No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NATIONAL CENTRE FOR RURAL WATER SUPPLY AND ENVIRONMENTAL SANITATION (N-CERWASS)

THE STUDY ON GROUNDWATER DEVELOPMENT IN THE RURAL PROVINCES OF THE SOUTHERN COASTAL ZONE IN THE SOCIALIST REPUBLIC OF VIETNAM

FINAL REPORT

(Follow Up for Model Sanitation Program)

MARCH 2009

TOKYO ENGINEERING CONSULTANTS CO., LTD.

IN ASSOCIATION WITH

OYO INTERNATIONAL CORPORATION

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Abbreviation and Acronyms

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BHN	Basic Human Needs
CD	Capacity Development
CEMA	Committee for Ethnic Minorities
CPC	Communal People's Committee
CPRGS	Comprehensive Poverty Reduction and Growth Strategy
DANIDA	Danish International Development Assistance
DARD	Department of Agriculture and Rural Development (Provincial Level)
DOET	Department of Education and Training (Provincial Level)
DOH	Department of Health (Provincial Level)
DONRE	Department of Natural Resources and Environment (Provincial Level)
DPC	District People's Committee
DPI	Department of Planning and Investment (Provincial Level)
DVCL	Double Vault Composting Latrine
EIA	Environmental Impact Assessment
FS	Feasibility Study
GOV	Government of Vietnam
HEP	Horizontal Electrical Profiling
IEC	Information, Education and Communication
IEE	Initial Environmental Evaluation
MARD	Ministry of Agriculture and Rural Development
MOC	Ministry of Construction
MOET	Ministry of Education and Training
MOF	Ministry of Finance
MOH	Ministry of Health
MOLISA	Ministry of Labour, War Invalids and Social Affairs
MONRE	Ministry of Natural Resources and Environment
MP	Master Plan
N-CERWASS	National Centre for Rural Water Supply and Environmental Sanitation
NGO	Non Government Organization
NRWSSS	National Rural Water Supply and Sanitation Strategy

NTP	National Target Programme
ODA	Official Development Assistance
O&M	Operation and Maintenance
P-CERWASS	Provincial Center for Rural Water Supply and Sanitation
PMU	Project Management Unit
PPC	Provincial People's Committee
RWSS	Rural Water Supply and Sanitation
SRTM	Shuttle Radar Topography Mission
TPBS	Targeted Programme Budget Support
UNICEFF	United Nations Children's Fund
USD	US Dollar
VBSP	Vietnam Bank for Social Policy
VES	Vertical Electrical Sounding
VND	Vietnamese Dong (The Vietnamese currency unit)
WSS	Water Supply and Sanitation

CURRENCY EQUIVALENTS

(July 2008)

USD 1.00 = JPY 106.17

USD 1.00 = VND 16,852

CHAPTER 1 INTRODUCTION

1.1 Background

Improvement of rural water supply shall be implemented together with sanitation improvement. Sanitary condition in the Study areas is serious, as coverage rate of sanitation is very low despite efforts by the Government of Vietnam.

As sanitation sector involves complex problems, such as personal hygiene, financial, technical and environmental issues, a model sanitation program is to be prepared in the course of the Study in order to address the problems in a more effective way. Under the program, sanitation education to students and sanitation facilities in the target schools are to be provided. Lessons learned in the program are to be reflected into the master plan for sanitation improvement.

1.2 Objectives

The model sanitation program aims to find out better approaches to improved sanitation in the Study areas, by provision of model sanitation toilet facilities and sanitation education to the target schools.
In order to achieve improved and sustainable environmental sanitation in the Study areas, the following activities are proposed, in addition to current practices of hand-washing before meals and after excretion, and increasing coverage rate of sanitation facilities:

(i) To disseminate proper function and maintenance of the dry type toilet so that people can reuse the separated urine as well as dry alkali feces in agricultural fields
(ii) To recommend an improved pour flush toilet with septic tank which separates urine from feces, considering that effluent from septic tank may cause groundwater pollution and that collected septic tank sludge are discharged into non-arable lands without treatment which causes environmental pollution.
(iii) To disseminate information that human excreta contains a lot of useful nutrient that could be applied to the fields, while chemical fertilizer may cause degradation of agricultural lands, especially in areas where multiple cropping is practiced, e.g. in the Study area.
(iv) To collaborate with MOH and DOH, which takes initiatives in IEC activities on sanitation education under NTP II.

1.3 Procedure of the Program

(1) Flowchart

The procedure followed for implementing this program is illustrated in the Figure 1.3.1.

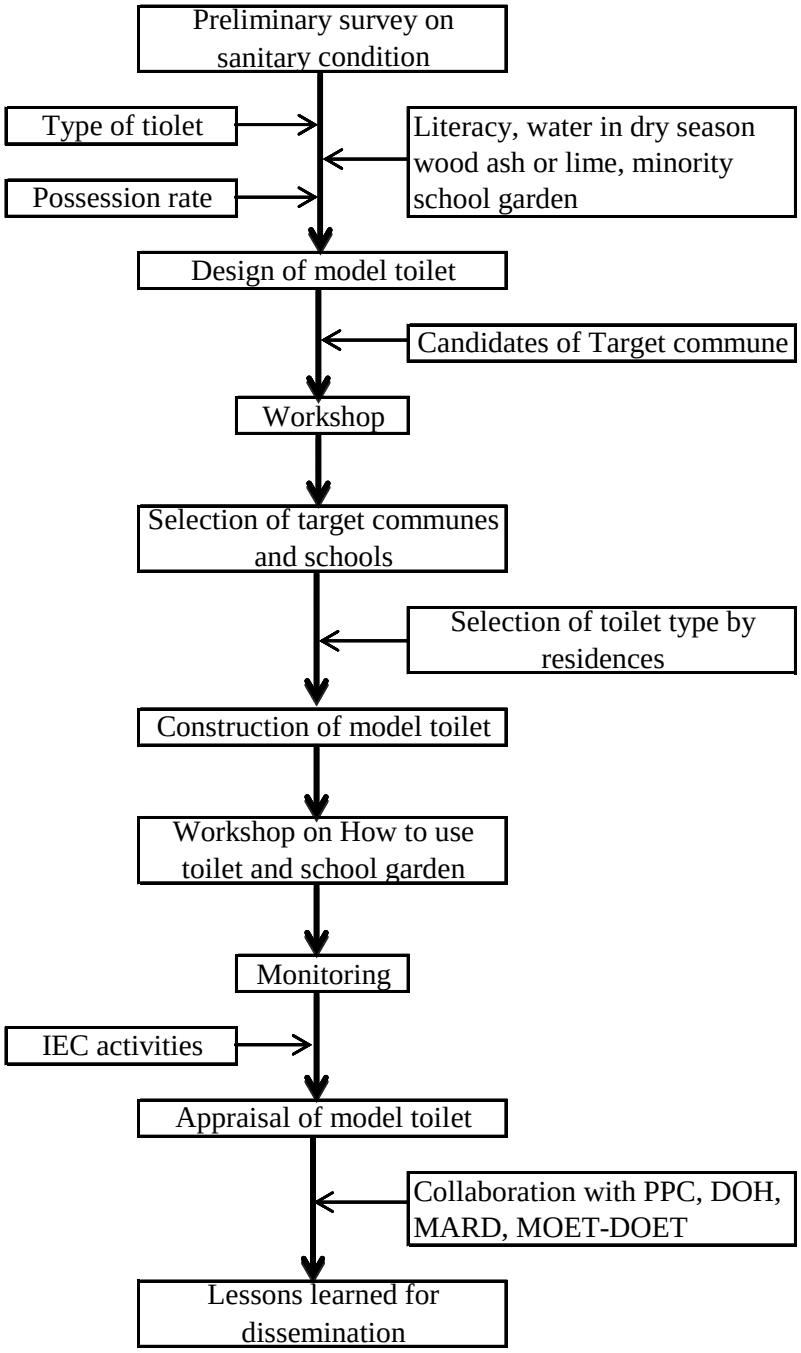
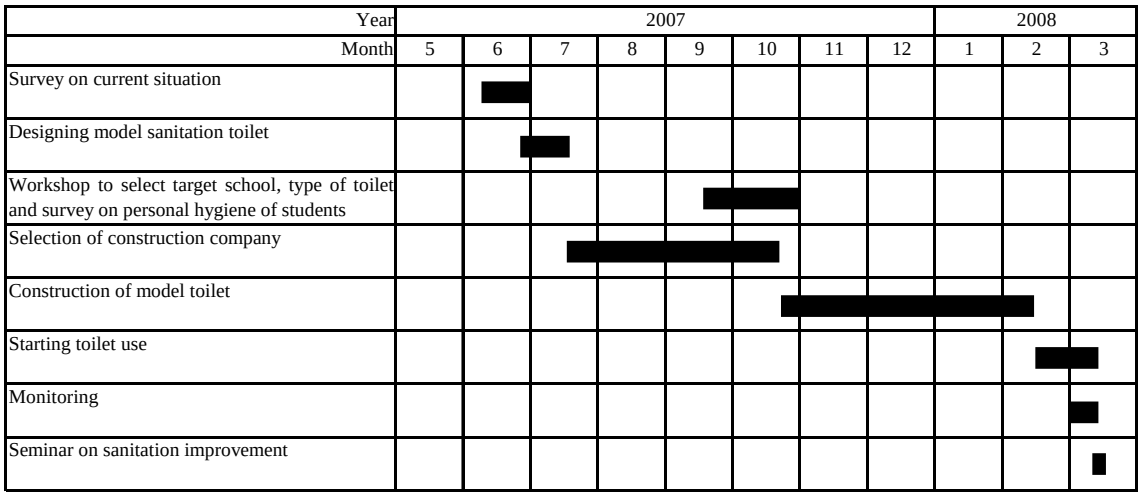


Figure 1.3.1 Implementation Flowchart of the Model Sanitation Program

(2) Implementation Schedule

The implementation schedule is shown in the Figure 1.3.2.

Phase 1: June 2007 – March 2008



Phase 2: May 2008 – February 2009

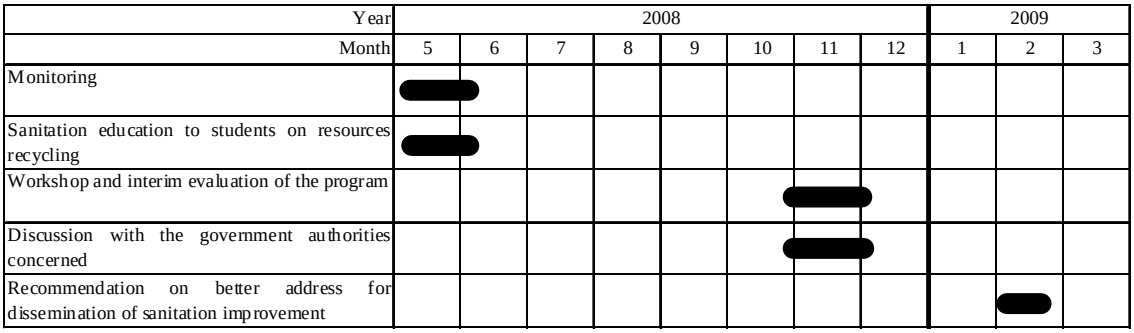


Figure 1.3.2 Implementation Schedule of the Model Sanitation Program

CHAPTER 2 RESULTS OF ACTIVITIES

2.1 Assessment on Sanitary Conditions in the Study Area

In the beginning of the program, the Study Team interviewed key informants of communes and schools to assess the current situation on sanitation in schools and residents. The results of this assessment are summarized in ANNEX-1 and described below:

2.1.1 School Toilets

(1) Number of toilets

Among the collected data being valid, number of toilets for both teachers and students are found to be insufficient in all schools, considering appropriate number of toilets as described below. Four out of 12 schools assessed in Phu Yen Provinces didn't have toilet. However, two of them are planning or under constructing toilets.

Table 2.1.1 Nunber of School Toilets by Province

	Number of school (data being valid)	Number of teachers	Number of students	Number of toilets	
				Teachers (per 100 teachers)	Students (per 100 students)
Phu Yen	12	413	6 037	0 (0)	15 (0.25)
Khanh Hoa	4	121	2 191	4 (3.3)	8 (0.37)
Ninh Thuan	6	160	3 678	6 (3.8)	17 (0.46)
Binh Thuan	3	73	1 252	3 (4.1)	8 (0.64)
Total	25	767	13 158	13 (1.7)	48 (0.36)

For comparison, the number of toilet booths according to the Vietnamese design standard is shown in the Table below.

Table 2.1.2 Design Standard of School Toilet (Vietnam)

	Number of students	Number of feces booth	Number per 100 students
Primary	300-350	2	0.57-0.67
	600-700	4	0.57-0.67
Secondary	240-320	2	0.63-0.83
	480-640	4	0.63-0.83

(2) Type of toilet

Type of toilets in 28 schools (90%) out of 31 schools, assessed by the Study Team, is septic tank toilet. The rest 3 schools (10%) use DVCL.

It was observed that most schools which use septic tank toilets do not have continuous water supply due to empty water tank or dried-up wells. In case of DVCL, urine is directly discharged to the ground, instead of fertilizing for agricultural use. It is assumed that the dry compost is also not used for agricultural purposes.

Table 2.1.3 Type of School Toilets by Province

	Number of school assessed by the Team	Toilet type		
		Septic Tank	DVCL	Others
Phu Yen	13	10 #)	3	0
Khanh Hoa	4	4	0	0
Ninh Thuan	7	7	0	0
Binh Thuan	7	7	0	0
Total	31	28	3	0

#) The number includes two schools of having plan and under construction.

(3) Physical Condition

Among 29 schools assessed, 16 school toilets (55%) are regarded as functioning, 5 toilets (17%) are conditionally functioning and 8 toilets (28%) are broken. According to school teachers, once toilets are broken, it is difficult for the school to repair due to budget constrain. In case toilets are malfunctioning and only a few toilets are functioning, small number of toilets are shared by many people in the school.

In addition, most of the toilets are locked by teachers because of broken condition, lack of water, etc. As a result, the students are not able to access toilets freely. Then, they defecate in open-air.

Table 2.1.4 Physical Condition of School Toilets by Province

	Number of school assessed by the Team	Physical condition		
		Functioning	Conditional	Broken
Phu Yen	9	4	2	3
Khanh Hoa	4	3	0	1
Ninh Thuan	9	6	2	1
Binh Thuan	7	3	1	3
Total	29	16	5	8

(4) Access to Water

Only 14% (5 out of 37 schools) replied enough water supply, while 51% replied water shortage in dry season. It seems that water supply condition is often overlooked, while the most schools chose septic tank type toilet.

Table 2.1.5 Access to Water of School by Province

	Number of school assessed by the Team	Access to water		
		Enough	Short or no water (dry season)	Unclear / No information
Phu Yen	14	1	6	7
Khanh Hoa	4	2	2	0
Ninh Thuan	10	2	3	5
Binh Thuan	9	0	8	1
Total	37	5	19	13

(5) Use of Vacuum Car

Although verifiable information is very few with regard to vacuum car use, it is assumed that most school teachers are not aware of necessity and cost of vacuum car for emptying the septic tank. As most Vietnamese citizens believe, the teachers replied that emptying the septic tank would be done after 5-10 years, while the Study Team recommend it should be done every half or one year. In fact, the cost of approx. 500,000 VND/time seems unaffordable for schools, unless budget is given by DOET.

2.1.2 Residential Toilets

- According to given information and interview with rural residents, rural people in general understand necessity of hygienic latrine by knowledge. However, they said that they can not afford to construct and maintain it mainly for financial reason.
- Through the interview with rural people, it was found that awareness on sanitation and hygiene is insufficient, that causes wrong hygiene practice. For example, the people in B3: Nghi Duc and B2: Gia Huynh told that premises of rural household are generally large enough. Therefore, they believe that open defecation in their premises doesn't cause hygienic problem. Some even think that open defecation is more comfortable than defecation in closed space, saying that they are familiar with open-air since they were born.
- Not a small number of cases are observed that septic tank is constructed near shallow well within premises of a resident, which may cause groundwater pollution by nitrate contained in effluent from the tank. Few residents pay attention to it.
- Few residents pay attention to groundwater pollution caused by effluent from septic tank and environmental pollution caused by untreated wastes discharged into the agricultural fields.
- In the Study area, dry type toilet was once promoted by MOH more than 20 years ago. The function and maintenance was not well understood by the residents. As a result, dry toilets are not accepted by most of the residents. On the other hand, pour flush toilet with septic tank is believed to be clean, with low level of smell and suitable to be constructed within the house.
- Another factor for the reason of unpopularity of DVCL is pointed out that nowadays use of firewood is decreasing even in the rural area. Therefore, wooden ash is hardly prepared. It is said especially in communes in Khanh Hoa and Binh Thuan Provinces.

2.1.3 Questionnaire Survey on Personal Hygiene of Students

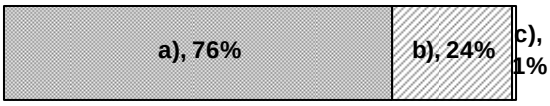
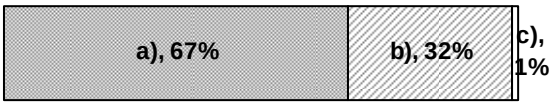
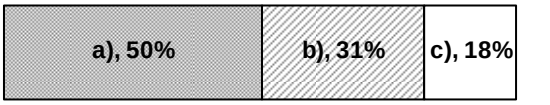
In parallel with the workshop in the commune, questionnaire survey was carried out for 309 students, by choosing each one class each per school from 10 schools of 8 communes which were preliminarily screened before selecting target communes.

The questionnaire and the result is shown in the ANNEX-2. The result is summarized as below.

(1) Hygiene Practice

Approx. 99% of the total students answered that they have practice of washing hand before meal

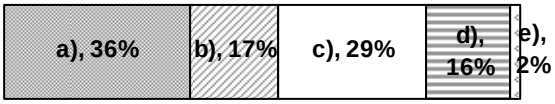
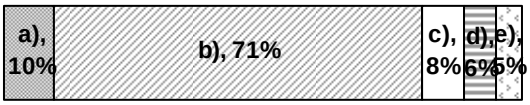
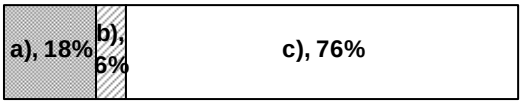
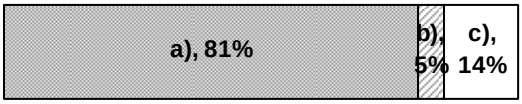
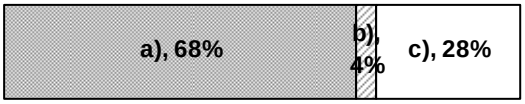
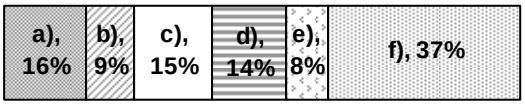
and after defecation, although approx. 1/3 – 1/4 of them doesn't wash hands every time. To the question 1-7, approx. 50% students answered habit of open defecation (including the answer of "Often" or "Never" use toilet).

1-1	Washing face a) Every time b) Often c) Never	
1-2	Washing hands before meal a) Every time b) Often c) Never	
1-3	Washing hands after defecation a) Every time b) Often c) Never	
1-4	Having tissue paper a) Every time b) Often c) Never	
1-5	Having handkerchief a) Every time b) Often c) Never	
1-6	Brushing teeth a) Every time b) Often c) Never	
1-7	Using toilet for defecation a) Every time b) Often c) Never	

(2) Situation of toilet in house

Question 2-1 shows that the type of toilet used differs by province. In Phu Yen and Khanh Hoa provinces, rates of hygienic latrine (including septic tank and DVCL) are 46 and 41% respectively, while it is more than 70% in Khanh Hoa and Binh Thuan provinces. It is noted that septic tank is used more where the rate of sanitation coverage is high.

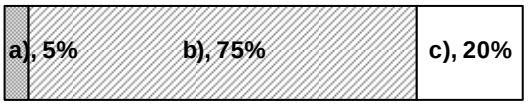
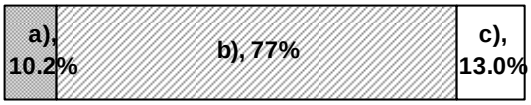
To the questions about existing toilet, more than 30% of respondents answered that they feel bad smell as well as dirtiness of their own toilets. Also approx. 70% feels necessity of improving their toilet (question 2-6).

2-1	Toilet type a) No (Open air) b) Septic Tank c) DVCL d) Dug hole e)Others	Phu Yen  Khanh Hoa  Ninh Thuan  Binh Thuan 
2-2	Smelling a) Yes b) in between c) No	 (Ratio among students who have toilet in house)
2-3	Dirtiness a) Yes b) in between c) No	 (Ratio among students who have toilet in house)
2-4	Danger for children a) Yes b) in between c) No	 (Ratio among students who have toilet in house)
2-5	Keep using now a) Yes b) in between c) No	 (Ratio among students who have toilet in house)
2-6	Need to improve toilet a) Yes b) in between c) No	 (Ratio among students who have toilet in house)
2-7	Reason of improvement a) Almost full b) Full in short c) Almost broken d) Dirty e) Bad smell f)Want cleaner one	 (Ratio among students who answered a) or b) in 2-6)

(3) Health Status

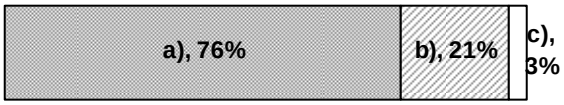
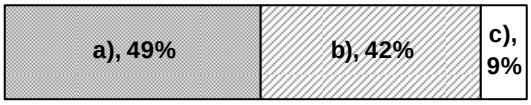
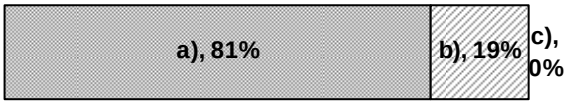
Groups of having and without toilet are compared in order to see the relationship between toilet pervasion and risk of disease. Although there seems to be slight tendency, remarkable difference

between the groups is not observed.

3-1	Fever and diarrhea a) Often b) Sometimes c) Never	Group of having toilet  Group of without toilet 

(4) Knowledge on environmental sanitation

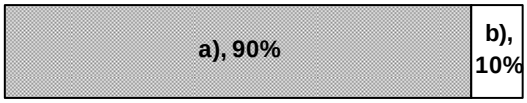
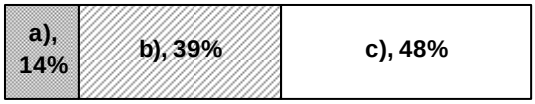
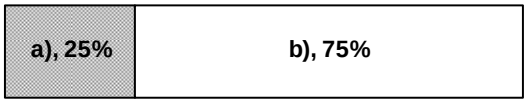
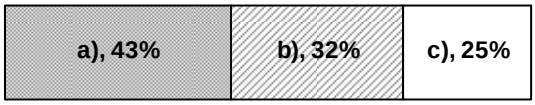
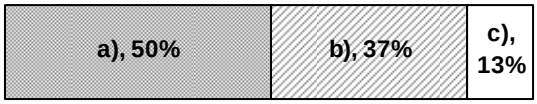
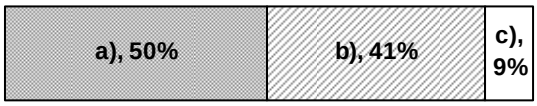
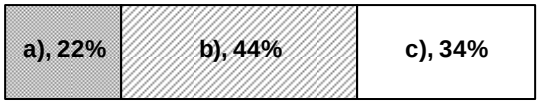
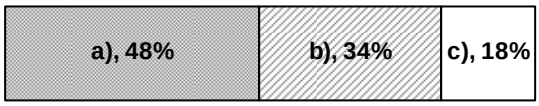
In general, most students answered they have some knowledge related to diseases from excreta, water pollution and environmental pollution. When groups of having and without toilet are compared, there is a tendency between perversion and knowledge on sanitation. In all questions, the group of having toilet seems to have better knowledge than the group of without toilet.

4-1	Knowledge of diseases from excreta a) Yes b) A little c) No	Group of having toilet  Group of without toilet 
4-2	Knowledge of polluted water a) Yes b) A little c) No	Group of having toilet  Group of without toilet 
4-3	Knowledge of environmental pollution a) Yes b) A little c) No	Group of having toilet  Group of without toilet 

(5) Awareness on human wastes

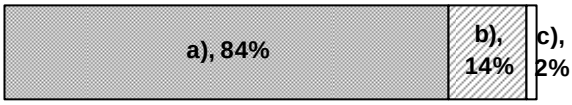
Several questions were asked about awareness on human wastes. Seeing results of 5-4 and 5-5, approx. 75-80% of students seem to have feelings of hesitation to handle human wastes, because of its dirtiness. At the same time, approx. 70% of students are somehow aware that human wastes can be

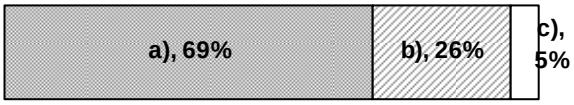
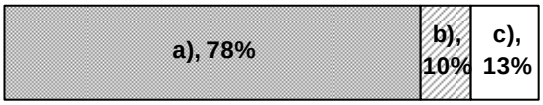
used as fertilizer, fuel and soil conditioner (5-7, 5-8 and 5-9).

5-1	Keep toilet clean a) Yes b) Nothing in particular	
5-2	Dreadful job of cleaning a) Yes b) in between c) No	
5-3	Experience of picking up waste a) Yes b) No	
5-4	Dreadful job of picking up defecation a) Yes b) in between c) No	
5-5	Awareness of excreta moving a) Dirty b) A little c) No	
5-6	Experience of using cleaner toilet a) Yes b) Only heard c) No	
5-7	Fertilizer a) Yes b) Only heard c) No	
5-8	Fuel gas a) Yes b) Only heard c) No	
5-9	Soil conditioner a) Yes b) Only heard c) No	

(6) Expectation for improvement of toilet

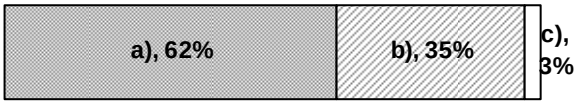
98% of students answered that they wants improved sanitation (6-1). Also approx. 95% answered they are interested in resources recycling (6-2).

6-1	Improvement more sanitary a) Do wish b) If possible c) Don't wish	

6-2	Improvement of resource use a) Do wish b) If possible c) Don't wish	
6-3	To use during flood a) Do wish b) If possible c) Don't wish	
6-4	Most preferable reason a) Sanitation b) Resources c) Every time use	

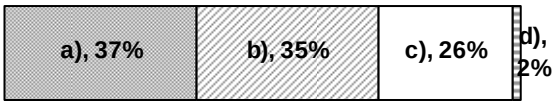
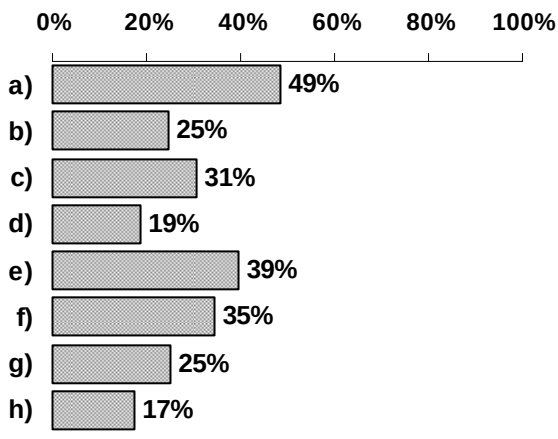
(7) When getting ill

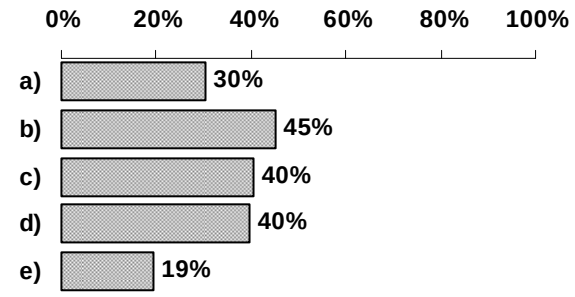
More than 90% of respondents answered to get medicine and consult with doctor when they get ill.

7-1	Getting medicine a) Easy b) Not difficult c) Difficult	
7-2	Seeing doctor a) Yes b) Only serious ill c) No	

(8) Life

Approx. 72 % of respondents feel satisfied with their life. For questions 8-2 and 8-3, where multiple answers were allowed, sport-related goods and facilities ranked the top of things desired by students.

8-1	General satisfaction in life a) Fully Satisfied b) Satisfied c) Not really d) Not at all	
8-2	Things desired at present a) Sports goods b) Musical instruments c) Text books d) Game players e) Comics f) Cloths g) Shoes h) Others	

8-3	Public facilities desired a) Gym b) Swimming pool c) Library d)Amusement park e) Others	

2.1.4 Water Quality Analysis of the Existing Septic Tank

Water quality was analyzed for effluent and sludge of the existing septic tank, in order to examine treatment effect of the existing septic tank. Three locations were selected in Cam An Bac Commune of Khanh Hoa Province, out of which one school and two households were chosen for sampling.

As a result, it was turned out that any sample of effluent and sludge from the existing septic tanks doesn't meet the referential value of Japanese wastewater quality standard. The result shows that the existing septic tanks have few effects to reduce pollution loads and a risk of groundwater pollution of shallow wells is progressing by the effluent of septic tanks.

Table 2.1.6 Sampling Points for Water Quality Analysis

Serial No.	Sampling date	Description	Location
M1	26/11/2007	Effluent from the septic tank	Nguyen Trai Secondary School
M2	26/11/2007	Sludge from the tank bottom	Nguyen Trai Secondary School
M3	26/11/2007	Effluent from the septic tank	Household-1
M4	26/11/2007	Sludge from the tank bottom	Household-1
M5	26/11/2007	Effluent from the septic tank	Household-2
M6	26/11/2007	Sludge from the tank bottom	Household-2

Table 2.1.7 Analysis Result of Water Quality of the Existing Septic Tank

		School		Household-1		Household-2		Effluent quality standard[#1)] (Japan)
		M1	M2	M3	M4	M5	M6	
Parameter	Unit	Effluent	Sludge	Effluent	Sludge	Effluent	Sludge	
Fecal coliforms	CFU/100ml	$2100x10^5$	93×10^5	1.5×10^5	9.3×10^5	0.75×10^5	2.4×10^5	3.0×10^5
Vibrio cholerae	CFU/100ml	0	0	0	0	0	0	
Shigella	CFU/100ml	0	0	0	0	0	0	
Salmonella	CFU/100ml	0	0	0	0	0	0	
pH		10.37	9.68	7.31	7.24	8.03	8.35	5.8-8.6
BOD_5	mg/L	691	1 387	717	725	240	398	20 [#2)]
COD	mg/L	965	1 900	969	897	350	510	120
Suspended Solids (SS)	mg/L	326	2 371	52	227	65	45	150

Parameter	Unit	School		Household-1		Household-2		Effluent quality standard[#1)] (Japan)
		M1	M2	M3	M4	M5	M6	
		Effluent	Sludge	Effluent	Sludge	Effluent	Sludge	
Total solids	mg/L	2 534	4 613	921	1 110	490	491	
Total Dissolved Solids (TDS)	mg/L	2 208	2 242	869	873	425	446	
Ammonium Nitrogen	mg/L	789	811	192	200	62.2	78.5	
Total Nitrogen	mg/L	795	829	227	240	85.8	89.6	60

(Note) [#1)] Water pollution control law, Japan
[#2)] Law on Johkasou (advanced domestic wastewater treatment tank), Japan

2.2 Target Communes and Schools

2.2.1 Selection of Target Communes

As the first screening, two communes from each province of the Study area were selected as candidates for the target communes considering the following criteria.

1) Literacy rate: For better communication, the rate should not be low.
2) Ethnic composition: Ethnic minorities should be considered.
3) Access to water in dry season: Water is needed for hand-washing and flushing (if necessary)
4) Necessity of toilet: Schools which lack of toilet or broken should be focused. Schools with new or satisfactory condition are not selected.
5) Awareness of sanitation promotion and ecological sanitation: Any commune/school who has good awareness on sanitation should be prioritized.
6) Accessibility: For mobilization, commune of better access from the national road should be prioritized.

As a result, eight communes were selected as the candidates: An Tho (P3) and Suoi Bac (P7) communes in Phu Yen Province, Cam An Bac (K1) and Cam Hai Tay (K3) in Khanh Hoa Province, Nhon Hai (N1) and Cong Hai (N2) communes in Ninh Thuan Province, Muong Man (B1) and Tan Duc (B4) communes in Binh Thuan Province.

In every commune, workshop was organized by the Study Team. In the workshop, representatives from CPC and schools, health workers and residents in the commune were invited to explain the objectives and approach of the Program. In the workshop, the Team also presented two types of toilet, as options to be selected by the target school.

2.2.2 Contents of Workshop

The workshops were organized by the Study Team in collaboration with P-CERWASS. The local moderator was employed to facilitate the workshop in Vietnamese language. The meeting hall of the CPC was provided as venue for the workshop. The main contents of workshop are listed as follows:

- Presentation on sanitation education including four topics; (i) necessity to stop practice of open defecation, (ii) possibility of groundwater pollution by pour flush with septic tank, (iii) concept of resources recycling, and (iv) important roles of students in model sanitation program
- Explanation on water quality of effluent and infiltration from septic tank, and risk of groundwater pollution
- Provision of sanitation education through interview to health worker and discussion on cause of waterborne disease which increases in rainy season
- Dialogue with residents about personal hygiene and sanitation
- Dissemination of correct knowledge to residents, health workers, teachers, and representatives of CPC, that recycling human excreta into agricultural lands is sanitarily and sustainable solution in rural area
- Demonstration of model toilets to be constructed under the program, which enable improved sanitation and resources recycling under conditions that few sewerage system and night soil treatment plants exist.

The workshop schedule is shown in the Table 2.2.1

Table 2.2.1 Workshop Schedule

	Subject	Commune	Date
1	Selection of target communes and schools	P3 (An Tho) and P7 (Suoi Bac) in Phu Yen Province	September 26-28/2007 October 15/2007
		K1 (Cam An Bac) and K3 (Cam Hai Tay) in Khanh Hoa Province	September 20-25/2007 October 9/2007
		N1 (Nhon Hai) and N2 (Cong Hai) in Ninh Thuan Province	October 4-8/2007 October 11/2007
		B1 (Muong Man) and B4 (Tan Duc) in Binh Thuan Province	October 1-3/2007 October 18/2007
2	Selection of toilet type	P7 (Suoi Bac) in Phu Yen Province	October 16/2007
		K1 (Cam An Bac) in Khanh Hoa Province	October 10/2007
		N2 (Nhon Hai) in Ninh Thuan Province	October 12/2007
		B1 (Muong Man) in Binh Thuan Province	October 19/2007

2.2.3 Results of Workshop to Select Target Commune

The workshop results are summarized in the following tables. After the workshop, five schools in four target communes were decided by the Study Team, in consideration of current situation and positive participation to the Program.

The target communes selected are: Suoi Bac (P-7), Cam An Bac (K-1), Cong Hai (N-2) and Muong Man (B-1).

1) Suoi Bac Commune (P-7), Phu Yen Province (Target Commune)

Date	September 28, 2007
Participants	42 persons (including Vice chairperson of CPC, Principal teachers of primary and secondary schools, Health worker, residents)

Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Lecture on "Effectiveness in sanitation of urine diversion by DVCL toilet" (by Dr. Phi, Pasteur Institute) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all participants)
Opinions through discussion	− [Pro-DVCL] DVCL is suitable since construction cost is lower and excreta can be used as fertilizer. − [Con-Septic] As vacuum track is not available in commune, septic tank type latrine should not be constructed. − [Pro-Septic]/[Pro-DVCL] Septic tank type seems better for public use such as school toilet, while DVCL is suitable for domestic use.
Remarks	This commune is outstanding among eight communes of which workshops were taken place since DVCL is traditionally used in many households. The participants' interest level for effectiveness of DVCL seems also higher than other communes. The vice chairperson of CPC, as a representative of the commune, is supportive for DVCL.

2) An Tho Commune (P-3), Phu Yen Province

Date	September 27, 2007
Participants	Vice chairperson of CPC, Principal teachers of primary and secondary schools, Health worker, residents
Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Lecture on "Effectiveness in sanitation of urine diversion by DVCL toilet" (by Dr. Phi, Pasteur Institute) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all participants)
Opinions through discussion	− [Pro-Septic] Septic tank toilet is suitable, because public water supply will be soon constructed after the JICA groundwater development study. − [Pro-Septic] To date, I have had no choice but DVCL because of lack of water. However, I wish septic tank toilet for model toilet because the septic tank type can be built inside or nearby the house which is convenient to use in night time. On the other hand, DVCL could be built apart from the house, which is often inconvenient. − [Pro-DVCL] Ground soil here is very hard since the commune is located on a mountain. It means that excavation for septic tank is difficult and costly. As heard about effectiveness of DVCL type, DVCL is better for me. Then, I want to know more information about construction method, cost, etc. Also I would like to ask financial help for construction, because I am not affordable to build toilet by myself.
Remarks	The sanitation coverage of the commune is very low. (1-5%, information by commune) Compared to P7 (Suoi Bac) commune, public awareness on sanitation seems lower.

3) Cam Hai Tay Commune (K-3), Khanh Hoa Province

Date	September 24, 2007
Participants	23 persons (including Vice chairperson of CPC, Principal teachers of primary

	and secondary schools, Health worker, residents)
Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Lecture on "Effectiveness in sanitation of urine diversion by DVCL toilet" (by Dr. Phi, Pasteur Institute) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all participants)
Opinions through discussion	− [Pro-Septic] I understand economical benefits of DVCL. However it is not favorable for bad smell and poor appearance. I choose septic tank type. Although effluent from septic tank may not be clean, we are not able to perceive pollution. Only that we can perceive is that septic tank toilet is clean appearance and no bad smell. I also wish to build septic tank toilet but I can't because of financial reason. − [Pro-Septic] I know that septic tank toilet is used in big city nowadays. Although here is now rural village, but near future it will be urbanized and more populated. Therefore I would like to build septic tank toilet if I could have financial support. − [Con-DVCL] DVCL is not a best option even now and in future. Because currently people cook by using gas or electricity, so that wooden ash is not available. Also people use chemical fertilizer and don't use human excreta. In fact, I am concerned that urine can be separated from feces, especially in case of female. We don't have custom of spraying urine to vegetables.
Remarks	Existing toilets which people use is only the septic tank toilet. Although environmental issues caused by septic tank were pointed out by the Study Team, such as polluted effluent and untreated sludge disposal, people don't care much, saying that these issues should be solved by the government. Regardless of environmental issues, septic tank is preferred by most people for its cleanness in appearance.

4) Cam An Bac Commune (K-1), Khanh Hoa Province (Target Commune)

Date	September 25, 2007
Participants	21 persons (including Vice chairperson of CPC, Principal teachers of primary and secondary schools, Health worker, residents)
Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Lecture on "Effectiveness in sanitation of urine diversion by DVCL toilet" (by Dr. Phi, Pasteur Institute) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all participants)
Opinions through discussion	− [Pro-Septic] People want septic tank toilet, despite of environmental effects explained by the Team. Is there any possibility to treat wastewater from septic tank? − [Pro-Septic] People in this commune have been familiar with septic tank toilet. It is very difficult to change it to DVCL, although we understood environmental benefits of DVCL. − [Con-DVCL] It is doubtful that DVCL doesn't cause environmental effects, unlike the case of septic tank toilet which causes groundwater pollution. − [Environment] If septic tank toilet causes water pollution, we hope that treatment plant would be constructed by Japanese assistance.

	− [Pro-DVCL] People who are familiar with septic tank toilet don't want to change to DVCL. However, people who hasn't toilet can choose DVCL. Recently septic tank toilet was constructed, but number of toilet is small. Therefore, I suggest building DVCL toilet in the school. (by a school teacher) − [Con-DVCL] In 1980's I used to use DVCL, which was very dirty and smelly. We applied compost as fertilizer, but it was inconvenient in many ways. Therefore, if JICA can help, we want septic tank toilet.
Remarks	Existing toilets which people use is only the septic tank toilet. Although environmental issues caused by septic tank were pointed out by the Study Team, such as polluted effluent and untreated sludge disposal, people don't care much, saying that these issues should be solved by the government. Regardless of environmental issues, septic tank is preferred by most people for its cleanness in appearance.

5) Cong Hai Commune (N-2), Ninh Thuan Province (Target Commune)

Date	October 8, 2007
Participants	22 persons (including Vice chairperson of CPC, Principal teachers of primary and secondary schools, residents)
Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Introduction of sanitation project in Bangladesh, where DVCL toilets were constructed and dry feces are used as fertilizer (by the Study Team) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all participants)
Opinions through discussion	− [Con-DVCL] DVCL is a traditional toilet which is applicable for rural villages. It is not applicable for new house. − [Con-DVCL] Nowadays, wooden ash is hardly obtained. − [General] Rural farmers of ethnic minority are mostly poor, so that construction cost of millions VND is not affordable. − [Con-DVCL] Rural minority don't have customs of toilet use and application of human excreta. Therefore, the traditional toilet (DVCL) is not acceptable. − [Con-DVCL] It was about 30 years ago that DVCL was introduced when Vietnam War was over. The structure was very simple (shabby) and people didn't use it properly. As a result, people regarded DVCL as dirty and stopped using for long time. − [Con-Septic] To date, I believed septic tank toilet is the cleanest option. However, I have realized for the first time today that effluent and sludge from septic tank causes environmental effects. − [Con-Septic]/[Con-DVCL] In this commune, septic tank toilet is not popular. The traditional toilet (DVCL) is used in some household. But they are simple (shabby) and dirty. Most people don't have toilet and defecate in forest and field. − [Pro-DVCL] There is wide land and many ethnic minorities live in this commune. Most people are engaged in agriculture. Therefore, DVCL is most suitable. − [General] Is that true that parasite eggs human feces are killed after drying feces for 6 months. − [Con-Septic] I built septic tank toilet away from my house. But it affects neighbor's house and well which is built nearby my toilet. Although septic tank toilet is believed as the appropriate by many people, it causes negative environmental effects. We need to inform people that toilet should be built

	properly with consideration of environment. − [Pro-DVCL] Approx. 70% of population is Raglai ethnic group. Most of them don't have toilet. It is necessary to inform them of effectiveness of DVCL and agriculture use of human excreta. − [Environment] In the commune rainfall and groundwater is very few. Effluent from septic tank may not reach to river since ground soil is very dry. − [Pro-Septic]/[Pro-DVCL] Both of the toilets which the Study Team introduced are suitable. The matter we should think is that how to prepare wooden ash or flushing water which is necessary for toilet use.
Remarks	Environmental and economical benefits of DVCL seem to be well understood. On the other hand, difficulty in getting wooden ash and sense of resisting to use human excreta. Some of them believed that effluent from septic tank is clean enough to wash hand. Despite of majority opinion that is supportive to DVCL type in the workshop, septic tank toilet was chosen by the commune after that.

6) Nhon Hai Commune (N-1), Ninh Thuan Province

Date	October 8, 2007
Participants	23 persons (including Vice chairperson of CPC, Principal teachers of primary and secondary schools, residents)
Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Introduction of sanitation project in Bangladesh, where DVCL toilets were constructed and dry feces are used as fertilizer (by the Study Team) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all participants)
Opinions through discussion	− [Con-DVCL] Since currently people uses gas and electricity for cooking, it is difficult to obtain wooden ash. Septic tank toilet is clean and suitable for the commune. − [Pro-DVCL]/[Pro-Septic] Both of DVCL and septic tank toilet seems applicable. I think the point is that our people should learn proper use of toilet. I suggest that septic tank toilet is suitable in the populated area and DVCL in the less-populated area. − [General] Rural farmers of ethnic minority are mostly poor, so that construction cost of millions VND is not affordable. − [Pro-DVCL] About 20-30 years ago campaign of constructing DVCL was taken place by the government. But it failed due to bad smell and dirtiness. I assume that the reason is that toilets were not built and used properly at that time. If we reconsider about effectiveness of DVCL, we should follow technical guidance of the JICA team. I understood well about necessity of urine-feces diversion. − [Pro-Septic] There is no toilet in the School, although number of students is about 1100 pupils. It should be septic tank type for school toilet. But I don't agree to the concept of school garden that vegetable is grown by urine.
Remarks	Both pro and con opinions were seen evenly. DVCL was introduced but failed in the past due to inappropriate construction and improper maintenance which caused bad smell and dirtiness. However, some people are aware of the reason why it failed and reconsider effectiveness of DVCL if it is used properly.

7) Tan Duc Commune (B-4), Binh Thuan Province

Date	September 2, 2007
Participants	37 persons (including Vice chairperson of CPC, Principal teachers of primary school and teacher of kindergarten, health worker, residents)
Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Introduction of sanitation project in Bangladesh, where DVCL toilets were constructed and dry feces are used as fertilizer (by the Study Team) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all participants)
Opinions through discussion	− [Con-DVCL] In the southern provinces, people don't have custom of using human and livestock excreta as fertilizer. From tens years ago traditional toilet (DVCL) was introduced to many farm households. People didn't understand how to handle the human waste, so that DVCL was thought as unsanitary toilet. The toilet was built away from the household since it was thought dirty and smelly. It is hardly accepted by people who have bad experience in DVCL, even if these negative points are improved. − [Pro-Septic] Septic tank toilet has become popular for the last decade. Even though wastewater and sludge from the septic tank is accordingly discharged into environment, septic tank toilet is most accepted by the rural people. − [Environment] Environmental issues of wastewater and sludge disposal should be solved in future. − [Pro-Septic] There is no toilet in six kindergartens in the commune. Type of toilet should be septic tank type. − [Pro-Septic] In order to protect school environment, septic tank toilet should be constructed instead of DVCL. It is concerned that bad smell comes into classroom if we fertilize human waste into the school garden. Students can't spend time for farming practice because they are busy enough in study. − [General] Sanitation coverage of the commune is still low. Therefore, public awareness campaign for toilet construction is important. − [Pro-Septic] I suggest constructing both types of DVCL and septic tank so that people can understand both characteristics and decide by themselves. Personally, I prefer the septic tank toilet.
Remarks	DVCL is strongly rejected by people, since DVCL used to be introduced by the government more than 20 years ago but it failed for bad smell and dirtiness. People also pointed out that there is no custom of fertilizing human wastes. Concept of school garden was objected by school teachers because of busyness of students and fear of smell by urine.

8) Muong Man Commune (B-1), Binh Thuan Province (Target Commune)

Date	September 3, 2007
Participants	22 persons (including chairperson of CPC, teachers of primary school, health worker, residents)
Agenda	− Background, objectives and methodology of the Model Sanitation Program under the JICA Study (by the Study Team) − Introduction of sanitation project in Bangladesh, where DVCL toilets were constructed and dry feces are used as fertilizer (by the Study Team) − Presentation on two types of model sanitation toilet; septic tank and DVCL (by the Study Team) − Discussion on type of toilet to be selected for Model Sanitation Program (all

	participants)
Opinions through discussion	− [Con-DVCL] It sounds like a folk tale. We all remember that the past project to disseminate DVCL toilet failed tens years ago. If we build a new house, we definitely choose the septic tank toilet. − [Con-DVCL] Nowadays rural people don't use straw and firewood, so that wooden ash is not available. − [Pro-Septic] [Pro-DVCL] Septic tank toilet is suitable among the two types. But in case that water source is far, DVCL can be suitable. − [General] I have recognized that public awareness campaign is necessary for disseminating sanitation facility. (by health worker)
Remarks	DVCL is regarded as a thing of the past, since DVCL used to be introduced by the government more than 20 years ago but it failed for bad smell and dirtiness. People also pointed out that there is no custom of fertilizing human wastes. And wooden ash is hardly available since people use gas and electricity.

2.2.4 Selection of Toilet Type

Type of toilets for students and teachers was selected by CPC, residents and teachers through workshops. They are listed in Table 2.2.2. The design of toilet is discussed in the following sub-section.

CPC, residents and teachers chose one from two types of toilets; dry type toilet and pour flush with septic tank proposed by the Study Team, with consideration of the following factors:

(i) Availability of water source in dry season

(ii) Availability of wooden ash, sawdust or lime

(iii) Viability of vegetable garden in school premises, or possibility of application of composted excreta

(iv) Financial affordability of costs for sucking out sludge regularly by vacuum car

In addition to the school toilet, three residents from each target communes were selected for demonstration purposes, who satisfy the following conditions:

(i) To have agricultural land

(ii) To have understandings on concept of ecological sanitation

(iii) To be willing to apply composted excreta to agricultural fields

(iv) To maintain the school toilets voluntarily

Table 2.2.2 List of Target Commune, Schools and Type of Toilet

Province	Target Commune	School Toilet			Demonstration Toilet
		Name of School	Type of toilet	Number of toilet bowls	Number of toilets
Phu Yen	P7 Suoi Bac	Truong Tieu Hoc primary school	dry type	Teacher:3 Pupils:6	Residents:3
		Truong Trung Hoc secondary school	dry type	Teacher:3 Pupils:6	
Khan Hoa	K1 Cam An Bac	Truong Thcs Nguyen Trai secondary school	Pour Flush with Septic Tank	Teacher:0 Pupils:6	Residents:3
Ninh Thuan	N2 Cong Hai	Truong Tieu Hoc primary school	Pour Flush with Septic Tank	Teacher:3 Pupils:6	CPC:1 Residents:2
Binh Thuan	B1 Muong Man	Truong Tieu Hoc primary school	Pour Flush with Septic Tank	Teacher:3 Pupils:6	Residents:3

2.3 Design and Construction of School Toilet and Demonstration Toilet

2.3.1 Design Concept

Considering several issues in the conventional type of toilet in Vietnam, improved sanitary toilets are recommended by the Study Team. The design concept is presented as below:

- Two types of dry type toilet and pour flush with septic tank are to be considered.
- Both types are to be urine-feces separation type. Urine is to be diluted with wastewater of hand-washing or rain water to be stored in urine storage tank which is applied as fertilizer. Effluent from the urine storage tank is to flow into school vegetable garden.
- Toilet stools to be installed for teachers and demonstration purposes are urine-feces separation type chair toilet which is designed by the Study Team.
- Students shall urinate in a space for urine while they excrete only feces in rooms so as to separate urine from feces. Toilet bowl for students is to be the squat type available in the market place.
- In the case of demonstration toilet to be installed in the residence, urine is to be collected in a plastic tank and diluted into 5 to 10 fold dilution for application to agricultural fields.
- Composted dry feces from dry type toilet are to be used as fertilizer or soil improvement agent.
- All chambers of septic tank are to be waterproof. Septic tank sludge shall be regularly sucked out by vacuum car before it gets filled up. Septic tank sludge is recommended to be sanitarily disposed of. In this regard, the Study Team recommends dry toilet, considering that currently sewage treatment plant nor night soil treatment plants don't exist in rural area, while dry toilet doesn't need off-site treatment system.

2.3.2 New Design of Chair Type Urine-Feces Separation Toilet Stool

Chair type urine-feces separation toilet stool is to be installed for teachers' and demonstration toilets, as shown in the Figure 2.3.1. It should be underlined that this prototype is the first model introduced in Vietnam which is designed by the Study Team. As of February 2009, this type is under procedure of application to be one of the hygienic standard latrines, approved by MOH.

Dry Type

Pour Flush with Septic Tank

Figure 2.3.1 Photos of Urine-Feces Type Chair Toilet Bowl

2.3.3 General Specification and Usage of the Toilet

Specifications and usage by each type of toilet are described in the following tables:

Table 2.3.1 School Toilet of Pour Flush with Septic Tank

	Student	Teacher
No. of rooms	Composed of boys and girls, having respectively 3 rooms each for feces and space for urine.	Composed of gents' toilet having one room for feces and one urine bowl and ladies' toilet having two rooms.
Type of toilet stool	Squat type (available in market)	Chair type (designed by the Study Team)
Separation of urine and feces	Students shall urinate in urine booth and defecate in feces booth. In emergency case, such as diarrheal cases, urine can be accepted in feces booth.	Urine is separated from feces by the toilet stool which has diversion structure.
Flushing	− Vinyl hose with stop cock connected with elevated water tank is equipped in every feces booth for flushing. No cistern tank is equipped. − Enough water shall be poured to flush out the waste. − Drain trap for water sealing is equipped to prevent intrusion of bad smell.	
Wiping anus	− Toilet paper (holder) is not equipped. Paper can be used upon desire of user. Paper shall not be thrown into toilet stool, but shall be disposed into dust bin. The waste paper is to be collected to burn. − Water from vinyl hose can be used for washing anus. User shall prepare any cloth for wiping water after washing.	
Urine tank	− Urine is stored in urine tank together with hand-washing water and rain water. − The diluted urine is designed to flow into school garden by gravity. It is sprayed to the field through perforated pipes which are embedded in the ground.	
Septic tank	− All chambers are to be waterproof in accordance with the design standard of pour flush with septic tank toilet as in 09/2005/QD-BYT. − Stop valve is equipped at the outlet of the effluent from the septic tank. It shall be kept "Closed". − The valve can be manually "Opened" only when sucking out of sludge by vacuum truck is delayed for any reason. The effluent temporarily flows into the school garden.	
Sludge removal	− Sludge removal by vacuum truck is periodically needed before septic tank becomes full, in order to prevent groundwater pollution.	

Table 2.3.2 Demonstration Toilet of Pour Flush with Septic Tank

	Demonstration
Type of toilet stool	Chair type (designed by the Study Team)
Separation of urine and feces	Urine is separated from feces by the toilet stool which has diversion structure.
Water supply and appurtenance	− Water supply and appurtenances shall be furnished by user, such as elevated water tank, flushing water hose, electricity, toilet paper holder, etc.
Flushing	− No flushing devices are provided by the program. Water shall be stored in a bucket for pour flushing. − User can install any water devices such as elevated tank, etc.
Wiping anus	− Paper shall not be thrown into toilet stool, but shall be disposed into dust bin. The waste paper is to be collected to burn.
Urine tank	− Urine is stored in urine tank, which shall be diluted to 10 times for fertilizing

	Demonstration
	into the farm land.
Septic tank	− All chambers are to be waterproof in accordance with the design standard of pour flush with septic tank toilet as in 09/2005/QD-BYT. − Stop valve is equipped at the outlet of the effluent from the septic tank. It shall be kept "Closed". − The valve can be manually "Opened" only when sucking out of sludge by vacuum truck is delayed for any reason.
Sludge removal	− Sludge removal by vacuum truck is periodically needed before septic tank becomes full, in order to prevent groundwater pollution.

Table 2.3.3 School Toilet of Dry Type

	Student	Teacher
No. of rooms	Composed of boys and girls, having respectively 3 rooms each for feces and space for urine.	Composed of gents' toilet having one room for feces and one urine bowl and ladies' toilet having two rooms.
Type of toilet stool	Squat type (available in market)	Chair type (designed by the Study Team)
Separation of urine and feces	− Students shall urinate in urine booth and defecate in feces booth. − For emergency case, such as diarrheal cases, urine pit is equipped in feces booth. But urine shall not be mixed with feces.	Urine is separated from feces by the toilet stool which has diversion structure.
Composting vault	− Two stools are placed symmetrically in a booth. Each one shall be used alternately, every 6-8 months.	− Two feces holes are made in floor slab. Both holes are connected to different vault which is to be used alternately, every 6-8 months. − Since toilet stool is only one, the stool shall be dismantled and rotate in changing the feces hole into another.
Flushing	− As it is dry type, flushing equipment and drain trap is not equipped. − Although it is not for flushing use, vinyl hose with stop cock connected with elevated water tank is equipped in every feces booth. Pour flushing is never allowed.	
Wiping anus	− Toilet paper (holder) is not equipped. Paper can be used by school. Paper shall not be thrown into feces hole, but shall be disposed into dust bin. The waste paper is to be collected to burn. − Water from vinyl hose can be used for washing anus. User shall prepare any cloth for wiping water after washing.	
Ash pouring	− Wooden ash or lime shall be prepared in every booth, to pour ash after defecation. − Feces hole is to be capped (or covered) after pouring ash.	
Urine tank	− Urine is stored in urine tank together with hand-washing water and rain water. − The diluted urine is designed to flow into school garden by gravity. It is sprayed to the field through perforated pipes which are embedded in the ground.	
Dry feces (compost)	− Feces are disinfected by ash under dry alkaline environment. After keeping dry for 6-8 months, dry feces become sanitized and harmless, which can be used as organic fertilizer and soil improvement media.	

Table 2.3.4 Demonstration Toilet of Dry Type

	Demonstration
Type of toilet stool	Chair type (designed by the Study Team)
Separation of urine and feces	Urine is separated from feces by the toilet stool which has diversion structure.
Water supply and appurtenance	− Water supply and appurtenances shall be furnished by user, such as elevated water tank, flushing water hose, electricity, toilet paper holder, etc.
Flushing	− As it is dry type, flushing equipment and drain trap is not equipped. − No water devices are provided by the program. − User can install water devices only for cleaning and hand-washing purpose.
Wiping anus	− Paper shall not be thrown into feces hole, but shall be disposed into dust bin. The waste paper is to be collected to burn.
Ash pouring	− Wooden ash or lime shall be prepared by user, to pour ash after defecation. − Feces hole is to be covered after pouring ash.
Urine tank	− Urine is stored in urine tank, which shall be diluted to 10 times for fertilizing into the farm land.
Dry feces (compost)	− Feces are disinfected by ash under dry alkaline environment. After keeping dry for 6-8 months, dry feces become sanitized and harmless, which can be used as organic fertilizer and soil improvement media.

2.3.4 Location Maps and Design Drawings

Location maps and design drawings is presented in ANNEX-3. The list of drawings is shown in the table.

Table 2.3.5 List of Drawings of Toilet (ANNEX-3)

Code	Title
View	Bird View
Loc.	Location Map of School Toilet
D-St.	School Toilet for Students (Dry Type)
D-Te.	School Toilet for Teachers (Dry Type)
D-Ga.	School Garden (Dry Type)
D-De.	Demonstration Toilet (Dry Type)
S-St.	School Toilet for Students (Septic Tank)
S-Te.	School Toilet for Teachers (Septic Tank)
S-Ga.	School Garden (Septic Tank)
S-De.	Demonstration Toilet (Septic Tank)

2.3.5 Cost of Toilet

The construction cost for the model sanitation toilets is shown in the table below. The cost is based on the price level of year 2007.

Table 2.3.6 Construction Cost of Toilet by Type

	Item	Description	Qty	Cost (VND)
1	School Toilet for Students			
1-1	Building	Building consists of boys and girls toilet. Each has 3 booths and urine space. Septic tank (or feces vault) is included.	1 Buldg.	47,900,000
1-2	Ancillaries	Elevated water tank, hand-washing basin, etc.	Set	4,100,00
	Total			52,000,000
2	School Toilet for Teachers			
2-1	Building	One feces booth and one urine bowl for gents' toilet. Two booths for ladies' toilet. Septic tank (or feces vault) is included.	1 Buldg.	29,300,000
2-2	Toilet Stool	Chair type Urine-feces Separation Stool	3 Nos.	3,300,000
	Total			32,600,000
3	Demonstration Toilet			
3-1	Building	One room with septic tank (or feces vault). Water tank is not included.	1 Buldg.	7,500,000
3-2	Toilet Stool	Chair type Urine-feces Separation Stool	1 No.	1,100,000
	Total			8,600,000

2.4 IEC and Sanitation Education

2.4.1 Outline

(1) Objectives

On recognition that provision of IEC is essential in order to raise personal hygiene of rural people, IEC activities were carried out in the program, in parallel with the school toilet. Environmental issues caused by the septic tank toilet and significance of resources recycling were mainly focused on, in order to find out better address toward sustainable environmental sanitation in rural area. The objectives of IEC activities under the Program are as follows:

- To educate people and students in the target commune of significance of resources recycling and how to use toilet
- To examine effective way of IEC in order to promote sanitation in the other rural areas.

(2) Approaches

The following activities were carried out in the program.

- Preparation of IEC materials, such as educational posters, instruction booklets for how to build toilet, DVD for sensitization of the new model toilet introduced in the program
- Sanitation education for the school class of the target commune
- Lecture on environmental sanitation and how to use toilet through workshop with representatives of

the target communes; including commune leader, health worker, school teachers and residents

- Information sharing and discussion with related organizations, such as central and provincial administrative organizations, women's union

2.4.2 IEC Materials Prepared in the Program

(1) Subjects to be Presented

Since it is envisaged that environmental issues are growing as sanitation coverage increase, the following subjects were focused in preparing IEC materials.

- Risk of groundwater pollution by septic tank effluent
- Environmental degradation by disposal of septic tank sludge
- Resources recycling by effective use of human wastes
- Introduction of new type urine-feces separation toilet designed by the Study Team

(2) Significance of Resources Recycling

In the program, the concept of the resources recycling is particularly emphasized, as sanitation promotion is considered based on the on-site system in rural area where the sewerage system is not applicable for low cost efficiency. In that case, treatment of human excreta should be carefully examined, since it could be a pollution source to the groundwater or surrounding environment if it isn't treated properly. On the other hand, human excreta can be utilized as organic fertilizer to the agricultural field, if it is treated properly. Therefore, resource recycling is focused as a key solution toward sustainable environmental sanitation in rural area. The following articles are to justify some benefits of using human excreta.

1) Nutrient Composition

From the viewpoint of material circulation, it is clear that recycling of nitrogen, phosphorus and potassium contained in human excreta into agricultural field is the most effective. Nutrient composition of urine and feces are tabulated in the Table 2.4.1.

Table 2.4.1 The Nutrient Composition of Urine and Feces

	Urine		Feces		Total	
unit	g/cap/day	%	g/cap/day	%	g/cap/day	%
Nitrogen	11.0	88	1.5	12	12.5	100
Phosphorus	1.0	67	0.5	33	1.5	100
Potassium	2.5	71	1.0	29	3.5	100

Source: "A Proposal of Advanced Sanitation System and Attempts to Improve Vietnam Sanitation", Hidenori Harada, 2007

Urine and feces are different in nutrient components. The three major nutrients of nitrogen, phosphorus and potassium are contained more in urine rather than in feces. Out of total amount of

nutrient in urine and faces, urine contains 88% of nitrogen, 67% of phosphorus and 71% of potassium. Urine from healthy human is clean and does not include pathogenic microbes. On the other hand, human feces contain undigested dietary fiber as main composition, and a lot of enterobacteria, protozoa, roundworms and ova-parasites.

Utilization of human excreta as the organic fertilizer, by means of separating urine to be diluted and feces to be composted, can reduce use of chemical fertilizer and return organic composition to the fields which revitalizes the degraded lands. It also enables the sustainable use of limited resources of phosphorus.

At present, there are no sewage or night soil treatment plants in the study area. Accumulated sludge in septic tanks are collected by vacuum trucks and discharged into the non-arable lands without treatment, which causes nitrate pollution to groundwater and other environmental problems. This situation can be mitigated by recycling urine to agricultural uses which contains 88% of nitrogen in total human wastes.

2) Trial Calculation on Value of Urine as Fertilizer

Value of recycled urine as fertilizer is estimated for a trial case of production from a school with 500 students.

Main assumptions are as follows:

- Number of students: 500 students
- Number of days going to school: 250 days per year
- Period staying in school: 8 hours (one third of a day)
- Price of fertilizer to compare: Market prices in Vietnam as of November 2008 are employed for trial calculation; ammonium sulfate for nitrogen, superphosphate of lime for phosphorus, and potassium chloride for potassium.

Table 2.4.2 Trial Calculation of Value of Urine as Fertilizer

	Amount of Nutrient in Urine (Kg/year)	Unit Price (USD/kg)	Amount (USD/year)	Remarks
Nitrogen	458.3	2.24	1 026.6	Pupils:500 School day:250/year Detention time in school: one third a day
Phosphorus	41.7	1.31	54.6	
Potassium	104.2	1.52	158.4	
Total			1 239.6	

As a result, recycling use of urine in the school values approximately USD 1,200 per year. The value would increase if other benefits are taken into account, e.g., prevention of land degradation and groundwater pollution.

(3) Educational Posters

The educational posters are prepared for school education and workshop held in the Program.

Posters consist of two parts; sanitation education and how to use toilet listed in the following tables. These posters are shown in ANNEX-4. They were distributed in the workshops and meetings held in the Program. The posters for how to use toilets were laminated to put permanently on the wall of toilet.

Table 2.4.3 Posters for Sanitation Education

Subject	Key Message
Prohibition of open defecation	Open defecation is a cause of disease. People must stop it by provision of hygienic latrine.
Risk of groundwater pollution by septic tank effluent	The effluent from the existing septic tank is not treated enough. It may pollute the groundwater from the shallow wells which is the main domestic water source.
Significance of resources recycling	A lot of nutrients are contained in human excreta which can be utilized as good organic fertilizer to grow up vegetables. The natural resources are recycled as food from the crops.

Table 2.4.4 Posters for How to Use Toilet

Subject	Key Message
How to use toilet (septic tank)	Urine and feces shall be separated. Feces are flushed out to the septic tank. The septic tank shall be emptied regularly by the vacuum truck.
How to use toilet (dry type)	Urine and feces shall be separated. After defecation, wooden ash shall be applied on the feces for disinfection. Two chambers are used alternately every after six months. The dry feces are to be used as organic fertilizer.
How to maintain school garden	Urine is to be diluted by rain water and hand-washing water to flow into the school garden.

(4) Booklets to instruct how to build toilet

By the concept to instruct rural people how to build toilet by themselves, technical instructional booklets are prepared for both of septic tank and dry type toilets. The outline of the booklets are shown in ANNEX-5. The booklets were distributed in the workshop and seminar held under the Study.

(5) DVD to sensitize new model of urine-feces separation toilet

DVD video was produced in order to sensitize rural people of the benefit of new model of urine-feces separation toilet which is introduced in the program. It also contains instructional movie of how to build toilet. The DVDs were shown and distributed in the workshop and seminar held under

the Study.

In the DVD, the cartridge type urine-feces separation dry toilet is introduced. It has single feces camber to store replaceable feces container, which can be removed when it is full and kept dry for a half year. The concept of the cartridge type toilet is illustrated as below:

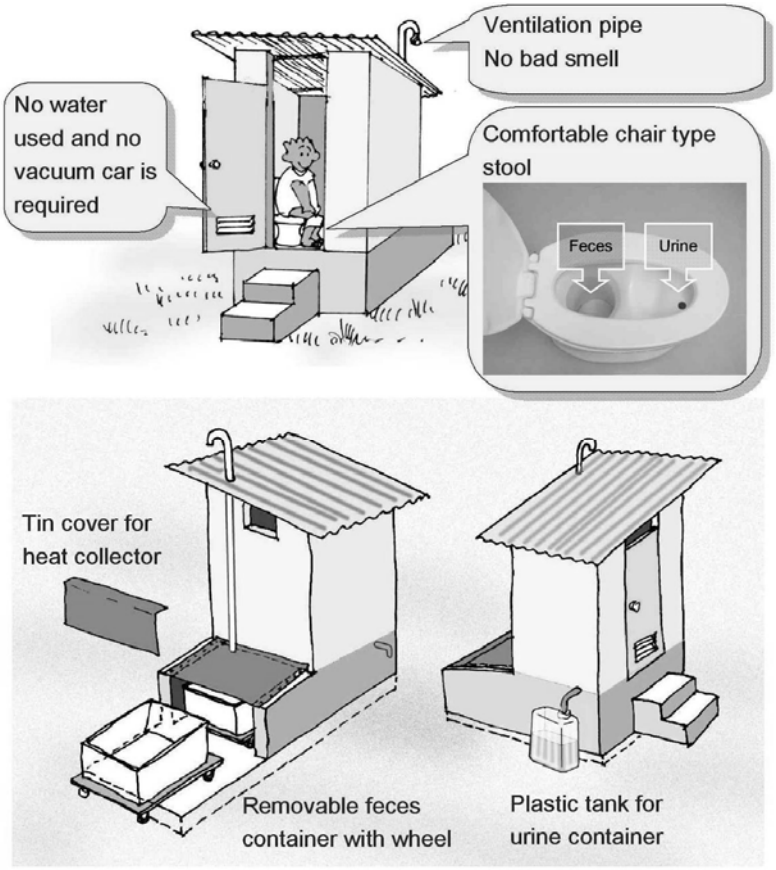


Figure 2.4.1 Illustration of Cartridge Type Dry Toilet

2.4.3 Sanitation Education in School

(1) Hygiene Education in School Curriculum

The Team visited some hygiene education classes as the following table. In the primary schools visited, hygiene education is provided one hour in a week by using a textbook of MOET. In case of secondary school, it is provided verbally instead of using textbook. The contents of school education include food hygiene, hand-washing, prohibition of open defecation, disease transmitting insects and animals, etc.

Taking into account of the survey result of personal hygiene of students, it is assumed that hygiene education take effects to give students fundamental knowledge. However it doesn't necessarily mean that their given knowledge is always practiced, since they live in rural environment where water supply and sanitation is not sufficiently equipped as taught in school.

Table 2.4.4 Visited Hygiene Education Class

Commune	School	Grade	Date of visit
Cong Hai Commune (N2), Ninh Thuan Province	Primary School	3rd	October 12, 2007
Suoi Bac Commune (P7), Phu Yen Province	Primary School	3rd	October 16, 2007
Muong Man Commune (B1), Binh Thuan	Primary Schoold	3rd	October 19, 2007

(2) Sanitation Education by the Study Team

Based on understanding that students are given the fundamental knowledge on hygiene by the school curriculum, sanitation education was provided by the team by using the education posters as shown in ANNEX-4.

The target school and date of class is shown in the table below. Due to time limitation, only one class of approx. 35 students in each school could be chosen in a day.

Table 2.4.5 Contents and Target School of School Education

	Target School				
Subject presented	P7 Primary	P7 Secondary	K1 Secondary	N2 Primary	B1 Primary
Prohibition of open defecation	16/10/07	-	25/02/08	26/02/08	19/10/07
Risk of groundwater pollution by septic tank effluent	16/10/07	-	25/02/08	26/02/08	19/10/07
Significance of resources recycling	16/10/07	-	25/02/08	26/02/08	19/10/07
How to use toilet (urine-feces separation)	27/02/08	27/02/08	25/02/08	26/02/08	28/02/08
How to maintain school garden	27/02/08	27/02/08	25/02/08	26/02/08	28/02/08


Figure 2.4.2 Photos of School Education by the Study Team

2.4.4 Information Sharing and Discussion with Related Organizations

Since behavioral change takes long time, long term intervention through diversified communication channels should be taken into account in implementing IEC. Also IEC should be performed through every possible ways of communication, by improving delivery of information. Hence, involvement of cross sectoral organizations is required in promotion of rural sanitation.

In the Study, workshop and seminar were organized to share information and discuss with related

organization. The summary is described as below.

(1) Workshop with Administrative Organizations of Provincial Level

In the framework of the NTP for RWSS, sanitation promotion is to be done by provincial government, namely DARD, P-CERWASS, DOH and DOET. However, it seems that their activities are limited within their authority, due to lack of information sharing and cooperation among the related organizations. Therefore, workshop was organized in each province, in order to identify the current situation on rural sanitation and share information among the parties concerned. The agenda of the workshop is given as below.

- Presentation of problem tree, related to environmental sanitation in rural area, which was identified through the Study. (by the Study Team)
- Demonstration of DVD for sensitization of new type urine-feces separation toilet and teaching how to build toilet, which was prepared under the Program. (by the Study Team)
- Presentation on concept of urine-feces separation and resources recycling (by the Study Team)
- Recommendation to establish taskforce group (by the Study Team)
- Discussion (all)

The result of the workshop is summarized in the table below:

1) Phu Yen Province

Date	November 12, 2008
Participants	5 persons (representatives from P-CERWASS, DARD, DOH and DOET)
Opinions through discussion	- [P-CERWASS] The objectives and approach of the JICA program is appropriate. In order to disseminate the new model toilet, further collaboration and information sharing is necessary. The government and people shall work together to conserve environment. For that purpose, people should be informed well about both advantages and disadvantages of the toilet. Also budget shall be prepared for public announcement. The most important thing for disseminating toilet is to raise public awareness. - [DOH] Sanitation coverage rate is still low in rural area. As lifestyle of rural people is changing to use gas and electricity for cooking, wooden ash is not popularly used. It should be considered that the existing toilets are to be replaced with the urine-feces separation toilet. Another idea is to implement a pilot project in any model area, to disseminate the new toilet. - [DOET] In this province, there is no custom of using human wastes. In order to disseminate the benefit of resources recycling and raise public awareness, public announcement and advertisement by using mass-media is necessary. In fact, hygiene education is done only in school curriculum. It seems that hygiene education is not recognized with significance. If we

	disseminate the new model toilet, coordination with MOET would be necessary. In any case, we would like to proceed to further step in collaboration with JICA.
Remarks	

2) Khanh Hoa Province

Date	November 10, 2008
Participants	7 persons (representatives from P-CERWASS, DARD, DOH and DOET)
Opinions through discussion	− [DOH] The DVD is good. For more promotion, approval by MOH for this model is recommended. Also public announcement and seminar should be done. People should change their understandings on sanitation. Wastewater and sludge disposal seems serious problem. − [DOET] The new design is different from the conventional design. We must consult with MOET for approval, if we disseminate this model. It is doubtful whether students accept dry toilet. In case of dry toilet, wooden ash is difficult to prepare. Especially it is difficult in the South. − [P-CERWASS] The urine-feces separation toilet contributes to improve rural environment. However, it needs long period to disseminate the concept of urine-feces separation, since rural people hardly change their customs. − [DARD] In case of septic tank type, capacity of the septic tank should be adjusted depending on family size. I wonder how to clean the dry toilet stool.
Remarks	

3) Ninh Thuan Province

Date	November 11, 2008
Participants	5 persons (representatives from P-CERWASS, DARD, DOH and DOET)
Opinions through discussion	− [P-CERWASS] The DVC is good. People can learn to build toilet by themselves. However, construction cost seems high and needs to reduce. In case of ethnic minorities, they can not afford it. − [DOET] Since the dry toilet doesn't generate bad smell if people use properly, it seems that the dry toilet can be disseminated on certain conditions which people may have. However, it is hardly acceptable that urine is sprayed to vegetable. − [DOH] I am worried about bad smells, flies and mosquitoes might be problem in case of dry toilet. It is questionable how to clean the dry type toilet stool. The construction cost is expensive for rural people. The

	conventional DVCL seems suitable. －. Therefore, cross-sectoral taskforce group is not necessary.
Remarks	The participants expressed the negative opinion on establishment of cross-sectoral taskforce group, saying that roles of governmental organizations related to sanitation promotion are clearly defined.

4) Binh Thuan Province

Date	November 14, 2008
Participants	8 persons (representatives from P-CERWASS, DARD, DOH and DOET)
Opinions through discussion	－[DOH] Construction cost seems very expensive. The dry toilet is not practical for school because it often causes problems by improper use. It is questionable that flies and mosquitoes in case of cartridge type dry toilet. －[DARD] Objectives and approach of the Program is appropriate. However, the toilet design is bad, since that structure is too hot and few ventilation. The roof is so simple that rain water is leaking. Dry toilet is difficult to use and expensive if it costs USD500. Nobody will build that. Any people will choose pour flush with septic tank toilet. People don't care about groundwater pollution by septic tank effluent, because people think that an environmental issue is beyond their control. －[DOET] The dry toilet is not suitable for school toilet. It could be applicable only for domestic use. However, the cost is so expensive that many things should be modified in design.
Remarks	

(2) Workshop with Women's Union

In implementing IEC to rural residents, it is envisaged that the existing community-based local network, such as women's union, farmers' union, etc. could be effectively utilized, since they have developed grass-roots network that is necessary to motivate rural people.

Workshop was held with the women's union of Suoi Bac Commune in Phu Yen Province. The agenda and the results are described in the table below:

Date	November 25, 2008
Participants	32 persons (including president, vice president of CPC, Women's union)
Agenda	－Demonstration of DVD for sensitization of new type urine-feces separation toilet and teaching how to build toilet, which was prepared under the Program. (by the Study Team)

	− Discussion (all)
Reaction observed by the Team	− The participants seemed to be very interested in DVD. Although the number of materials was limited, all the DVDs, leaflets and drawings were demanded and taken by them. − People questioned how to order the toilet stool, contact address, etc. which is a proof of their positive impression. − The chairperson of CPC promised further cooperation to the Study Team.
Remarks	Among 29 housewives participated, approximately 1/3 has no toilet, 1/3 uses DVCL and 1/3 uses septic tank toilet.

(3) Seminar on Model Sanitation Program

In order to share information and update with regard to rural sanitation, technical transfer seminars were taken place in the course of the Study. Representatives from central ministries, N-/P-CERWASS, provincial governments gathered to the seminar. The participants and subjects presented are shown as table below.

1) 1st Technical Transfer Seminar

Date	March 11, 2008
Participants	47 persons (including MARD, MONRE, DARD, N-CERWASS, P-CERWASS, DOH, DOET)
Subject presented	− Advanced Ecological Sanitation for Vietnam (Dr. Sabro Matsui, Emeritus Prof. Kyoto University, Japan) − Rural Sanitation in Vietnam (Dr. Dương Trọng Phỉ, Pasteur Institute, Nha Trang, Vietnam) − Progress report of JICA Model Sanitation Program (Mr. Yarai Sato, JICA Study Team)

2) 2nd Technical Transfer Seminar

Date	November 27, 2008
Participants	Approx. 30 persons (including MARD, N-CERWASS, DARD, P-CERWASS, DOH, DOET)
Subject presented	− Model Sanitation Program in Vietnam - Dissemination of the new model toilet - (Mr. Yarai Sato, JICA Study Team) − Enhancement of IEC activity through diversified communication channels and necessity of cooperation among parties concerned (JICA Study Team)

	− Presentation of DVD prepared in the Model Sanitation Program (presented in lunch break)
Comments from participants	− In the school toilets, it seems difficult for students to urinate before defecation. − The dry toilet is not applicable where wooden ash is difficult to prepare because of using gas and electricity for cocking. − Rural people don't realize the necessity of emptying the septic tank regularly. − Issue of night soil treatment sounds like a matter of future.

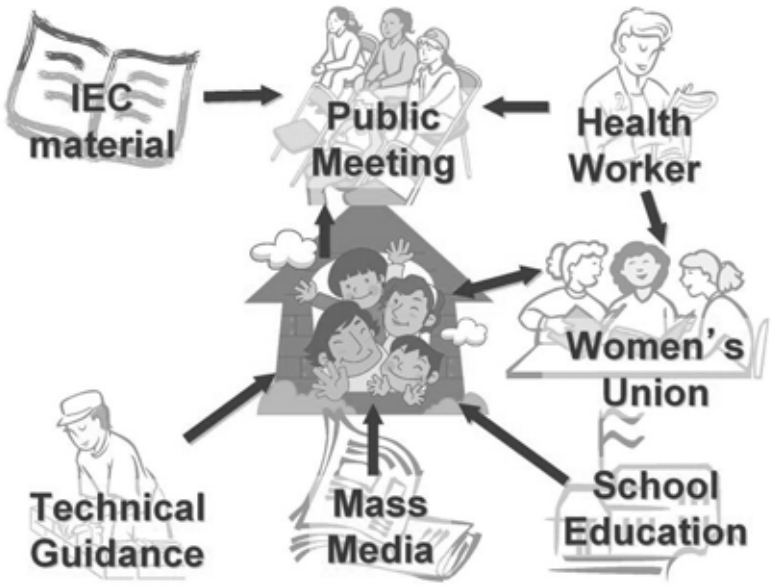


Figure 2.4.3 Concept of diversified IEC channels

3) 3rd Technical Transfer Seminar

Date	February 27, 2009
Participants	Approx. 30 persons (N-CERWASS, MARD, MOH, MOET, MONRE)
Subject presented	− Keynote lecture (Dr. Sabro Matsui, Emeritus Prof. Kyoto University, Japan) − Result of the Model Sanitation Program (Mr. Yarai Sato, JICA Study Team) − Discussion on further promotion for rural sanitation

(4) IWA Seminar

The Study Team participated in the IWA (International Water Association) seminar on "Sanitation Option in Asia Pacific" held in Hanoi to present the Model Sanitation Program in the donor session which was co-sponsored by JICA and titled "Delivery of Sanitation Services in the Asia-Pacific-Perspectives from Donors and Funding Institutions". The presentation of the Study Team is shown in ANNEX-6.

IEC materials such as educational posters, booklets, DVDs as well as toilet stool were displayed in space of the hall. The display booth was visited by many participants who are interested in the new

design of urine-feces separation toilet as well as IEC materials. The materials were distributed for free in order that they would be used in sanitation promotion activities in the other countries.

Date	November 17-20, 2008, Hanoi
Participants	Approx. 120 persons (including academic researchers, government officials, international donors, NGOs, etc. from more than 20 countries)
Subject presented in the donor session	Session 8: "Delivery of Sanitation Services in the Asia-Pacific- Perspectives from Donors and Funding Institutions" − Domestic Wastewater Sanitation Systems in Japan -Lessons from it's historical change - (Mr. Matsuzawa Yutaka, Advisor to MONRE-Vietnam, Japan) − Sustainable Rural Sanitation (Mr. Peter Marcy/ Mr. John Pasch, USAID, USA) − Sanitation Experience of GTZ in the Philippines (Mr. Hanns-Bernd Kuchta, GTZ, Germany) − Model Sanitation Program in Vietnam - Dissemination of the new model toilet - (Mr. Sato Yarai, JICA Study Team, Japan) − Asian Development Bank Sanitation Strategy (Mr. Hubert Jenny, Representative of ADB Vietnam) − Vietnam – Key Rural Sanitation issues and the Commitment of Denmark (Ms. Quy Kim Nguyen, DANIDA-Vietnam, Demark) − Finnish plans and early experiences on sanitation projects for small and provincial towns in Vietnam (Mr. Mukala Kari, Embassy of Finland, Vietnam)
Comments from participants	− The cost of toilet seems high. Further efforts to reduce cost is required. − Design of septic tank doesn't meet the standard design of Vietnam. It should be reviewed.

(5) Taskforce Group Meeting

In order to enhance implementation organization in provincial level, establishment of a cross-sectoral workgroup, e.g. taskforce group, is recommended in the Study. The composition and main function recommended in the Study is as table below:

Table 2.4.6 Recommended Taskforce for Sanitation Promotion

Member	DARD(leading agency), P-CERWASS, DOH, DOET, DONRE, DPC, etc.
Main functions	(1) Policy formation: through discussion of priority subject and decision making (2) Needs identification and analysis: by monitoring knowledge, attitude and

	practice (KAP) related to sanitation (3) Cooperation with local authorities: by information sharing with DPC and CPC (4) Implementation of pilot project (5) Support to grass-roots activity

As kick-off, taskforce group meeting was held in each province in February 2009. The discussion agenda proposed by the Team is shown below:

Table 2.4.7 Proposed Discussion Agenda of the Kick-off Taskforce Group Meeting

	Subject	Presenter
1	Explanation on current situation on sanitation promotion and purpose of the meeting	JICA Study Team
2	Presentation by each organization on activity in 2008 and difficulties related to sanitation promotion	Each organization
3	Actions to be taken in 2009 - How to increase sanitation coverage - How to raise public awareness - How to solve financial issues - How to regulate septic tank sludge - How to approach environmental issues	Discussion by all participants
4	Commitment to continue the meeting regularly	All participants

CHAPTER 3 MONITORING

3.1 Monitoring Items

The monitoring items are proposed from the viewpoints of usability and maintenance of the model toilets. The items to be monitored are as follows:

- Defects in usability (any problems from sanitary point of view)
- Ancillary conditions: water for hand-washing, flushing water, wood ash, lime, toilet paper, etc.
- Popularity of model toilet (cleanness, smell, emergence of mosquitoes and flies, etc.)
- Popularity of vegetable garden and growth of products
- Recycling use of human excreta in demonstration toilets
- Frequency of toilet usage by students
- How to clean the school toilet
- Provision of toilet paper, soap in school toilet
- Changes in cases of waterborne disease
- Interest in resources recycling by students and residents

3.2 Monitoring Method

(1) Monthly Monitoring by Check Sheet

The model toilets were monitored by using monitoring check sheet which was prepared by the Study Team. The monitoring was carried out twice a month by the staff of P-CERWASS from March 2008 until February 2009. Each monitoring item was rated by scoring. The monitoring check sheet as of January 2009 is attached as ANNEX-7. Although a number of data were collected continuously, reliability of the rating is not secured in all items, depending on qualification of the monitoring staff.

(2) Carte of toilet

In addition to the above monitoring check sheet, carte of toilet was prepared, which includes basic information and observation record by the expert of the Team, as attached in ANNEX-8.

(3) Questionnaire Survey to Users

To supplement information, questionnaire survey was carried out in February 2009. The questionnaire sheet was distributed to the representative of the school or demonstration toilets. Also questionnaire for students are distributed to one class of each target school. The result is described in the following sub-section.

3.3 Monitoring Result

3.3.1 School Toilet

(1) Primary School in Suoi Bac Commune (DVCL)

1) Toilet Usage

The toilets for students are used properly. However, teachers' toilets are not used well. The toilet stools for female teachers are little dirty. The teachers explained that the female teachers in particular don't go to toilet in school.

The dry toilets are used despite of experience of water intrusion to the feces vaults in rainy season. It is assumed that water intrusion was not so serious, unlike the secondary school and some residents in this commune.

The school installed roof fans to the school toilet at the own expense. Ash and toilet papers are prepared by students, whereas soaps are by school.

2) Cleaning Toilet

Cleaning is done by the school keepers and students twice a week. The teachers don't participate in cleaning, although they recognize that the teachers' toilets are dirtier than their own toilets.

3) Maintenance (Changing Feces Vault)

Since it has past about one year from starting toilet use, it was assumed that another feces chamber should be used and the currently used vault should be kept dry for sanitizing. However, the Team found that the vaults are not full yet.

4) Fertilizing Practice

No fertilizing is done. No teachers show interest in the school garden. In order to change the situation, the Team presented vegetable seeds brought from Japan. Then he promised to grow up the vegetables by using the seeds.

Table 3.3.1 Questionnaire Survey Result (Teacher)

School			**Suoi Bac Primary in Phu Yen**
Toilet Type			**DVCL**
Feeling of the toilet	Teacher	Benefits	Separating male from female is convenient. It's modern
		Problems	Bad smell because of water intrusion in feces tank
	Student	Benefits	Separating male from female is convenient. It's modern
		Problems	Bad smell because of water intrusion
	School Garden	Benefits	Students are growing trees and herbal there. They have learned laboring and solidarity.
		Problems	Not enough water in dry season
Any wish to refurbish type of toilet			No idea
How to clean toilet		By whom	Students
		How often	2 times/week
Practice of fertilizing			Water is not enough for tree Interested in fertilizing
Provision and treatment of toilet paper and hand soap		Paper	Students preparing
		Soap	School
		Used paper	Burn
		Treatment	School keeper

5) Questionnaire Survey for Students

Questionnaire survey was carried out for students as shown in the table below.

Despite that students' toilets are used well, 80% of the respondents feel that the toilet is not so convenient (Q1). On the other hand, to the question of toilet type wanted (Q9), approx. 80% answered to choose urine-feces separation type for their own (including DVCL and septic tank), while 19% chose the conventional septic tank toilet.

Taking into account that students somehow feel difficulty and fail in separating urine before defecation (Q3 and Q4), the main reason of feeling inconvenient is assumed that it's difficult for them to urinate in the urine place before defecation. Hence, if urination is allowed in the feces booth, such as chair type toilet, it is assumed that the toilet would be used comfortably.

Awareness on school garden is very low (Q5 and Q6), because no crops are cultivated in the school.

Table 3.3.2 Questionnaire Survey Result (Students)

Question	a)	b)	c)	d)
1. How do you feel about the toilet (urine feces separation type)? a) Good b) Normal c) Not so convenient	0 0%	5 20%	20 80%	-
2. How often do you use feces booth? a) Regularly b) Sometimes c) Rarely	3 12%	13 52%	9 36%	-
3. How often do you urinate into feces hole? a) Regularly b) Sometimes c) Rarely	4 16%	4 16%	17 68%	-
4. Is it difficult to separate urine from feces? a) Difficult b) A little difficult c) Easy	7 28%	18 72%	0 0%	-
5. Do you like school garden? a) Yes b) Normal c) I don't care	5 20%	6 24%	14 56%	-
6. What kind of crops do you grow in the school garden?	(No answer. Students don't know where is the school garden)			
7. Do you have a toilet in your house? a) Yes b) No	16 73%	6 27%	-	-
8. If you have a toilet, what kind of toilet? a) Septic Tank b) DVCL c) Others	11 46%	11 46%	2 8%	-
9. If you have a chance to construct a new toilet, what kind of toilet do you want to have in your house? a) DVCL b) Urine-feces separation type septic tank c) Conventional type septic tank (not urine-feces separation) d) Others	4 15%	17 66%	5 19%	0 0%

(2) Secondary School in Suoi Bac Commune (DVCL)

1) Toilet Usage

The toilet booths were locked when the Team visited in February 2009. Only the urine spaces for students are able to be used. According to the vice principal teacher, the booths has been locked since water intrusion into feces vaults occurred in rainy season, which caused bad smell. They say the booths are locked until the feces vault is dried and the old toilets are used instead. However, the old toilets are too old and dirty to use. Among the five schools, only this school answered to the

questionnaire that they want to refurbish the DVCL into the pour flush with septic tank toilet.

Ash and toilet papers are prepared by students. Soaps are not equipped.

2) Cleaning Toilet

Cleaning is done by students once a week.

3) Maintenance (Changing Feces Vault)

As feces booths haven't been used for long period. It is assumed that feces vaults are not full yet.

4) Fertilizing Practice

No fertilizing is done. No teachers show interest in the school garden.

Table 3.3.3 Questionnaire Survey Result (Teacher)

School			**Suoi Bac Secondary in Phu Yen**
Toilet Type			**DVCL**
Feeling of the toilet	Teacher	Benefits	Urinating is convenient
		Problems	No ash Bad smell because of water intrusion
	Student	Benefits	Urinating is convenient
		Problems	No ash Bad smell because of water intrusion
	School Garden	Benefits	(Not cultivated)
		Problems	Not planted yet
Any wish to refurbish type of toilet			Wish to refurbish to septic tank because of using easier
How to clean toilet		By whom	Students
		How often	1 time/week by 1 class Enough to clean
Practice of fertilizing			Not fertilizing because of bad land Need to improve school land
Provision and treatment of toilet paper and hand soap		Paper	Students
		Soap	Nobody
		Used paper	Burn
		Treatment	Students

5) Questionnaire Survey for Students

Approx. 50% of the respondents feel that the toilet is not so convenient (Q1). On the other hand, to the question of toilet type wanted (Q9), 78% answered to want the urine-feces separation toilet for their own (including DVCL and septic tank), while the rest chose the conventional septic tank toilet.

Compared to the primary school, rate of students who somehow feel difficulty and fail in separating urine before defecation is lower (Q3 and Q4), as they are able to control physiology better than lower-grade students. Seeing the result of Q9, the concept of separating urine from feces is generally accepted. And the urine-feces separation toilet would be accepted more, when urination is allowed in the feces booth, such as chair type toilet.

Awareness on school garden is very low (Q5 and Q6), because no crops are cultivated in the school.

Table 3.3.4 Questionnaire Survey Result (Students)

Question	a)	b)	c)	d)
1. How do you feel about the toilet (urine feces separation type)? a) Good b) Normal c) Not so convenient	14 44%	2 6%	16 50%	-
2. How often do you use feces booth? a) Regularly b) Sometimes c) Rarely	3 9%	12 38%	17 53%	-
3. How often do you urinate into feces hole? a) Regularly b) Sometimes c) Rarely	3 9%	7 22%	22 69%	-
4. Is it difficult to separate urine from feces? a) Difficult b) A little difficult c) Easy	5 16%	18 56%	9 28%	-
5. Do you like school garden? a) Yes b) Normal c) I don't care	7 23%	9 30%	14 47%	-
6. What kind of crops do you grow in the school garden?	(No answer. Students don't know where is the school garden)			
7. Do you have a toilet in your house? a) Yes b) No	26 81%	6 19%	-	-
8. If you have a toilet, what kind of toilet? a) Septic Tank b) DVCL c) Others	10 34%	13 45%	6 21%	-
9. If you have a chance to construct a new toilet, what kind of toilet do you want to have in your house? a) DVCL b) Urine-feces separation type septic tank c) Conventional type septic tank (not urine-feces separation) d) Others	5 16%	20 62%	7 22%	0 0%

(3) Secondary School in Cam An Bac Commune (Pour Flush with Septic Tank)

1) Toilet Usage

Toilets are used properly as instruction by the Study Team. The roof fan of the boys toilet was repaired by the school which was broken and caused bad smell by poor ventilation.

The hoses to wash urine troughs of both boys and girls were damaged. The school requested to the Team for repair. But the Team replied it should be done by the School.

2) Cleaning Toilet

Toilets are kept clean. Approx. 10 students are assigned by turn to clean the toilets every day.

3) Maintenance (Emptying Septic Tank)

Although the Team instructed to the toilet owners that septic tank should be emptied regularly, they say that the tank is not full yet. It seems that they are not aware well of necessity of emptying septic tank. For school, the cost for vacuum cars of approx. VND 2,000,000 per time (four trucks would be necessary) is not affordable, as they are dependent on budget of DOET.

4) Fertilizing Practice

Corn and pumpkin was harvested by urine fertilizer. They answered to the questionnaire that the crops grow well by the urine fertilizer. It should be noted that the principal teacher of the school show high interest in fertilizing and is very cooperative to the program. He also mentioned that the school garden provides good educational effects to students.

As the urine fertilizer is designed to flow by natural gravity through perforated pipe embedded

underground, it is pointed out that urine doesn't reach to the place far from toilet. In this case, urine shall be sprinkled by manual.

Table 3.3.5 Questionnaire Survey Result (Teacher)

School			**Cam An Bac Secondary in Khanh Hoa**
Toilet Type			**Pour Flush with Septic Tank**
Feeling of the toilet	Teacher	Benefits	Satisfy with toilets Toilet can meet their demand
		Problems	No
	Student	Benefits	Feel comfortable Meeting their daily demand
		Problems	Washing hand water is not enough to wash out urine and dilute it Urine splash out whenever at urinating
	School Garden	Benefits	Growing well without chemical fertilizer. Teaching and studying place for students
		Problems	Water volume is not enough for trees far from toilet
Any wish to refurbish type of toilet			No idea
How to clean toilet		By whom	Students and school keeper
		How often	About 10 persons at one time Everyday, enough
Practice of fertilizing			Water drained out is not enough for trees Being interested in using urine
Provision and treatment of toilet paper and hand soap		Paper	Students preparing
		Soap	School
		Used paper	Burn
		Treatment	School keeper

5) Questionnaire Survey for Students

59% of the respondents feel that the toilet is convenient (Q1). Although approx. 86% feel somehow difficult to urinate before feces (Q4) and 41% often fails to separate urine in defecation (Q3), mixture of urine with flushing water could be accepted, unlike the case of dry toilet which doesn't allow liquid intrusion.

To the question about the type of toilet wanted for own use (Q9), only 3% chose DVCL but 47% chose urine-feces separation type septic tank. The conventional septic tank toilet is also chosen by 36% of respondents. As shown in Q7 and Q8, approx. 94% have toilet in household and 61% uses the conventional type septic tank toilet, it is assumed that they are so familiar with the septic tank toilet, and firewood is not used for cooking by people in the commune.

School garden is preferred by 78% of the student (Q5), as the school garden is well maintained and crops were harvested which provided educational effects to the students.

Table 3.3.6 Questionnaire Survey Result (Students)

Question	a)	b)	c)	d)
1. How do you feel about the toilet (urine feces separation type)?	21	12	3	-
a) Good b) Normal c) Not so convenient	59%	33%	8%	
2. How often do you use feces booth?	6	14	16	-
a) Regularly b) Sometimes c) Rarely	17%	39%	44%	

3. How often do you urinate into feces hole? a) Regularly b) Sometimes c) Rarely	8 22%	7 20%	21 58%	-
4. Is it difficult to separate urine from feces? a) Difficult b) A little difficult c) Easy	18 50%	13 36%	5 14%	-
5. Do you like school garden? a) Yes b) Normal c) I don't care	28 78%	8 22%	 0%	-
6. What kind of crops do you grow in the school garden?	Corn, pumpkin			
7. Do you have a toilet in your house? a) Yes b) No	34 94%	2 6%	-	-
8. If you have a toilet, what kind of toilet? a) Septic Tank b) DVCL c) Others	22 61%	1 3%	13 36%	-
9. If you have a chance to construct a new toilet, what kind of toilet do you want to have in your house? a) DVCL b) Urine-feces separation type septic tank c) Conventional type septic tank (not urine-feces separation) d) Others	1 3%	17 47%	13 36%	5 14%

(4) Primary School in Cong Hai Commune (Pour Flush with Septic Tank)

1) Toilet Usage

Since the electric power line was installed in January 2009, water is pumped up to the elevated tank. Students are using the toilet well. However, the teachers' toilets are dirty. And some teachers don't want to use, saying that they go to toilet of their own before coming to school and during the lunch time.

2) Cleaning Toilet

Cleaning is mainly done by the school keeper twice or three times a week. Although it is said that students sometime clean, it doesn't seem regular duty of students.

3) Maintenance (Emptying Septic Tank)

Since toilet has been used for short period (approx. one month), the tank is not full yet. Therefore, only the necessity of emptying the tank regularly was taught. However, the reaction to the instruction is not positive enough.

4) Fertilizing Practice

No teachers show interest in the school garden. In order to break the situation, the Team presented vegetable seeds brought from Japan. Then he promised to grow up the vegetables by using the seeds.

Table 3.3.7 Questionnaire Survey Result (Teacher)

School			**Cong Hai Primary in Ninh Thuan**
Toilet Type			**Pour Flush with Septic Tank**
Feeling of the toilet	Teacher	Benefits	Good
		Problems	Lack of electricity Lack of water
	Student	Benefits	Good
		Problems	Lack of electricity Lack of water
	School Garden	Benefits	Wide
		Problems	Poor soil condition
Any wish to refurbish type of toilet			No idea

How to clean toilet	By whom	School keeper Sometimes students
	How often	2 or 3 times a week Clean enough
Practice of fertilizing		Not working at November
Provision and treatment of toilet paper and hand soap	Paper	School keeper and user
	Soap	No use soap
	Used paper	Burn
	Treatment	School keeper and all people

5) Questionnaire Survey for Students

79% of the respondents feel that the toilet is convenient (Q1). Although approx. 66% often fails to separate urine in defecation (Q3), mixture of urine with flushing water could be accepted, unlike the case of dry toilet which doesn't allow liquid intrusion.

To the question about the type of toilet wanted for own use (Q9), only 3% chose DVCL but 86% chose urine-feces separation type septic tank. The conventional septic tank toilet is chosen by 11% of respondents. In common with the case of Cam An Bac secondary School, not a small number of students are using septic tank toilet in their own household. Therefore, it is assumed that they are familiar with the septic tank toilet, and firewood is not widely used in the commune.

As the school garden is not harvested, awareness of the students is low.

Table 3.3.8 Questionnaire Survey Result (Students)

Question	a)	b)	c)	d)
1. How do you feel about the toilet (urine feces separation type)? a) Good b) Normal c) Not so convenient	23 79%	6 21%	 0%	-
2. How often do you use feces booth? a) Regularly b) Sometimes c) Rarely	3 11%	11 39%	14 50%	-
3. How often do you urinate into feces hole? a) Regularly b) Sometimes c) Rarely	10 34%	9 32%	10 34%	-
4. Is it difficult to separate urine from feces? a) Difficult b) A little difficult c) Easy	2 7%	12 41%	15 52%	-
5. Do you like school garden? a) Yes b) Normal c) I don't care	10 34%	10 34%	9 32%	-
6. What kind of crops do you grow in the school garden?	They don't know where there is the school garden			
7. Do you have a toilet in your house? a) Yes b) No	23 79%	6 21%	-	-
8. If you have a toilet, what kind of toilet? a) Septic Tank b) DVCL c) Others	21 72%	2 7%	6 20%	-
9. If you have a chance to construct a new toilet, what kind of toilet do you want to have in your house? a) DVCL b) Urine-feces separation type septic tank c) Conventional type septic tank (not urine-feces separation) d) Others	1 3%	24 86%	3 11%	0 0%

(5) Primary School in Muong Man Commune (Pour Flush with Septic Tank)

1) Toilet Usage

Toilets both for teachers and students are properly used as instruction by the Study Team. Urine space for boys smells due to clogging of urine trough which causes poor drainage of urine. It will be repaired by the school.

Both of toilet papers and soaps are provided by the School.

2) Cleaning Toilet

Toilet is kept clean as the school keeper cleans everyday. The students don't participate in cleaning toilet. In this school the school keeper plays very important role to keep the school clean.

3) Maintenance (Emptying Septic Tank)

The school are aware of the cost of emptying septic tank of approx. VND 2,000,000 (four vacuum cars are assumed). They say it can be affordable.

4**) Fertilizing Practice**

They are harvesting many kinds of crops. The school keeper explains any plants grow very well. The teachers show interest in the school garden. Teachers also show interest in the school garden.

Table 3.3.9 Questionnaire Survey Result (Teacher)

School			**Moung Man Primary in Binh Thuan**
Toilet Type			**Pour Flush with Septic Tank**
Feeling of the toilet	Teacher	Benefits	Clean and sanitary
		Problems	Feces room is small
	Student	Benefits	Wide space Enough feces booth for male and female
		Problems	Bad smell in urine booth Urine trough is not good slope Water conducting pipe is small
	School Garden	Benefits	Good
		Problems	
Any wish to refurbish type of toilet			No idea
How to clean toilet		By whom	School keeper
		How often	Everyday, clean enough
Practice of fertilizing			Well going Growing vegetables
Provision and treatment of toilet paper and hand soap		Paper	School
		Soap	School
		Used paper	Burn
		Treatment	School keeper

5) Questionnaire Survey for Students

In spite that students' toilets are used very well, 86% of the respondents feel that the toilet is not so convenient (Q1). Also, 60% of students chose the conventional septic tank toilet, to the question of toilet type wanted (Q9), while urine-feces separation type septic tank toilet is chosen by 27% only. DVCL was not chosen by anybody.

Taking into account that rates of respondents who feel difficulty and fail in separating urine before defecation are very high, 90% and 79% respectively, it is assumed to be the main reason of

inconvenience. In this commune, where access from urban area is very near, lifestyle of the residents seems to be somehow urbanized. Therefore, wooden ash is hardly obtained, so that DVCL is not practical in the commune.

Although students preferred conventional septic tank toilet for their own use, 100% of students replied that they like school garden (Q5). The school garden is well maintained and many kinds of crops were harvested which provided educational effects to the students.

Table 3.3.10 Questionnaire Survey Result (Students)

Question	a)	b)	c)	d)
1. How do you feel about the toilet (urine feces separation type)? a) Good b) Normal c) Not so convenient	3 10%	1 3%	26 87%	-
2. How often do you use feces booth? a) Regularly b) Sometimes c) Rarely	23 76%	5 17%	2 7%	-
3. How often do you urinate into feces hole? a) Regularly b) Sometimes c) Rarely	16 55%	7 24%	6 21%	-
4. Is it difficult to separate urine from feces? a) Difficult b) A little difficult c) Easy	21 70%	6 20%	3 10%	-
5. Do you like school garden? a) Yes b) Normal c) I don't care	30 100%	0 0%	0 0%	-
6. What kind of crops do you grow in the school garden?	bean, pea, banana, pumpkin, rice, vegetable, cabbage			
7. Do you have a toilet in your house? a) Yes b) No	24 80%	6 20%	-	-
8. If you have a toilet, what kind of toilet? a) Septic Tank b) DVCL c) Others	16 53%	2 7%	12 40%	-
9. If you have a chance to construct a new toilet, what kind of toilet do you want to have in your house? a) DVCL b) Urine-feces separation type septic tank c) Conventional type septic tank (not urine-feces separation) d) Others	0 0%	8 27%	18 60%	4 13%

3.3.2 Demonstration Toilet

(1) Suoi Bac Commune (DVCL)

1) Toilet Usage

There was incident that intensity of rainfall in rainy season was so strong that water came into the feces vault from the little space of wooden cover. Then the wet feces generated bad smell, which discomforts the users a lot.

In the questionnaire survey (see below), two out of three respondents answered positive feelings on the DVCL toilet. However, even the one of two who feels positive wants to refurbish it (P7-Rst-1). As a result, two out of three respondents answered that they want to change into septic tank toilet. Both of them say that they don't use in rainy season, because of the experience of bad smell.

According to the observation by the Study Team, the rest one household uses the toilet properly (P7-Rst-3). The family put wooden ash after defecation every time. The toilet is kept clean and has no

bad smell, flies nor mosquitoes.

2) Maintenance (Changing Feces Vault)

Since it has past about one year from starting toilet use, the Study Team instructed that another feces chamber should be used by rotating the position of chair type stool and the currently used vault should be kept dry for sanitizing. However, the residents say that it is not necessary yet because the vault is not full.

3) Fertilizing Practice

One respondent answered that he uses urine as fertilizer (P7-Rst-3). However, according to the observation by the Team, urine is sprinkled without dilution. And no crops are planted in fact as they just dispose urine into the field. The rest two respondents used to sprinkle diluted urine only in the beginning (P7-Rst-1, 2). Now the two don't use urine, saying that urine leaks from the bottom of urine chamber. In fact, they seem to be no interest in fertilizing urine nor feces.

4) Advertising to Neighbors

All of the three respondents answered yes to the questionnaire. Although it has not been verified by data, when the Team asked a person in street near the toilet, one neighbor said that she visited to see the toilet.

Table 3.3.11 Questionnaire Survey Result

Serial No.	**P7-Rst-1**	**P7-Rst-2**	**P7-Rst-3**
Toilet Type	**DVCL with Chair Type Stool**		
Feeling of use	Better than conventional toilet	Not clean, not perfect	Generally satisfied with this toilet
Any wish to refurbish type of toilet	Yes, I want to change it into septic tank because this toilet is not suitable with small children	Yes, I want to change into septic tank	No
Neighbors visit to see/ use	Neighbors like it	Neighbors don't have this kind of toilet *(The answer seems off the point of question)*	No
Advertizing to neighbors	Yes	Yes	Yes, but not much
Diarrhea or fever	No changes	(No answer)	No changes
Practice of fertilizing	No, urine leaks out into ground from the urine container	No fertilizing	Yes, very good
Well usage	I use deep well, not shallow well	There is changing but not considerable	Not change much

(2) Cam An Bac Commune (Pour Flush with Septic Tank)

1) Toilet Usage

It was observed that the toilets are generally kept clean and that there are no bad smell, mosquitoes and flies. All the three residents say that all the family members use it comfortably. One old resident who has short height pointed out that the height of toilet stool is too high for him (owner of K1-Rst-1).

2) Maintenance (Emptying Septic Tank)

Although the Team repeatedly instructed to the toilet owners that septic tank should be emptied regularly, they anonymously say that the tank is not full yet. It is because it is widely believed, as a commonsense in Vietnam, that septic tank sludge is sucked out after 5-10 years in average. Also they seem to have a resistance to pay the cost for vacuum car of approx. VND 500,000 per time.

3) Fertilizing Practice

Two respondents are fertilizing urine to the farm land (K1-Rst-1, 2). The rest one doesn't for having no interest in fertilizing (K1-Rst-3).

The owner of K1-Rst-1 installed a pipe to let urine flow into the farm land. However, because of his wrong knowledge, he also installed another pipe to the farm land from effluent pipe of septic tank which is polluted by coliforms, etc. Although the Team repeatedly tried to change his practice of flowing the effluent, it failed.

The owner of K1-Rst-2 didn't have interest in fertilizing urine in the beginning. But he became interested in later and now tries to grow some vegetables and flowers.

4) Advertising to Neighbors

Two respondents answered they advertise to the neighbors. However, it hasn't been verified.

Table 3.3.12 Questionnaire Survey Result

Serial No.	**K1-Rst-1**	**K1-Rst-2**	**K1-Rst-3**
Toilet Type	**Urine-feces separation type Pour Flush with Septic Tank**		
Feeling of use	Meet 95% usage demand	Very good	Good, cleaning every day
Any wish to refurbish type of toilet	No idea	No	No
Neighbors visit to see/ use	Not let them use it	Yes, but need fund for them	No
Advertizing to neighbors	Yes	Not so much	Yes
Diarrhea or fever	No more diarrhea	No diarrhea or fever	No diarrhea or fever
Practice of fertilizing	Yes, but cannot bring urine far from here	No time to use urine for fertilizing but became interested in fertilizing because of bananas and pumpkins were growing	Not much interested in.
Well usage	Washing, drinking and other domestic use	As normal	As normal

(3) Cong Hai Commune (Pour Flush with Septic Tank)

1) Toilet Usage

The demonstration toilet of N2-Rst-1 was constructed in CPC office for public use. It is near the open-air market and many customers came to use the toilet in the beginning. However, as CPC buys flushing water from water vendors at his expense, the toilet is locked by CPC so as to limit the users only to CPC staff. Cleaning of toilet is done by CPC staff in turn.

As of February 2009, a new toilet is under construction beside the demonstration toilet of CPC (N2-Rst-1). Two booths each for male and female are planned, while the demonstration toilet has only

a single booth. According to CPC, the new toilet and the demonstration toilet is used together to meet the demand of many users. The type of new toilet is to be the conventional pour flush with septic tank. This implies that CPC doesn't fully support the concept of urine-feces separation type.

The owner of N2-Rst-2 stopped use of the toilet for defecation, saying that the toilet is closed to the neighbor's house and it is troublesome that the effluent from the septic tank flows into the neighbor's. They use the toilet only for urination and bashing, but defecate outside. The Team instructed the tank should be emptied and the effluent pipe to be closed, in order to use for defecation.

2) Maintenance (Emptying Septic Tank)

They say no need to empty yet, as the case in Khanh Hoa province.

3) Fertilizing Practice

Only one resident fertilizes urine properly (N2-Rst-3), while the other two have never interest to do. It seems that instruction from the Team could be understood by the ordinary people rather than the persons of some public positions, such as officials of CPC or schools.

4) Advertising to Neighbors

One respondent of N2-Rst-1 answered that many neighbors uses and CPC introduces to neighbors. But in fact, it is a pubic toilet in nature. Therefore, it is assumed that advertisement is not actually done by CPC with intension. The rest two respondents don't advertize and show the neighbors. It seems that their awareness on sanitation is not high enough compared to the other communes.

Table 3.3.13 Questionnaire Survey Result

Serial No.	N2-Rst-1	N2-Rst-2	N2-Rst-3
Toilet Type	**Urine-feces separation type Pour Flush with Septic Tank**		
Feeling of use	Good	Good	Good, no fly and no mosquito
Any wish to refurbish type of toilet	No idea	No idea	No idea
Neighbors visit to see/ use	Many times	No visit	No visit
Advertizing to neighbors	Introducing	No	No
Diarrhea or fever	No disease	No disease	No disease
Practice of fertilizing	No	No interest	Use for growing rice, corn and fruits
Well usage	No well. CPC buys water from vendor	（No answer）	Washing and domestic use No change

(4) Muong Man Commune (Pour Flush with Septic Tank)

1) Toilet Usage

The toilets are generally kept clean and used properly as instructed. There are no bad smell, mosquitoes and flies. All the three residents say that all the family members use it comfortably.

2) Maintenance (Emptying Septic Tank)

The owner of B1-Rst-3 constructed the forth tank in addition to three chambers of septic tank. The additional tank is a so called soaking pit which is a bottomless chamber in order that the effluent from

the septic tank percolates into the ground.

The other two residents say that emptying septic tank is not needed yet, for the same reasons as the other communes.

3) Fertilizing Practice

In the beginning, none of residents fertilized the diluted urine. But one resident became to fertilize diluted urine to grow pumpkin (B1-Rst-1). The other two are not fertilizing properly, they just dispose urine to the field without dilution, although one respondent answers to the questionnaire that he fertilizes (B1-Rst-2).

4) Advertising to Neighbors

All the three respondents answered they advertise the demonstration toilet. And two answered some visitors came to see or use the toilet.

Table 3.3.14 Questionnaire Survey Result

Serial No.	B1-Rst-1	B1-Rst-2	B1-Rst-3
Toilet Type	**Urine-feces separation type Pour Flush with Septic Tank**		
Feeling of use	Good	Good	Good
Any wish to refurbish type of toilet	No idea	No idea	No idea
Neighbors visit to see/ use	No visit	2 or 3 times	Yes
Advertizing to neighbors	Yes	Yes	Yes
Diarrhea or fever	No disease	No disease	No disease
Practice of fertilizing	Yes	Yes	No interest
Well usage	（No answer）	No use well water	Washing, drinking and toilet flush

(5) Cam Phuoc Dong Commune (Cartridge type dry toilet)

The cartridge type dry toilet was constructed for producing DVD materials to instruct how to build toilet in June 2008. Its usage is monitored by the Study Team.

1) Toilet Usage

The toilet is kept clean and used properly by the family. Although a few flies are found in the booth, no bad smell was felt, which is an effect of drying feces well. The temperature inside the chamber was measured in order to examine the effect of tin cover, which is colored in black for heat collection. As a result as shown in the table below, the inside temperature is increased to approx. 8-9 degrees higher than the outside temperature. The raised inside temperature contributes to the reaction of killing pathogen by alkali environment of using ash. Also the higher inside temperature helps to release moisture and smells through the ventilation pipe.

Table 3.3.15 Temperature of the Feces Chamber by Effect of Tin Heat Collector

Date	Outside Temperature (degrees Celsius)	Inside Temperature (degrees Celsius)
24 June 2008	37	46
25 June 2008	37	45
26 June 2008	37	46

Since the ground level is raised above the flood level of rainy season and the chamber is designed to be of water-tightness, the feces chamber is kept dry throughout the year.

The owner, who seems to be a neat person in nature, decorates the toilet basement by flowerbed, which gives positive impression of cleanness and beautifulness instead of dirtiness.

2) Maintenance (Changing Feces Container)

The owner understands well the principles of the dry toilet and handles excreta properly as instructed by the Study Team. Since it is a cartridge type toilet, one feces chamber is equipped which store the removable feces container. Two or more containers should be prepared to use alternately after one container become full and kept in dry for sanitizing.

3) Fertilizing Practice

Fertilizing is performed as instruction by the Team. The owner has started to grow two banana trees to compare between ones with and without urine fertilizer since November 2008. As of February 2009, remarkable difference is not observed. Also he started another experimental cultivation of loofah (luffa), by comparing between ones grown by dry feces only and without it. The effect, however, hasn’t been seen yet.

As such, the owner seems to have had a ground knowledge of using human excreta and to be a kind of practical farmer who have inquiring mind.

4) Advertising to Neighbors

Not a small number of neighbors visited to see the toilet by heard of it. According to owner, the visitors showed interest in this cartridge type dry toilet. Although none of them has built it as of today, some neighbors who met the member of the Team told that he wants to build the same toilet if he could receive any financial support

CHAPTER 4 LESSONS LEARNED

4.1 Introduction

Lessons learned are obtained through the Program. These are summarized in terms of the following six viewpoints.

1) Awareness of N-CERWASS and P-CERWASS in sanitation promotion
2) Roles and responsibilities of N-CERWASS, P-CERWASS and local authorities
3) Measures for raising public awareness on rural water and sanitation
4) Evaluation on new urine-feces separation type toilets
5) Proper maintenance and dissemination of sanitation facility
6) Proper knowledge dissemination on sanitation in community

4.2 Findings and Lessons Learned

4.2.1 Awareness of N-CERWASS and P-CERWASS in sanitation promotion

(1) Findings

- Although N-CERWASS and P-CERWASS is assigned as the official implementing agency to improve rural water supply and sanitation, none of N-/P-CERWASS in the study area has special section in charge of sanitation promotion. There is also few staff of N-/P-CERWASS who received professional education/ training for sanitation. Design standards and technical guidelines related to rural sanitation are provided under responsibility of Ministry of Health.
- Instead of sanitation section, N-CERWASS has IEC section as IEC is recognized as essential factor for sanitation promotion. The IEC section produces IEC materials to instruct toilet construction and public relations magazines. The IEC activities have been supported by WES (Water, Environment and Sanitation) program by UNICEF since year 2001. However, IEC materials prepared by N-CERWASS don't seem to be fully utilized in provincial level, as these materials can be seen only in office of N-CERWASS.
- Although importance of IEC is well understood, there is no IEC section in P-CERWASS of the Study Area. A few staff is assigned for IEC as their additional task without clear job description in most cases. The model sanitation program was implemented through collaboration with P-CERWASS. However, participation of some staff was not active enough so that only a few staff showed good attitude to learn from the expert of the Team.
- Mobilization of staff is also a difficult issue, considering that there are approx. 300,000 households without hygienic latrines in the four provinces (estimated by the Team). Then, P-CERWASS performs IEC through collaboration with local residents group such as women's union, farmers' union, youth union, etc. But due to budget constraint, these activities are not done regularly and systematically.
- There are some cases that P-CERWASS constructs school toilets in collaboration with DOET by using budget of NTP II and some contribution by commune. According to information by Khanh Hoa

P-CERWASS, the case of Dien Tan Commune in 2008, good educational effects were found by demonstrating actual toilet, which gives more impact than paper-based IEC materials. This experience seems a successful example of collaboration by taking advantage of P-CERWASS who has better experience in construction.

- As the counterpart organization, N-/P-CERWASS has become aware of environmental issues that are pointed out by the Study Team, e.g. groundwater pollution by septic tank effluent, environmental degradation by disposing untreated sludge.

(2) Lessons Learned

- IEC in provincial level should be more activated, by using IEC materials of N-CERWASS, banners, slogans, etc. P-CERWASS also should utilize local residents groups, e.g. women's union, etc in order to improve delivery of information.
- IEC specialist should be developed in P-CERWASS, who works on planning IEC strategy, annual action planning, budget planning, monitoring of activities, etc. The staff must be given clear job description and appropriate evaluation to the job, otherwise his/her satisfaction to job becomes low which leads to reluctant working attitude. Any incentive system also should be considered. Budget allocation on IEC should be increased accordingly.
- As succeeded in a commune in Khanh Hoa, collaboration cases should be more duplicated by using strength of each organization
- The problem consciousness on environment caused by septic tank, etc. is shared with N-/P-CERWASS through the Study. Although any practical actions have been taken yet, the discussion should be developed further, since the environmental issues are not commonly recognized among the parties related to rural sanitation.

4.2.2 Roles and responsibilities of N-CERWASS, P-CERWASS and local authorities

(1) Findings

- According to decentralization policy, the provincial government (PPC) executes budgets in provincial level, whereas the central government monitors and evaluates (M&E) the activity according to the M&E system. In the course of the Study, it was often seen that information sharing between central and provincial governments is not done well due to poor communication among the parties concerned.
- Cooperation and information sharing for sanitation promotion is not done well in provincial level, among DARD (including P-CERWASS), DOH and DOET. They are working on their duty according to the mandates given by the central and provincial government, and there isn't coordinating function between the related organization in regular basis. As a result, understandings on the target program on rural water and sanitation seem still low in the provincial level.
- As the status of P-CERWASS is an organization under DARD, it is regarded as the lower authority by the Department of PPC. Therefore, despite of their responsibility, P-CERWASS is not granted with enough power to deal with the upper authorities. It is also difficult for P-CERWASS to

coordinate the different sectors under the bureaucratic system. In that case, P-CERWASS request to DARD for coordination. However, it seems that DARD have few interest in sanitation promotion.

- There is clinic and health worker in every commune under DOH. Public health campaign is carried out by using this local network. Also groups of residents exist commonly in every commune, such as farmers' union, women's union, youth union, etc. They are already established and have good link with CPC and local residents. In the model sanitation program, neither health workers nor residents groups were not used. However, the team organized a workshop in Suoi Bac commune to present the progress of the program and discuss about possibility of collaboration in future phase. At that time, the participants show very positive interest which is an essential factor to be local motivators.

(2) Lessons Learned

- Monitoring on sanitation activity by provincial government should be systematically done by the central government. In implementing any projects, communication system should be clearly confirmed among the parties concerned.
- Cooperation and information sharing should be developed in provincial level, by means of coordination meeting, e.g. taskforce meeting at regular basis.
- When coordination with provincial departments is necessary, DARD should be more involved for smooth implementation.
- In IEC and public campaign, existing network of DOH in collaboration with residents groups should be utilized to link from provincial to individual levels. They could be potential motivators for sanitation promotion.

4.2.3 Measures for raising public awareness on rural water and sanitation

(1) Findings

- According to the socio-economic survey carried out by the Study Team, approx. 81% of respondents who don't have toilet (approx. 60% of total respondents) wants sanitary toilet. However, the rest 19% answered not so much needed. Such people sometime think that open defecation doesn't cause any hygienic problem since the premises are wide enough. Also some people are familiar with open defecation and feel comfortable.
- The type of toilet is mostly chosen as the pour flush with septic tank latrine for its cleanliness and comfort. However, people often overlook necessity of water supply as well as cost of emptying septic tank. Also, most of them are not aware of risk of groundwater pollution caused by effluent from septic tank.
- Many rural people who don't have toilets explain financial reason foremost, although many of them have other items, such as television and mobile phone.
- In the southern Vietnam, human wastes are not used as fertilizer from their cultural background, whereas they have been used in north. Resisting mind against DVCL prevails from failure of the past campaign project by MOH, which attempted to disseminate DVCL. Although details are not clear, it is said that when DVCL was disseminated in some communes, sufficient technical guidance on

maintenance was not provided. And the quality of construction is poor and shabby, it became dirty soon. Then, people cannot maintain properly and quit using as becoming dirty.

(2) Lessons Learned

- Although high demand exist, still more awareness campaign to create demand is needed for whom don't feel necessity of toilet.
- Rural people should be provided with a variety of technical options to choose the suitable toilet type in the affordable cost.
- In parallel with the above public awareness campaign, which is mainly focusing on hygienic and technical issues, information on financial support should be provided.
- Successful experience of introducing the new type of urine-feces separation toilet in the Model Sanitation Program should be widely disseminated.

4.2.4 Evaluation on new urine-feces separation type toilets

(1) Toilet Evaluation

According to the observation by the Team as well as the monitoring result as described in Chapter 3, the current status on the model toilet is evaluated as Table 4.2.1.

Table 4.2.1 Toilet Evaluation on Usage

Item		Criteria	School				Demonstration		
			Teacher		Student				
			DVCL	Septic Tank	DVCL	Septic Tank	DVCL	Septic Tank	
		Stool type	Chair	Chair	Squat	Squat	Chair	Char	
		No. of toilet	2	2	2	3	4	9	
Cleanliness	A	Very clean		1		1	1	8	A
	B	Clean		1	2	2	3	1	B
	C	Acceptable	2						C
	D	Dirty							D
Frequency of cleaning practice	A	Enough		1		2	4	7	A
	B	Somehow enough	1	1	1	1		2	B
	C	Not enough	1		1				C
	D	Not done							D
Flies and mosquitoes	A	No		1		2	3	8	A
	B	A few	2	1	2	1	1	1	B
	C	Some							C
	D	Many							D
Bad smell (Dry season)	A	No	1	2		2	2	7	A
	B	Some	1		2	1	2	2	B
	C	Often							C
	D	Too bad							D
Bad smell (Rainy season)	A	No		2		2	1	7	A
	B	Some	1		1	1	2	2	B
	C	Often	1		1		1		C
	D	Too bad							D
User's feeling on comfort	A	Very comfortable		2			1	7	A
	B	Good	1		1	1	1	1	B
	C	Acceptable	1		1	2	2		C
	D	Not comfortable						1	D

Item		Criteria	School				Demonstration		
			Teacher		Student				
			DVCL	Septic Tank	DVCL	Septic Tank	DVCL	Septic Tank	
		Stool type	Chair	Chair	Squat	Squat	Chair	Char	
		No. of toilet	2	2	2	3	4	9	
User's wish to refurbish	A	No (as it is)	1	2			2	9	A
	B	Somehow no							B
	C	Somehow yes							C
	D	Yes (want change)	1				2		D
Separating urine from feces	A	Done properly	2	2			3	9	A
	B	Done somehow							B
	C	Not done well			1	1	1		C
	D	Not done at all			1	2			D
Fertilization	A	Done properly		1		2	1		A
	B	Done somehow						3	B
	C	Not done well					1	3	C
	D	Not done at all	2	1	2	1	2	3	D
Users' interest in fertilizing	A	Very much		1		2	1		A
	B	Somehow						3	B
	C	Not much					1	3	C
	D	Not at all	2	1	2	1	2	3	D

(2) Findings

- Cleanliness: Both of the DVCL toilets for teachers in Phu Yen are not so clean. According to teachers, they have a resistance to clean feces hole of the chair type dry toilet stool, when they find a kind of scum of anybody else. And the hole does not allow water use even for cleaning, it is more difficult. Some teachers don't want to sit on the dirty stool, then use the squat type for students. Otherwise, teachers go back home, instead of using school toilet. However, situation is different if it is personal use, like demonstration toilet. Even though water is not allowed, the family keep toilet clean as they don't feel like scum of others when cleaning. For flush toilet, all toilets are generally kept clean, regardless of toilet types, public and domestic use. Also cleanliness is related closely to practice of cleaning, according to the table.
- Flies and Mosquitoes: Only a few flies are found in some toilets. But generally no flies are seen.
- Bad smell: Due to rainwater intrusion in dry toilets in Phu Yen province, bad smell was generated which became the cause of dislike to DVCL by users. However, in dry season, no bad smell is felt, that implies bad smell can be prevented even in rainy season if water tightness of feces vault can be secured. Effect of ventilation pipe and roof fan is an influential factor.
- User's feeling on comfort: The chair type urine-feces separation toilet stool is designed to be friendly to aged and handicapped people. Most users answered using comfortably. The users who experienced bad smell of DVCL caused by rainwater intrusion answered acceptable or not really comfortable. The rating of septic tank toilet for students is not high, because not a small number answered to the questionnaire survey as "not so convenient". It is assumed that they feels difficulty in urinate before feces, taking into account that considerable number of students answered to choose urine-feces separation type toilet for their house. One resident in Ninh Thuan don't use toilet, because of his concern that effluent from septic tank flows to the neighbors premises. Three out of 6 users of DVCL

wants to refurbish it into septic tank toilet. But it is assumed that incident of rainwater intrusion affects to this result.

- Practice of urine-feces separation: Users of chair type stool can separate easily owing to the mechanism of toilet stool in nature. But the students feel difficulty in separating urine before defecation.
- Fertilization: Only three users are fertilizing properly. It largely depends on user's interest and understanding. People having interest show positive attitude of using the urine and composted feces as fertilizer to grow and harvest crops. If users don't have interest, fertilization is never done and urine is collected but just disposed. Some users don't follow the instruction of dilution.

(3) Lessons Learned

- For public use, such as school toilet, chair type dry toilet stool is not applicable because of difficulty in cleaning. In this case, squat type DVCL toilet base is applicable, which has urine hole as well. For domestic use, chair type dry toilet stool is applicable since cleaning is not really difficult. As for the septic tank toilet, urine-feces separation toilet stool is applicable both for public and domestic purpose.
- Flies and mosquitoes are not found a lot, which are ones of prime reason of dislike of DVCL. Difference between DVCL and septic tank wasn't observed. Bad smells are also not felt under condition of proper using. In case of DVCL, water-tightness shall be secured with care. Ventilation should also be paid attention to.
- The chair type urine-feces separation toilet stool is possibly accepted by rural people. Especially pour flush with septic tank type is favored by most people, both of public use and domestic use. For dry toilet stool, it could be applicable for domestic use only.
- Practice of fertilizing is not done as expected. People don't fertilize if they don't have interest and understand. Even though they have interest, some people don't dilute as instructed for troublesome job of dilution and conveying. Although fertilizing is not understood well within the time frame of the Program, the effects of urine fertilization were confirmed through the success in school garden of Cam An Bac and Muong Man Schools, where a variety of crops are grown by urine fertilizer and harvested periodically under good practice of the schools. Taking into account that good practice is done by persons who have an interest in fertilizing and maintain properly, rural people could convince the effects if they can see for themselves the actual farm and products grown by urine fertilization. In this regard, sanitation promotion would be effective if it is performed in collaboration with instructors of agriculture under DARD and/or leaders of farmers union, who can demonstrate the good practice and motivate the people.

4.2.5 Proper maintenance and dissemination of sanitation facility

(1) Toilet Evaluation

The current status on the model toilet related to maintenance is evaluated as Table 4.2.2.

Table 4.2.2 Toilet Evaluation on Maintenance

Item		Criteria	School				Demonstration		
			Teacher		Student				
			DVCL	Septic Tank	DVCL	Septic Tank	DVCL	Septic Tank	
		Stool type	Chair	Chair	Squat	Squat	Chair	Char	
		No. of toilet	2	2	2	3	4	9	
Provision of water or wooden ash	A	Always ready		2		3	4	9	A
	B	Sometime lack	2		2				B
	C	Often lack							C
	D	Not ready							D
Provision of paper and soap	A	Always ready				1	3	9	A
	B	Sometime lack	1	1	1	2	1		B
	C	Often lack	1	1	1				C
	D	Not ready							D
Treatment of septic tank sludge or dry feces	A	Done properly					1		A
	B	Done somehow	1				1	3	B
	C	Not done well	1	2	2	3	2	3	C
	D	Not done at all						3	D

(2) Findings

- Provision of water or wooden ash: Collection of wooden ash was an issue raised in the school toilet of Phu Yen province. In this case, both two schools are helped by students to bring ash from home. In a school of Ninh Thuan, toilet was not used for about 9 months after commissioning, because of lack of water. It took 8 months for them to receive the budget for installing motor pump and tank from the DOET.
- Provision of paper and soap: In case of school, it depends on policy of school, either school provides or student shall provide.
- Treatment of septic tank sludge: There is big consciousness gap between rural people and the Team, in terms of necessity of emptying septic tank as it is widely believed in Vietnam as a commonsense that the tank can be sucked out only after 5-10 years, while the Team suggested every 6 months – one year in order to prevent pollution by septic tank effluent. One user installed soak-pit after the effluent pipe. And another one extends the effluent pipe to the field. Both practices are done by wrong knowledge. Also the cost for vacuum car of approx. VND 500,000 seems unaffordable for common rural people as well as school which is dependent on budget from DOET.

(3) Lessons Learned

- In planning toilet, necessary requirements should be considered carefully, such as availability of wooden ash (or lime) for dry toilet and water supply facility and sucking out by vacuum cars for septic tank toilet.
- Way of provision of paper and soap should be confirmed before construction.
- People's awareness on treatment of septic tank sludge seems difficult to change, unless large-scale campaign would be taken place. In this case, enforcement policy lead by the central government could be effective.

4.2.6 Proper knowledge dissemination on sanitation in community

(1) Findings

- Under the governance system of Vietnam, any activity in commune should be performed through consent of CPC. Access to any organizations in commune, such as school, residents groups, etc. is easy by cooperation of CPC. Mobilization of people also can be done by CPC. And workshop was held in the hall of CPC. In this case, however, CPC is so influential that discussion is often subject to CPC's opinion. Whereas the governance system works well, it could be obstacle to spontaneous activities of rural people. In the program, decision making was done by CPC in most cases, such as selecting toilet type and nominees of demonstration toilet.
- Sanitation education was provided by the Team in the target schools. Since the class was held limited to one class of each target commune due to time constraints, the remarkable effects were not seen. It seems that sanitation class was more accepted by primary school than secondary school. Higher grade students seem to have preconception and tend to show shame of talking about human wastes.
- Visual educational materials were used for sanitation education and workshop which can help to reduce language barriers and understand some technical subject. It is also suggested from the experience of P-CERWASS Khanh Hoa that provision of real toilet for demonstration purpose, like the model toilet under the program, can be more convincing rural people rather than virtual image and information. In fact, the Team received a lot of reaction and feedback by displaying the real model of urine-feces separation toilet stool on occasions of workshop and seminar.
- Demonstration effect by the user of model toilet was not seen as anticipated. The users are not aware well of their role of advertizing the model toilet because they were not clearly told by the Team. Another factor is assumed that some users were chosen by CPC regardless of their interest in sanitation promotion, although the Team explained one objective of the program is to disseminate sanitation toilet through demonstration, and requested to choose good motivators to the other people.
- As a whole, intervention to rural people by the Team was given for short period and information was given in one-way due to time constraints, whereas transferring proper knowledge requires long time and face-to-face dialogues. As a result, the effect of knowledge transfer depends largely on the base knowledge of the recipients.

(2) Lessons Learned

- Whenever intervention from outside commune is carried out, consensus and cooperation of CPC is necessary. Although involvement of CPC is important, some mechanism of participatory process should be taken into account in discussion and decision making.
- In sanitation education in school curriculum should be started from lower grades for better effects.
- Visual materials are effective for better understanding by rural people. Also displaying and demonstrating real model would be more convincing than virtual information given by papers and images.
- Local motivators, who can influence and motivate people by using their grass-roots networks, should be developed in order to promote effectively. In this case, it is envisaged that the local motivators can

be found in the residential groups, such as women's union and farmers' union as they are established organization already in the commune and able to mobilize the group easily.

ANNEX-1 Assessment on School Toilet in the Study Area

PHỤ LỤC 1: Đánh giá về nhà vệ sinh trường học tại khu vực nghiên cứu

Assessment on School Toilet

Province	Commune	Name of School	[A] Number of Students	[B] Number of Teachers	[C1] Number of Toilets: Teacher	[C2] Number of Toilets: Boy	[C3] Number of Toilets: Girl	[D] Type of Toilet	[E] Conditions	[F] Access to Water
Phu Yen	Xuan phuoc (P1)	Primary school -1	376	73				Septic tank		Short in dry season
		Primary school -2	469					Septic tank		Deep well has enough water
		Secondary school	1,493	90				Septic tank		
	An Dinh(P2)							Septic tank		High water in wet season
	An Tho(P3)	An Tho primary school	300	30	0	1	1	DVCL	Half broken	Short in dry season
		An Tho secondary school	245	22	0	0	0	Not exist but plan to build toilet (To be septic tank)	N/A	Enough
	An My(P4)	An My primary school	674	40	0	0	0	Septic tank (under construction)	N/A	
		Nguyen Thai Binh secondary school	1,000	52	0	1	1	Septic tank	Old but functioning	
	Son Phuoc(P5)	Pi Nang Tac primary school	443	30	0	1	1	Septic tank	Girls' toilet not in use	
		Vu A Dinh secondary school	257	23	0	1	1	Septic tank	Functioning	
	Ea Cha Rang(P6)	Ea Cha Rang primary school (incl. 5 blanches)	345	33	0	0	0		Broken	Short in dry season
		Dinh Nup day-boarded high school	295	30	1			Septic tank	Functioning	
	Suoi Bac(P7)	Suoi Bac primary school (incl. 3 branches)	610	40	0	1	1	DVCL	Broken	Short in dry season
		Suoi Bac secondary school	411	26	0	1	1	DVCL	Not functioning	
	Son Thanh Dong (P8)	Son Thanh Dong primary school	636	35	0	0	0	N/A	N/A	
		Dinh Tien Hoang secondary school	821	52	0	1	1	Septic tank	Functioning	
Khanh Hoa	Cam An Bac(K1)	Cam An Bac primary school	684	36	2	2	2	Septic tank	Old but functioning. Teachers' toilet are under construction	Enough
		Nguyen Trai secondary school	640	29	0	1	1	Septic tank	Broken	Enough
	Cam Hiep Nam (K2)	Nguyen Cong Tru secondary school	617	34	0	1	1	Septic tank	Functioning	Short in dry season
	Cam Hai Tay(K3)	Cam Hai Tay primary school	250	22	2	0	0	Septic tank	Functioning	Short in dry season

Assessment on School Toilet

Province	Commune	Name of School	[A] Number of Students	[B] Number of Teachers	[C1] Number of Toilets: Teacher	[C2] Number of Toilets: Boy	[C3] Number of Toilets: Girl	[D] Type of Toilet	[E] Conditions	[F] Access to Water
Ninh Thuan	Nhon Hai (N1)	My Tuong primary school	684	22	0	2	2	Septic tank	Girls' toilets are broken	Desalting instrument Enough for hand-washing
		Luong The Vinh secondary school	1508	62	1	1		Septic tank	Functioning. Teachers' was constructed in 2007	No water in dry season
	Cong Hai(N2)	Cong Hai primary school	543	34	2	2	2	Septic tank	Broken (girls). 2 each more for teachers, boys and girls are demanded by the school	Getting water from the agriculture pond
		Cong Hai secondary school						Septic tank	Broken	
	Bac Son(N3)	Binh Nghia primary school	535	19	0	2	2	Septic tank	Functioning	
	Phuoc Minh(N4)	Quan The primary school	138	6	2	1 for urine	1 for urine	Septic tank Students' toilets are only for urine (no feces)	Functioning	Enough for hand-washing in dry season
		Phan Chu Trinh secondary school	270	17	1	1	1	Septic tank	Functioning	No water in dry season
	Phuoc Hai(N5)	Thanh Tin primary school	480		0	1 + urine	1 + urine	Septic tank	Functioning	No water in dry season
		Phan Dinh Phung secondary school	1036		0	4	4		Functioning but very dirty	
	Phuoc Dinh(N6)									
Binh Thuan	Muong Mang(B1)	Muong Mang primary school	518	27	2	2	2	Septic tank	Functioning, 4 for teachers and 15 for students are demanded by the school	Short in dry season
	Gia Huynh(B2)	Gia Huynh primary school (including 2 branches)	278	21	1	1	1	Septic tank	One functioning and two (students) are broken	Short in dry season
		Ba Ta primary school	467			5	5	Septic tank	New and functioning	
	Nghi Duc(B3)									Short in dry season
	Tan Duc (B4)	Xa Tan Duc primary school (incl. 2 branches)	456	25	0	1	1	Septic thank	Broken	Short in dry season
	Me Pu(B5)	MePu primary school	474		0	1	1	Septic tank	Functioning	Short in dry season
	Sung Nhon(B6)	Sung Nhon 1primary school	679		0	1+urine		Septic tank	Not functioning	Short in dry season
		Sung Nhon secondary school	860		1	0	0	Septic tank	Not functioning	
	Da Kai(B7)									

(Note)

The Study Team interviewed key informant of the communes and schools, in order to overview current situation.

The figure might be inconsistent with the other study results, such as socio-economic survey, etc.

(Information source)

[A], [B], [C], [F], [G], Information provided by representative of school

[D], [E] Observation by the Study Team

[I], [J], [K] Information provided by representative of CPC

Assessment on School Toilet

Province	Commune	Name of School	[G] Use of vacuum car	[H] Willingness to improve	[I] Sanitary Toilet Possession in	[J] Literacy Rate	[K] Ethnic Composition	[L] Remarks
Phu Yen	Xuan phuoc (P1)	Primary school -1			60% (Septic tank & pour flush)	100%	Kinh:95% Cham and Hroi:75 households	People think septic tank is better option
		Primary school -2						
		Secondary school						
	An Dinh(P2)				70%	100%	Kinh:100%	People seem generally rich. People don' have custom of fertilizing organic compost
	An Tho(P3)	An Tho primary school	Easy to get vacuum	Yes	1 - 5%	100%	Kinh:100%	
		An Tho secondary school						
	An My(P4)	An My primary school		Yes	70%	100%	Kinh: 100%	Some households use organic compost as fertilizer
		Nguyen Thai Binh secondary school		Yes				
	Son Phuoc(P5)	Pi Nang Tac primary school			0%	100%	Cham Hai:62.5% Kinh:37.5%	
		Vu A Dinh secondary school						
	Ea Cha Rang(P6)	Ea Cha Rang primary school (incl. 5 blanches)	No vacuum car used		5% (Septic tank)	60%	Kinh: 10%; Ede: 70%; Cham H'roi: 10%; Tay, Kho me, Gia Rai: 10%	Eco-San project by Netherland grant failed in the past
		Dinh Nup day-boarded high school		Yes				
	Suoi Bac(P7)	Suoi Bac primary school (incl. 3 branches)	No vacuum car used		40% (DVCL), 1% (Septic tank)	90-100%	Kinh: 70%; Cham H'roi: 20%; ay,Ede,Bana,Nung: 10%	Septic tank:along national road DVCL:in the field
		Suoi Bac secondary school		Yes				
	Son Thanh Dong (P8)	Son Thanh Dong primary school		Yes	20% (Septic tank)	85-100%	Kinh:99.9%; Ede: 0.1%(only four household)	
		Dinh Tien Hoang secondary school						
Khanh Hoa	Cam An Bac(K1)	Cam An Bac primary school	To be desludged every 5 to 10 years		30% (Septic tank)	>95%	Kinh: 100%	Commune leader tells that there is a few waterborne disease
		Nguyen Trai secondary school						
	Cam Hiep Nam (K2)	Nguyen Cong Tru secondary school		Yes	50% (Septic tank)	>95%	Kinh: 100%	There is no custom of using organic compost. People use chemical fertilizer
	Cam Hai Tay(K3)	Cam Hai Tay primary school	500,000VND/time	Yes	<50% (Septic Tank)	>95%	Kinh: 100%	People are well aware of environment DVCL is not popular

Assessment on School Toilet

Province	Commune	Name of School	[G] Use of vacuum car	[H] Willingness to improve	[I] Sanitary Toilet Possession in	[J] Literacy Rate	[K] Ethnic Composition	[L] Remarks
Ninh Thuan	Nhon Hai (N1)	My Tuong primary school	No vacuum car used	Yes	40% (Septic Tank)	100%	Kinh: 100%, some families are Hoa people	People don't seem to be concerned about sanitation
		Luong The Vinh secondary school	No vacuum car used					
	Cong Hai(N2)	Cong Hai primary school		Yes	65% (Septic tank)	97%	Kinh:33%; Raglai: 67%	
		Cong Hai secondary school						
	Bac Son(N3)	Binh Nghia primary school	5 to 6 vacuum cars in Ninh Thuan	Yes	40%	>90%	Kinh: 77%; Cham and Raglay: 23%:	
	Phuoc Minh(N4)	Quan The primary school		Yes	30% (Septic tank)	>90%	Kinh: 95%; Cham, Raglay,Muong: 5%	
		Phan Chu Trinh secondary school						
	Phuoc Hai(N5)	Thanh Tin primary school	Never vacuum car used since 1999 (8years)	Yes	30-40% (Septic Tank)	100%	Kinh: 65%; Cham: 35%	
		Phan Dinh Phung secondary school						
	Phuoc Dinh(N6)				60%	100%	Kinh: 100%	
Binh Thuan	Muong Mang(B1)	Muong Mang primary school		Yes	70%(Septic tank), 10%(DVCL)	100%	Kinh: 99%; Cham and Giarai: 1%	There is no custom of using organic compost. People use chemical fertilizer
	Gia Huynh(B2)	Gia Huynh primary school (including 2 branches)		not much concerned	10% (Septic tank)	90%	Kinh90%; Churo:10%	There is no custom of using organic compost. People use chemical fertilizer
		Ba Ta primary school						
	Nghi Duc(B3)		near 25km		10% (Septic tank)	100%	Kinh100%, Cham: 1 household	Fuel in use: gas & electricity:40% firewood:60% Some people think open air not bad
	Tan Duc (B4)	Xa Tan Duc primary school (incl. 2 branches)		Yes	35% (Septic tank)	<35 years old: 95%; >36 years old: 80%	biggest: kinh: 95%;Nung, Hoa,Muong: 5% second:Kinh73%,RaiRo27%	People changed from DVCL to septic tank
	Me Pu(B5)	MePu primary school		Yes	10% (Pour flash)	90%	Kinh: 95%; K'ho: 5%	Fuel in use: gas: 50% and firewood: 50% DVCL pilot project by MOH failed due to lack of ash
	Sung Nhon(B6)	Sung Nhon 1primary school		Yes	70% (Septic tank), 10% (DVCL)	100%	Kinh: 98%; Muong, Khome: 2%	
		Sung Nhon secondary school		Yes	80%			
	Da Kai(B7)				15% (Septic tank)	100%		

ANNEX-2 Questionnaire Survey on Personal Hygiene of Students

PHỤ LỤC 2: Điều tra thăm dò tình trạng vệ sinh cá nhân học sinh

ANNEX-2

Questionnaire on Personal Hygiene (1/2)

Item	No.	Question	Answer
Hygiene Practice	1-1	Washing face	a) Every time b) Often c) Never
	1-2	Washing hands before meal	a) Every time b) Often c) Never
	1-3	Washing hands after defecation	a) Every time b) Often c) Never
	1-4	Having tissue paper	a) Every time b) Often c) Never
	1-5	Having handkerchief	a) Every time b) Often c) Never
	1-6	Brushing teeth	a) Every time b) Often c) Never
	1-7	Using toilet for defecation	a) Every time b) Often c) Never
Situation of toilet in house	2-1	Toilet type	a) No (Open air) b) Septic Tank c) DVCL d) Dug hole e)Others
	2-2	Smelling	a) Yes b) in between c) No
	2-3	Dirtiness	a) Yes b) in between c) No
	2-4	Danger for children	a) Yes b) in between c) No
	2-5	Keep using now	a) Yes b) in between c) No
	2-6	Need to improve toilet	a) Yes b) in between c) No
	2-7	Reason of improvement	a) Almost full b) Full in short c) Almost broken d) Dirty e) Bad smell f)Want cleaner one
Health Status	3-1	Fever and diarrhea	a) Often b) Sometimes c) Never
Knowledge on environmental sanitation	4-1	Knowledge of diseases from excreta	a) Yes b) A little c) No
	4-2	Knowledge of polluted water	a) Yes b) A little c) No
	4-3	Knowledge of environmental pollution	a) Yes b) A little c) No
Awareness on human wastes	5-1	Keep toilet clean	a) Yes b) Nothing in particular
	5-2	Dreadful job of cleaning	a) Yes b) in between c) No
	5-3	Experience of picking up waste	a) Yes b) No
	5-4	Dreadful job of picking up defecation	a) Yes b) in between c) No
	5-5	Awareness of excreta moving	a) Dirty b) A little c) No
	5-6	Experience of using cleaner toilet	a) Yes b) Only heard c) No
	5-7	Fertilizer	a) Yes b) Only heard c) No
	5-8	Fuel gas	a) Yes b) Only heard c) No
	5-9	Soil conditioner	a) Yes b) Only heard c) No

Questionnaire on Personal Hygiene (2/2)

Item	No.	Question	Answer
Expectation for improvement of toilet	6-1	Improvement more sanitary	a) Do wish b) If possible c) Don't wish
	6-2	Improvement of resource use	a) Do wish b) If possible c) Don't wish
	6-3	To use during flood	a) Do wish b) If possible c) Don't wish
	6-4	Most preferable reason	a) Sanitation b) Resources c) Every time use
When getting ill	7-1	Getting medicine	a) Easy b) Not difficult c) Difficult
	7-2	Seeing doctor	a) Yes b) Only serious ill c) No
Life	8-1	General satisfaction in life	a) Fully Satisfied b) Satisfied c) Not really d) Not at all
	8-2	Things desired at present	a) Sports goods b) Musical instruments c) Text books d) Game players e) Comics f) Cloths g) Shoes h) Others
	8-3	Public facilities desired	a) Gym b) Swimming pool c) Library d)Amusement park e) Others

(End)

ANNEX2-3

Questionnaire Survey Result (Data sheet, total respondents)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			22	25	38	85		35	20	55		46	42	19	107		42	20	62		309			
Item	No.	Ans.																					Ans.	No.
1	1-1	a	12	20	20	52	71%	29	10	39	71%	21	42	8	71	67%	22	12	34	54%	196	66%	a	1-1
		b	10	5	6	21	29%	6	10	16	29%	25	0	10	35	33%	21	8	29	46%	101	34%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	c	
	1-2	a	17	17	36	70	82%	23	11	34	64%	11	42	13	66	63%	27	8	35	56%	205	67%	a	1-2
		b	5	8	2	15	18%	11	8	19	36%	31	0	6	37	35%	15	12	27	44%	98	32%	b	
		c	0	0	0	0	0%	0	0	0	0%	2	0	0	2	2%	0	0	0	0%	2	1%	c	
	1-3	a	18	22	32	72	88%	29	9	38	70%	28	40	15	83	79%	23	13	36	59%	229	76%	a	1-3
		b	3	3	3	9	11%	6	10	16	30%	17	1	4	22	21%	18	6	24	39%	71	24%	b	
		c	0	0	1	1	1%	0	0	0	0%	0	0	0	0	0%	1	0	1	2%	2	1%	c	
	1-4	a	3	9	10	22	28%	15	4	19	36%	14	17	2	33	31%	21	1	22	35%	96	32%	a	1-4
		b	13	6	7	26	33%	15	8	23	43%	6	15	15	36	34%	21	10	31	50%	116	39%	b	
		c	6	9	15	30	38%	3	8	11	21%	24	10	2	36	34%	0	9	9	15%	86	29%	c	
	1-5	a	7	12	12	31	48%	17	3	20	36%	8	22	2	32	30%	23	5	28	46%	111	39%	a	1-5
		b	15	9	5	29	45%	16	12	28	51%	7	5	17	29	27%	17	12	29	48%	115	40%	b	
		c	0	4	0	4	6%	2	5	7	13%	31	14	0	45	42%	1	3	4	7%	60	21%	c	
	1-6	a	10	23	36	69	82%	29	11	40	73%	20	34	10	64	60%	22	11	33	53%	206	67%	a	1-6
		b	12	2	1	15	18%	6	9	15	27%	26	5	9	40	38%	19	9	28	45%	98	32%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	2	0	2	2%	1	0	1	2%	3	1%	c	
	1-7	a	18	18	7	43	52%	25	8	33	60%	16	20	6	42	40%	24	11	35	58%	153	50%	a	1-7
		b	3	6	3	12	14%	10	12	22	40%	21	4	13	38	36%	16	7	23	38%	95	31%	b	
		c	0	1	27	28	34%	0	0	0	0%	8	17	0	25	24%	1	1	2	3%	55	18%	c	
2	2-1	a	1	3	30	34	36%	4	1	5	9%	9	21	0	30	27%	0	6	6	10%	75	23%	a	2-1
		b	5	8	3	16	17%	22	10	32	57%	19	9	6	34	30%	37	7	44	71%	126	39%	b	
		c	15	12	0	27	29%	1	7	8	14%	4	4	4	12	11%	1	4	5	8%	52	16%	c	
		d	2	0	13	15	16%	4	1	5	9%	7	15	0	22	20%	3	1	4	6%	46	14%	d	
		e	0	2	0	2	2%	5	1	6	11%	8	1	5	14	13%	1	2	3	5%	25	8%	e	
	2-2	a	8	5	0	13	26%	9	2	11	28%	3	26	2	31	39%	12	2	14	29%	69	32%	a	2-2
		b	2	3	0	5	10%	2	0	2	5%	2	7	0	9	11%	0	0	0	0%	16	7%	b	
		c	12	17	3	32	64%	12	15	27	68%	18	9	12	39	49%	25	9	34	71%	132	61%	c	
	2-3	a	4	8	0	12	24%	6	2	8	21%	2	24	1	27	35%	13	0	13	27%	60	28%	a	2-3
		b	2	2	0	4	8%	1	1	2	5%	3	1	0	4	5%	0	0	0	0%	10	5%	b	
		c	16	14	3	33	67%	16	13	29	74%	18	16	13	47	60%	25	11	36	73%	145	67%	c	
	2-4	a	4	1	0	5	11%	2	1	3	9%	2	18	0	20	25%	7	1	8	19%	36	18%	a	2-4
		b	4	1	0	5	11%	1	1	2	6%	1	0	4	5	6%	0	0	0	0%	12	6%	b	
		c	13	18	3	34	77%	18	12	30	86%	20	24	10	54	68%	25	10	35	81%	153	76%	c	

ANNEX-2

Questionnaire Survey Result (Data sheet, total respondents)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			22	25	38	85		35	20	55		46	42	19	107		42	20	62		309			
Item	No.	Ans.																					Ans.	No.
2	2-5	a	16	21	1	38	78%	16	11	27	71%	20	33	9	62	81%	34	9	43	91%	170	81%	a	2-5
		b	0	1	0	1	2%	5	1	6	16%	1	0	3	4	5%	0	0	0	0%	11	5%	b	
		c	5	3	2	10	20%	2	3	5	13%	2	8	1	11	14%	3	1	4	9%	30	14%	c	
	2-6	a	15	19	0	34	71%	13	11	24	63%	14	36	10	60	77%	14	11	25	54%	143	68%	a	2-6
		b	0	4	0	4	8%	1	1	2	5%	2	0	0	2	3%	0	0	0	0%	8	4%	b	
		c	7	1	2	10	21%	8	4	12	32%	7	5	4	16	21%	21	0	21	46%	59	28%	c	
	2-7	a	6	3	0	9	19%	4	5	9	26%	10	1	3	14	15%	1	1	2	5%	34	16%	a	2-7
		b	0	1	0	1	2%	6	0	6	17%	4	2	0	6	6%	7	0	7	19%	20	9%	b	
		c	5	5	0	10	21%	2	2	4	11%	3	4	4	11	12%	4	3	7	19%	32	15%	c	
		d	0	3	0	3	6%	3	0	3	9%	1	19	4	24	26%	0	0	0	0%	30	14%	d	
		e	4	3	0	7	15%	3	0	3	9%	0	2	4	6	6%	1	1	2	5%	18	8%	e	
		f	10	7	0	17	36%	10	0	10	29%	14	12	7	33	35%	16	3	19	51%	79	37%	f	
3	3-1	a	0	0	3	3	4%	0	3	3	6%	4	3	0	7	7%	5	1	6	12%	19	7%	a	3-1
		b	21	17	25	63	82%	24	12	36	68%	32	32	12	76	78%	28	8	36	69%	211	76%	b	
		c	1	7	3	11	14%	11	3	14	26%	6	5	3	14	14%	6	4	10	19%	49	18%	c	
4	4-1	a	11	11	6	28	34%	18	3	21	38%	5	18	7	30	29%	15	3	18	31%	97	32%	a	4-1
		b	9	14	28	51	61%	15	12	27	49%	26	23	10	59	56%	22	10	32	55%	169	56%	b	
		c	2	0	2	4	5%	2	5	7	13%	14	0	2	16	15%	2	6	8	14%	35	12%	c	
	4-2	a	18	19	5	42	50%	28	12	40	74%	35	20	9	64	60%	38	14	52	85%	198	65%	a	4-2
		b	4	6	24	34	40%	7	4	11	20%	7	20	9	36	34%	3	6	9	15%	90	30%	b	
		c	0	0	8	8	10%	0	3	3	6%	4	1	1	6	6%	0	0	0	0%	17	6%	c	
	4-3	a	20	19	8	47	57%	31	12	43	80%	37	24	15	76	74%	34	13	47	78%	213	71%	a	4-3
		b	2	6	26	34	41%	4	7	11	20%	6	16	3	25	24%	6	6	12	20%	82	27%	b	
		c	0	0	1	1	1%	0	0	0	0%	1	0	1	2	2%	0	1	1	2%	4	1%	c	
5	5-1	a	22	25	31	78	92%	33	18	51	94%	32	37	4	73	81%	41	18	59	97%	261	90%	a	5-1
		b	0	0	7	7	8%	2	1	3	6%	13	2	2	17	19%	0	2	2	3%	29	10%	b	
	5-2	a	4	8	1	13	15%	8	3	11	20%	1	8	3	12	11%	1	5	6	10%	42	14%	a	5-2
		b	7	7	23	37	44%	15	6	21	39%	19	10	12	41	39%	12	5	17	29%	116	39%	b	
		c	11	10	13	34	40%	12	10	22	41%	26	21	5	52	50%	26	9	35	60%	143	48%	c	
	5-3	a	5	6	0	11	14%	4	7	11	20%	2	8	6	16	16%	33	3	36	63%	74	25%	a	5-3
		b	17	19	34	70	86%	31	12	43	80%	43	31	12	86	84%	6	15	21	37%	220	75%	b	
	5-4	a	11	10	17	38	46%	26	8	34	63%	23	7	7	37	35%	16	5	21	35%	130	43%	a	5-4
		b	2	7	19	28	34%	4	6	10	19%	10	20	12	42	40%	13	5	18	30%	98	32%	b	
		c	9	8	0	17	20%	5	5	10	19%	13	12	1	26	25%	13	8	21	35%	74	25%	c	

Questionnaire Survey Result (Data sheet, total respondents)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			22	25	38	85		35	20	55		46	42	19	107		42	20	62		309			
Item	No.	Ans.																					Ans.	No.
5	5-5	a	12	10	24	46	55%	21	7	28	54%	18	29	1	48	48%	19	8	27	45%	149	50%	a	5-5
		b	6	11	14	31	37%	11	8	19	37%	13	5	14	32	32%	21	7	28	47%	110	37%	b	
		c	3	3	0	6	7%	2	3	5	10%	15	3	3	21	21%	2	3	5	8%	37	13%	c	
	5-6	a	15	22	3	40	47%	29	13	42	78%	16	18	11	45	43%	13	11	24	39%	151	50%	a	5-6
		b	6	3	15	24	28%	5	5	10	19%	27	20	8	55	53%	28	9	37	60%	126	41%	b	
		c	0	0	21	21	25%	1	1	2	4%	2	2	0	4	4%	1	0	1	2%	28	9%	c	
	5-7	a	18	13	1	32	38%	16	8	24	44%	14	15	11	40	38%	16	11	27	44%	123	40%	a	5-7
		b	2	8	16	26	31%	15	6	21	38%	15	16	8	39	37%	13	7	20	33%	106	35%	b	
		c	1	4	21	26	31%	4	6	10	18%	16	10	0	26	25%	13	1	14	23%	76	25%	c	
	5-8	a	6	11	0	17	20%	6	3	9	17%	9	14	11	34	32%	0	7	7	12%	67	22%	a	5-8
		b	12	7	14	33	39%	12	3	15	28%	27	19	8	54	51%	27	6	33	55%	135	44%	b	
		c	4	7	24	35	41%	17	13	30	56%	9	9	0	18	17%	15	5	20	33%	103	34%	c	
	5-9	a	14	18	10	42	49%	14	9	23	44%	27	34	8	69	68%	0	10	10	16%	144	48%	a	5-9
		b	6	4	22	32	38%	13	2	15	29%	6	2	12	20	20%	27	9	36	59%	103	34%	b	
		c	2	3	6	11	13%	7	7	14	27%	12	1	0	13	13%	15	0	15	25%	53	18%	c	
6	6-1	a	19	20	35	74	89%	24	13	37	70%	35	33	13	81	79%	42	15	57	97%	249	84%	a	6-1
		b	3	5	1	9	11%	10	5	15	28%	8	4	5	17	17%	0	2	2	3%	43	14%	b	
		c	0	0	0	0	0%	0	1	1	2%	3	2	0	5	5%	0	0	0	0%	6	2%	c	
	6-2	a	15	9	33	57	78%	24	9	33	66%	22	30	14	66	66%	30	10	40	66%	196	69%	a	6-2
		b	6	6	1	13	18%	6	8	14	28%	20	4	3	27	27%	12	7	19	31%	73	26%	b	
		c	1	0	2	3	4%	2	1	3	6%	3	3	1	7	7%	0	2	2	3%	15	5%	c	
	6-3	a	18	18	33	69	85%	30	10	40	75%	31	23	16	70	70%	41	9	50	83%	229	78%	a	6-3
		b	1	3	1	5	6%	5	5	10	19%	5	3	1	9	9%	0	4	4	7%	28	10%	b	
		c	3	4	0	7	9%	0	3	3	6%	9	12	0	21	21%	0	6	6	10%	37	13%	c	
	6-4	a	12	14	20	46	52%	21	12	33	46%	22	16	12	50	47%	31	12	43	57%	172	50%	a	6-4
		b	5	3	4	12	13%	13	4	17	24%	15	13	4	32	30%	0	4	4	5%	65	19%	b	
		c	12	8	11	31	35%	17	4	21	30%	10	9	6	25	23%	24	4	28	37%	105	31%	c	
7	7-1	a	13	18	18	49	62%	19	10	29	57%	38	29	15	82	80%	33	8	41	67%	201	68%	a	7-1
		b	9	7	5	21	27%	13	7	20	39%	5	6	2	13	13%	7	10	17	28%	71	24%	b	
		c	0	0	9	9	11%	1	1	2	4%	3	4	1	8	8%	1	2	3	5%	22	7%	c	
	7-2	a	14	22	9	45	55%	21	12	33	60%	31	17	13	61	62%	33	12	45	74%	184	62%	a	7-2
		b	8	2	22	32	39%	13	8	21	38%	15	16	5	36	36%	8	7	15	25%	104	35%	b	
		c	0	1	4	5	6%	1	0	1	2%	0	2	0	2	2%	0	1	1	2%	9	3%	c	

Questionnaire Survey Result (Data sheet, total respondents)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			22	25	38	85		35	20	55		46	42	19	107		42	20	62		309			
Item	No.	Ans.																					Ans.	No.
8	8-1	a	5	8	11	24	30%	4	7	11	21%	22	21	1	44	42%	21	12	33	54%	112	37%	a	8-1
		b	12	11	11	34	42%	17	5	22	42%	17	10	6	33	31%	12	4	16	26%	105	35%	b	
		c	5	6	12	23	28%	11	7	18	34%	7	8	11	26	25%	7	4	11	18%	78	26%	c	
		d	0	0	0	0	0%	2	0	2	4%	0	2	0	2	2%	1	0	1	2%	5	2%	d	
	8-2	a	15	14	23	52	61%	22	8	30	55%	19	19	6	44	41%	19	5	24	39%	150	49%	a	8-2
		b	13	9	5	27	32%	19	3	22	40%	4	9	6	19	18%	3	5	8	13%	76	25%	b	
		c	11	8	7	26	31%	26	7	33	60%	1	7	10	18	17%	17	1	18	29%	95	31%	c	
		d	5	7	13	25	29%	7	4	11	20%	2	7	2	11	10%	7	4	11	18%	58	19%	d	
		e	9	14	8	31	36%	17	10	27	49%	7	13	10	30	28%	27	7	34	55%	122	39%	e	
		f	10	13	3	26	31%	17	6	23	42%	13	10	7	30	28%	23	5	28	45%	107	35%	f	
		g	7	7	1	15	18%	16	6	22	40%	8	7	4	19	18%	19	3	22	35%	78	25%	g	
		h	6	4	3	13	15%	12	5	17	31%	3	8	9	20	19%	0	4	4	6%	54	17%	h	
	8-3	a	11	5	2	18	21%	20	7	27	49%	11	13	5	29	27%	20	0	20	32%	94	30%	a	8-3
		b	8	12	11	31	36%	16	9	25	45%	24	26	4	54	50%	15	15	30	48%	140	45%	b	
		c	13	13	18	44	52%	26	9	35	64%	3	6	13	22	21%	20	4	24	39%	125	40%	c	
		d	15	14	6	35	41%	21	8	29	53%	11	12	6	29	27%	26	4	30	48%	123	40%	d	
		e	7	2	6	15	18%	13	3	16	29%	2	5	8	15	14%	12	2	14	23%	60	19%	e	

Questionnaire Survey Result (Group A: Having toilet in house)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			20	20	3	43		23	17	40		23	13	14	50		38	11	49		182			
Item	No.	Ans.																					Ans.	No.
1	1-1	a	10	15	1	26	60%	17	7	24	60%	7	13	7	27	55%	22	7	29	58%	106	58%	a	1-1
		b	10	5	2	17	40%	6	10	16	40%	16	0	6	22	45%	17	4	21	42%	76	42%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	c	
	1-2	a	15	14	3	32	74%	13	8	21	55%	4	13	11	28	56%	23	6	29	59%	110	61%	a	1-2
		b	5	6	0	11	26%	9	8	17	45%	18	0	3	21	42%	15	5	20	41%	69	38%	b	
		c	0	0	0	0	0%	0	0	0	0%	1	0	0	1	2%	0	0	0	0%	1	1%	c	
	1-3	a	16	18	3	37	88%	17	6	23	59%	18	13	13	44	88%	22	7	29	60%	133	74%	a	1-3
		b	3	2	0	5	12%	6	10	16	41%	5	0	1	6	12%	16	3	19	40%	46	26%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	c	
	1-4	a	3	7	0	10	23%	10	3	13	33%	12	5	2	19	38%	17	1	18	37%	60	33%	a	1-4
		b	11	6	0	17	40%	10	8	18	46%	1	6	11	18	36%	21	5	26	53%	79	44%	b	
		c	6	7	3	16	37%	2	6	8	21%	10	2	1	13	26%	0	5	5	10%	42	23%	c	
	1-5	a	7	10	3	20	47%	11	2	13	33%	3	8	2	13	26%	23	4	27	55%	73	40%	a	1-5
		b	13	7	0	20	47%	10	12	22	55%	3	3	12	18	36%	15	6	21	43%	81	45%	b	
		c	0	3	0	3	7%	2	3	5	13%	17	2	0	19	38%	0	1	1	2%	28	15%	c	
	1-6	a	8	18	3	29	67%	19	8	27	68%	8	12	9	29	58%	20	6	26	53%	111	61%	a	1-6
		b	12	2	0	14	33%	4	9	13	33%	15	1	5	21	42%	18	5	23	47%	71	39%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	c	
	1-7	a	17	15	3	35	83%	17	7	24	60%	15	9	4	28	56%	24	6	30	63%	117	65%	a	1-7
		b	2	5	0	7	17%	6	10	16	40%	8	1	10	19	38%	14	4	18	38%	60	33%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	3	0	3	6%	0	0	0	0%	3	2%	c	
2	2-1	a	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	a	2-1
		b	5	8	3	16	37%	22	10	32	80%	19	9	6	34	74%	37	7	44	90%	126	71%	b	
		c	15	12	0	27	63%	1	7	8	20%	4	4	4	12	26%	1	4	5	10%	52	29%	c	
		d	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	d	
		e	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	e	
	2-2	a	6	4	0	10	23%	9	2	11	28%	3	6	2	11	22%	12	2	14	29%	46	25%	a	2-2
		b	2	3	0	5	12%	2	0	2	5%	2	7	0	9	18%	0	0	0	0%	16	9%	b	
		c	12	13	3	28	65%	12	15	27	68%	18	0	12	30	60%	25	9	34	71%	119	66%	c	
	2-3	a	2	4	0	6	14%	6	2	8	21%	2	4	1	7	14%	13	0	13	27%	34	19%	a	2-3
		b	2	2	0	4	9%	1	1	2	5%	3	0	0	3	6%	0	0	0	0%	9	5%	b	
		c	16	14	3	33	77%	16	13	29	74%	18	9	13	40	80%	25	11	36	73%	138	76%	c	
	2-4	a	2	1	0	3	7%	2	1	3	9%	2	3	0	5	10%	7	1	8	19%	19	11%	a	2-4
		b	4	1	0	5	12%	1	1	2	6%	1	0	4	5	10%	0	0	0	0%	12	7%	b	
		c	13	18	3	34	81%	18	12	30	86%	20	10	10	40	80%	25	10	35	81%	139	82%	c	

ANNEX2-8

Questionnaire Survey Result (Group A: Having toilet in house)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			20	20	3	43		23	17	40		23	13	14	50		38	11	49		182			
Item	No.	Ans.																					Ans.	No.
2	2-5	a	14	16	1	31	74%	16	11	27	71%	20	12	9	41	84%	34	9	43	91%	142	81%	a	2-5
		b	0	1	0	1	2%	5	1	6	16%	1	0	3	4	8%	0	0	0	0%	11	6%	b	
		c	5	3	2	10	24%	2	3	5	13%	2	1	1	4	8%	3	1	4	9%	23	13%	c	
	2-6	a	13	15	0	28	68%	13	11	24	63%	14	10	10	34	68%	14	11	25	54%	111	63%	a	2-6
		b	0	4	0	4	10%	1	1	2	5%	2	0	0	2	4%	0	0	0	0%	8	5%	b	
		c	7	0	2	9	22%	8	4	12	32%	7	3	4	14	28%	21	0	21	46%	56	32%	c	
	2-7	a	5	3	0	8	18%	4	5	9	26%	10	0	3	13	19%	1	1	2	5%	32	17%	a	2-7
		b	0	1	0	1	2%	6	0	6	17%	4	2	0	6	9%	7	0	7	19%	20	11%	b	
		c	4	5	0	9	20%	2	2	4	11%	3	3	4	10	15%	4	3	7	19%	30	16%	c	
		d	0	3	0	3	7%	3	0	3	9%	1	4	4	9	13%	0	0	0	0%	15	8%	d	
		e	4	3	0	7	16%	3	0	3	9%	0	1	4	5	7%	1	1	2	5%	17	9%	e	
		f	10	7	0	17	38%	10	0	10	29%	14	3	7	24	36%	16	3	19	51%	70	38%	f	
3	3-1	a	0	0	0	0	0%	0	1	1	3%	1	1	0	2	4%	5	0	5	12%	8	5%	a	3-1
		b	19	14	0	33	77%	15	12	27	69%	19	7	10	36	77%	28	4	32	76%	128	75%	b	
		c	1	6	3	10	23%	8	3	11	28%	1	5	3	9	19%	2	3	5	12%	35	20%	c	
4	4-1	a	10	8	2	20	47%	13	3	16	40%	2	10	3	15	30%	14	2	16	36%	67	38%	a	4-1
		b	8	12	1	21	49%	9	9	18	45%	17	3	10	30	60%	20	6	26	58%	95	53%	b	
		c	2	0	0	2	5%	1	5	6	15%	4	0	1	5	10%	1	2	3	7%	16	9%	c	
	4-2	a	17	15	1	33	77%	19	9	28	72%	19	10	5	34	68%	35	7	42	86%	137	76%	a	4-2
		b	3	5	1	9	21%	4	4	8	21%	2	3	9	14	28%	3	4	7	14%	38	21%	b	
		c	0	0	1	1	2%	0	3	3	8%	2	0	0	2	4%	0	0	0	0%	6	3%	c	
	4-3	a	18	16	2	36	84%	21	10	31	79%	19	10	11	40	83%	30	7	37	79%	144	81%	a	4-3
		b	2	4	1	7	16%	2	6	8	21%	2	3	3	8	17%	6	4	10	21%	33	19%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	c	
5	5-1	a	20	20	3	43	100%	22	15	37	95%	20	12	1	33	89%	38	9	47	96%	160	95%	a	5-1
		b	0	0	0	0	0%	1	1	2	5%	3	1	0	4	11%	0	2	2	4%	8	5%	b	
	5-2	a	2	7	0	9	21%	4	3	7	18%	0	3	2	5	10%	1	5	6	13%	27	15%	a	5-2
		b	7	6	0	13	30%	11	3	14	36%	4	2	9	15	29%	9	2	11	24%	53	30%	b	
		c	11	7	3	21	49%	8	10	18	46%	19	8	4	31	61%	25	4	29	63%	99	55%	c	
	5-3	a	3	4	0	7	16%	2	5	7	18%	1	3	5	9	18%	33	3	36	80%	59	34%	a	5-3
		b	17	16	3	36	84%	21	11	32	82%	22	10	8	40	82%	2	7	9	20%	117	66%	b	
	5-4	a	9	8	2	19	44%	18	6	24	62%	15	2	4	21	41%	13	3	16	34%	80	44%	a	5-4
		b	2	6	1	9	21%	1	5	6	15%	1	6	10	17	33%	13	2	15	32%	47	26%	b	
		c	9	6	0	15	35%	4	5	9	23%	7	5	1	13	25%	12	4	16	34%	53	29%	c	

ANNEX-2

Questionnaire Survey Result (Group A: Having toilet in house)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			20	20	3	43		23	17	40		23	13	14	50		38	11	49		182			
Item	No.	Ans.																					Ans.	No.
5	5-5	a	10	9	3	22	54%	13	6	19	51%	5	8	1	14	29%	15	4	19	39%	74	42%	a	5-5
		b	6	8	0	14	34%	7	6	13	35%	4	1	11	16	33%	21	4	25	51%	68	39%	b	
		c	3	2	0	5	12%	2	3	5	14%	14	3	1	18	38%	2	3	5	10%	33	19%	c	
	5-6	a	14	18	1	33	79%	20	12	32	82%	10	9	7	26	52%	12	7	19	39%	110	61%	a	5-6
		b	5	2	0	7	17%	3	3	6	15%	13	3	7	23	46%	25	4	29	59%	65	36%	b	
		c	0	0	2	2	5%	0	1	1	3%	0	1	0	1	2%	1	0	1	2%	5	3%	c	
	5-7	a	18	8	0	26	62%	10	6	16	40%	8	5	7	20	40%	13	7	20	41%	82	45%	a	5-7
		b	1	8	0	9	21%	10	6	16	40%	10	5	7	22	44%	13	4	17	35%	64	35%	b	
		c	0	4	3	7	17%	3	5	8	20%	5	3	0	8	16%	12	0	12	24%	35	19%	c	
	5-8	a	6	8	0	14	33%	5	3	8	20%	2	5	7	14	28%	0	5	5	10%	41	23%	a	5-8
		b	12	7	0	19	44%	6	2	8	20%	18	5	7	30	60%	26	5	31	63%	88	48%	b	
		c	2	5	3	10	23%	12	12	24	60%	3	3	0	6	12%	12	1	13	27%	53	29%	c	
	5-9	a	14	14	1	29	67%	10	8	18	46%	18	11	6	35	70%	0	7	7	14%	89	49%	a	5-9
		b	6	3	2	11	26%	7	2	9	23%	3	1	9	13	26%	26	4	30	61%	63	35%	b	
		c	0	3	0	3	7%	6	6	12	31%	2	0	0	2	4%	12	0	12	24%	29	16%	c	
6	6-1	a	17	16	2	35	83%	13	12	25	66%	18	10	10	38	78%	38	7	45	96%	143	81%	a	6-1
		b	3	4	0	7	17%	9	3	12	32%	3	3	3	9	18%	0	2	2	4%	30	17%	b	
		c	0	0	0	0	0%	0	1	1	3%	2	0	0	2	4%	0	0	0	0%	3	2%	c	
	6-2	a	13	5	1	19	59%	14	8	22	61%	15	10	12	37	77%	26	4	30	63%	108	66%	a	6-2
		b	6	5	0	11	34%	6	6	12	33%	7	1	1	9	19%	12	4	16	33%	48	29%	b	
		c	1	0	1	2	6%	1	1	2	6%	1	1	0	2	4%	0	2	2	4%	8	5%	c	
	6-3	a	16	15	1	32	78%	20	8	28	74%	16	7	11	34	72%	37	6	43	91%	137	79%	a	6-3
		b	1	2	0	3	7%	3	4	7	18%	2	3	1	6	13%	0	2	2	4%	18	10%	b	
		c	3	3	0	6	15%	0	3	3	8%	5	2	0	7	15%	0	2	2	4%	18	10%	c	
	6-4	a	10	12	2	24	51%	12	11	23	56%	17	6	10	33	62%	28	7	35	57%	115	57%	a	6-4
		b	5	2	0	7	15%	5	4	9	22%	4	4	4	12	23%	0	2	2	3%	30	15%	b	
		c	10	6	0	16	34%	7	2	9	22%	3	2	3	8	15%	22	2	24	39%	57	28%	c	
7	7-1	a	11	14	2	27	64%	13	7	20	54%	22	8	10	40	85%	30	3	33	69%	120	69%	a	7-1
		b	9	6	0	15	36%	8	7	15	41%	0	1	2	3	6%	7	7	14	29%	47	27%	b	
		c	0	0	0	0	0%	1	1	2	5%	1	2	1	4	9%	0	1	1	2%	7	4%	c	
	7-2	a	12	19	0	31	74%	15	11	26	65%	18	3	11	32	70%	32	8	40	83%	129	73%	a	7-2
		b	8	1	1	10	24%	8	6	14	35%	5	7	2	14	30%	5	3	8	17%	46	26%	b	
		c	0	0	1	1	2%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	1	1%	c	

Questionnaire Survey Result (Group A: Having toilet in house)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			20	20	3	43		23	17	40		23	13	14	50		38	11	49		182			
Item	No.	Ans.																					Ans.	No.
8	8-1	a	3	7	2	12	29%	4	7	11	28%	14	5	1	20	43%	20	6	26	54%	69	39%	a	8-1
		b	12	8	0	20	48%	10	3	13	33%	6	3	4	13	28%	12	3	15	31%	61	35%	b	
		c	5	5	0	10	24%	7	6	13	33%	3	2	8	13	28%	4	2	6	13%	42	24%	c	
		d	0	0	0	0	0%	2	0	2	5%	0	0	0	0	0%	1	0	1	2%	3	2%	d	
	8-2	a	14	12	0	26	60%	13	8	21	53%	9	6	3	18	36%	16	3	19	39%	84	46%	a	8-2
		b	13	8	0	21	49%	11	3	14	35%	0	4	2	6	12%	3	5	8	16%	49	27%	b	
		c	9	7	1	17	40%	16	7	23	58%	1	5	7	13	26%	14	1	15	31%	68	37%	c	
		d	5	7	0	12	28%	3	4	7	18%	1	3	0	4	8%	7	1	8	16%	31	17%	d	
		e	9	13	1	23	53%	10	9	19	48%	2	6	6	14	28%	23	4	27	55%	83	46%	e	
		f	8	11	0	19	44%	8	5	13	33%	6	5	4	15	30%	20	2	22	45%	69	38%	f	
		g	7	7	0	14	33%	9	5	14	35%	3	4	1	8	16%	16	2	18	37%	54	30%	g	
		h	6	3	0	9	21%	5	4	9	23%	1	6	5	12	24%	0	3	3	6%	33	18%	h	
	8-3	a	11	5	0	16	37%	12	6	18	45%	6	6	2	14	28%	17	0	17	35%	65	36%	a	8-3
		b	8	11	0	19	44%	7	8	15	38%	12	7	2	21	42%	15	9	24	49%	79	43%	b	
		c	13	10	1	24	56%	17	8	25	63%	0	4	10	14	28%	17	3	20	41%	83	46%	c	
		d	13	11	1	25	58%	12	8	20	50%	3	5	4	12	24%	22	2	24	49%	81	45%	d	
		e	7	2	0	9	21%	7	2	9	23%	1	3	5	9	18%	10	0	10	20%	37	20%	e	

Questionnaire Survey Result (Group B: Without Toilet)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			2	5	35	42		12	3	15		23	29	5	57		4	9	13		127			
Item	No.	Ans.																					Ans.	No.
1	1-1	a	2	5	19	26	87%	12	3	15	100%	14	29	1	44	77%	0	5	5	38%	90	78%	a	1-1
		b	0	0	4	4	13%	0	0	0	0%	9	0	4	13	23%	4	4	8	62%	25	22%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	c	
	1-2	a	2	3	33	38	90%	10	3	13	87%	7	29	2	38	69%	4	2	6	46%	95	76%	a	1-2
		b	0	2	2	4	10%	2	0	2	13%	13	0	3	16	29%	0	7	7	54%	29	23%	b	
		c	0	0	0	0	0%	0	0	0	0%	1	0	0	1	2%	0	0	0	0%	1	1%	c	
	1-3	a	2	4	29	35	88%	12	3	15	100%	10	27	2	39	71%	1	6	7	54%	96	78%	a	1-3
		b	0	1	3	4	10%	0	0	0	0%	12	1	3	16	29%	2	3	5	38%	25	20%	b	
		c	0	0	1	1	3%	0	0	0	0%	0	0	0	0	0%	1	0	1	8%	2	2%	c	
	1-4	a	0	2	10	12	34%	5	1	6	43%	2	12	0	14	25%	4	0	4	31%	36	31%	a	1-4
		b	2	0	7	9	26%	5	0	5	36%	5	9	4	18	33%	0	5	5	38%	37	32%	b	
		c	0	2	12	14	40%	1	2	3	21%	14	8	1	23	42%	0	4	4	31%	44	38%	c	
	1-5	a	0	2	9	11	52%	6	1	7	47%	5	14	0	19	34%	0	1	1	8%	38	37%	a	1-5
		b	2	2	5	9	43%	6	0	6	40%	4	2	5	11	20%	2	6	8	67%	34	33%	b	
		c	0	1	0	1	5%	0	2	2	13%	14	12	0	26	46%	1	2	3	25%	32	31%	c	
	1-6	a	2	5	33	40	98%	10	3	13	87%	12	22	1	35	63%	2	5	7	54%	95	76%	a	1-6
		b	0	0	1	1	2%	2	0	2	13%	11	4	4	19	34%	1	4	5	38%	27	22%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	2	0	2	4%	1	0	1	8%	3	2%	c	
	1-7	a	1	3	4	8	20%	8	1	9	60%	1	11	2	14	25%	0	5	5	42%	36	29%	a	1-7
		b	1	1	3	5	12%	4	2	6	40%	13	3	3	19	35%	2	3	5	42%	35	28%	b	
		c	0	1	27	28	68%	0	0	0	0%	8	14	0	22	40%	1	1	2	17%	52	42%	c	
2	2-1	a	1	3	30	34	67%	4	1	5	31%	9	21	0	30	45%	0	6	6	46%	75	51%	a	2-1
		b	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	c	
		d	2	0	13	15	29%	4	1	5	31%	7	15	0	22	33%	3	1	4	31%	46	32%	d	
		e	0	2	0	2	4%	5	1	6	38%	8	1	5	14	21%	1	2	3	23%	25	17%	e	
	2-2	a	2	1	0	3	43%	0	0	0	0%	0	20	0	20	69%	0	0	0	0%	23	64%	a	2-2
		b	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	b	
		c	0	4	0	4	57%	0	0	0	0%	0	9	0	9	31%	0	0	0	0%	13	36%	c	
	2-3	a	2	4	0	6	100%	0	0	0	0%	0	20	0	20	71%	0	0	0	0%	26	76%	a	2-3
		b	0	0	0	0	0%	0	0	0	0%	0	1	0	1	4%	0	0	0	0%	1	3%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	7	0	7	25%	0	0	0	0%	7	21%	c	
	2-4	a	2	0	0	2	100%	0	0	0	0%	0	15	0	15	52%	0	0	0	0%	17	55%	a	2-4
		b	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	14	0	14	48%	0	0	0	0%	14	45%	c	

Questionnaire Survey Result (Group B: Without Toilet)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			2	5	35	42		12	3	15		23	29	5	57		4	9	13		127			
Item	No.	Ans.																					Ans.	No.
2	2-5	a	2	5	0	7	100%	0	0	0	0%	0	21	0	21	75%	0	0	0	0%	28	80%	a	2-5
		b	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	b	
		c	0	0	0	0	0%	0	0	0	0%	0	7	0	7	25%	0	0	0	0%	7	20%	c	
	2-6	a	2	4	0	6	86%	0	0	0	0%	0	26	0	26	93%	0	0	0	0%	32	91%	a	2-6
		b	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	b	
		c	0	1	0	1	14%	0	0	0	0%	0	2	0	2	7%	0	0	0	0%	3	9%	c	
	2-7	a	1	0	0	1	50%	0	0	0	0%	0	1	0	1	4%	0	0	0	0%	2	7%	a	2-7
		b	0	0	0	0	0%	0	0	0	0%	0	0	0	0	0%	0	0	0	0%	0	0%	b	
		c	1	0	0	1	50%	0	0	0	0%	0	1	0	1	4%	0	0	0	0%	2	7%	c	
		d	0	0	0	0	0%	0	0	0	0%	0	15	0	15	56%	0	0	0	0%	15	52%	d	
		e	0	0	0	0	0%	0	0	0	0%	0	1	0	1	4%	0	0	0	0%	1	3%	e	
		f	0	0	0	0	0%	0	0	0	0%	0	9	0	9	33%	0	0	0	0%	9	31%	f	
3	3-1	a	0	0	3	3	9%	0	2	2	14%	3	2	0	5	10%	0	1	1	10%	11	10%	a	3-1
		b	2	3	25	30	88%	9	0	9	64%	13	25	2	40	80%	0	4	4	40%	83	77%	b	
		c	0	1	0	1	3%	3	0	3	21%	5	0	0	5	10%	4	1	5	50%	14	13%	c	
4	4-1	a	1	3	4	8	20%	5	0	5	33%	3	8	4	15	27%	1	1	2	15%	30	24%	a	4-1
		b	1	2	27	30	75%	6	3	9	60%	9	20	0	29	53%	2	4	6	46%	74	60%	b	
		c	0	0	2	2	5%	1	0	1	7%	10	0	1	11	20%	1	4	5	38%	19	15%	c	
	4-2	a	1	4	4	9	22%	9	3	12	80%	16	10	4	30	54%	3	7	10	83%	61	49%	a	4-2
		b	1	1	23	25	61%	3	0	3	20%	5	17	0	22	39%	0	2	2	17%	52	42%	b	
		c	0	0	7	7	17%	0	0	0	0%	2	1	1	4	7%	0	0	0	0%	11	9%	c	
	4-3	a	2	3	6	11	28%	10	2	12	80%	18	14	4	36	65%	4	6	10	77%	69	57%	a	4-3
		b	0	2	25	27	69%	2	1	3	20%	4	13	0	17	31%	0	2	2	15%	49	40%	b	
		c	0	0	1	1	3%	0	0	0	0%	1	0	1	2	4%	0	1	1	8%	4	3%	c	
5	5-1	a	2	5	28	35	83%	11	3	14	93%	12	25	3	40	75%	3	9	12	100%	101	83%	a	5-1
		b	0	0	7	7	17%	1	0	1	7%	10	1	2	13	25%	0	0	0	0%	21	17%	b	
	5-2	a	2	1	1	4	10%	4	0	4	27%	1	5	1	7	13%	0	0	0	0%	15	12%	a	5-2
		b	0	1	23	24	59%	4	3	7	47%	15	8	3	26	48%	3	3	6	50%	63	52%	b	
		c	0	3	10	13	32%	4	0	4	27%	7	13	1	21	39%	1	5	6	50%	44	36%	c	
	5-3	a	2	2	0	4	11%	2	2	4	27%	1	5	1	7	13%	0	0	0	0%	15	13%	a	5-3
		b	0	3	31	34	89%	10	1	11	73%	21	21	4	46	87%	4	8	12	100%	103	87%	b	
	5-4	a	2	2	15	19	48%	8	2	10	67%	8	5	3	16	30%	3	2	5	38%	50	41%	a	5-4
		b	0	1	18	19	48%	3	1	4	27%	9	14	2	25	46%	0	3	3	23%	51	42%	b	
		c	0	2	0	2	5%	1	0	1	7%	6	7	0	13	24%	1	4	5	38%	21	17%	c	

Questionnaire Survey Result (Group B: Without Toilet)

			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			2	5	35	42		12	3	15		23	29	5	57		4	9	13		127			
Item	No.	Ans.																					Ans.	No.
5	5-5	a	2	1	21	24	57%	8	1	9	60%	13	21	0	34	64%	4	4	8	73%	75	62%	a	5-5
		b	0	3	14	17	40%	4	2	6	40%	9	4	3	16	30%	0	3	3	27%	42	35%	b	
		c	0	1	0	1	2%	0	0	0	0%	1	0	2	3	6%	0	0	0	0%	4	3%	c	
	5-6	a	1	4	2	7	16%	9	1	10	67%	6	9	4	19	35%	1	4	5	38%	41	33%	a	5-6
		b	1	1	15	17	40%	2	2	4	27%	14	17	1	32	59%	3	5	8	62%	61	49%	b	
		c	0	0	19	19	44%	1	0	1	7%	2	1	0	3	6%	0	0	0	0%	23	18%	c	
	5-7	a	0	5	1	6	14%	6	2	8	53%	6	10	4	20	36%	3	4	7	58%	41	33%	a	5-7
		b	1	0	16	17	40%	5	0	5	33%	5	11	1	17	31%	0	3	3	25%	42	34%	b	
		c	1	0	18	19	45%	1	1	2	13%	11	7	0	18	33%	1	1	2	17%	41	33%	c	
	5-8	a	0	3	0	3	7%	1	0	1	7%	7	9	4	20	36%	0	2	2	18%	26	21%	a	5-8
		b	0	0	14	14	33%	6	1	7	50%	9	14	1	24	43%	1	1	2	18%	47	38%	b	
		c	2	2	21	25	60%	5	1	6	43%	6	6	0	12	21%	3	4	7	64%	50	41%	c	
	5-9	a	0	4	9	13	31%	4	1	5	38%	9	23	2	34	65%	0	3	3	25%	55	46%	a	5-9
		b	0	1	20	21	50%	6	0	6	46%	3	1	3	7	13%	1	5	6	50%	40	34%	b	
		c	2	0	6	8	19%	1	1	2	15%	10	1	0	11	21%	3	0	3	25%	24	20%	c	
6	6-1	a	2	4	33	39	95%	11	1	12	80%	17	23	3	43	80%	4	8	12	100%	106	87%	a	6-1
		b	0	1	1	2	5%	1	2	3	20%	5	1	2	8	15%	0	0	0	0%	13	11%	b	
		c	0	0	0	0	0%	0	0	0	0%	1	2	0	3	6%	0	0	0	0%	3	2%	c	
	6-2	a	2	4	32	38	93%	10	1	11	79%	7	20	2	29	56%	4	6	10	77%	88	73%	a	6-2
		b	0	1	1	2	5%	0	2	2	14%	13	3	2	18	35%	0	3	3	23%	25	21%	b	
		c	0	0	1	1	2%	1	0	1	7%	2	2	1	5	10%	0	0	0	0%	7	6%	c	
	6-3	a	2	3	32	37	93%	10	2	12	80%	15	16	5	36	68%	4	3	7	54%	92	76%	a	6-3
		b	0	1	1	2	5%	2	1	3	20%	3	0	0	3	6%	0	2	2	15%	10	8%	b	
		c	0	1	0	1	3%	0	0	0	0%	4	10	0	14	26%	0	4	4	31%	19	16%	c	
	6-4	a	2	2	18	22	52%	9	1	10	33%	5	10	2	17	31%	3	5	8	57%	57	41%	a	6-4
		b	0	1	4	5	12%	8	0	8	27%	11	9	0	20	37%	0	2	2	14%	35	25%	b	
		c	2	2	11	15	36%	10	2	12	40%	7	7	3	17	31%	2	2	4	29%	48	34%	c	
7	7-1	a	2	4	16	22	59%	6	3	9	64%	16	21	5	42	75%	3	5	8	62%	81	68%	a	7-1
		b	0	1	5	6	16%	5	0	5	36%	5	5	0	10	18%	0	3	3	23%	24	20%	b	
		c	0	0	9	9	24%	0	0	0	0%	2	2	0	4	7%	1	1	2	15%	15	13%	c	
	7-2	a	2	3	9	14	35%	6	1	7	47%	13	14	2	29	55%	1	4	5	38%	55	45%	a	7-2
		b	0	1	21	22	55%	5	2	7	47%	10	9	3	22	42%	3	4	7	54%	58	48%	b	
		c	0	1	3	4	10%	1	0	1	7%	0	2	0	2	4%	0	1	1	8%	8	7%	c	

Questionnaire Survey Result (Group B: Without Toilet)

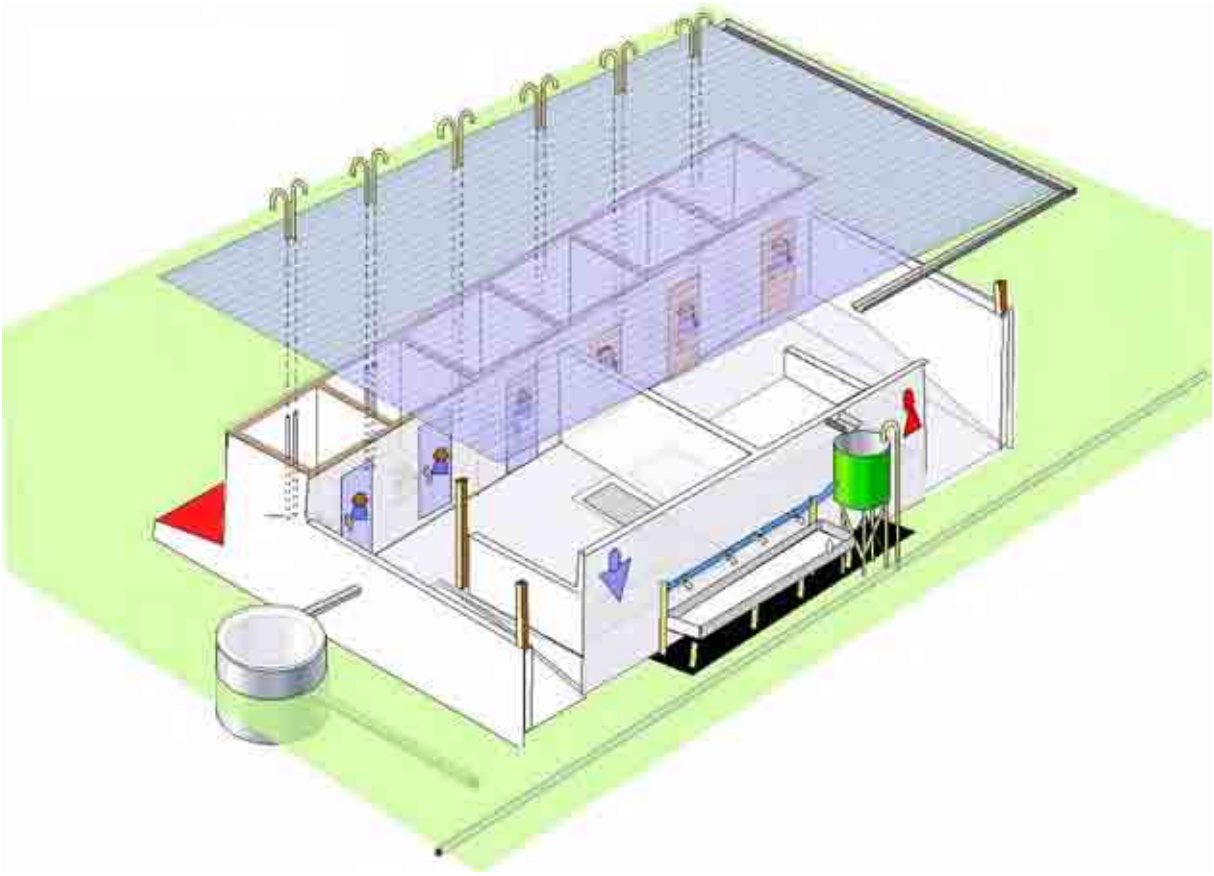
			Phu Yen					Khanh Hoa				Ninh Thuan					Binh Thuan				Total			
Commune			P7 Suoi Bac		P3 An Tho	Sub Total	%	K1 Cam An Bac	K3 Cam Hai Tay	Sub Total	%	N1 Nhon Hai	N2 Cong Hai		Sub Total	%	B1 Muong Man	B4 Tan Duc	Sub Total	%	Total	%		
School (P: Primary, S: Secondary)			P	S	P & S			S	P			P	P	S			P	P						
Number of sample			2	5	35	42		12	3	15		23	29	5	57		4	9	13		127			
Item	No.	Ans.																					Ans.	No.
8	8-1	a	2	1	9	12	31%	0	0	0	0%	8	16	0	24	41%	1	6	7	54%	43	34%	a	8-1
		b	0	3	11	14	36%	7	2	9	64%	11	7	2	20	34%	0	1	1	8%	44	35%	b	
		c	0	1	12	13	33%	4	1	5	36%	4	6	3	13	22%	3	2	5	38%	36	29%	c	
		d	0	0	0	0	0%	0	0	0	0%	0	2	0	2	3%	0	0	0	0%	2	2%	d	
	8-2	a	1	2	23	26	62%	9	0	9	60%	10	13	3	26	46%	3	2	5	38%	66	52%	a	8-2
		b	0	1	5	6	14%	8	0	8	53%	4	5	4	13	23%	0	0	0	0%	27	21%	b	
		c	2	1	6	9	21%	10	0	10	67%	0	2	3	5	9%	3	0	3	23%	27	21%	c	
		d	0	0	13	13	31%	4	0	4	27%	1	4	2	7	12%	0	3	3	23%	27	21%	d	
		e	0	1	7	8	19%	7	1	8	53%	5	7	4	16	28%	4	3	7	54%	39	31%	e	
		f	2	2	3	7	17%	9	1	10	67%	7	5	3	15	26%	3	3	6	46%	38	30%	f	
		g	0	0	1	1	2%	7	1	8	53%	5	3	3	11	19%	3	1	4	31%	24	19%	g	
		h	0	1	3	4	10%	7	1	8	53%	2	2	4	8	14%	0	1	1	8%	21	17%	h	
	8-3	a	0	0	2	2	5%	8	1	9	60%	5	7	3	15	26%	3	0	3	23%	29	23%	a	8-3
		b	0	1	11	12	29%	9	1	10	67%	12	19	2	33	58%	0	6	6	46%	61	48%	b	
		c	0	3	17	20	48%	9	1	10	67%	3	2	3	8	14%	3	1	4	31%	42	33%	c	
		d	2	3	5	10	24%	9	0	9	60%	8	7	2	17	30%	4	2	6	46%	42	33%	d	
		e	0	0	6	6	14%	6	1	7	47%	1	2	3	6	11%	2	2	4	31%	23	18%	e	

ANNEX-3 Maps and Drawings of School Toilet

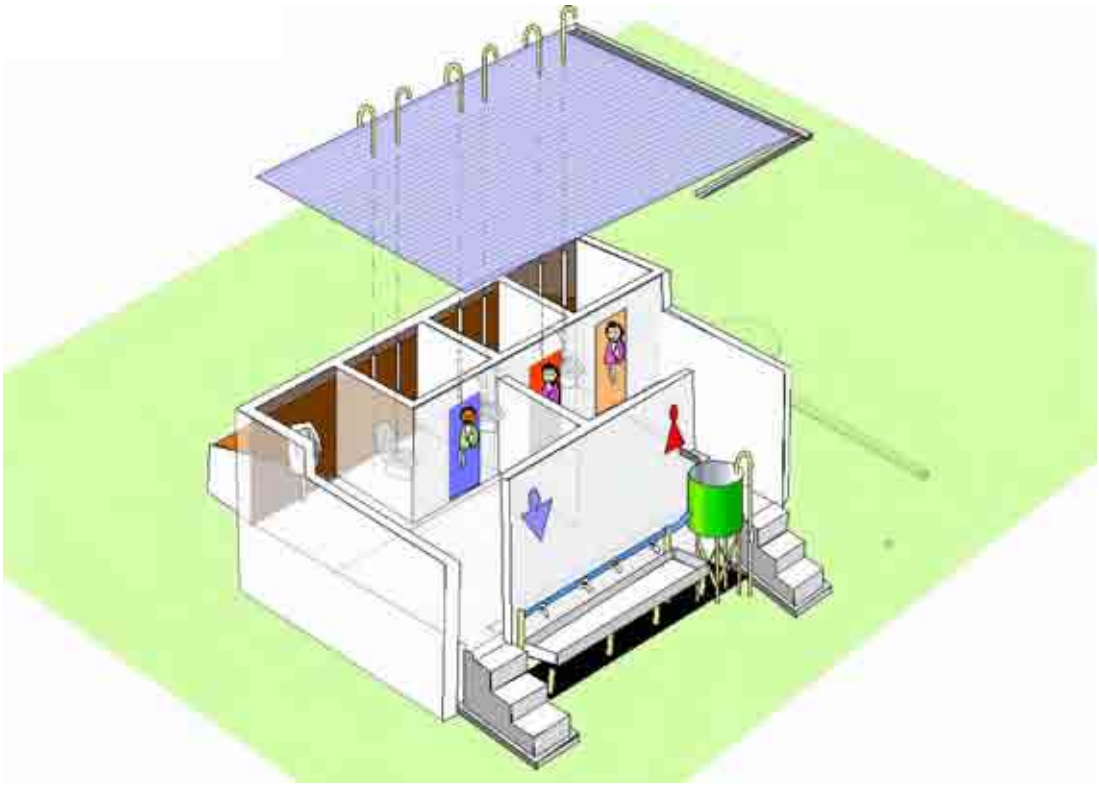
PHỤ LỤC 3: Bản đồ và bản vẽ nhà vệ sinh trường học

LIST OF DRAWINGS

Bird View

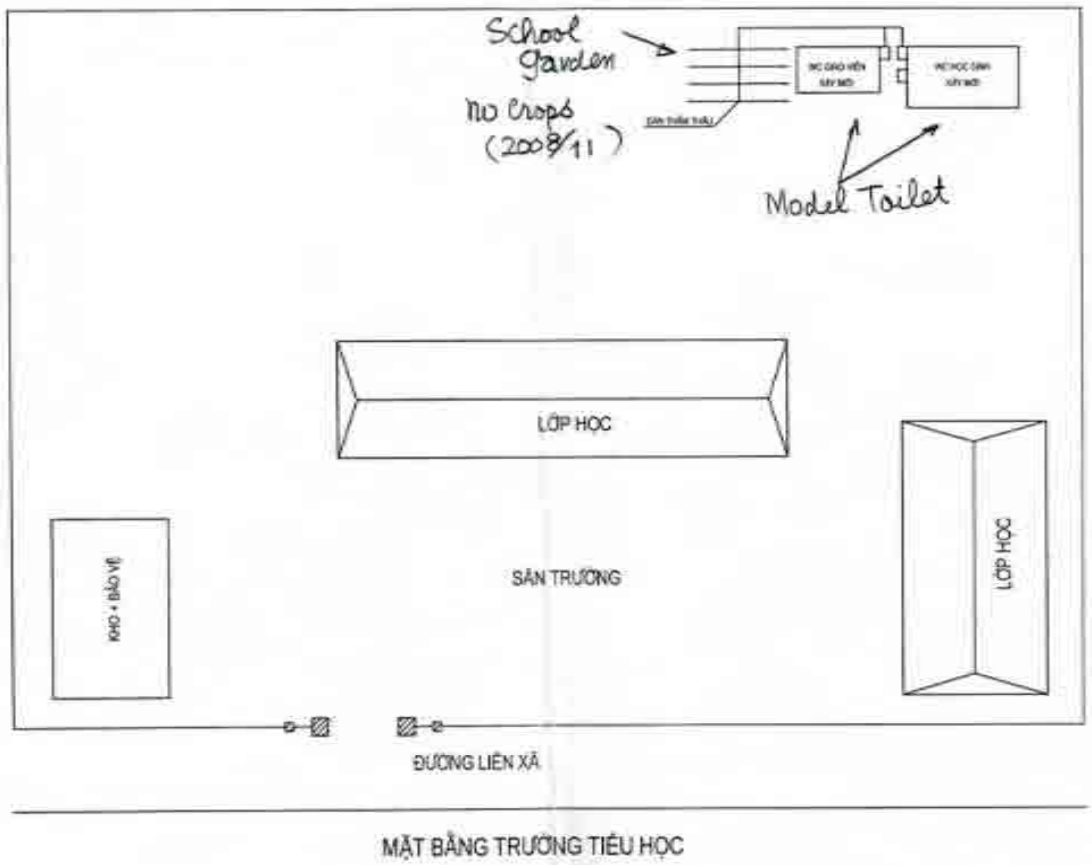


View-01 School Toilet for Students

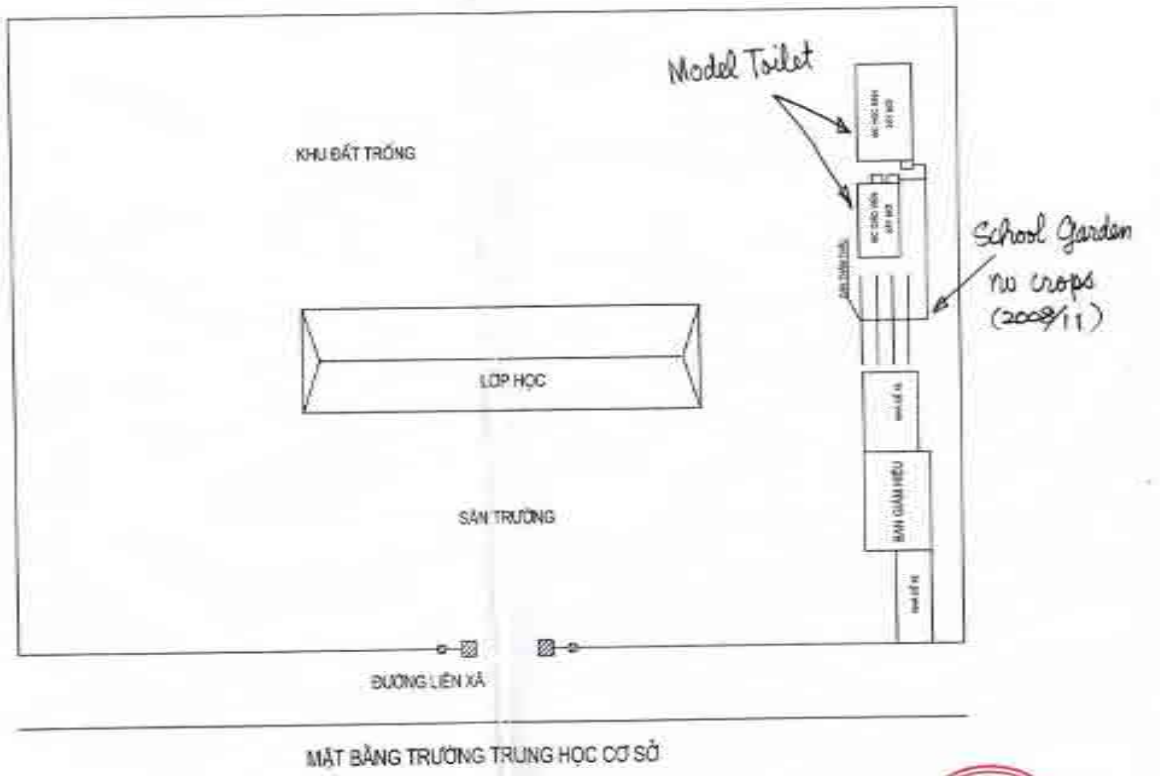


View-02 School Toilet for Teachers

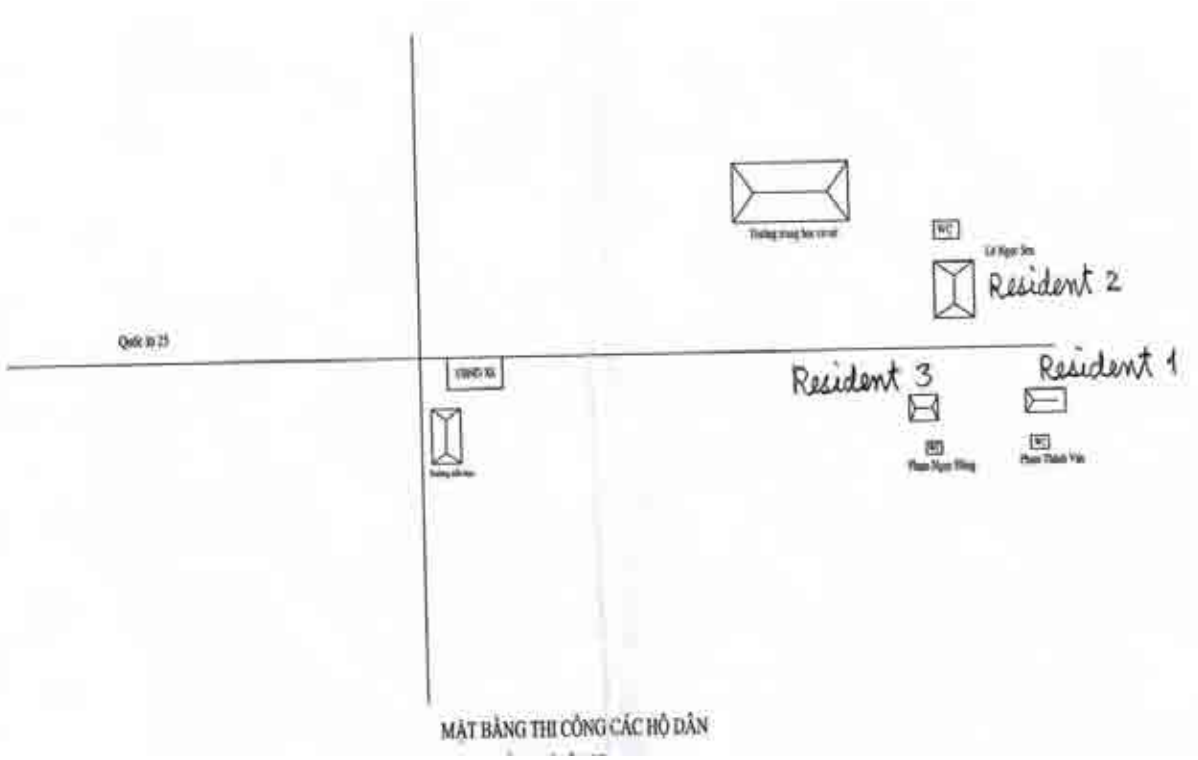
Location Map



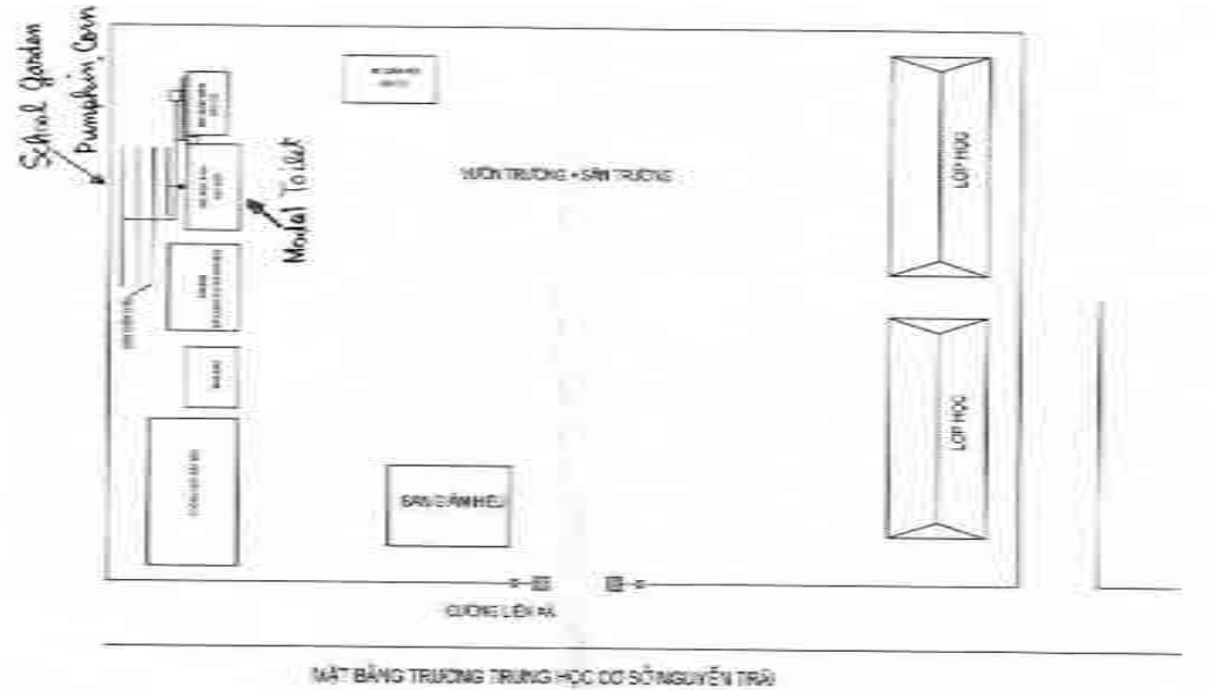
Loc-01 Suoi Bac Primary School



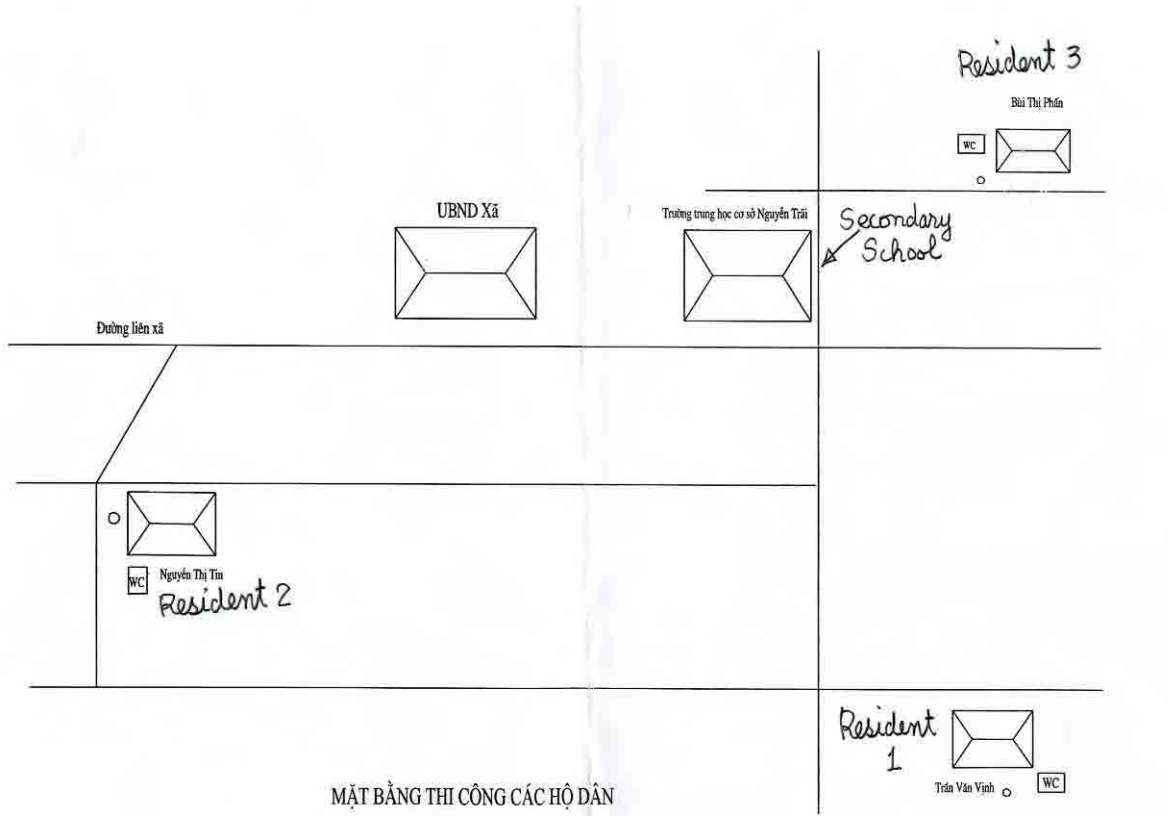
Loc-02 Suoi Bac Secondary School



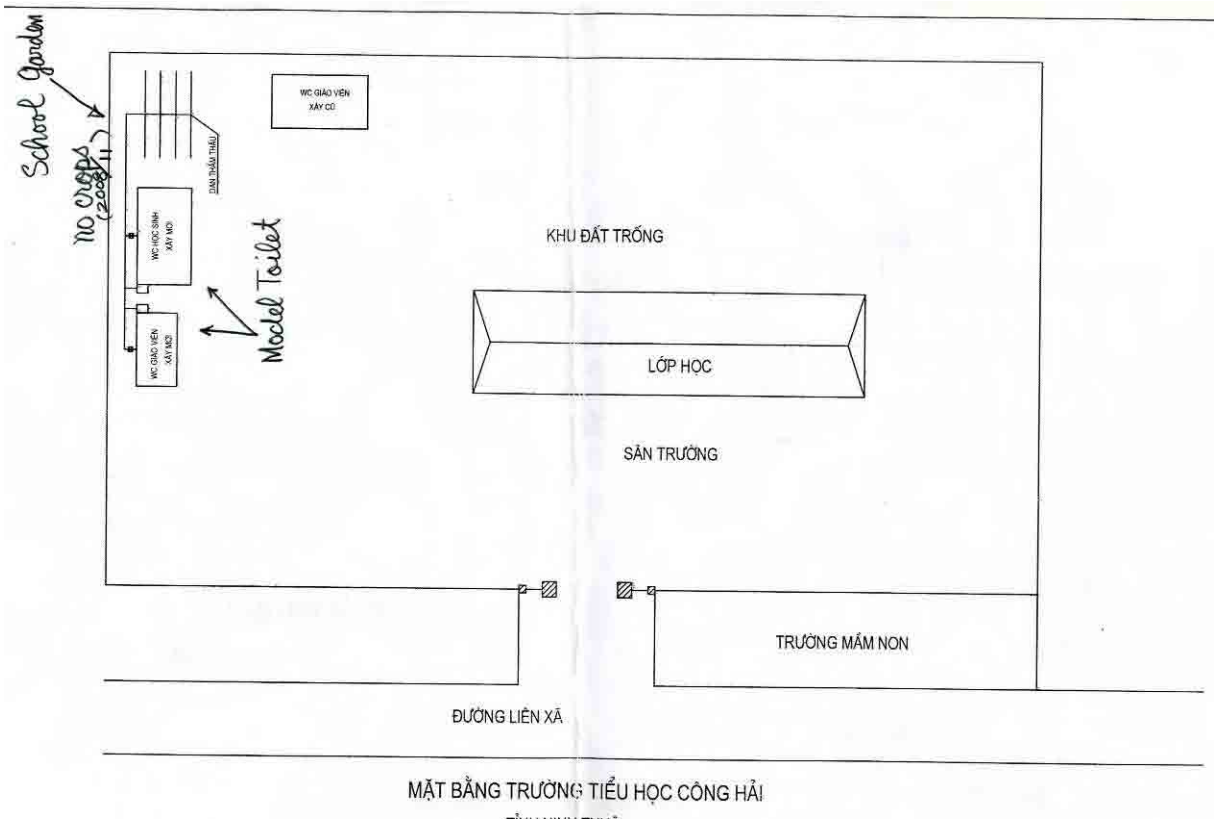
Loc-03 Suoi Bac Demonstration



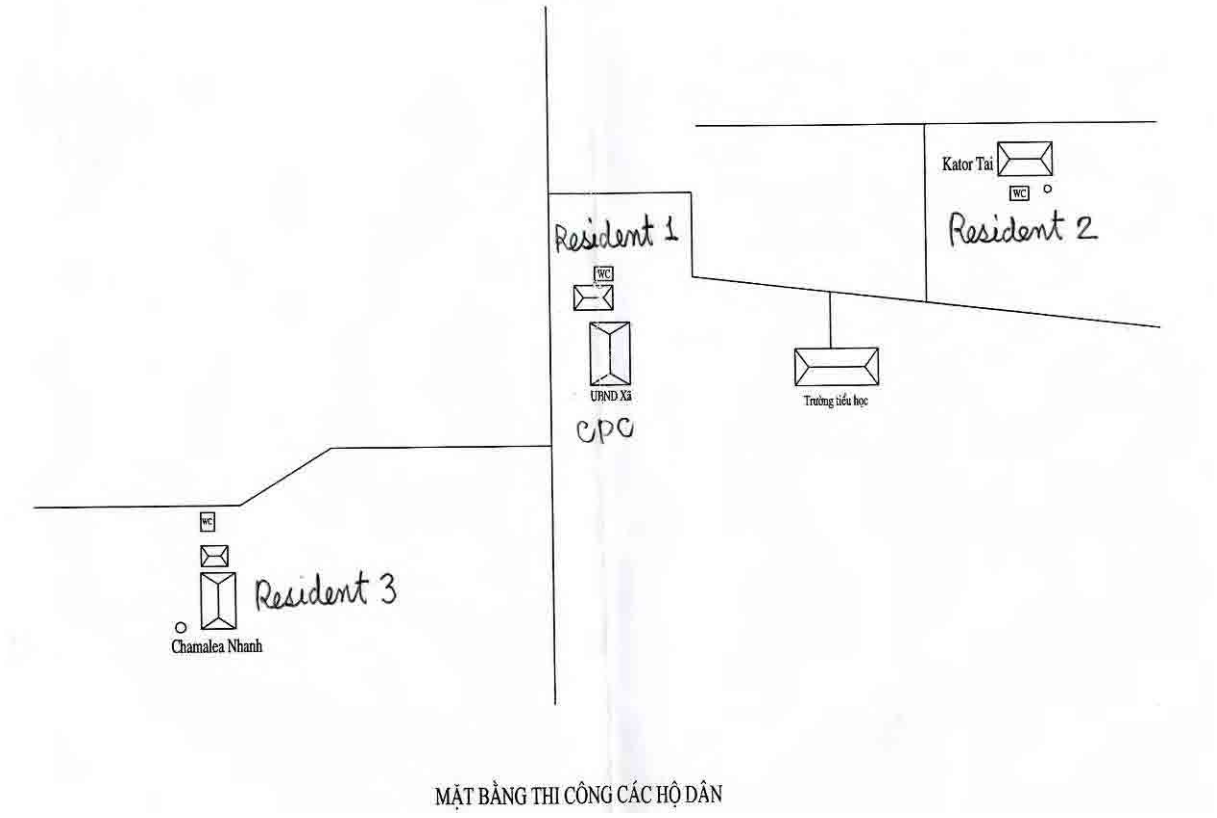
Loc-04 Cam An Bac Secondary



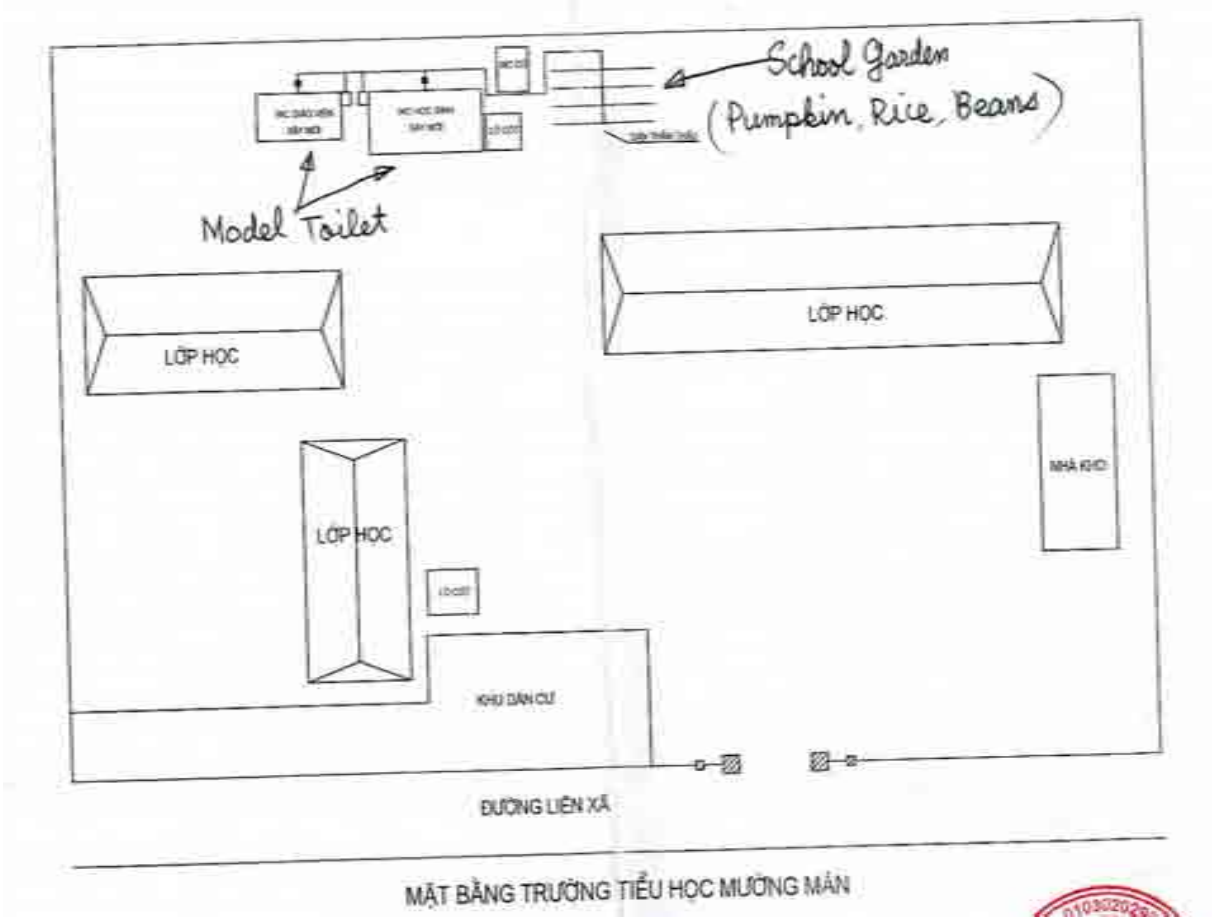
Loc-05 Cam An Bac Demonstration



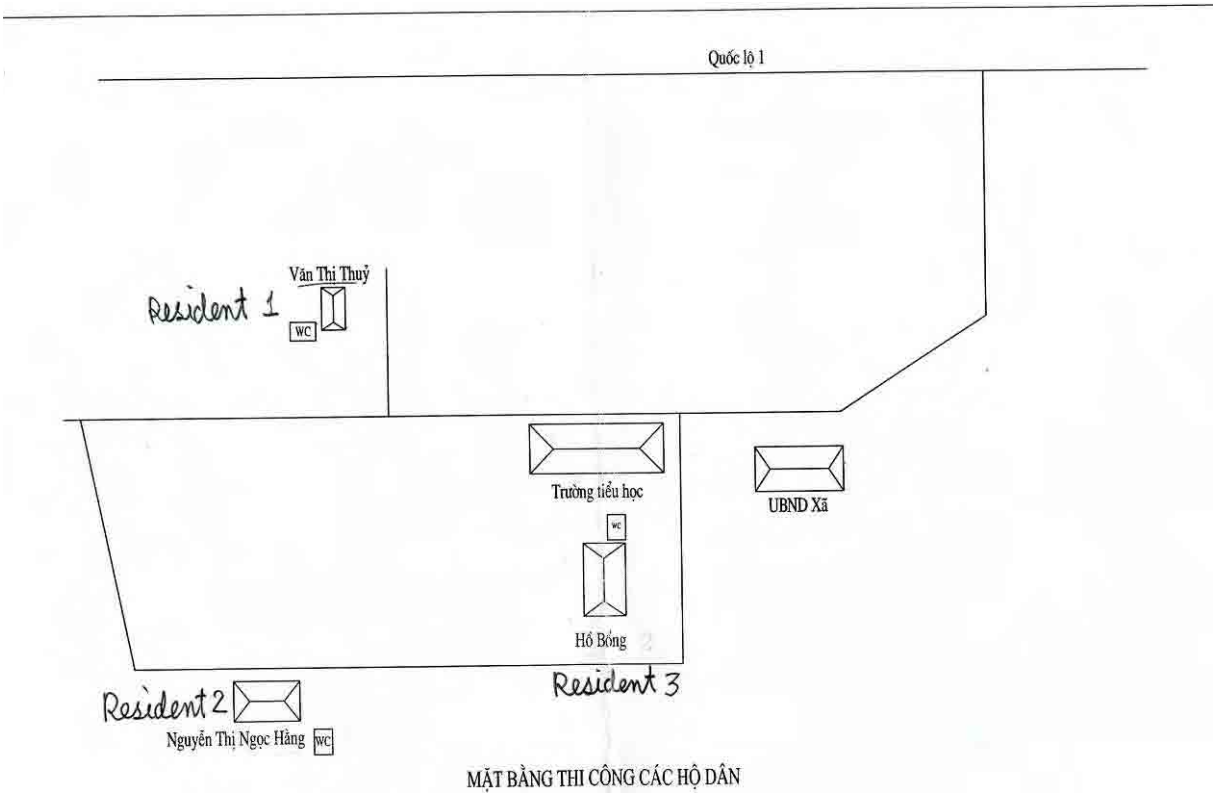
Loc-06 Cong Hai Primary School



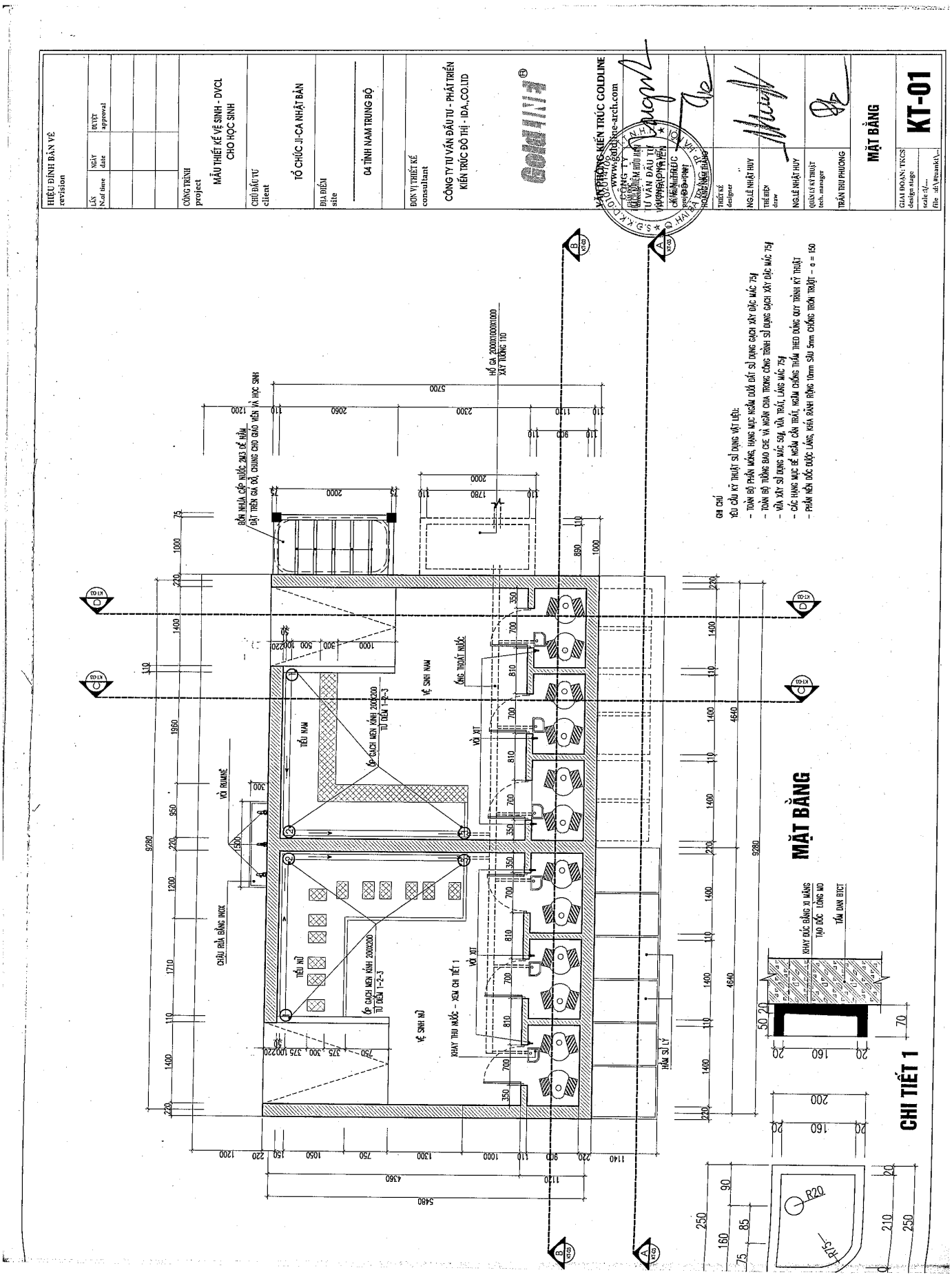
Loc-07 Cong Hai Demonstration



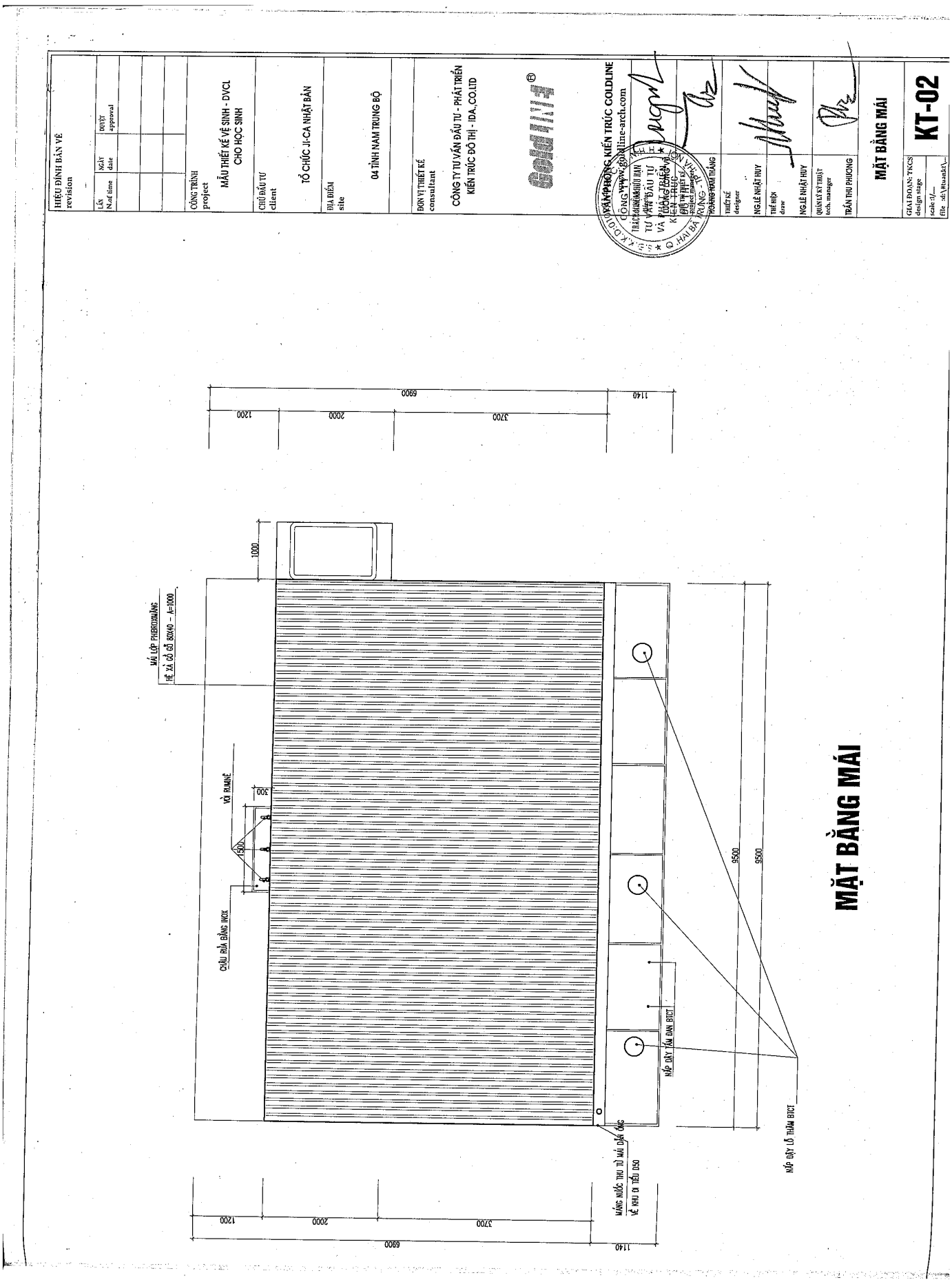
Loc-08 Muong Man Primary School



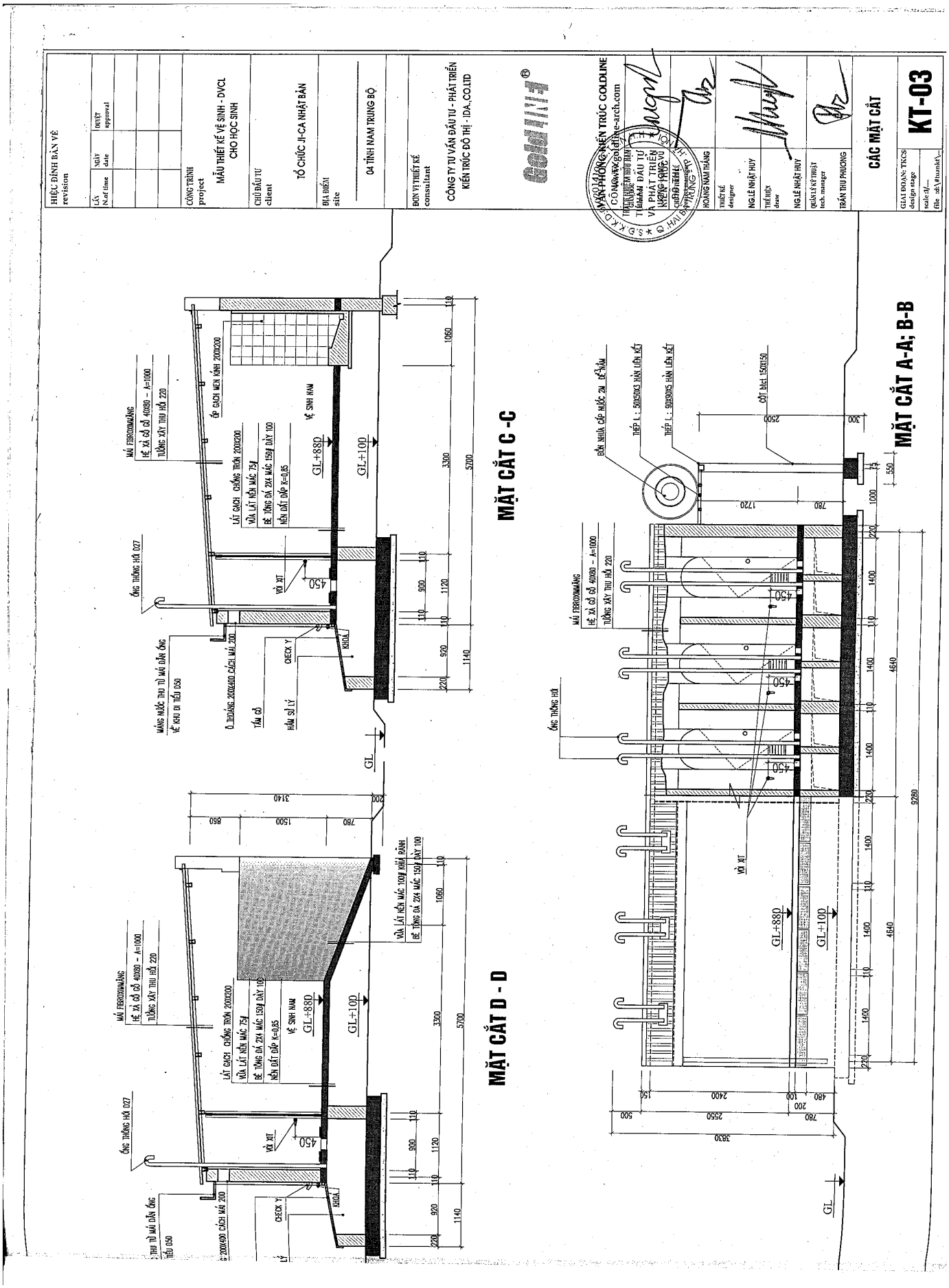
Loc-09 Muong Man Demonstration



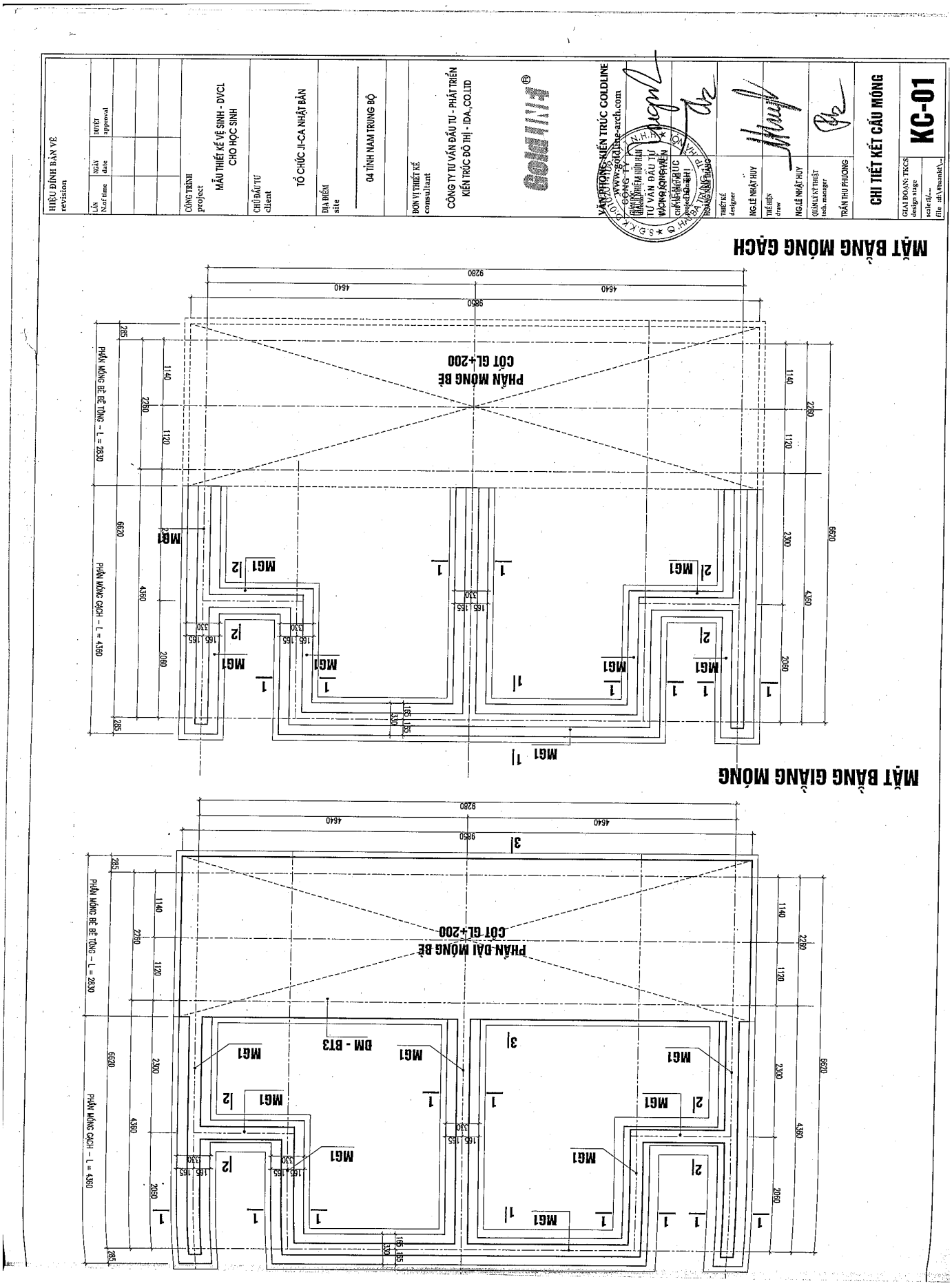
D-St.-01 School Toilet for Students (DVCL)



D-St.-02 School Toilet for Students (DVCL)



D-St.-03 School Toilet for Students (DVCL)



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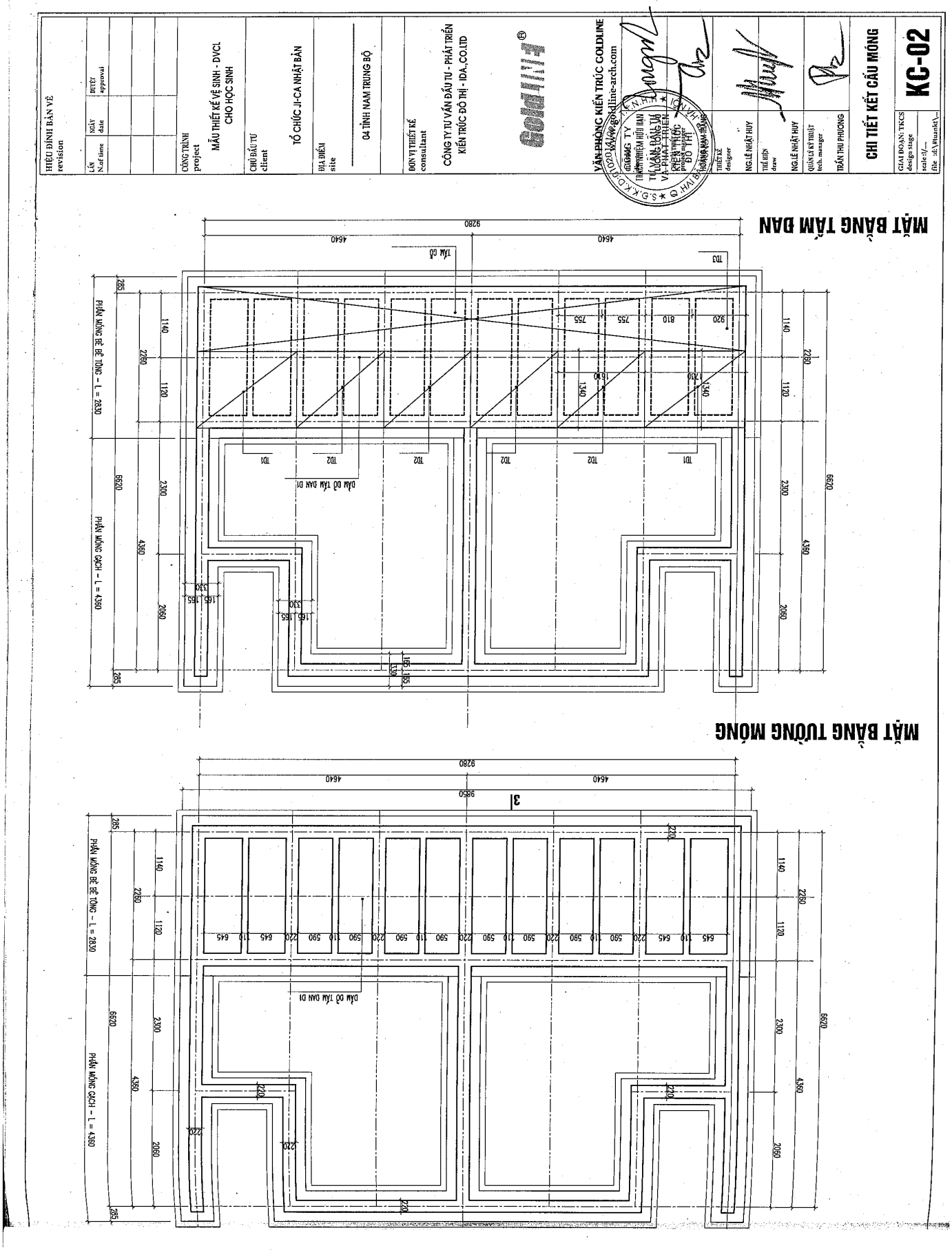
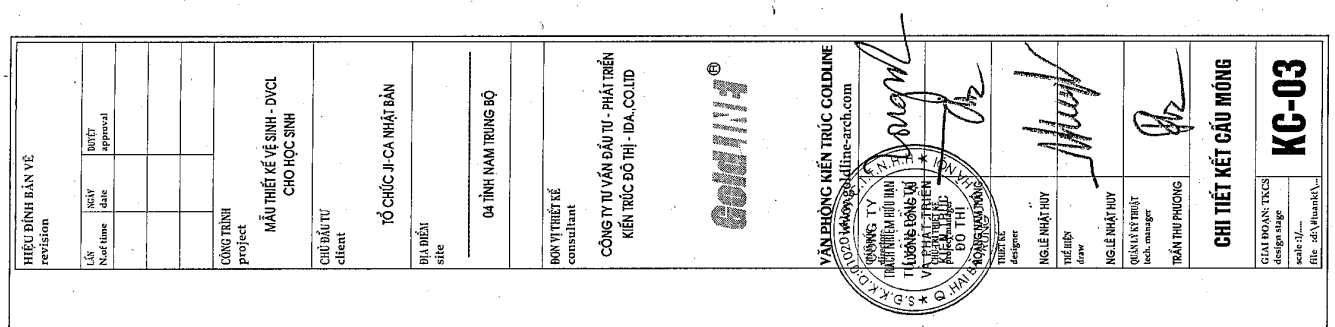


D-St.-05 School Toilet for Students (DVCL)


HIỆU ĐÍNH BẢN VẼ
revision
CÔNG TRÌNH
project
MẪU THIẾT KẾ VỆ SINH - DVCL
CHO HỌC SINH
CHỦ ĐẦU TƯ
client
TỔ CHỨC JI-CA NHẬT BẢN
ĐỊA ĐIỂM
site
04 TỈNH NAM TRUNG BỘ
ĐƠN VỊ THIẾT KẾ
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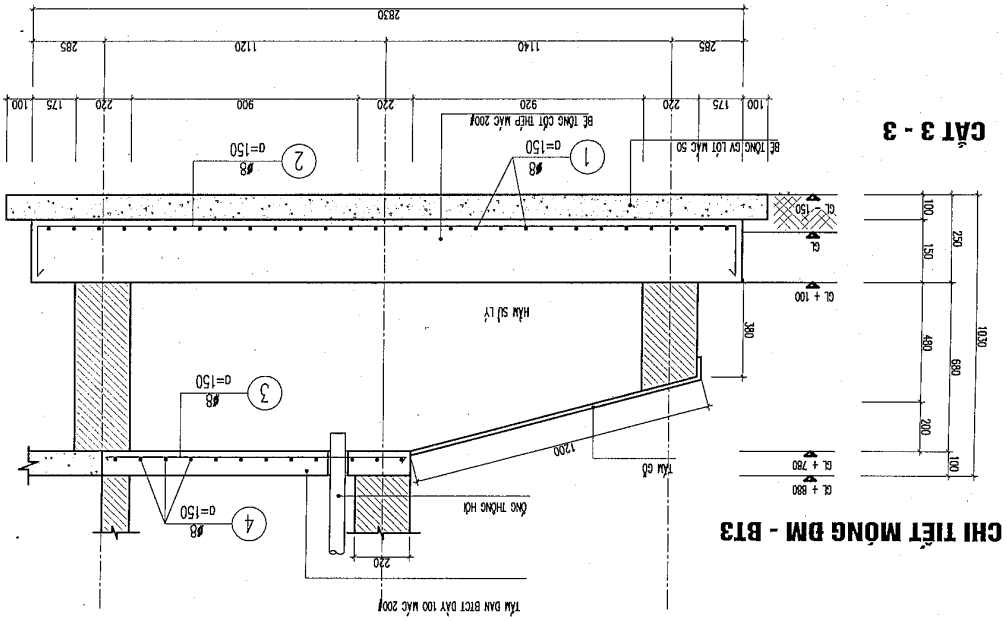
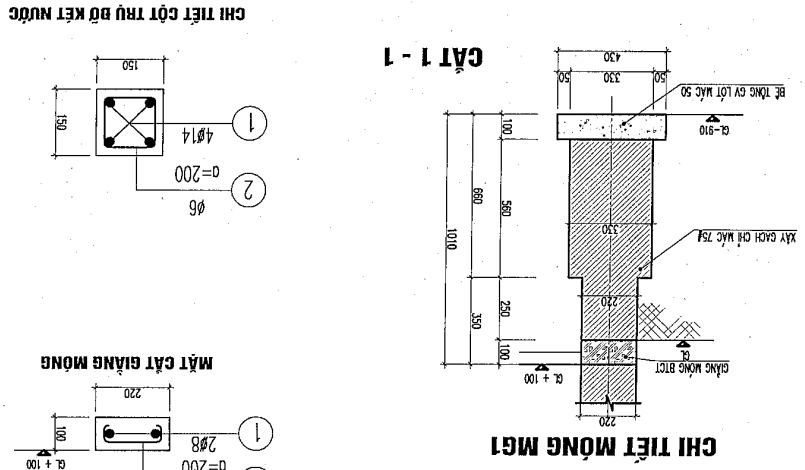
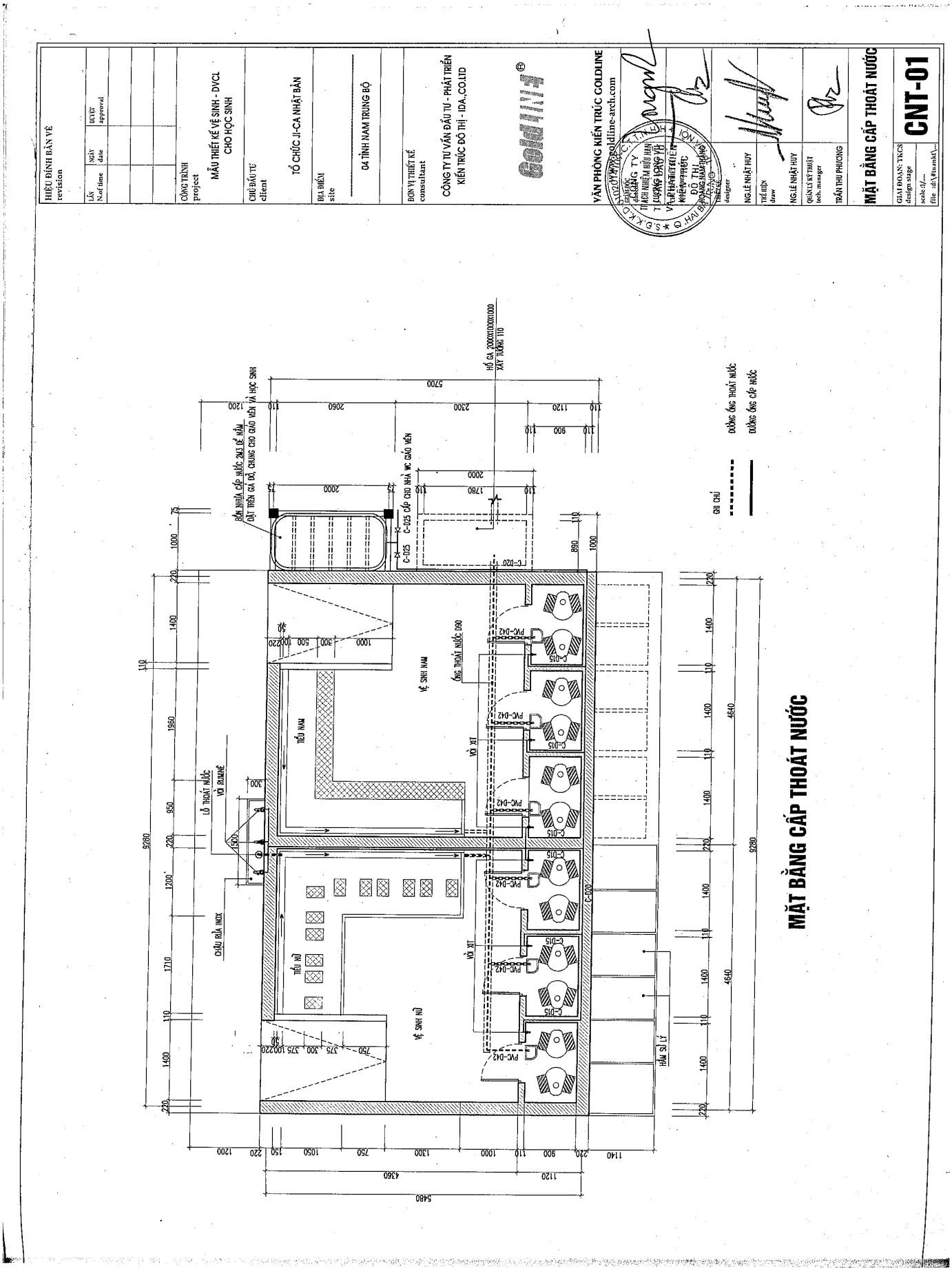
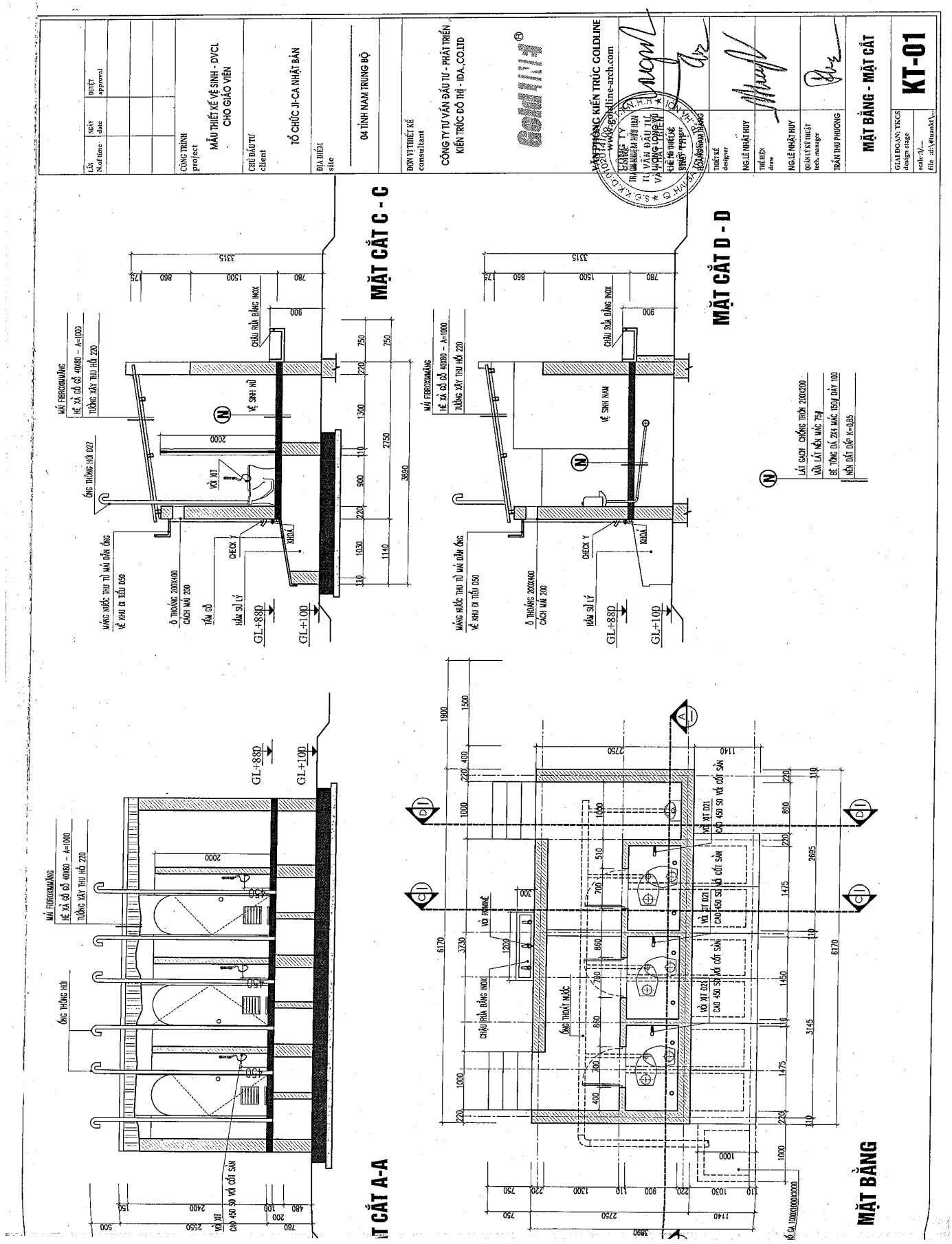
CHI TIẾT KẾT CẤU MÓNG
KC-03


CHI TIẾT MÓNG ĐM - BT3
CẮT 3 - 3
BÊ TÔNG CỔ THÉP MÁC 200#
BÊ TÔNG GV LÓT MÁC 50
HẦM SỈ LÝ
TẤM ĐAN BTCT DÀY 100 MÁC 200#
ỐNG THÔNG HƠI
TẤM GỖ


CHI TIẾT MÓNG MG1
CẮT 1 - 1
CHI TIẾT CỘT TRỤ ĐỠ KẾT NƯỚC
MẶT CẮT GIẰNG MÓNG
BÊ TÔNG GV LÓT MÁC 50
XÂY GẠCH CHỈ MÁC 75#
GIẰNG MÓNG BTCT



D-St.-07 School Toilet for Students (DVCL)



D-Te.-01 School Toilet for Teachers (DVCL)

LẦN N.of time	NGÀY date	DUYỆT approval	

CÔNG TRÌNH project: MẪU THIẾT KẾ VỆ SINH - DVCL CHO GIÁO VIÊN

CHỦ ĐẦU TƯ client: TỔ CHỨC JI-CA NHẬT BẢN

ĐỊA ĐIỂM site: 04 TỈNH NAM TRUNG BỘ

ĐƠN VỊ THIẾT KẾ consultant: CÔNG TY TƯ VẤN ĐẦU TƯ - PHÁT TRIỂN KIẾN TRÚC ĐÔ THỊ - IDA.,CO.LTD

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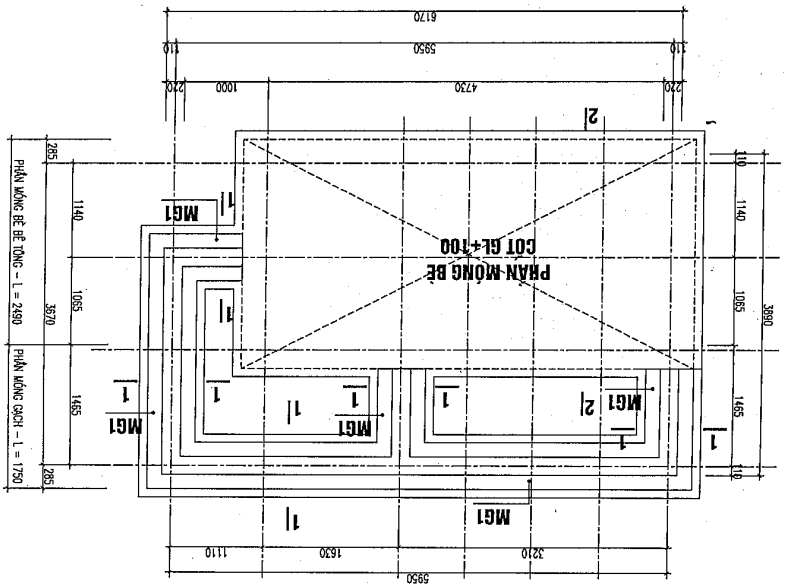
NG LÊ NHẬT HUY	
QUẢN LÝ KỸ THUẬT tech. manager	
TRẦN THỊ PHƯƠNG	

CHI TIẾT KẾT CẤU MÓNG

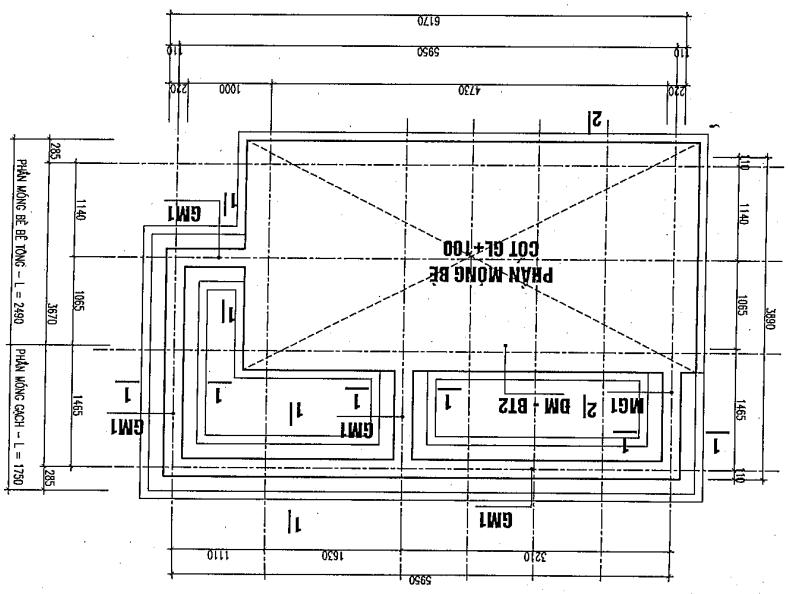
GIAI ĐOẠN-TKCS design stage | scale: tỷ:— | file: ...dA\vthoanket\...

KC-01

MẶT BẰNG MÓNG GẠCH



MẶT BẰNG GIẰNG MÓNG



Lần N.of time	NGÀY date	DUYỆT approval	

CÔNG TRÌNH project: MẪU THIẾT KẾ VỆ SINH - DVCL CHO GIÁO VIÊN

CHỦ ĐẦU TƯ client: TỔ CHỨC JI-CA NHẬT BẢN

ĐỊA ĐIỂM site: 04 TỈNH NAM TRUNG BỘ

ĐƠN VỊ THIẾT KẾ consultant: CÔNG TY TƯ VẤN ĐẦU TƯ - PHÁT TRIỂN KIẾN TRÚC ĐÔ THỊ - IDA.,CO.LTD

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THỂ HIỆN draw	NG.LÊ NHẬT HUY	
QUẢN LÝ KỸ THUẬT tech. manager	TRẦN THỊ PHƯƠNG	

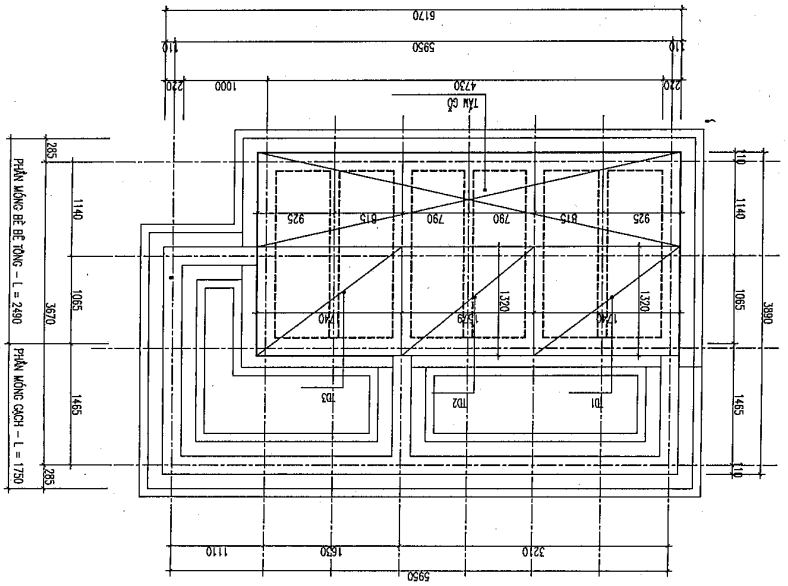
CHI TIẾT KẾT CẤU MÓNG

GIAI ĐOẠN: TKCS design stage — **KC-02**

scale 1/—

file : cải Vthanh1\...

MẶT BẰNG TẤM ĐAN



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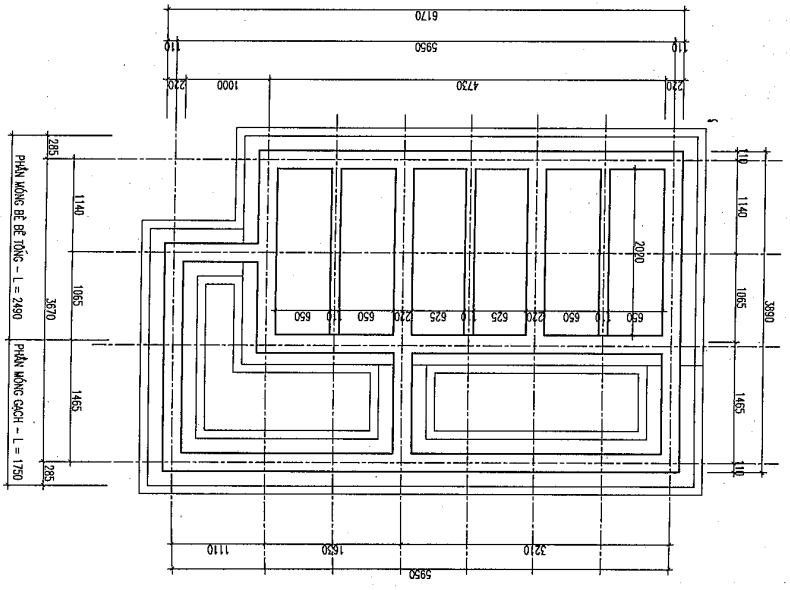

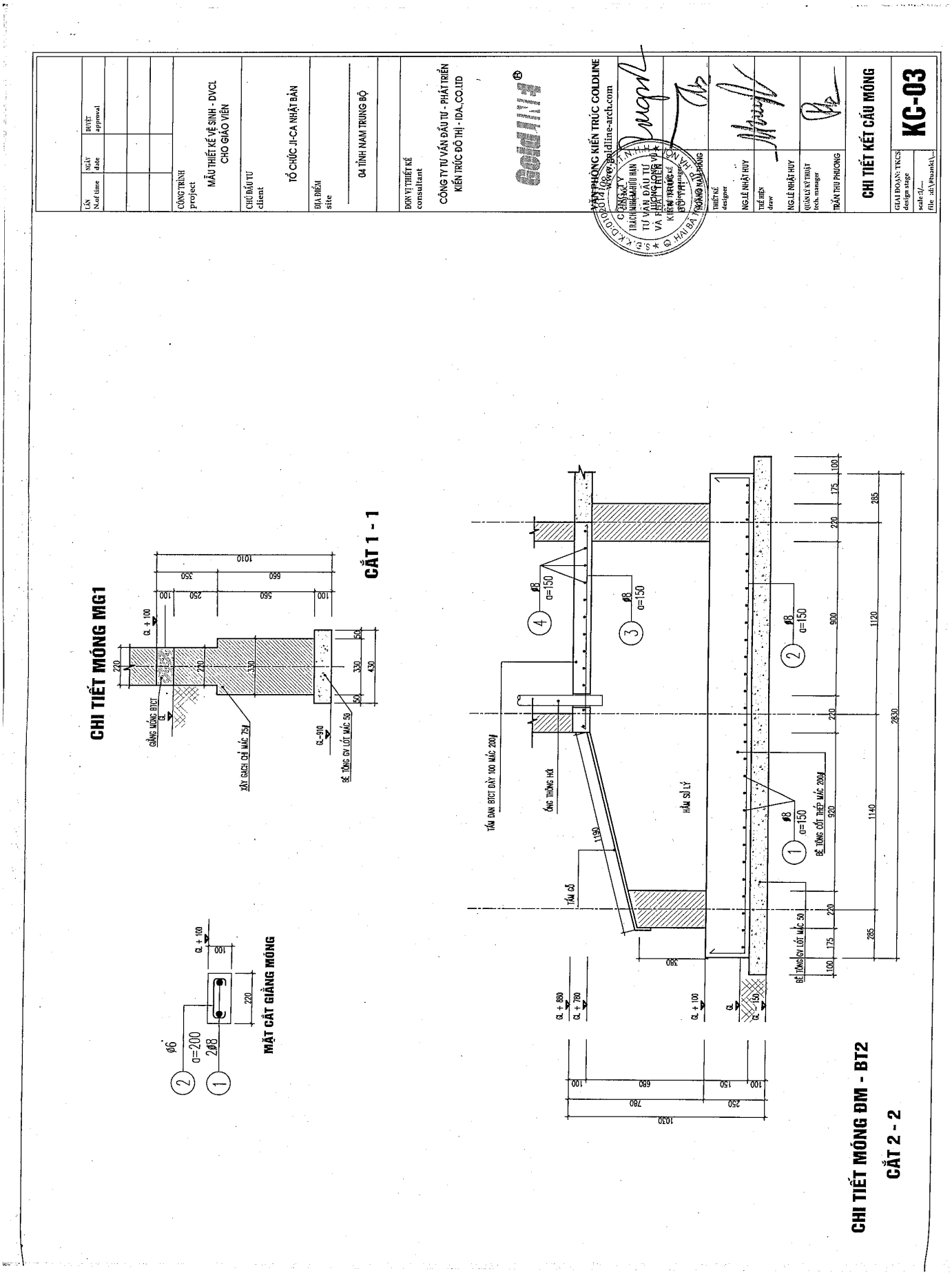
CÔNG TRÌNH
project
MẪU THIẾT KẾ VỆ SINH - DVCL
CHO GIÁO VIÊN
CHỦ ĐẦU TƯ
client
TỔ CHỨC JI-CA NHẬT BẢN
ĐỊA ĐIỂM
site
04 TỈNH NAM TRUNG BỘ
ĐƠN VỊ THIẾT KẾ
consultant
CÔNG TY TƯ VẤN ĐẦU TƯ - PHÁT TRIỂN KIẾN TRÚC ĐÔ THỊ - IDA.,CO.LTD
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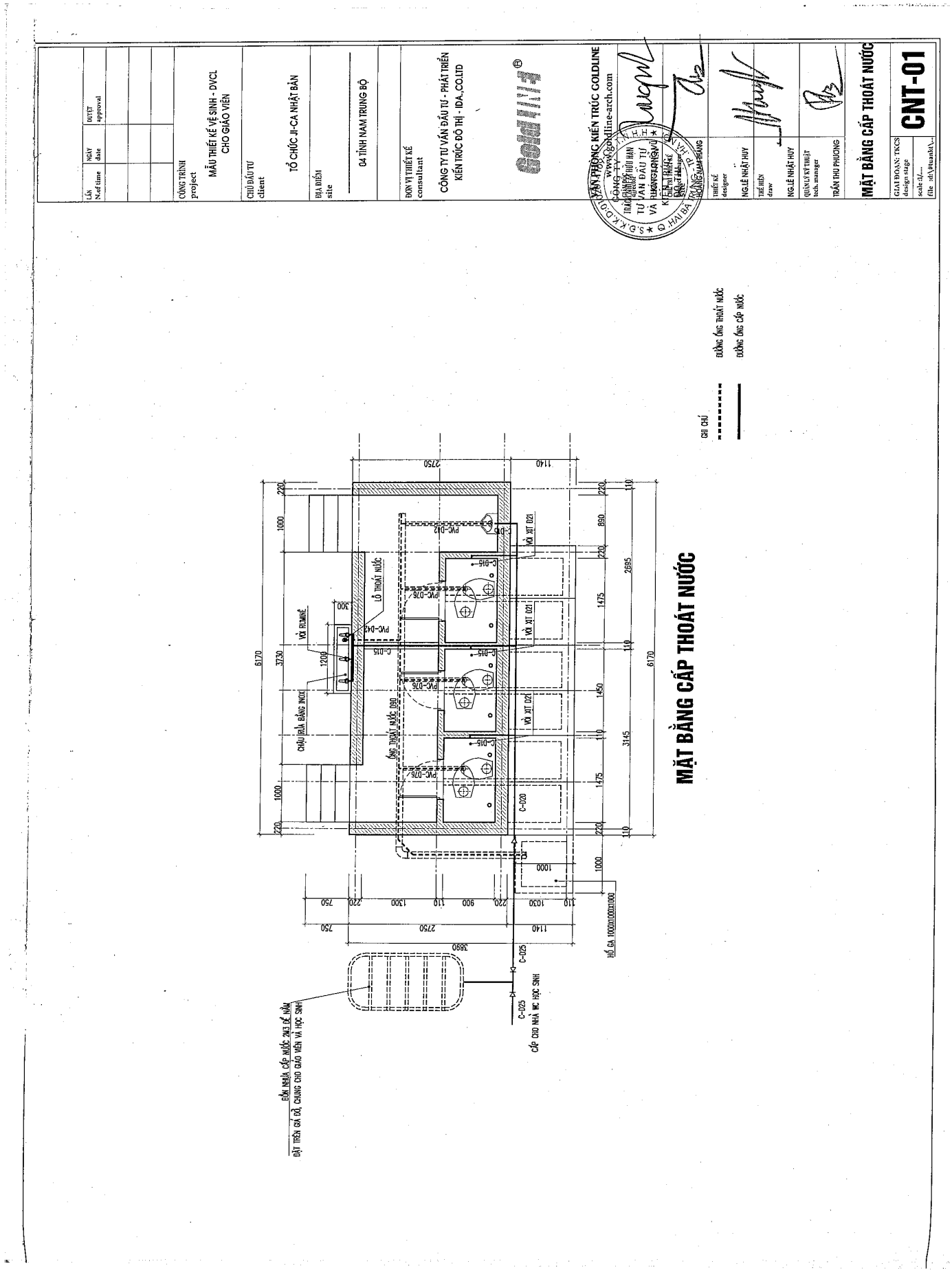
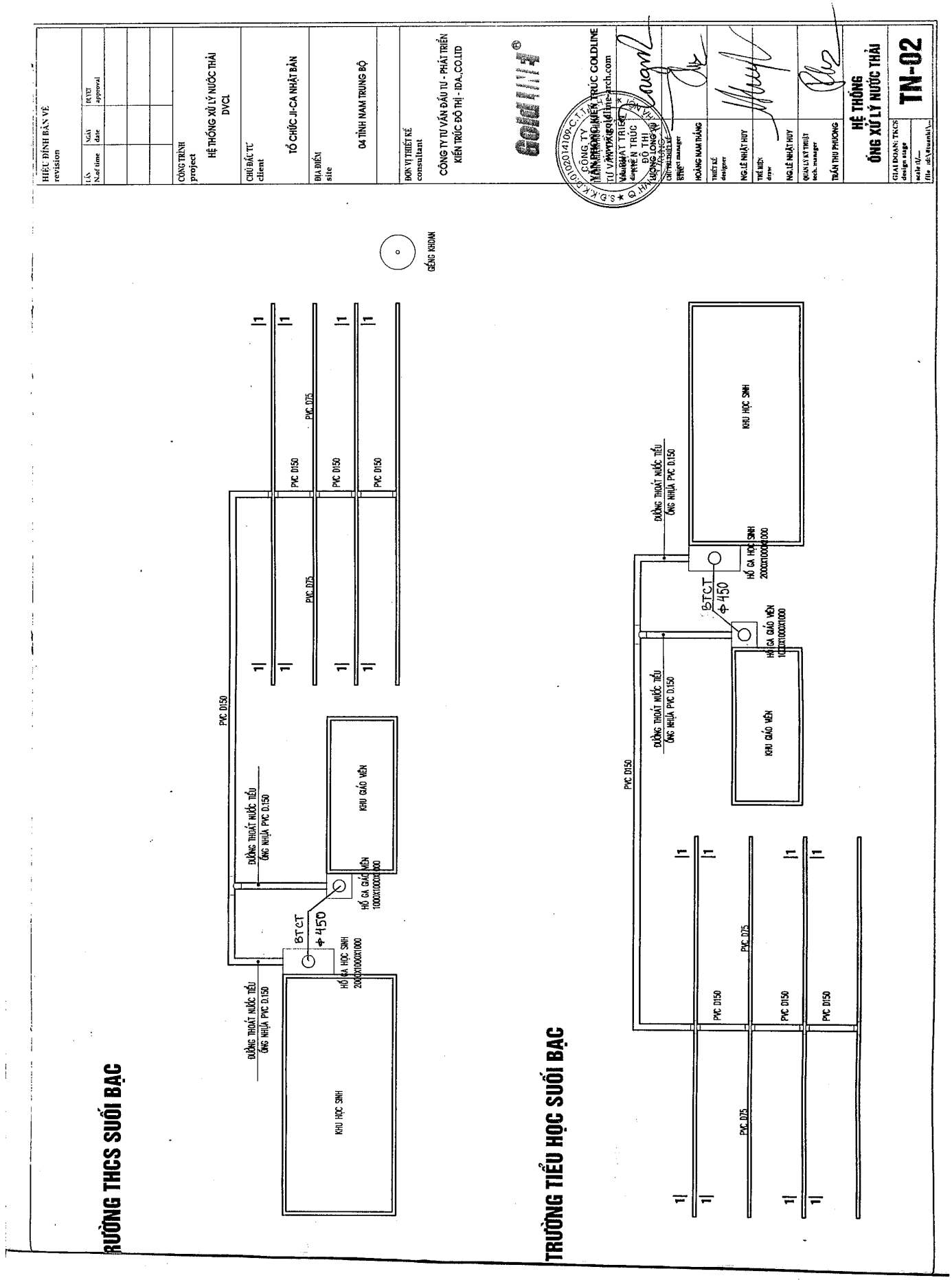
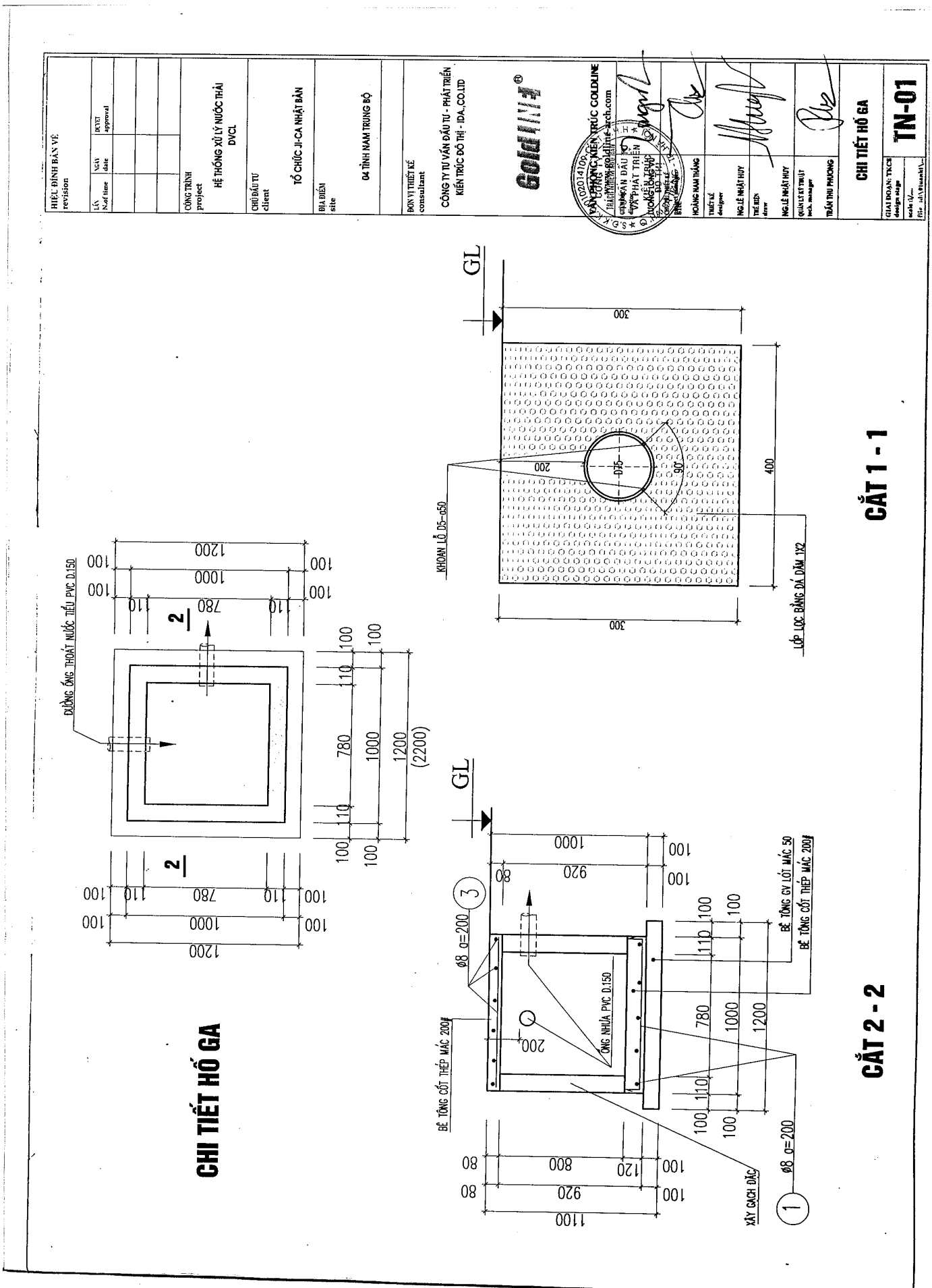
THIẾT KẾ designer
NG.LÊ NHẬT HUY
VẼ draw
NG.LÊ NHẬT HUY
QUẢN LÝ KỸ THUẬT tech. manager
TRẦN THU PHƯƠNG
CHI TIẾT KẾT CẤU MÓNG
GIAI ĐOẠN: TKCS design stage
KC-03
CHI TIẾT MÓNG MG1
CẮT 1 - 1
MẶT CẮT GIẰNG MÓNG
CHI TIẾT MÓNG ĐM - BT2
CẮT 2 - 2



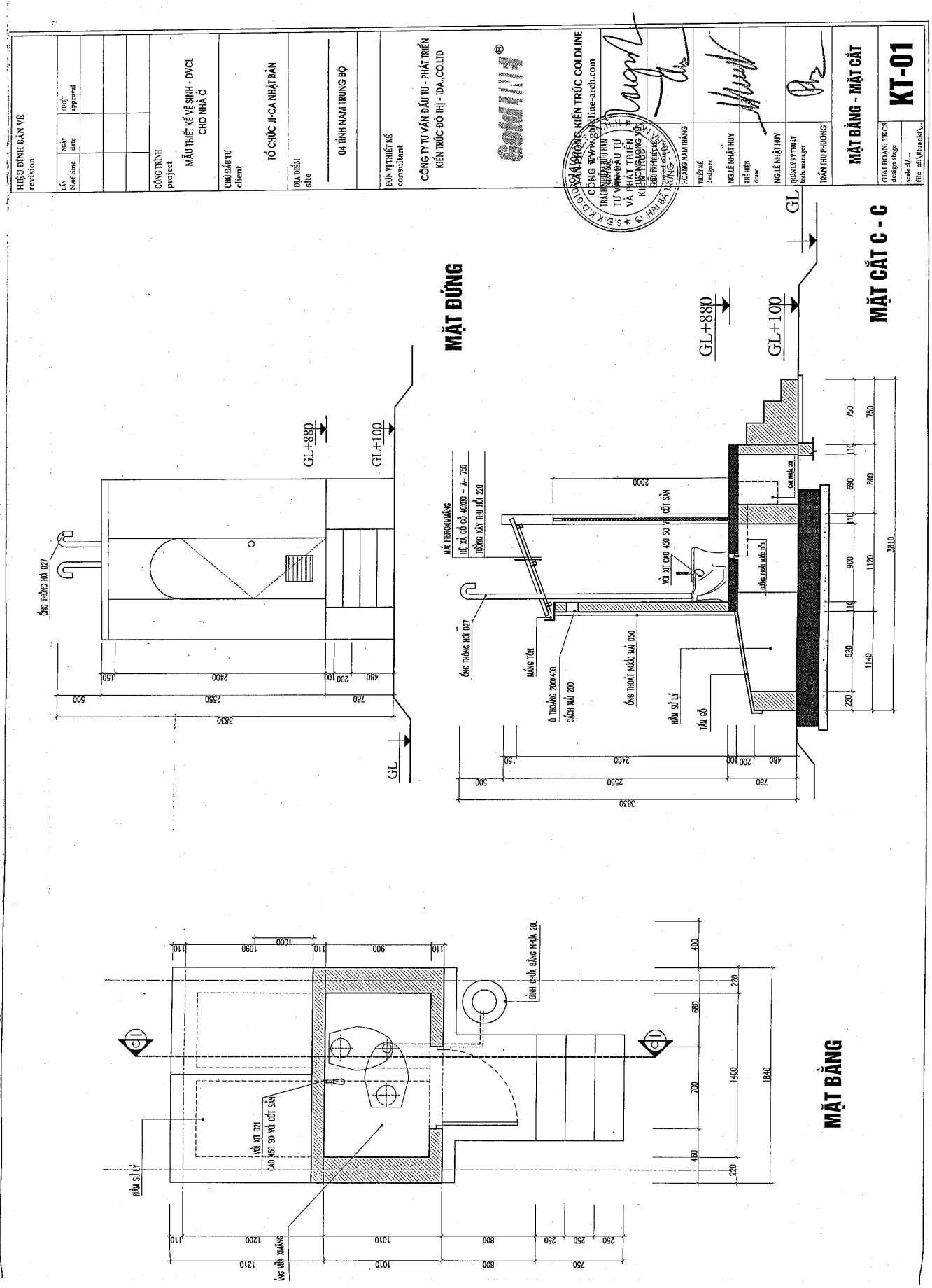
D-Te.-05 School Toilet for Teachers (DVCL)



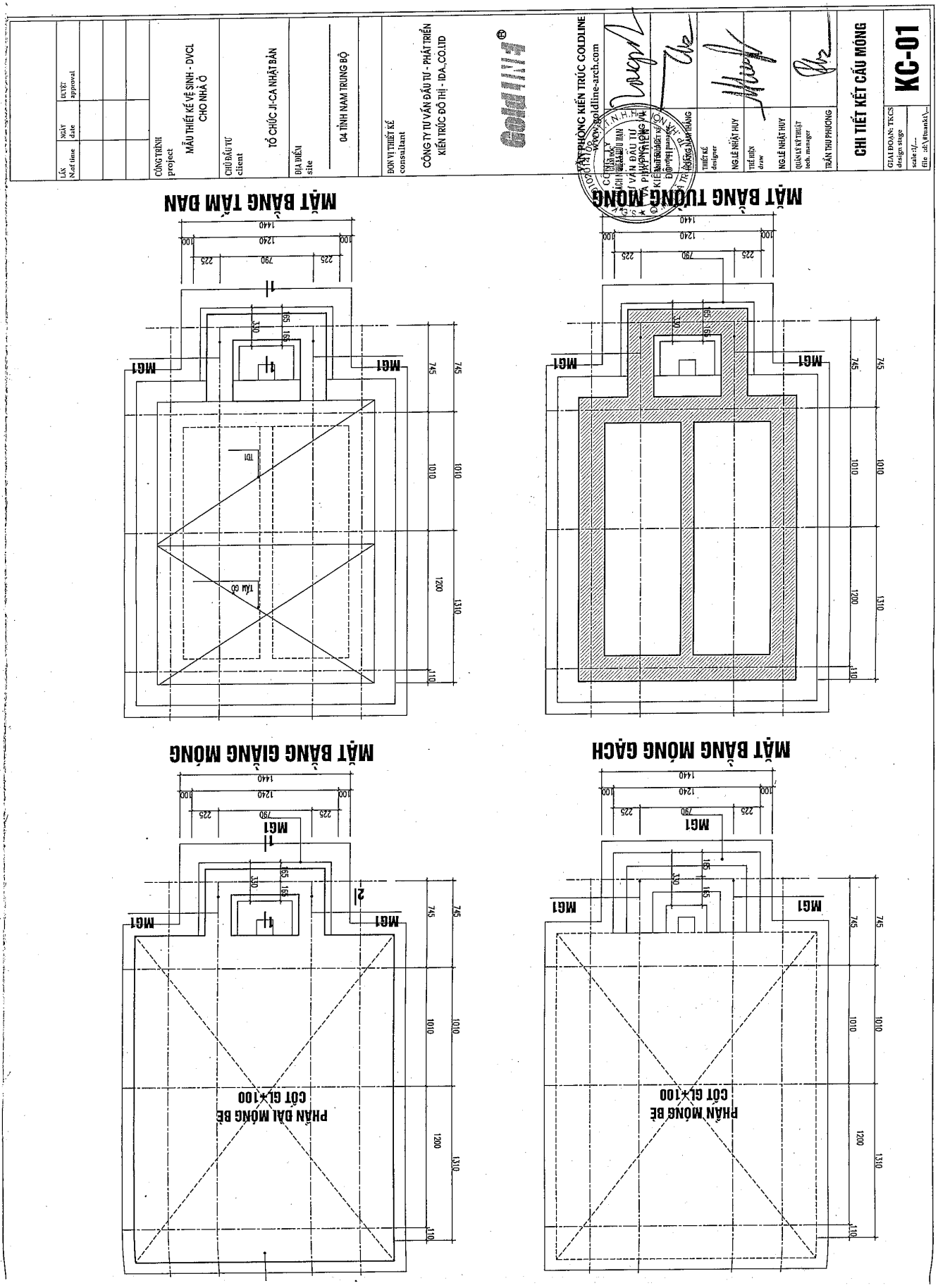
D-Ga.-01 School Garden (DVCL)



D-Ga.02 School Garden (DVCL)

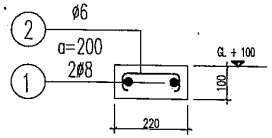


D-De.-01 Demonstration Toilet (DVCL)

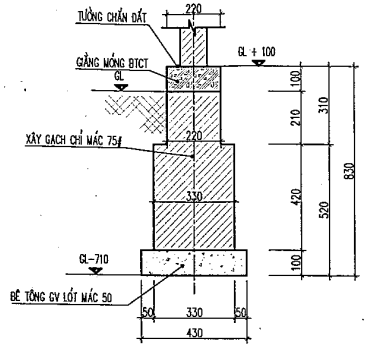


D-De.-02 Demonstration Toilet (DVCL)

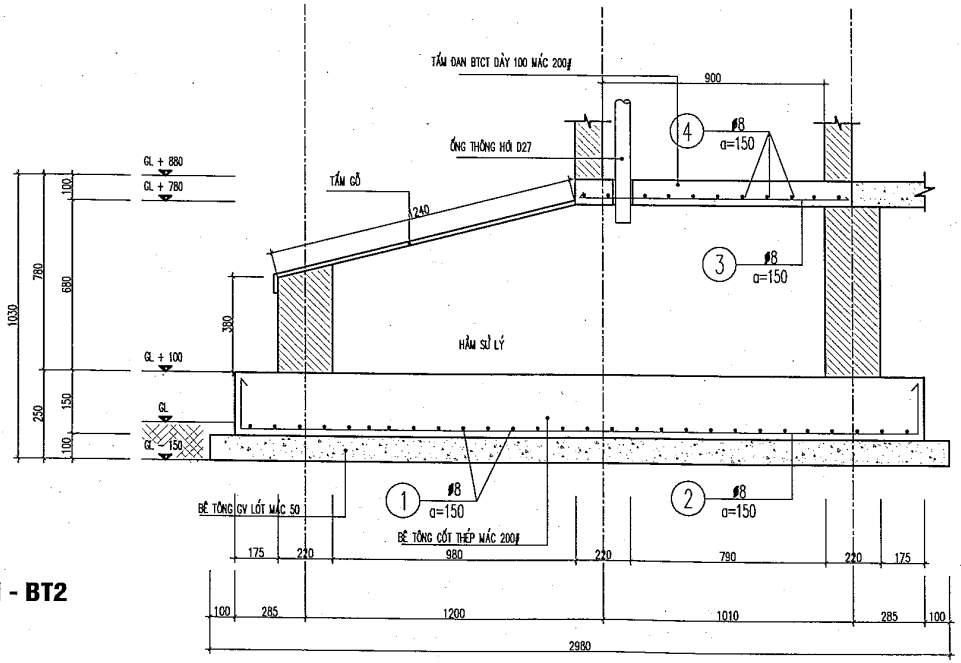
CHI TIẾT MÓNG MG1



MẶT CẮT GIẰNG MÓNG



CẮT 1 - 1



CHI TIẾT MÓNG ĐM - BT2
CẮT 2 - 2

LẦN N.of time	NGÀY date	DUYỆT approval

CÔNG TRÌNH
project

MẪU THIẾT KẾ VỆ SINH - DVCL CHO NHÀ Ở

CHỦ ĐẦU TƯ
client

TỔ CHỨC JI-CA NHẬT BẢN

ĐỊA ĐIỂM
site

04 TỈNH NAM TRUNG BỘ

ĐƠN VỊ THIẾT KẾ
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CHỦ TRÌ THIẾT KẾ project manager	HOÀNG NAM THẮNG
THIẾT KẾ designer	NG.LÊ NHẬT HUY
THỂ HIỆN draw	NG.LÊ NHẬT HUY
QUẢN LÝ KỸ THUẬT tech. manager	TRẦN THU PHƯƠNG

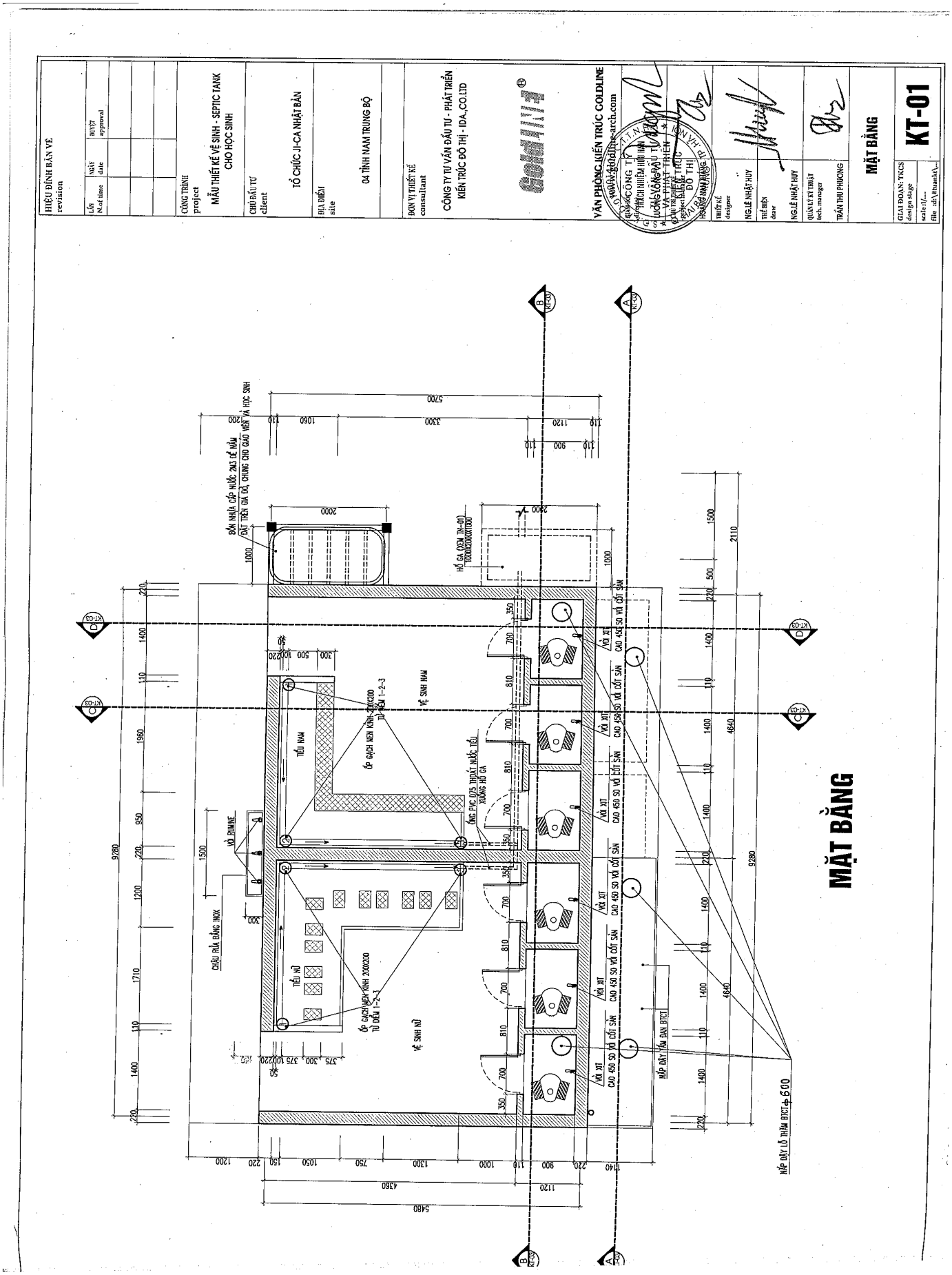
CHI TIẾT KẾT CẤU MÓNG

GIAI ĐOẠN: TKCS
design stage

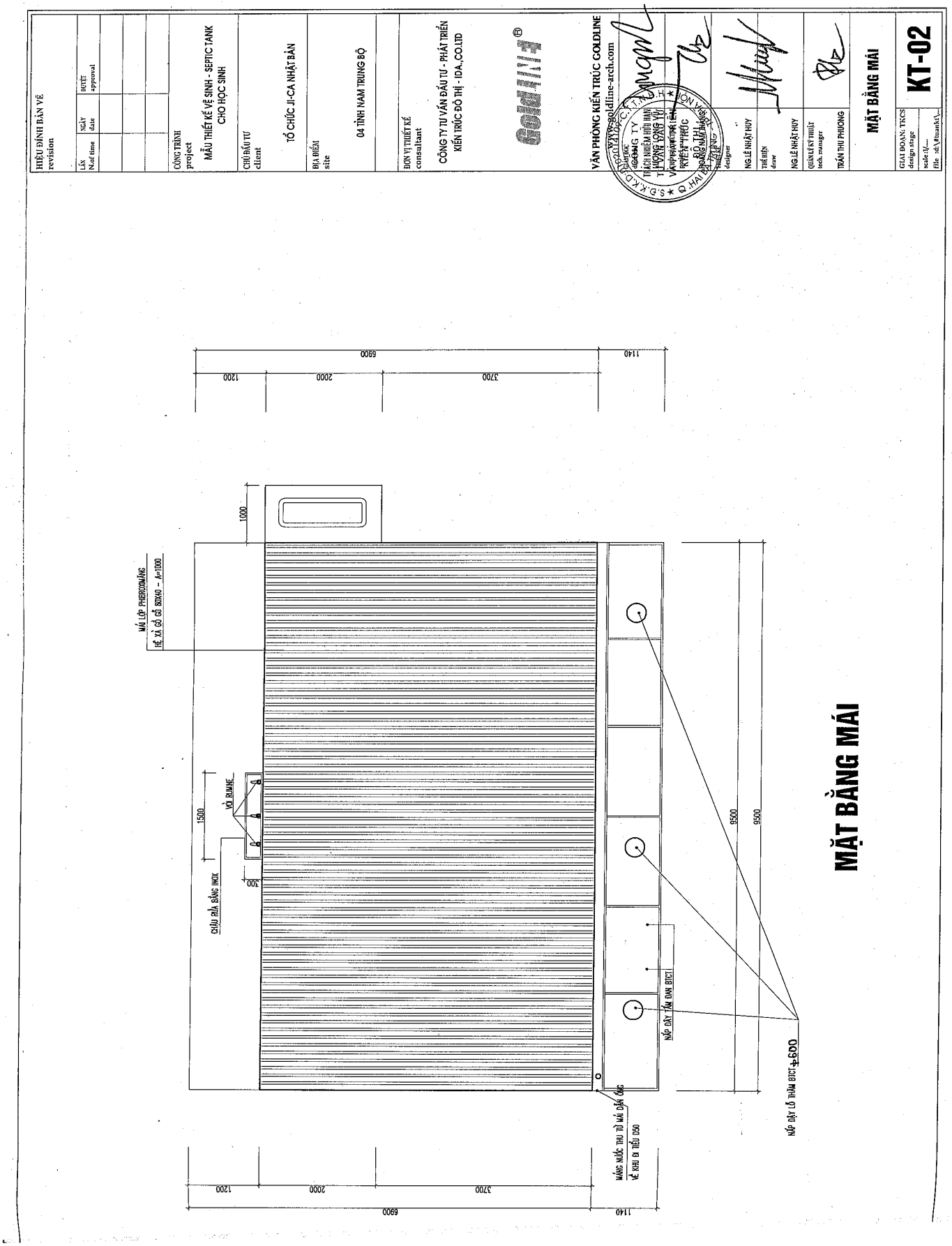
scale :1/.....

file :d:\Ritsuanket\...

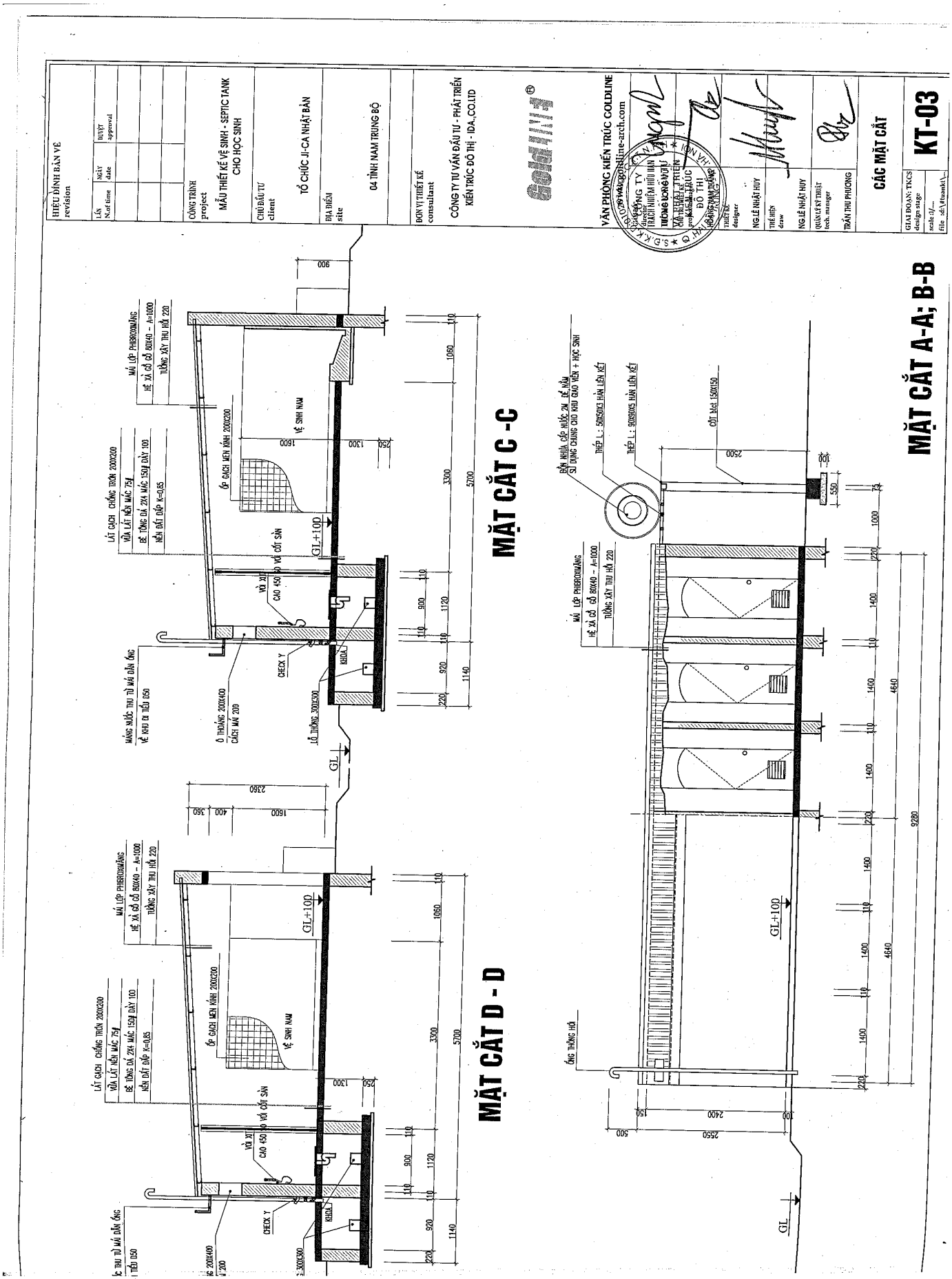
KC-02



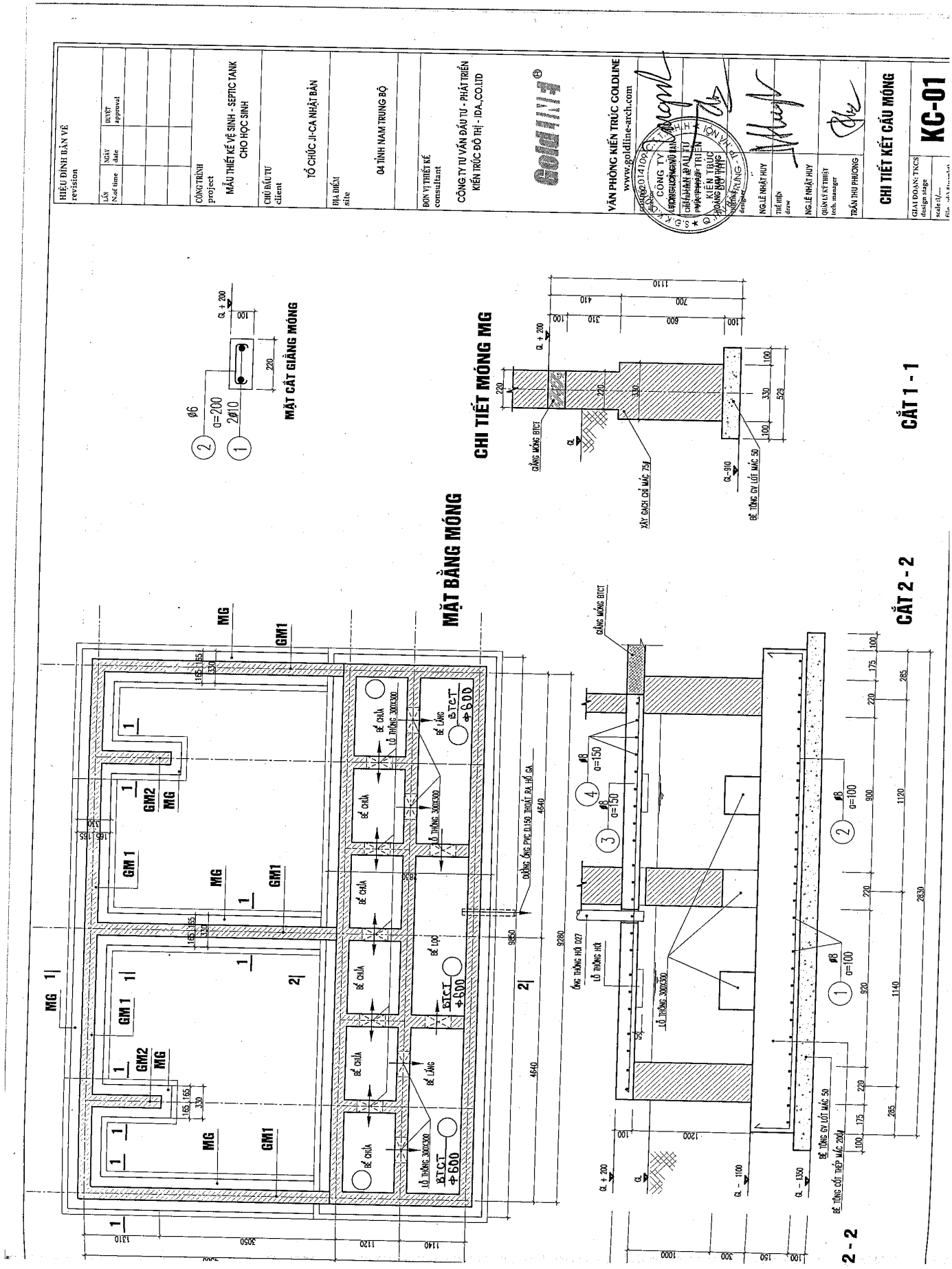
S-St.-01 School Toilet for Students (Septic Tank)



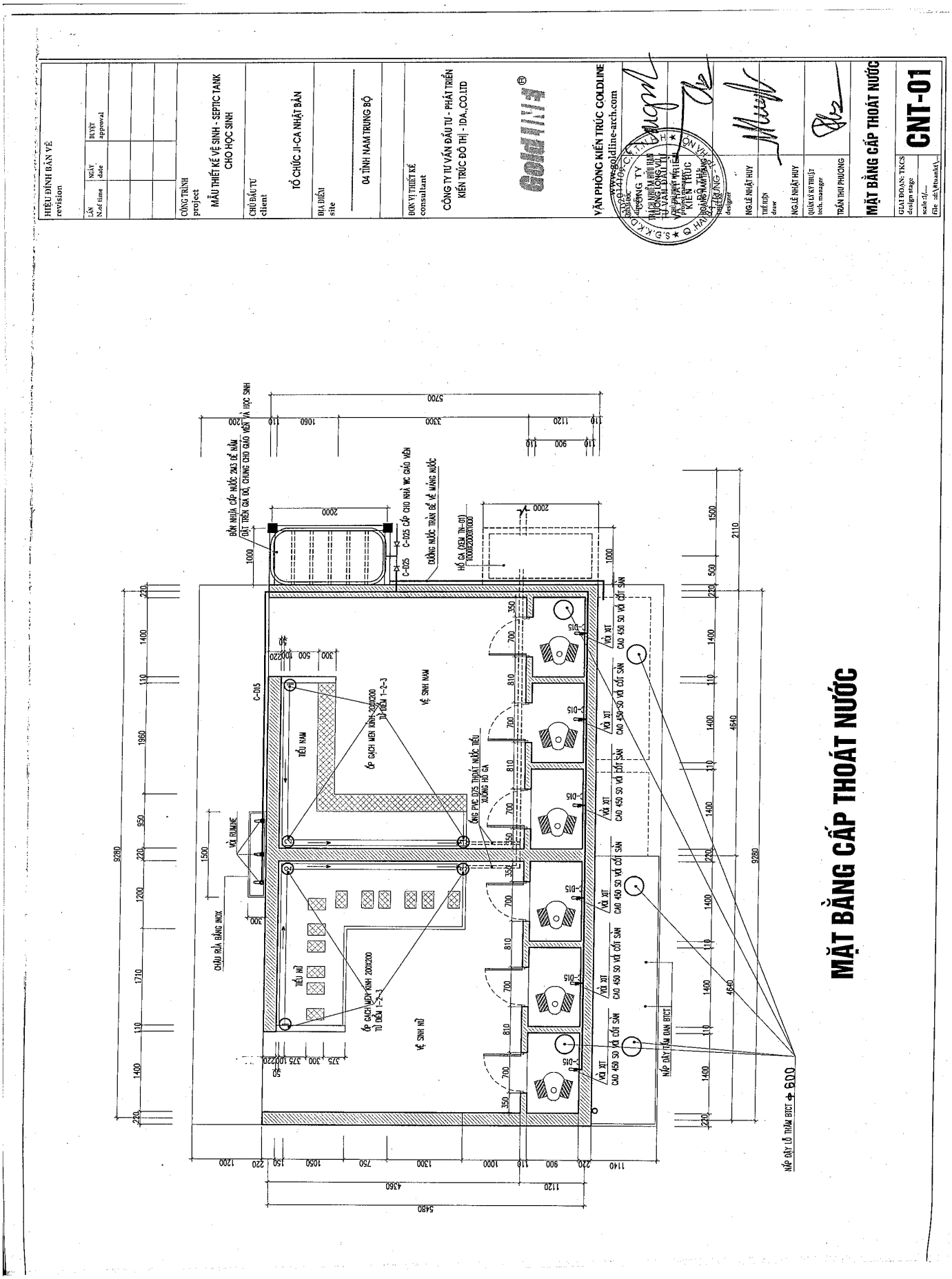
S-St.-02 School Toilet for Students (Septic Tank)



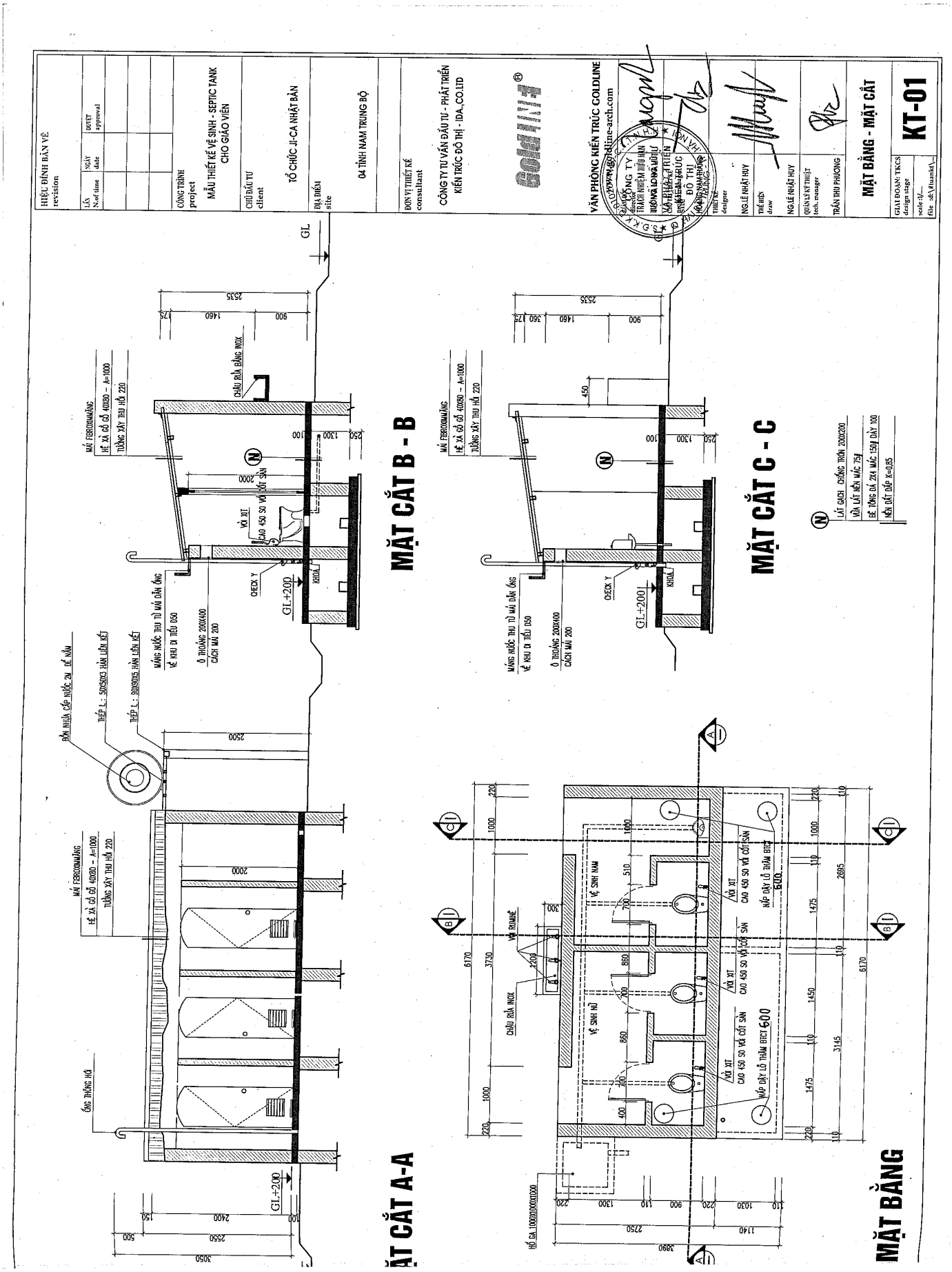
S-St.-03 School Toilet for Students (Septic Tank)



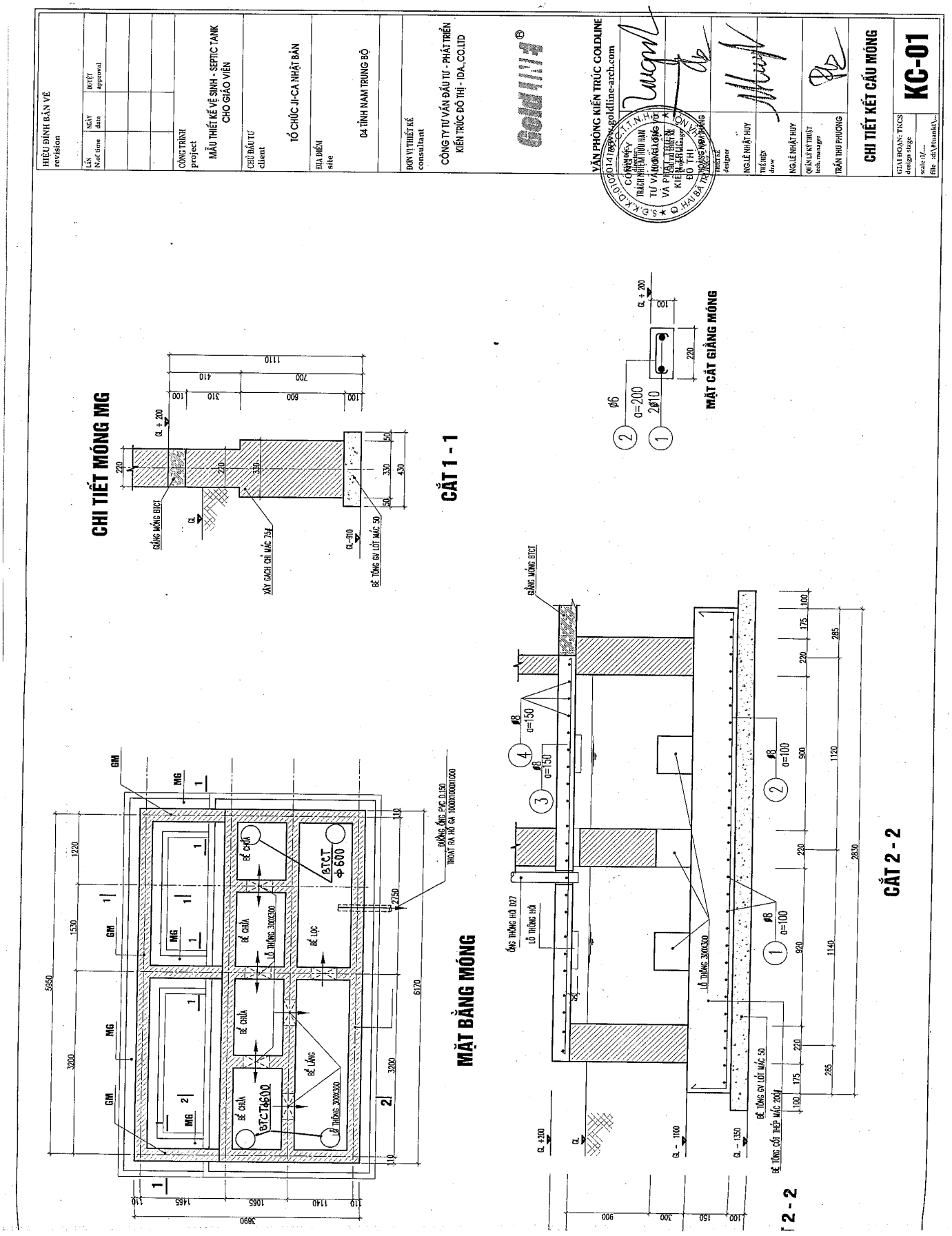
S-St.-04 School Toilet for Students (Septic Tank)



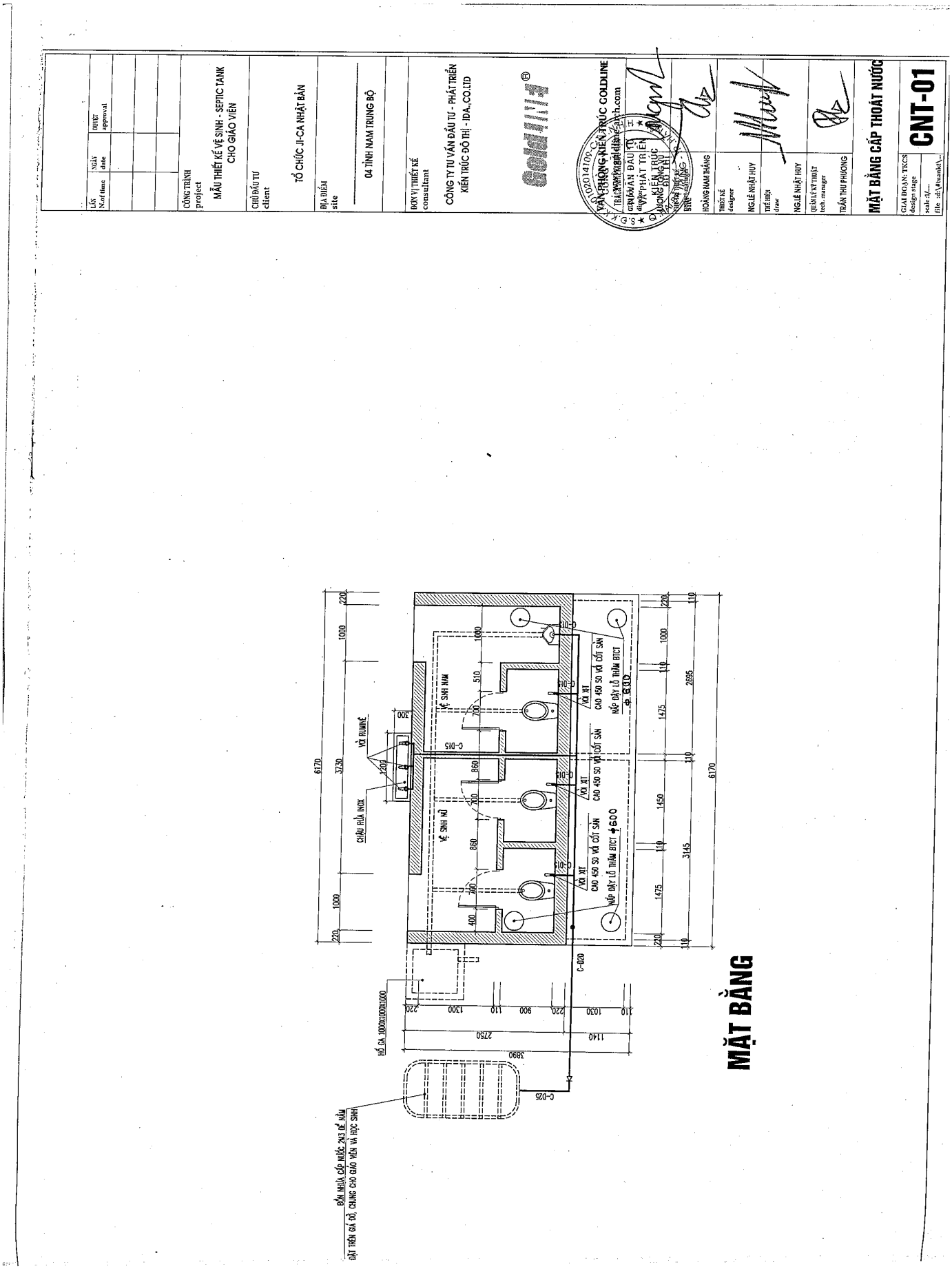
S-St.-05 School Toilet for Students (Septic Tank)



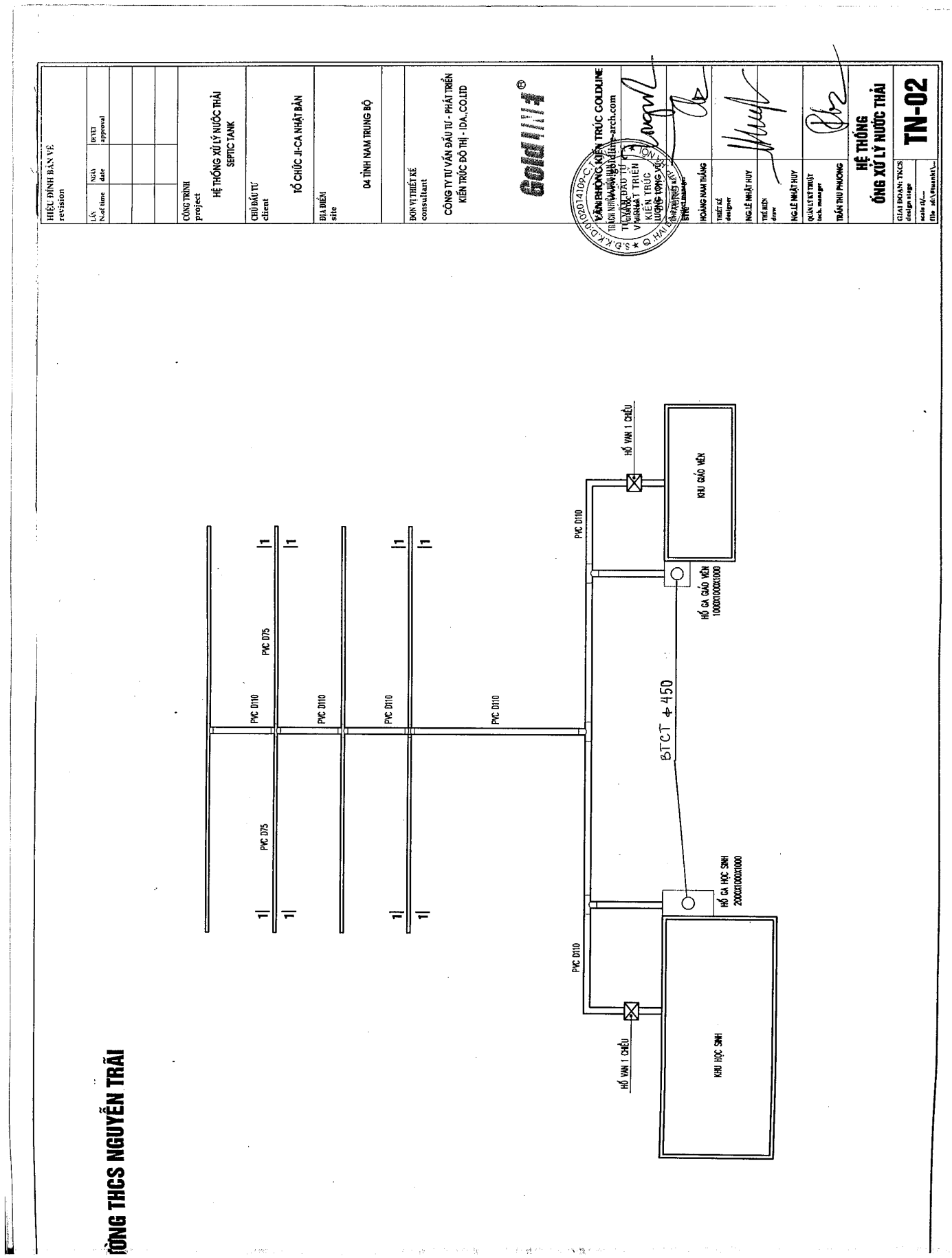
S-Te.-01 School Toilet for Teachers (Septic Tank)



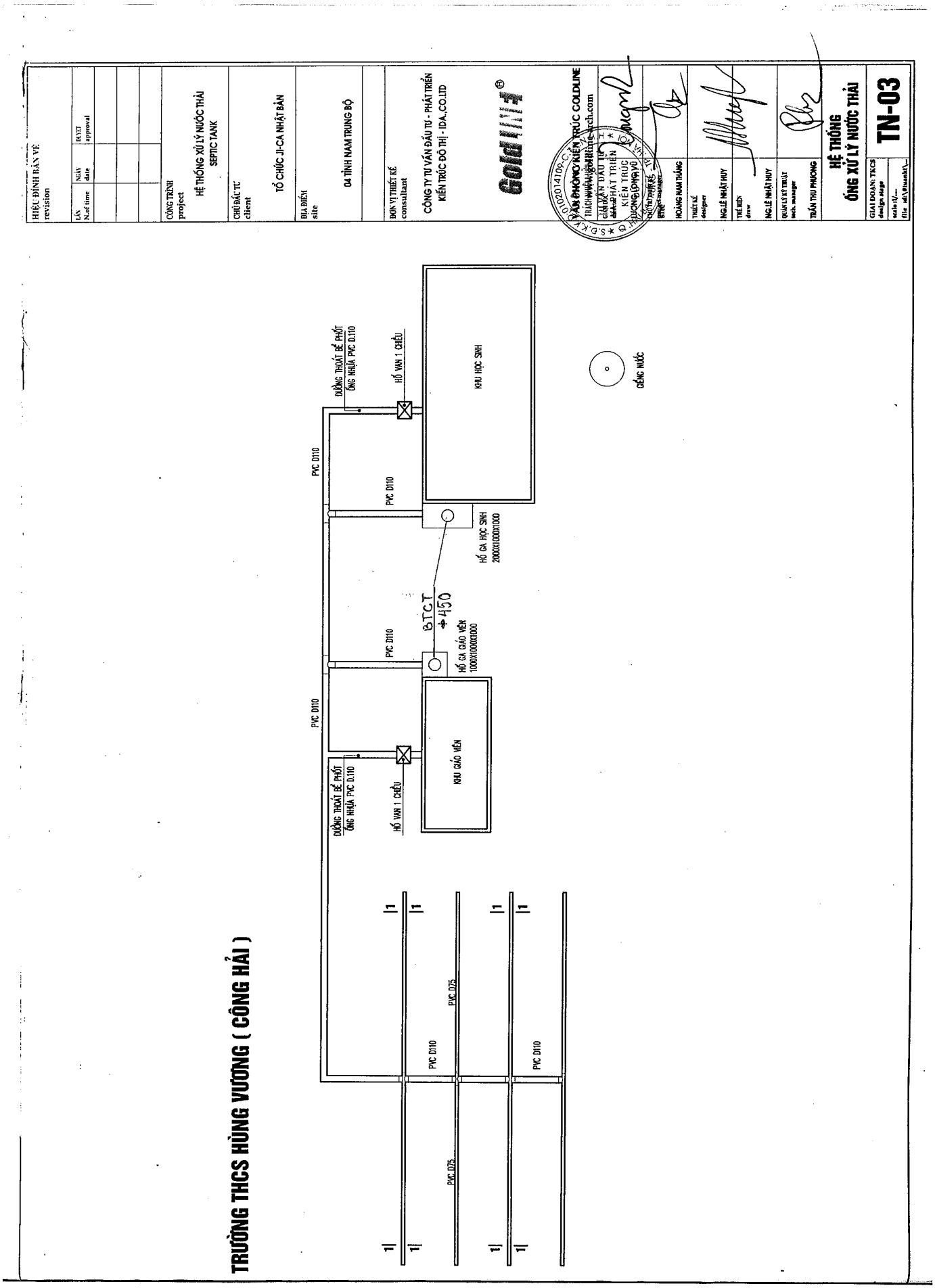
S-Te.-02 School Toilet for Teachers (Septic Tank)



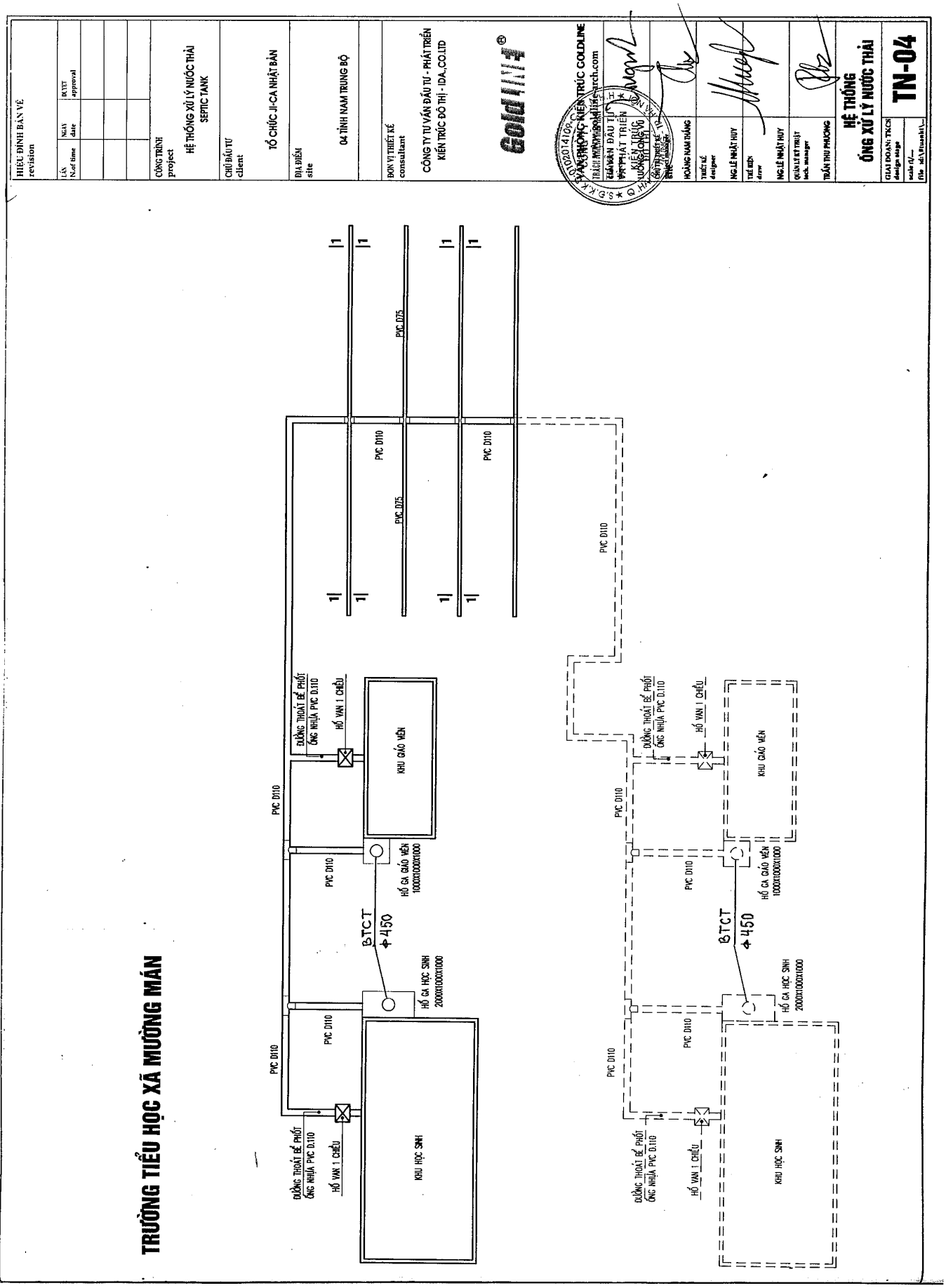
S-Te.-03 School Toilet for Teachers (Septic Tank)



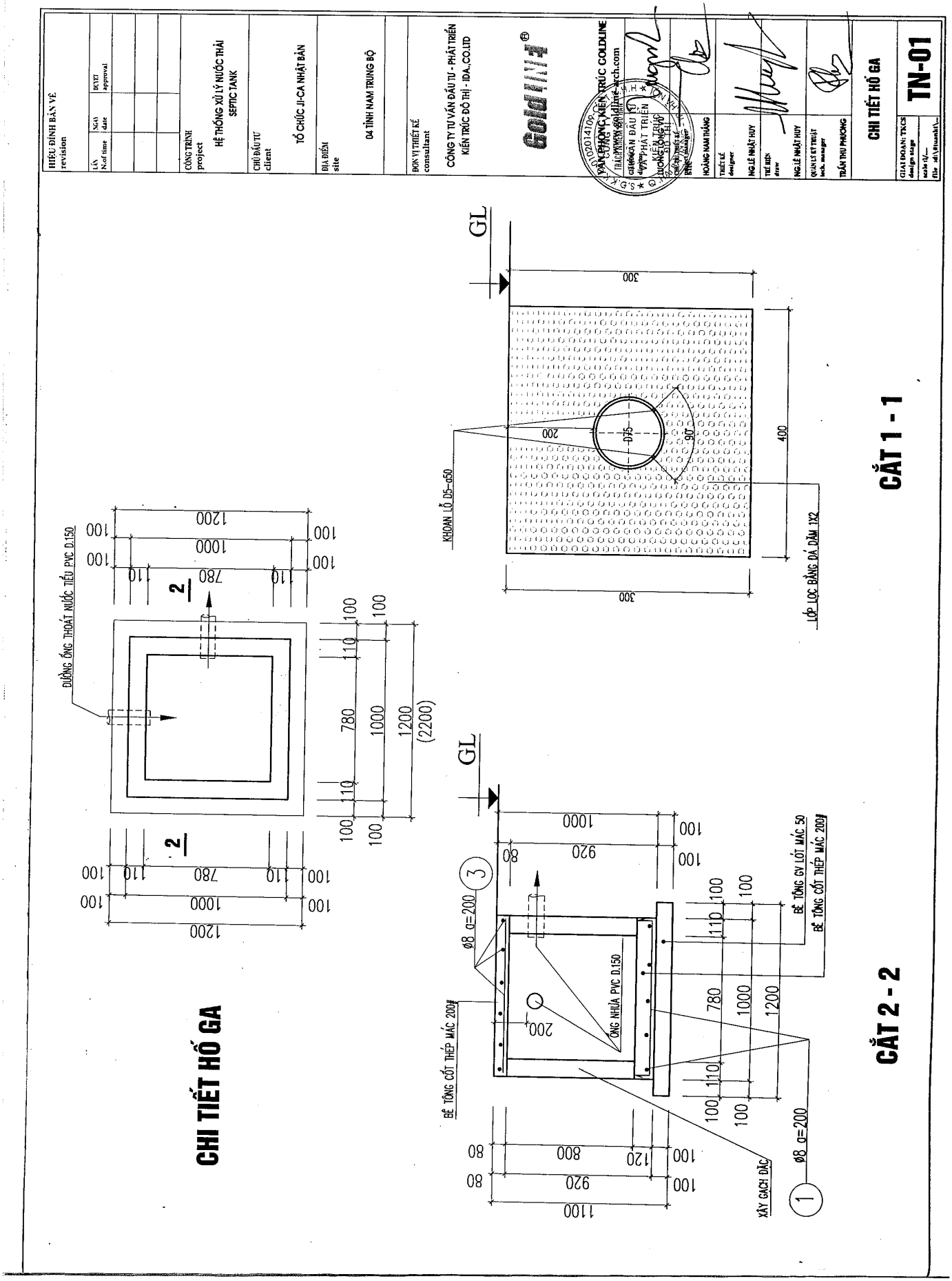
S-Ga.-01 School Garden (Septic Tank)

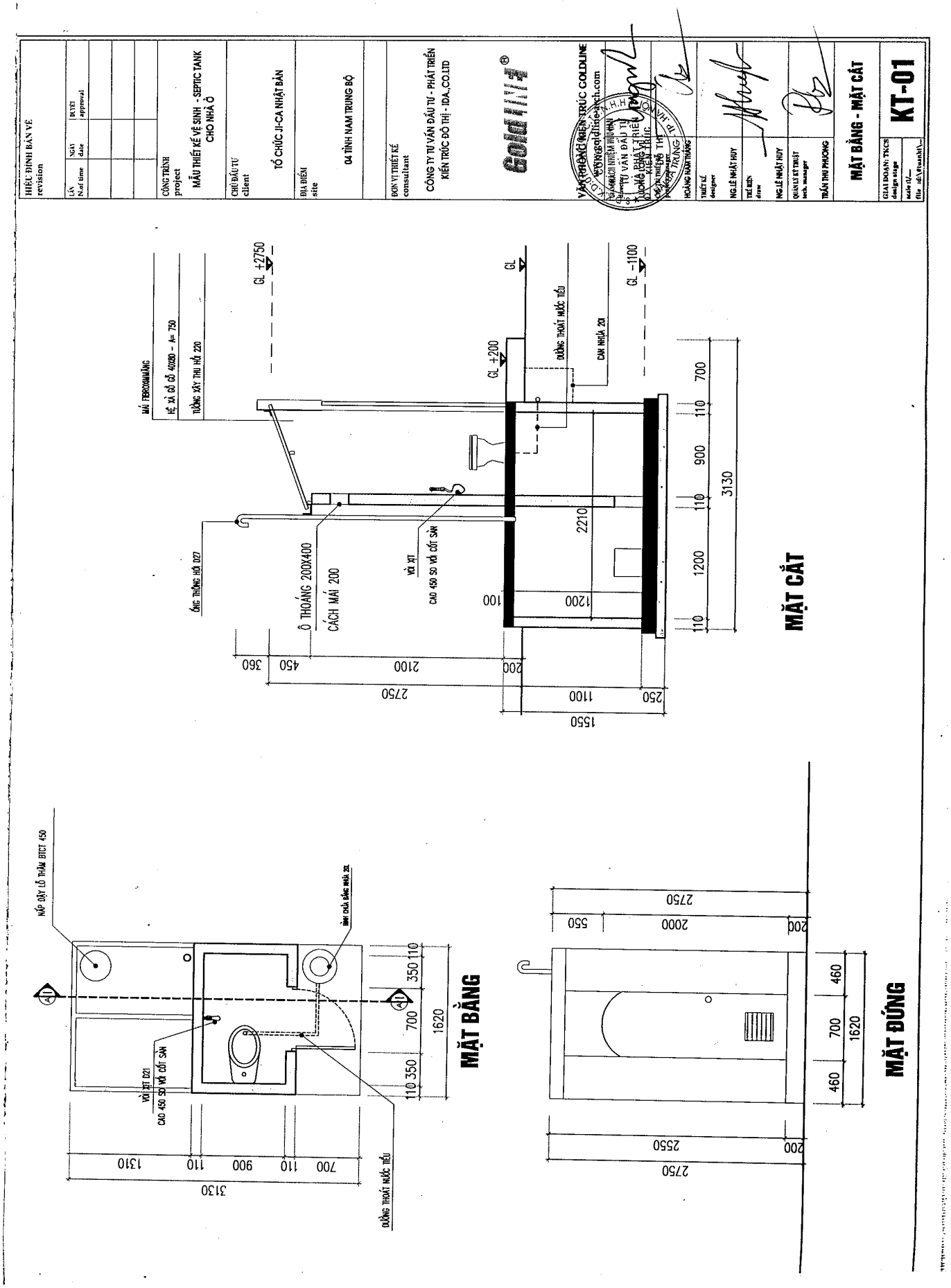


S-Ga.-02 School Garden (Septic Tank)

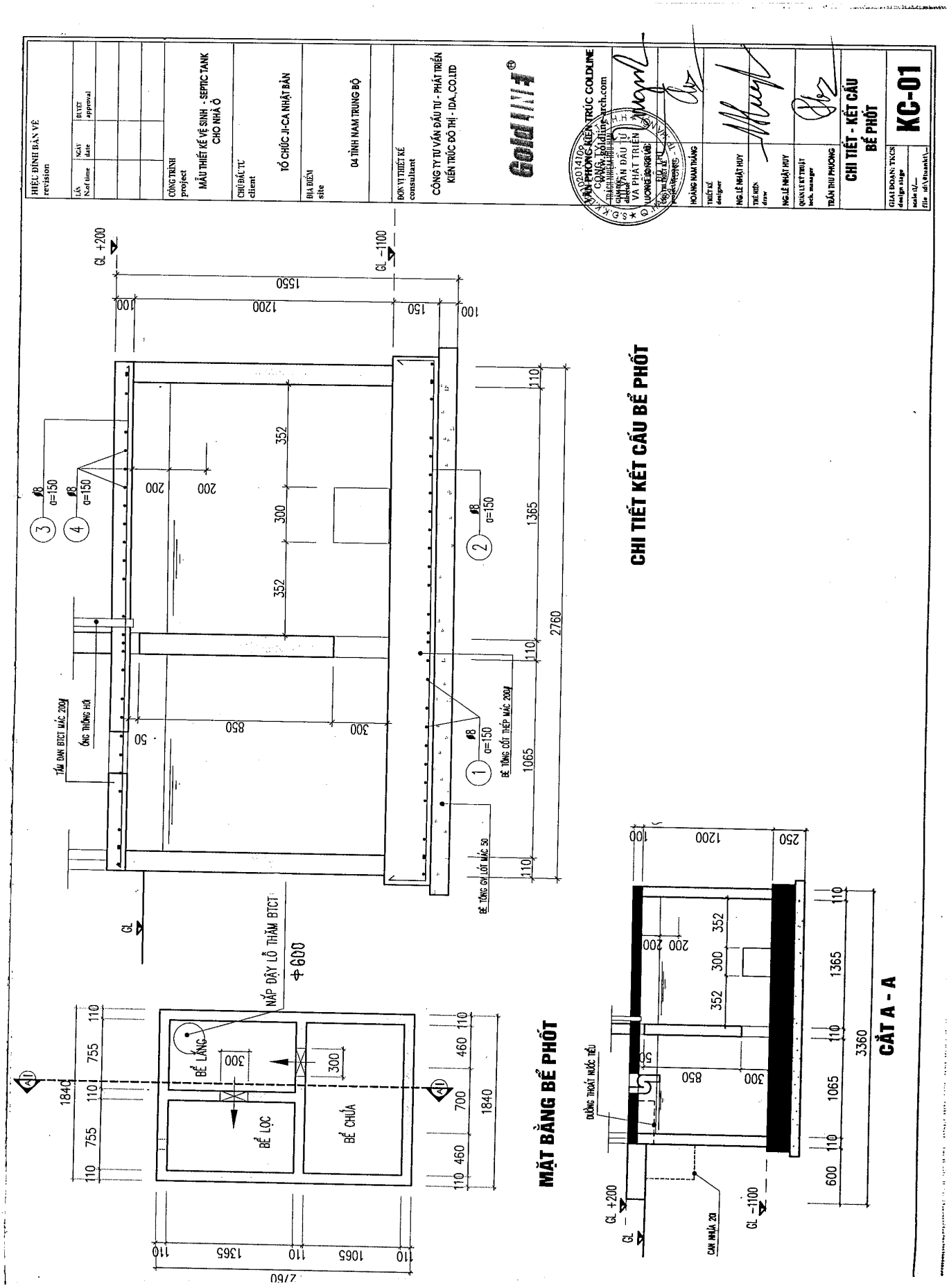


S-Ga.-03 School Garden (Septic Tank)

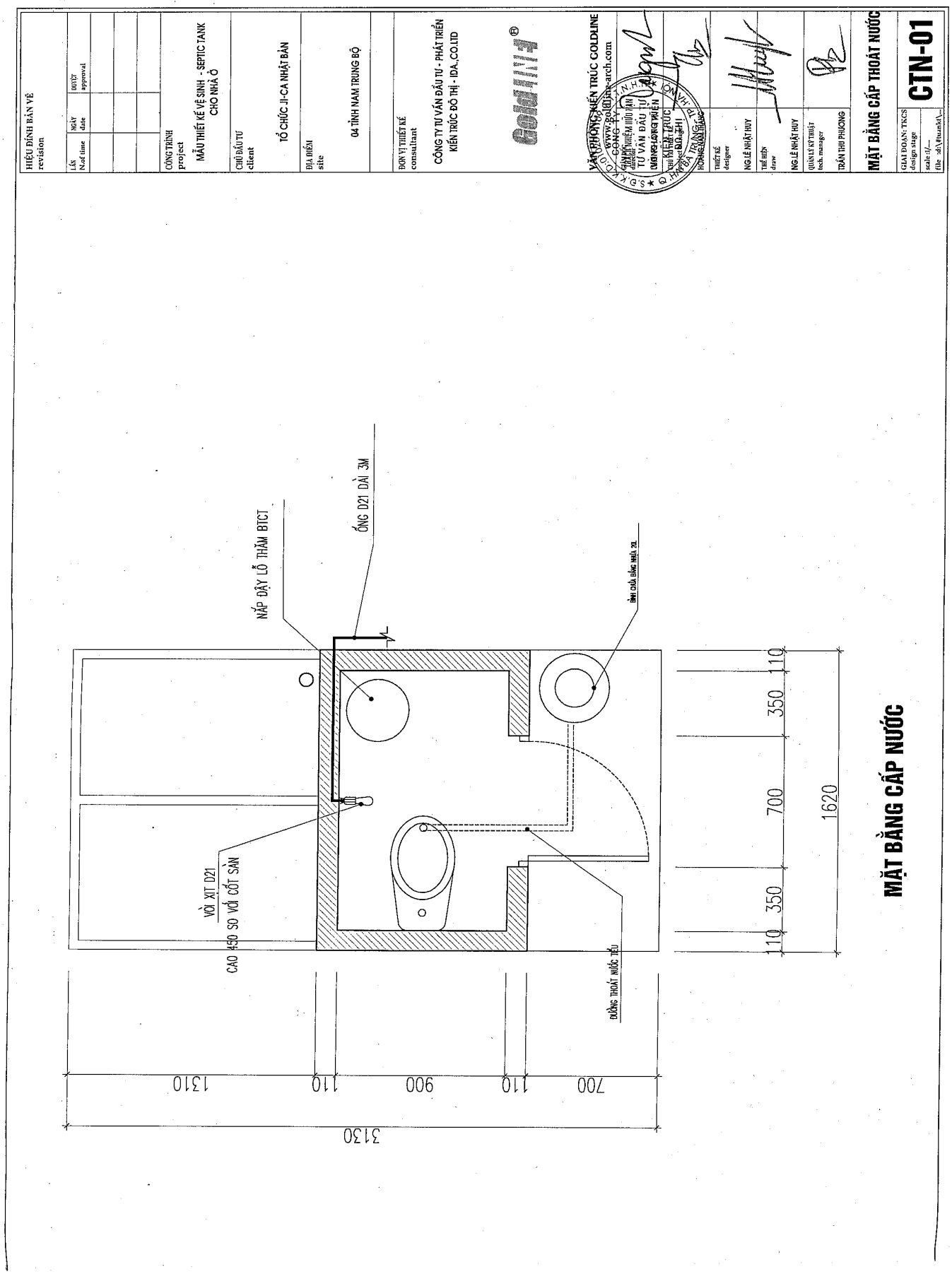

HIỆU ĐỈNH BẢN VẼ
revision
CÔNG TRÌNH
project
HỆ THỐNG XỬ LÝ NƯỚC THẢI
SEPTIC TANK
CHỦ ĐẦU TƯ
client
TỔ CHỨC JI-CA NHẬT BẢN
ĐỊA ĐIỂM
site
04 TỈNH NAM TRUNG BỘ
ĐƠN VỊ THIẾT KẾ
consultant
CÔNG TY TƯ VẤN ĐẦU TƯ - PHÁT TRIỂN KIẾN TRÚC ĐÔ THỊ - IDA.,CO.LTD
GoldLine
CHI TIẾT HỐ GA
TN-01
CẮT 1 - 1
CẮT 2 - 2
CHI TIẾT HỐ GA
GL
KHOAN LỖ D5-d50
LỚP LỌC BẰNG ĐÁ DĂM 1X2
ỐNG NHỰA PVC D.150
BÊ TÔNG CỐT THÉP MÁC 200#
BÊ TÔNG GV LÓT MÁC 50
XÂY GẠCH ĐẶC
Ø8 a=200
DƯỜNG ỐNG THOÁT NƯỚC TIỂU PVC D.150



S-De.-01 Demonstration Toilet (Septic Tank)



S-De.-02 Demonstration Toilet (Septic Tank)

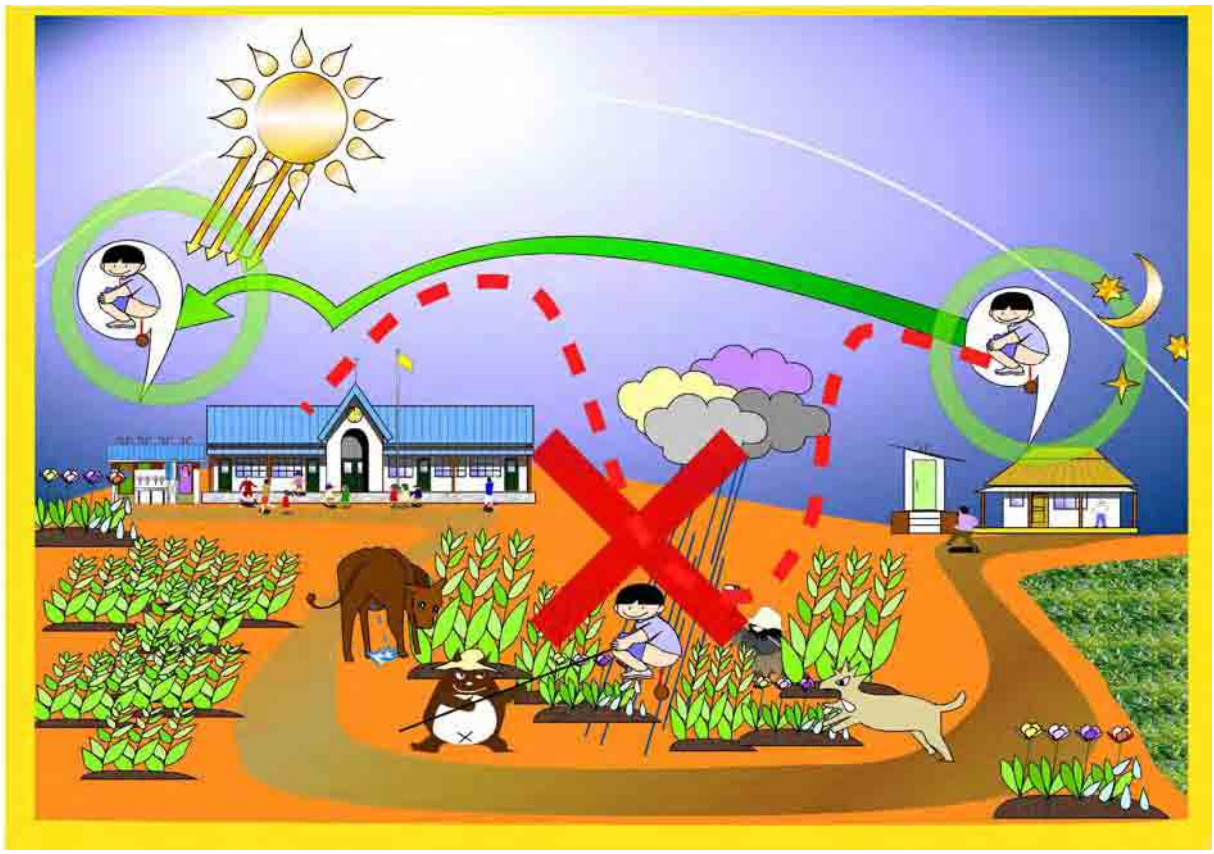


S-De.-03 Demonstration Toilet (Septic Tank)

ANNEX-4 Educational Posters

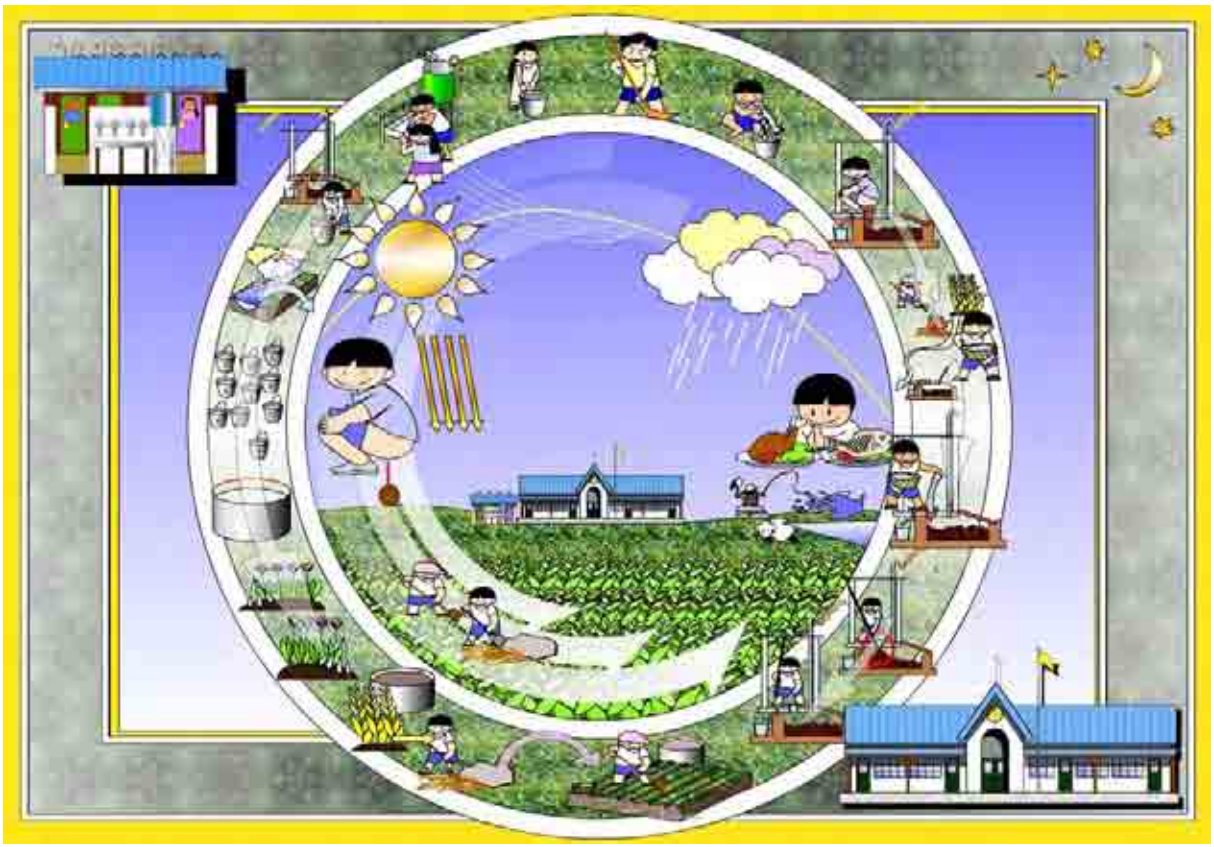
PHỤ LỤC 4: Tranh áp phích giáo dục

POSTER FOR SANITATION EDUCATION

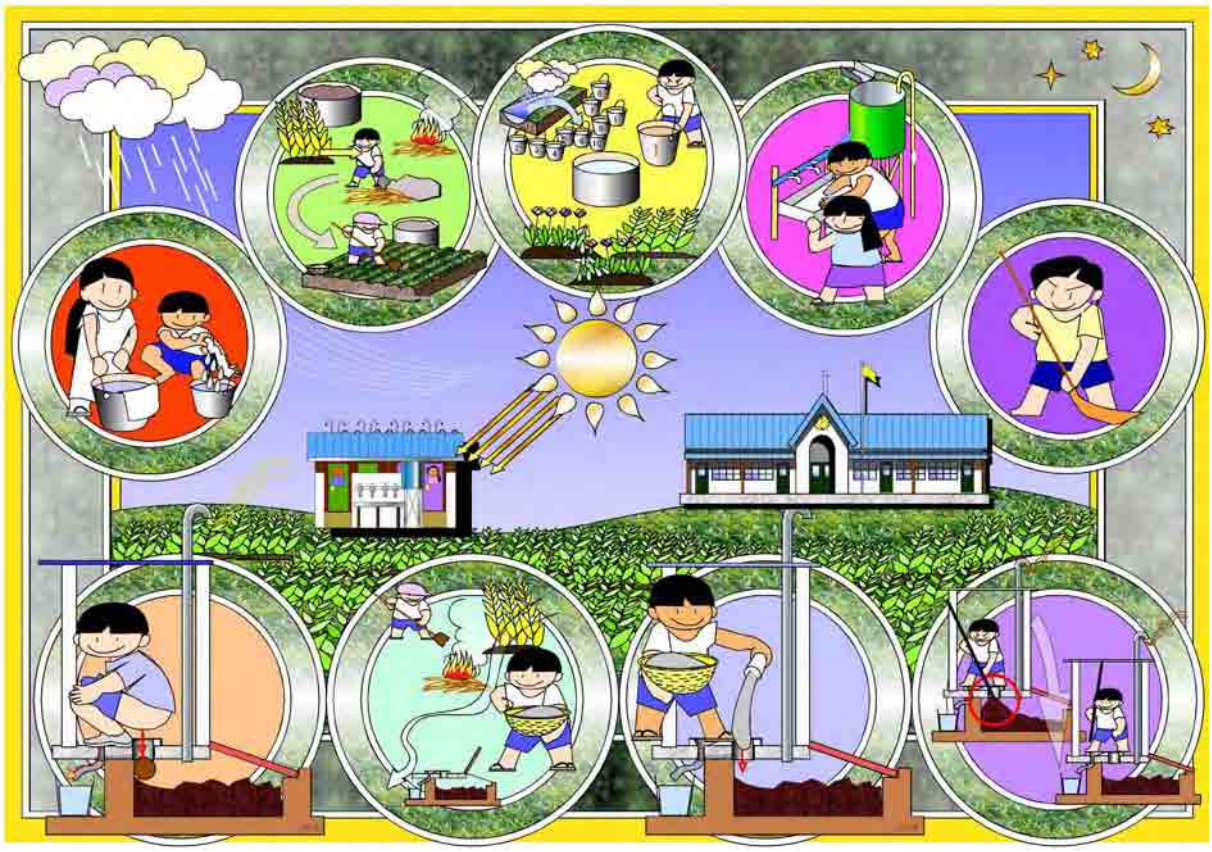


Prohibition of Open Defecation

Risk of Groundwater Pollution by Septic Tank Effluent

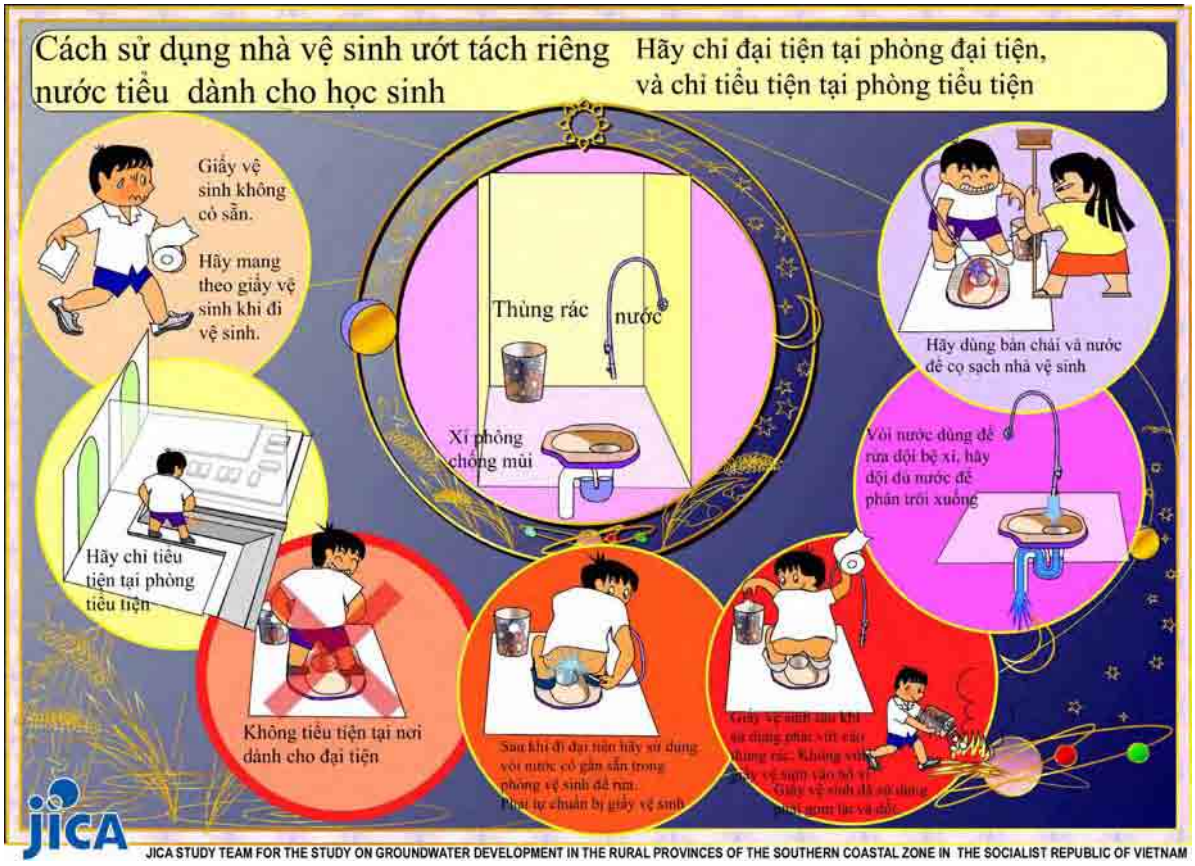


Concept of Resources Recycling through School Toilet and Garden

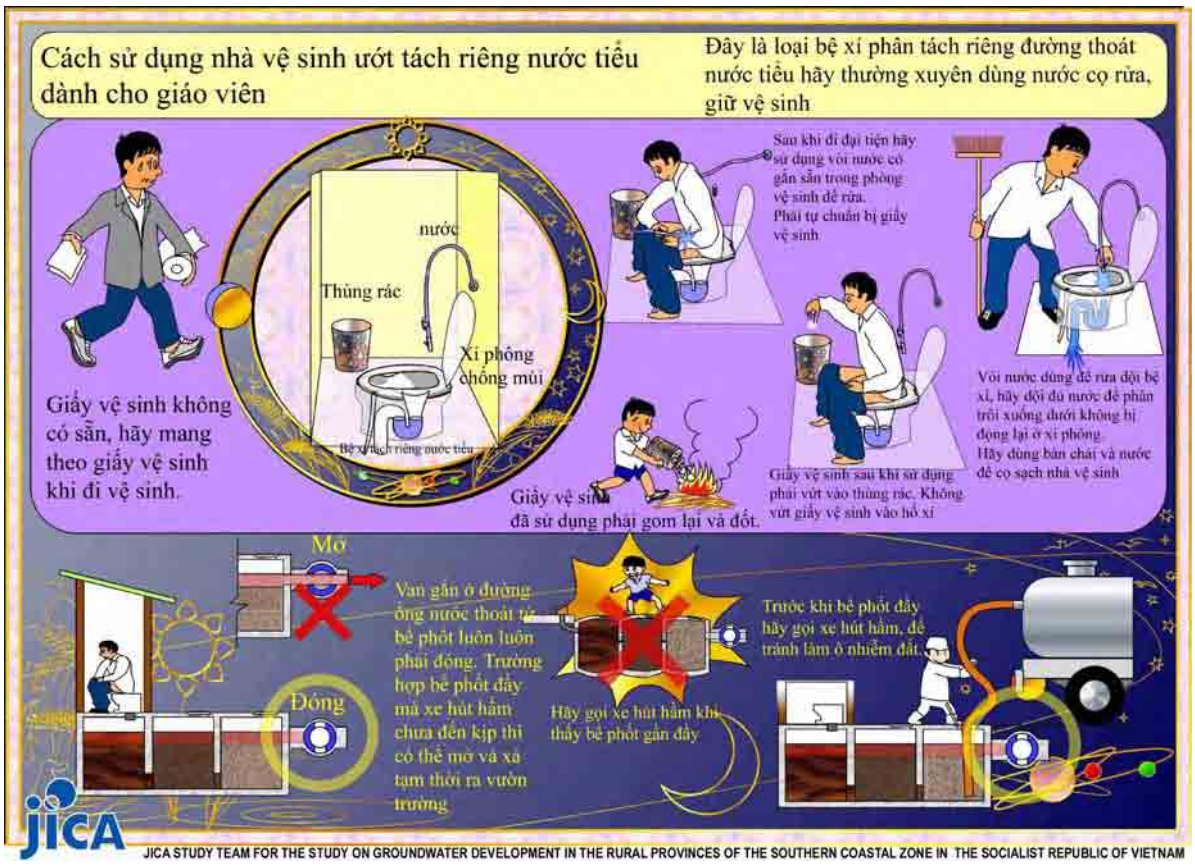


How to Maintain School Toilet and Garden

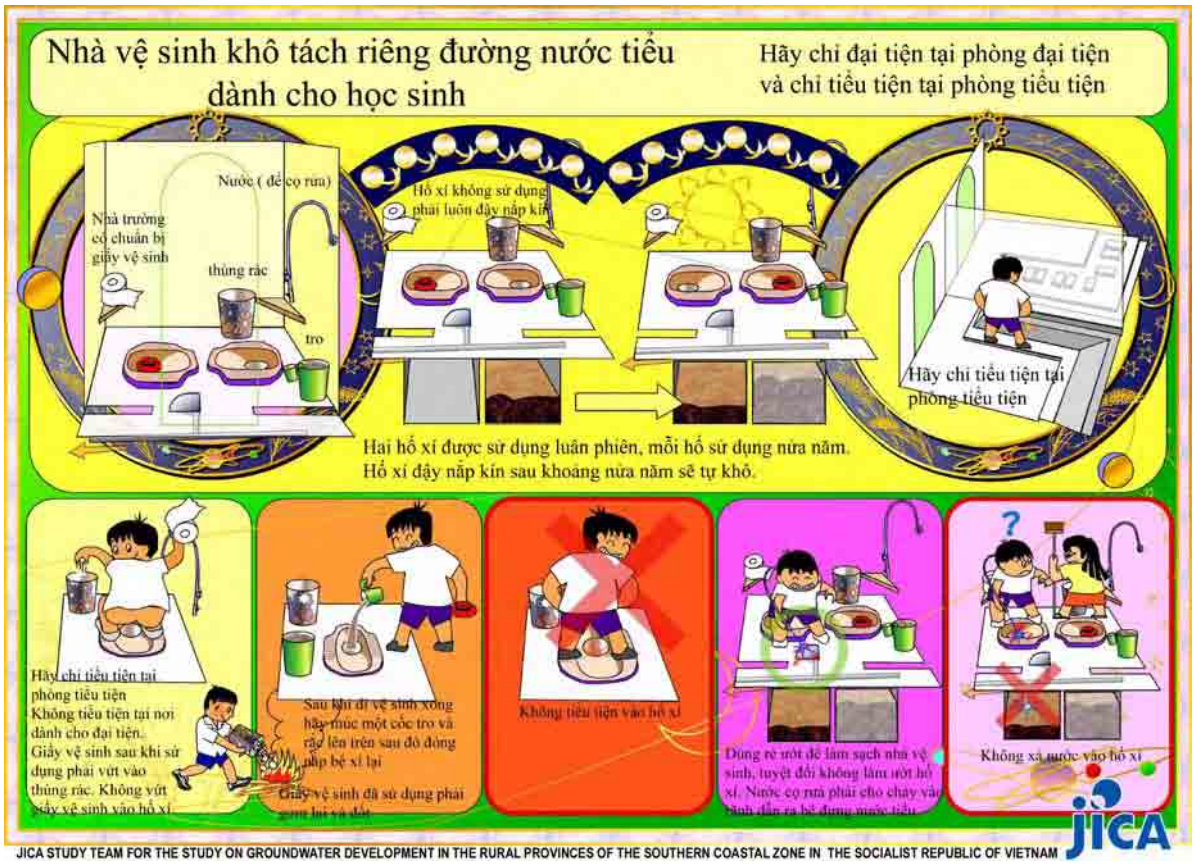
INSTRUCTION HOW TO USE TOILET



How to Use School Toilet for Students (Septic Tank)

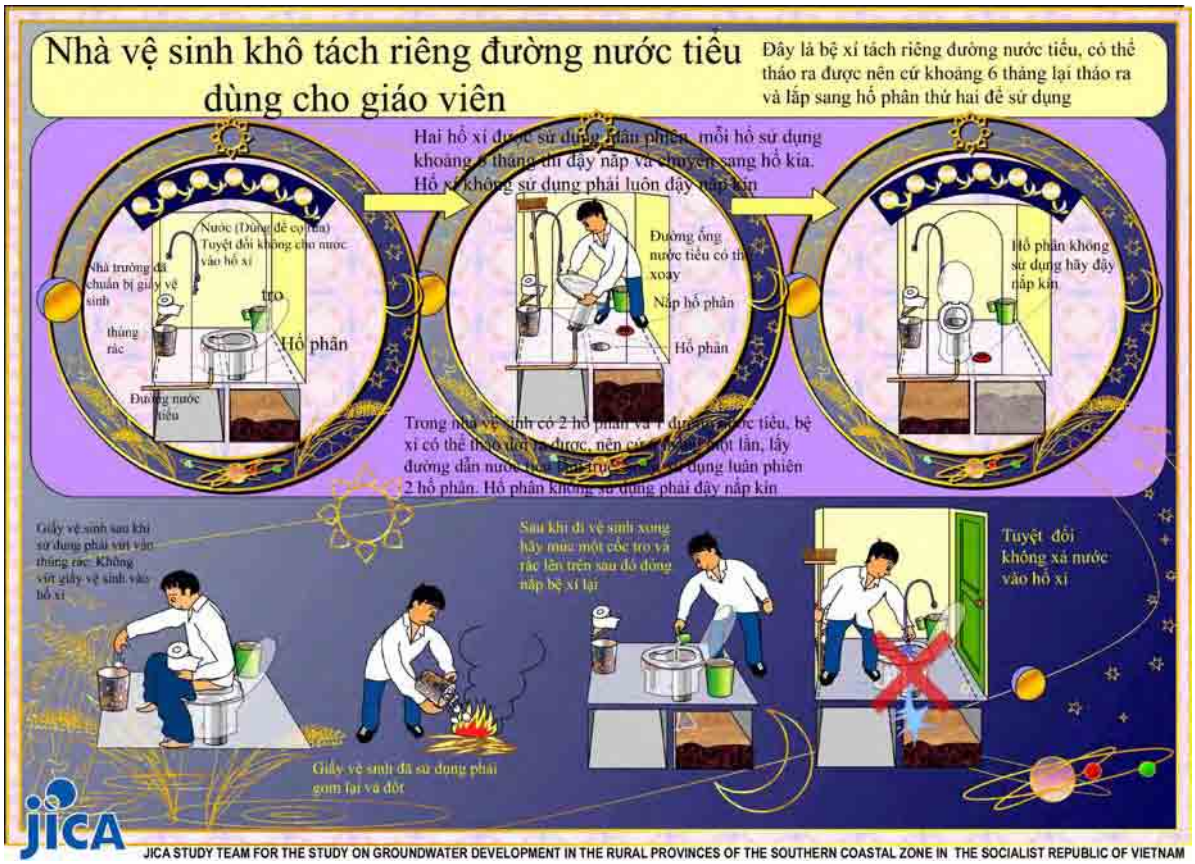


How to Use Toilet for Teachers & Demonstration (Septic Tank)



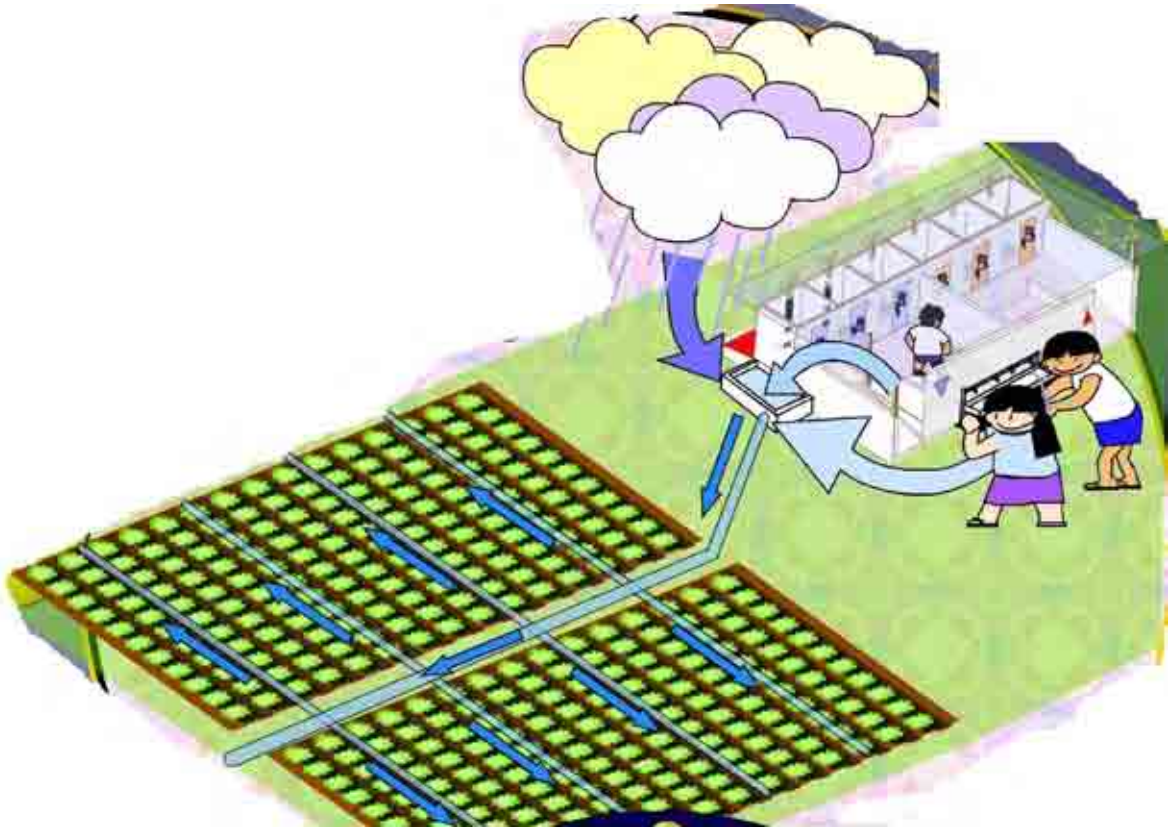
JICA STUDY TEAM FOR THE STUDY ON GROUNDWATER DEVELOPMENT IN THE RURAL PROVINCES OF THE SOUTHERN COASTAL ZONE IN THE SOCIALIST REPUBLIC OF VIETNAM

How to Use School Toilet for Students (Dry Toilet)



JICA STUDY TEAM FOR THE STUDY ON GROUNDWATER DEVELOPMENT IN THE RURAL PROVINCES OF THE SOUTHERN COASTAL ZONE IN THE SOCIALIST REPUBLIC OF VIETNAM

Instruction for How to Use Toilet for Teachers & Demonstration (Dry Toilet)



Application of Urine Fertilizer which is Diluted with Hand-washing Water and Rain Water and Flows by Gravity to the School Garden