0.180)	
	<b>Total</b>					<b>27.440</b>	
6	<b>WOOD WORK</b>						
	Door		0.800		1.800	1.440	m <sup>2</sup>
	Roof round wood	3	1.250				d= 10cm
	Door lintel round wood	3	1.100				d= 8cm
	Wooden board		1.200	0.800	0.010	0.011	
	Mat		1.200	0.800		1.080	m <sup>2</sup>
7	<b>MUD WORK</b>						
	Top of roof		1.200	0.800	0.110	0.100	
	<b>Total</b>					<b>0.100</b>	
8	<b>P.C.C. WORK</b>						
	Latrine floor		1.200	0.900	0.070	0.076	
	Floor of door		0.800	0.400	0.070	0.023	
	Foundation of drainage flume		2.050	0.300	0.100	0.601	70=70+65=205
	Top stairs		1.000	0.600	0.040	0.024	
	Top of drainage flume walls		2.050	0.120	0.040	0.010	
	Place of pit (deduction)		0.320		0.070	(0.022)	$\pi(0.14)^2(2)=7.86 \times 10^{-4}$
	<b>Total</b>					<b>0.172</b>	$\pi(0.11)^2(2)=4.76 \times 10^{-4}$ $(0.14+0.11) \times 0.25 \times 2=0.32$
9	<b>B.C.C. WORK</b>						
	Cover of drainage		2.050	0.100	0.040	0.015	
	Rings	2	0.600			0.094	$\pi(0.30)^2 \times 0.70(2)=0.047$
	Ring cover plate	2	0.750		0.080	0.120	$\pi(0.30)^2=0.75$
	Deduction	2	0.600		0.040	(0.050)	$\pi(0.3)^2=0.83$
	Reduction slab	2	1.300	1.300	0.050	0.168	$\pi(0.74)^2=0.43$
	Deduction	2	0.400		0.050	(0.043)	
	<b>Total</b>					<b>0.308</b>	





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