社会開発調査部報告書

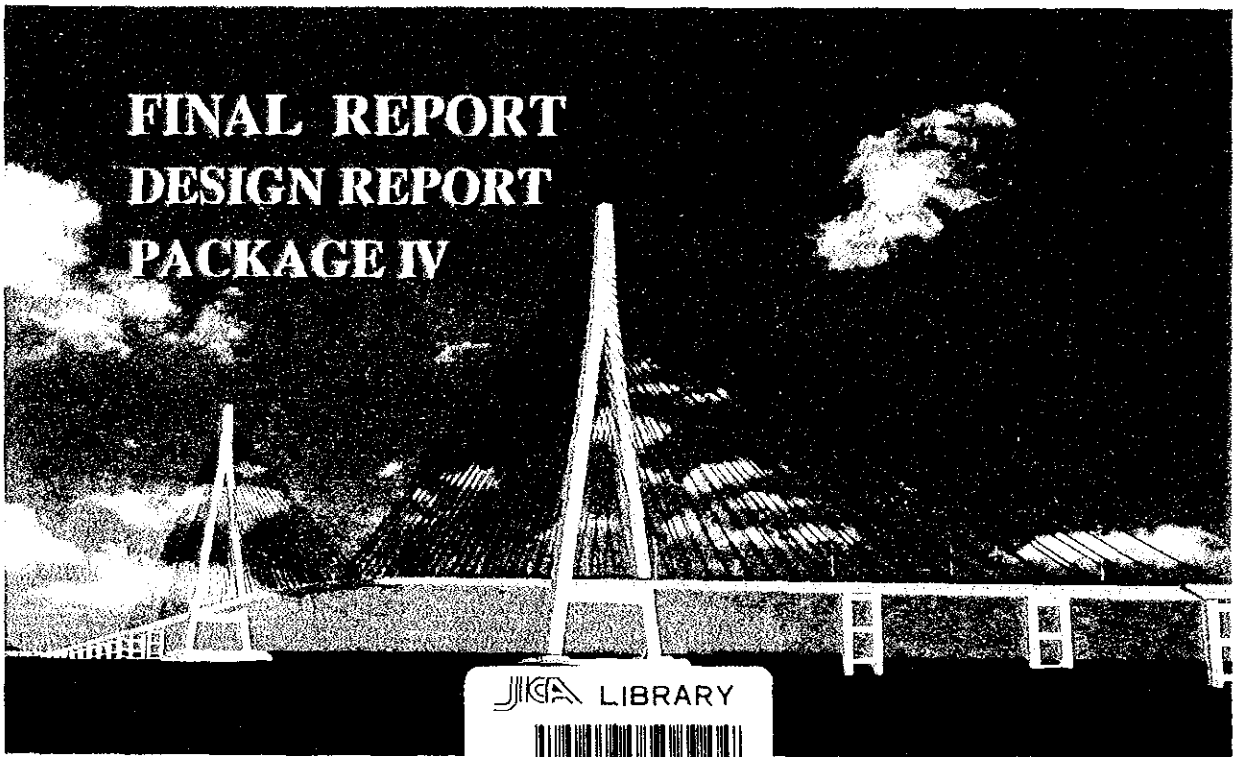
No. 32

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF TRANSPORT
SOCIALIST REPUBLIC OF VIET NAM

THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM

FINAL REPORT
DESIGN REPORT
PACKAGE IV



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF TRANSPORT
SOCIALIST REPUBLIC OF VIET NAM

THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM

FINAL REPORT
DESIGN REPORT
PACKAGE IV

OCTOBER 2000

NIPPON KOEI CO., LTD.

FINAL REPORT
ON
THE DETAILED DESIGN OF THE CAN THO BRIDGE CONSTRUCTION
IN
SOCIALIST REPUBLIC OF VIET NAM

DESIGN REPORT
PACKAGE-IV

Table of Contents

PART 1 DESIGN REPORT

SECTION 1 DESIGN CRITERIA

DESIGN CRITERIA FOR RESETTLEMENT AREA

1. References

The following Notice of Decision and Publication of the listed below to the extent referenced and applied.

- The Resettlement Area of Hung Phu Ward was followed the Can Tho City Master Plan which were approved by Prime Minister – Attacked Sheet 1 to 3.
- Notice of Decision No. 1747/1998-CT.KT dated 23rd July 1998 of a Planning Detail for Master Plan at Hung Phu Ward residental area on Can Tho City based on Decision No. 606/TTg 20th December 1993 was issued by Prime Minister and Decision No. 3236/QD.UBT 97 dated 16th December 1997 was issued by People Committee of Can Tho Province- Attached Sheet 1 to 3.
- Notice Decision No. 592/QD- GTVT dated 11th March 1999 was issued by MOT 1988 regarding land acquisition procedures and regulation page No. 60, 70, 71, 76 and 77 -Attached Sheet 4 to 6.
- Minutes of Meeting dated 4th and 5th October 1999- Attached Sheet 7 to 10
- Standard Construction of Vietnam, Ministry of Construction (MOC) Decision No. 682/BXD-CSXD dated 14th December 1986 was issued by Minister of MOC page 98- Attaches Sheet 11 to 12.
- Vietnam Highway Design Standards (TCVN 4054-98) page 523, 525 and 526 - Attached sheet 13 to 15.
- Our letter Ref No. FKOCO /001/2000 dated 4th January 2000, the Technical Parameter of the Resettlement Area- Attached Sheet 16.
- Our Letter Ref No. FKOCO/059/99 dated 22nd November 1999 Minutes of Meeting -Attached Sheet 17.

Summary

Items	Binh Minh R.A	Hung Phu R.A	Chau Thanh R.A	Remarks
Number of Households	149	22	57	Total 228 Refer to attached Sheet 16
Number of land lots	149	22	57	Total 228
Average Area of each lot	250 m^2 325 m^2	126 m^2	200 m^2	Refer to attached Sheet 7 to 12
Total Area	60.645 m^2	10.815 m^2	21.250 m^2	Total 92.710 m^2 refer to attached sheet 16
Public Const. Toilet and W.T.P*	Toilet - 3 W.T.P	W.T.P	Toilet - 2 W.T.P	Refer to attached Sheet 17
Access Road Bicycle lane	1 x 3.5 2x 1.75	1 x 3.5 2 x 1.75	1 x 3.5 2 x 1.75	Refer to attached Sheet 13 to 15
Inner Road Bicycle lane	1 x 3.5 2 x 1.25		1 x 3.5 2 x 1.25	Refer to attached Sheet 13 to 15
Sidewalk and Shoulder	2.00 or 2.75	5.00	2.00 or 2.75	Refer to attached Sheet 13 to 15

* W.T.P: Water Treatment Plant

2. ***Details Design of Resettlement Site***

The planning and basic design report of a "Draft of Land Acquisition and Resettlement Plan" have been submitted to the concerned authorities on August 1999 which the report were consist of Volume I and II.

During November 1999 to February 2000, the PMU My Thuan, Local Agency and the Consultants had several times were held on meeting were discussed about these Infrastructures of Resettlement Site on Vinh Long and Can Tho Province and were also time to time on Project Office in Ho Chi Minh City.

3. **Land lot Resettlement Site (RS)**

3.1 ***Binh Minh RS on Vinh Long***

3.1.1 149 number households

- Area of each lot, TYPE A: 9m x 25m = 225m²/unit 105 lots

  TYPE B: 13m x 25m = 325m²/ unit 44 lots

  Total 149 lots

- Total Area of Housing Lot, = 37,925m²

As shown a location plan, typical cross sections and cross sections see drawing No.4, 5, 14, 15 and 16.

3.1.2 Road

- Access Road 3.5m for one traffic lane, 1.75m for two bicycle lanes and for pedestrian on one side respectively.
- Inner Road 3.5m for one traffic lane, 1.25m for two bicycle lanes and for pedestrian on one side respectively.
- Total Area of road and pedestrian: = 13,067m²

As shown typical road cross sections see drawings No.14.

3.1.3 Public Facility for public toilet and water treatment facilities = 1,688m²

3.1.4 Slope and green belt and bicycle road = 7,965m²

Total of Binh Minh RS area = 60,645m²

3.2 *Hung Phu Ward RS on Can Tho*

3.2 Number households

- Area of each lot 4.5m x 28m = 126m²/unit 22 lots
- Total Area of Housing Lot = 2,772m²

As shown a location plan, typical cross sections and cross sections see drawing No. 4, 14 and 16.

3.2.1 Road

- Geometric design of an access and inner road has been applied to the master plan in this area.
- Access Road 3.5m for one traffic lane, 5.0m for two bicycle lanes and for pedestrian lanes one side respectively.
- Inner Road 3.5m for one traffic lane, 5.0m for two bicycle lanes and for pedestrian lanes one side respectively.
- Total Area of road and pedestrian: = 3,779m²

As shown typical road cross sections see drawings No.16.

3.2.2 Public Facilities for Water Treatment Plant = 644m²

3.2.3 Slope and Green Belt = 3,620m²

Total of Hung Phu RS area = 10,815m²

3.3 ***Chau Thanh RS on Can Tho***

3.3.1 57 number households

- Area of each lot 8m x 25m = 200m²/unit 57 lots
- Total Area of Housing Lot = 11.400m²

As shown a location plan, typical cross sections and cross sections see drawing No. 5, 15 and 17.

3.3.2 Road

- Access Road 3.5m for two traffic lanes, 1.75m for two bicycle lanes and for pedestrian traffic on one side respectively.
- Inner Road 3.5m for one traffic lane, 1.25m for two bicycle lanes and for pedestrian traffic on one side respectively
- Total Area of road and pedestrian = 4,830m²

As shown road cross sections see No.17.

3.3.3 Public Facilities for Public Toilet and water treatment = 1,063m²

3.3.4 Slope and Green Belt = 3,957m²

Total of Chau Thanh RS Area = 21,250m²

4.. Finish Grade Elevation on RS Site

According to the "Main Report Volume II" page 20 and 21 have been studied and decided that it filling embankment level is +2.50m on the lowest point pavement, therefore the highest elevation of housing area will be +3.0m.

5. Road Pavement Structure

Access and inner road pavement structures are designed a maximum wheel load of 6 ton for housing area.

The following pavements structure to be applied.

- Bituminous treated surface course 5cm thickness
- Crushed stone course 20cm thickness
- Subgrade compacted to a minimum 90% of a maximum dry density.

6. Public Utility Systems for each RS

6.1 Drainage and Sewage Systems

Drainage facilities construct to collection of surface water across to daylight for removal of storm water from road and housing area.

Sewage facilities construct to septic tank for treatment of sewage before discharging to drainage facility.

The project will provide these facilities include pipe culvert, rip-rap channel, curb, gutter, surface inlet, manhole and e.t.c. in accordance with "Construction Standard TCXD 51: 1984 Drainage of Viet Nam" and the "Highway Drainage Guideline of Japan Road Association" were applied.

6.1.1 Facilities

- Curb and Gutter provide on both sides the edge of pavement at access and inner roads.
- Manhole inlet provides an adequate interval of the edge of pavement for collection surface water through gutters.

- Pipe culvert or rip-rap U ditch with concrete cover provide a between Manhole or Manhole inlet.
- Septic tank for sewage treatment.
- Minimum pipe culvert diameter is 300mm.
- Rip-rap open channel, concrete headwall inlet and outlet provide a Erosion Control prevent to flood.

6.2 *Water supply systems*

The new location of each RS area supply to clean water to each household to be constructed a water treatment plant with it's operation facilities based on Viet Nam Standard for drinking water requirements by Ministry of Medicine on 13/04/1992 in new Resettlement Site area.

6.2.1 The following water supply demands will be applied in accordance with "Viet Nam Construction Code ' Volume I issued by Ministry of Construction 1997".

6.3 *Electricity Systems*

Distribution of a new electricity of housing areas will be laid underground cable and manhole or junction box are also constructs to new sub transformer station which to be connected with the existing secondary voltage line adjacent to the existing road above ground public electricity.

To be provided a street light with fixture and pole on the sidewalk.

PART 1 DESIGN REPORT

SECTION 2 DRAINAGE SYSTEM

DESIGN OF THE STORM DRAINAGE SYSTEMS

1. **The Basic Data**

   1) The topographic survey map of resettlement area is scale 1; 500, see Drawings Volume III.

   2) The general layout plan in resettlement area, see Drawings Volume III.

   3) The record of rainfall intensity from the Can Tho Gaging Station, see attached sheet.

2. **The Principles Arrangement of the Drainage Systems**

   1) The drainage system will be designed gravity flow.

   2) The drainage systems are to be installed under ground of sidewalk and clearance is 2~3m far from foundation of buildings; 1- 2m far from street lighting pole foundation.

   3) The gradient of drainage structures might be followed to the gradient of road.

3. **Runoff Data**

Stream flow data are usually available as mean daily flow or peak flow. Mean daily flow is a measurement of the mean flow in volume per unit time for the 24- hour period from midnight to midnight. Another type of runoff data, rate of flow with respect to time, is not normally published or readily available. Commonly referred to as a hydrographic, it is the result of data accumulated by a continuous- recording stream gage. Mean daily flows may be sufficient to describe the hydrographic of a large stream, but increments as short as 10 minutes may be necessary for small basins.

Stream flow and flood-related data are commonly divided into two types: historical data and recorded data. Historical data are characteristically noncontiguous and consist of indirect stream flow measurements based on observed high water marks. Historical data can be useful in extending stream gage records.

Recorded data are those observed at recording gage stations. The reliability of data observed at well-maintained gaging station is generally good since these records are based on detailed information about the stream channel cross section. Flow rates or velocities in the stream have also been measured by current meters and accurately reflect the transverse velocities in a cross section.

4. Rainfall Data

In storm generated flood runoff, rainfall is the primary form of precipitation. Under certain circumstances, precipitation in this study is considered primarily as rainfall in flood runoff analysis.

The storm rainfall data generally used are daily total amounts or storm totals as measured at rain gages, or total amounts for specified duration as found in statistical studies made by the Can Tho Gauging Station.

5. Hydrologic Computation

1) The peak runoff discharge of storm water is determined by following equation

(a) Based on Viet Nam Standard "Design standard drainage out side system and works"

$Q_1 = C \times I \times A$ (Liter/second)

where:

A: Area of watershed = $A_1 + A_2$ (Ha)

A_1: Grass area (Ha)

A_2: Sidewalk (concrete), AC pavement & House: (Ha)

C: Runoff coefficient = $\frac{(C\ xA_1 + C2xA_2)}{A_1 + A_2}$

C_1: Runoff coefficient of grass

C_2: Runoff coefficient of House, Sidewalk or Ac pavement.

$Q_1 = 166.7 \times I$ (Liter/second/hecta)

(b) Based on Japanese Standard

$Q_1 = \frac{1}{3.6x10^6} Cx1xA$ (m^3/second)

Where

A: Area of watershed = A1 + A2 (m^2)

A_1: Grass area (m^2)

A_2: Sidewalk (Concrete), AC pavement & Houses: (m^2)

C: Runoff coefficient = $\frac{(C_1xA_1xC_2xA_2)}{A_1 + A_2}$

C_1: Runoff coefficient of grass

C_2: Runoff coefficient of House, Sidewalk or Ac pavement.

C: is the Average Flowing Coefficient. It reflects the portion under the total water discharge flowing into the drainage system. It is depended on characteristics of surface area, for example:

- If surface area is concrete, asphalt: C = 0.95
- If surface area is aggregate, stone: C = 0.40-0.60
- If surface area is natural ground: C = 0.20

I: Rainfall intensity is decided 10-year frequency return period.

Rainfall intensity (refer to record on site attached I = 81mm/hr)

2) The discharge of sewage:

Q2 = (Number of house in watershed area) x 0.001m^3/sec/house

3) Total discharge:

Q = Q1 + Q2 (m^3/Sec)

Hydrologic Computation were attached sheets

6. Hydraulic Commutation by Manning Formulas

$Q_{max.} = A . V$

$$V = \frac{1}{n} x R^{0.67} x S^{0.5}$$

Where:

A = Water sectional area (m2)

V = Mean velocity in m per second

N = Manning's roughness coefficient

R = Hydraulic radius in m

S = Slope of energy grade line in m/m

It is emphasized that the Manning's "n" roughness value in this case applies to open channel flow and should be taken from appropriate tables as provided in most hydrology or hydraulics text or reference books. In general, the channel roughness factors will be much lower than the values for overland flow with similar surface appearance due to a higher ratio of flow area to wetted perimeter in the channel. The velocity in Manning's equation can be computed for bank-full conditions at the mid-point and divided into the flow path length. Hydraulic computation were attached sheets.

7. Culvert Hydraulics

The culvert size and type can be selected after the determination of the design discharge, culvert location, tailwater and controlling design headwater. The hydraulic performance of culverts is complex and the flow characteristics for each site should be analyzed carefully to select an economical installation which will perform satisfactorily over a range of flow rates.

Flood routing through a culvert is an alternate culvert sizing practice that evaluates the effect of temporary upstream ponding caused by the culvert's backwater. There are some instances that a culvert should be sized on the basis of the flood routing concept, depending on the amount of temporary storage involved and the degree of environmental concern and flood hazard. The peak discharge, must be generated, Elevation, often denoted as stage, is the parameter, which relates storage to discharge providing the key to the flood routing solution.

8. Culvert Type

Culver type selection includes the choice of material, shape and cross section and the number of culvert barrels. Total culvert cost can vary considerably depending upon the culvert type section. Fill height, terrain, foundation condition, roadway profile, allowable headwater, stream stage discharge and frequency discharge relationships, cost and service life are some of the factors which influence culvert type selection.

9. Shape and Cross Section

The shape of a culvert is bit the most important consideration at most sites, so far as hydraulic performance is concerned. Rectangular, arch or circular shapes of equal hydraulic capacity are generally satisfactory. It is often necessary, however for the culvert to have a low profile because of the terrain or because of limited fill height on Can Tho Mekong Delta Area. Construction cost, the potential for clogging by debris, limitations on headwater elevation, fill height, and the hydraulic performance of the design alternatives enter into the section of the culvert shape.

The longer construction time required for cast-in-place concrete can be an important consideration in the selection of this type of culvert. Therefore, hand rip-rap U TYPE DITCH has been adopted to the project see Details Drawings.

10. PIP RAP STONE MASONRY U TYPE DITCH WITH MORTAR LINNING

A culvert of rectangular cross section can be designed to pass large floods and to fit nearly any site condition. A rectangular culvert lends itself more readily than other shapes to low allowable headwater situations, since the height may be decreased and the total span increased to satisfy the location requirement.

11. Erosion Control

1) Inlet Control

A culvert operates with inlet control when the flow capacity is controlled at the entrance by the depth of headwater and the entrance geometry, including the barrel shape, cross sectional area and the inlet edge. Sketches to illustrate inlet control flow of bottom edge of curb adjacent to access or inner road are shown on drawing of Curb Inlet in "Details Drawings of drainage structures".

For a culvert operating with inlet control, the roughness and length of the culvert therefore and outlet conditions (including tailwater) are not factors in determining culvert hydraulic performance. The entrance edge and the overall entrance geometry have much to do with culvert performance in this type of flow; therefore, special entrance designs can improve hydraulic performance and result in a more efficient and economical culvert. Type of entrance is likely open mouth as a "Curb Inlet", see Details Drawings of drainage structures.

2) Outlet Control

In outlet control, the culvert hydraulic performance is determined by the factors governing inlet control plus the controlling water surface elevation at the outlet and the slope, length, and roughness of the culvert barrel. Culverts operating in outlet control may flow full at flooded. Depending on various combinations of the above factors. In outlet control, factors that may affect performance appreciably for a given culvert size and headwater are berrel length, roughness and tailwater depth.

The type of outlet is hand placed "RIP-RAP" stone masonry head wall and wing wall apron beside, rip-rap side ditch provide a prevent to erosion due to becomes high velocity when during flooded outlet portion.

TABLE VALUES of n. to be used MANNING FORMULAS

Surface	Rough coefficient		
	Min	Normal	Max
1. Pipes			
- Steel			
• Welding joints	0.010	0.012	0.014
• Mechanical joints	0.013	0.016	0.017
- Cast iron			
• With the bitum surface	0.010	0.013	0.014
• Without the bitum surface	0.011	0.015	0.016
- Concrete Pipe	0.012	0.014	0.016
2. Ditche			
- Earth, straight and uniform	0.016	0.018	0.020
- Rock cut, smooth and uniform	0.025	0.030	0.033
- Ground with dense grass	0.030	0.035	0.040
- Cement-lined channels	0.012	0.014	0.016
- Ground with gravel	0.022	0.027	0.033
- Steel with paint surface	0.012	0.013	0.017
- Steel with non-paint surface	0.011	0.012	0.014
- Concrete with flat surface	0.017	0.020	-
- Concrete with non-flat surface	0.022	0.027	-

Calculation of Overland Flowtime
Rainfall Duration Intensity Relation for Can Tho

Duration (mm)	(a) Intensities, I (mm/h) Average Recurrence Interval						
	1	2	5	10	20	50	100
5	105	140	175	200	215	240	250
6	102	136	171	194	209	234	245
7	99	132	167	188	203	228	240
8	96	128	163	182	197	222	235
9	93	124	159	176	191	216	230
10	90	120	155	170	185	210	225
15	85	108	135	150	162	172	185
20	76	95	122	133	143	158	165
30	58	76	100	110	120	137	145
60	42	54	72	81	90	110	105

Duration (mm)	(b) Values of $t.I^{0.4}$ coresponding to Above Intensities Average Recurrence Interval (years)						
	1	2	5	10	20	50	100
5	32	36	40	42	43	45	46
6	38	43	47	50	51	53	54
7	44	49	54	57	59	61	63
8	50	56	61	64	66	69	71
9	55	62	68	71	74	77	79
10	60	68	75	78	81	85	87
15	88	97	106	111	114	117	121
20	113	123	136	141	145	151	154
30	152	169	189	196	204	214	219
60	267	296	332	348	363	378	386

PART 1 DESIGN REPORT

SECTION 3 PUBLIC TOILET

I. Design Standard of Public Toilets

1.1 Public Toilets

The public toilet was calculated due to the standard of 25 people per toilet and urinal

It requires the number of 7 toilets and 3 bathrooms for woman and 7 toilets and one urinal for man, these public toilets are to be serve of 300-350 people in the resettlement area for Binh Minh and Chau Thanh. In addition, it also designs wash baisn for households who want to take a path and wash their clothes at the public toilets.

The public toilets are constructed by class IV structure with brick walls 10cm thickness, mortar cement M75 and 2cm thickness, corrugated iron roof, enamelled tiled toilet room floor, clay tiled yard floor. The septic tank to be installed near the public toilet, with 3m width approch to inner road for vacuum of waste materials of sediment tank and replace filter materials of treatment tank.

1.2 Septic tank

The design is studies based on the Technical Standard of Vietnam TCVN 4448-1987, according to the standard of waste quantity was calculated by 200-300 liters for each person per year. The average quantity is estimated about 250 liters/person/year. The capacity of septic tank will have 200-250 people with the volume of 55.74 m^3 (4.5mx7.5x2m) is consist of sediment tank, filter tank, dosing tank, and replacing filter materials a minimum one time per year.

The septic tank is to be constructed by reinforced concrete structures in the following dimensions:

- Walls thickness is 20cm.
- Bottom slab thickness is 25cm to be put under the aggregate concrete layer 4x6 M100.
- Top slab is 10cm thickness.
- Inside wall thickness is 20cm with motar cement M100, 2cm thickness.

The septic tank is designed of waste materials under the self-destroying system of sanitary sewer convey by a 150mm pipe from the public toilets to tank, the waste materials will settle down into sediment tank. Because of the effect of waste materials bacterium, the big sediments themselves will ferment, be oxydate, the harmful bacillus will be destroyed. After that (about 6-18 months) the sediments will be disintegrated into mud and water in which the volume will be reduced. After treated water will flow into ditches, the remaining sediments in the water will continue to settle down, and through filter part, after flowing to material layer, the small sediments will be entirely kept, and water flows into the manhole and drained off to the drainage system.

Because the underground water at the Vinh Long and Can Tho areas is very high, in order to ensure the drainage level of the septic tank suitable to the drainage in outside of the resettlement area. The filter part will use the back filtering method for the active coal arranged in order from up to down with size from small to big one on the reinforced concrete slab to be bored a hole with ϕ50mm (referred the details of drawing).

PART 1 DESIGN REPORT

SECTION 4 WATER DISTRIBUTION SYSTEM

I. CLEAN WATER DEMAND

1.1 Criteria for clean water demand calculation

1.1.1 Planned population to be supplied

The number of households to be resettled to new residential sites is as follows: Binh Minh site- 149. Hung Phu site- 22 and Chau Thanh site- 57 households. On the basis of an average household size of 7 persons/household for suburban/country areas, the population to be resttled to new residential sites will be: Binh Minh site- 1043 persons, Hung Phu site- 154 persons and Chau Thanh site- 399 persons.

In. accordance with Vietnamese standard new water supply systems should be planned for a period of at least 10 years. It means the water supply systems should be designed to meet the water demand on the year 2010.

The planned population to the year 2010 can be estimated basing on present population and yearly average increase of population within the areas. Forecast of population growth in the Mekong Delta area shows that yearly average growth rate of population for the period 2000-2010 will be about 2% in the country areas. Therefor the planned population to the year 2010 will be 1400 persons in Binh Minh area, 190 persons in Hung Phu and 480 persons in Chau Thanh area.

1.1.2 Specific average domestic water demand and service ratio

With the reference on the "National Water Supply Strategy up to the year 2020", "Vietnam Construction Codes" issued by Ministry of Construction in 1997 and actual conditions of the Can Tho and Vinh Long areas, a specific average domestic water demand of 100 l/c/d and a service ratio (population connected to the clean water supply network) of 100% will be applied.

1.1.3 Water demand of non-domestic consumers

The non-domestic water consumers in the new residential areas may be small commercial services, handicraft activities and public users (including water using for public toilets, plants irrigation, road washing, etc.). Alongwith the growth up population and socio-economic development, the water demand of this groups of consumers will be chanced remarkable. It is therefor very difficult to meet an accurate planning of this demand. Basing on Vietnam Construction Codes, water demand of non-domestic consumers can be estimated as 30% of domestic water demand.

1.1.4 Water loss in the water distribution network

The water loss depends on the status of the water distribution network (WDN). For the new-constructed water network, the water loss can be 10% of total capacity of the water distribution network.

1.1.5 Water use within the water treatment plant

A ratio of 5% of water treatment plant capacity can be applied for the water use within the water treatment plant (filter backwash, service water, etc.)

1.2 Clean water demand and capacity of water treatment plant

The clean water demand and capacity of water treatment plant (WTP) will be estimated on basis of the above accepted criteria. The results are shown in the below table.

Description	Unit	Binh Minh site	Hung Phu site	Chau Thanh site
Domestic water demand	m3/d	140	19	48
Non-domestic water demand	m3/d	42	6	14
Total water demand	**m3/d**	**182**	**25**	**62**
Water loss in WDN	m3/d	18	3	7
Water use within WTP	m3/d	10	2	4
Capacity of WTP	**m3/d**	**210**	**30**	**75**

II. SELECTION OF RAW WATER SOURCE

2.1 At Binh Minh site (Vinh Long province)

The potential raw water sources supplying to Binh Minh site are:

- Underground water
- Tra On river water

At Binh Minh site there is lack of sufficient investigation required for a reliable assessment of the underground water resources and their quality. According to the Hydrogeology group No. 8, almost underground water sources in Vinh Long province are salty. Fresh water is only found in the Northern area of Vinh Long province and My Thuan ferry-boat area at the depth of above 350m. For these above reasons, underground water may not be considered as a source of water supply for the Binh Minh site.

Tra On river- tributary of Hau river may be selected as a raw water source for Binh Minh resettlement site. Although water quality of Tra On river is not as good as that of Hau river but its pollution (wastewater and solid wastes from Cai Von district town and people living along both river banks) still remains within the allowable limits of a surface water source using for water supply purpose.

2.1 At Hung Phu and Chau Thanh sites (Can Tho province)

The potencial raw water sources supplying to Hung Phu and Chau Thanh sites are:

- Underground water
- Hau river water

- Can Tho river water
- Ba Lang river

The results of water analysis, continuously performed over a long period by the Laboratory of Can Tho Water Treatment Plant No.1 and the Can Tho Preventive Medicine Center show that Can Tho river water quality is not good. It is polluted by the wastewater and solid wastes from Can Tho city. Turbidity and total suspended solids are usually high. In addition, according to the reports of the Public Medicine and Hygiene Institute, Pasteur Institute and Department of Medicine of Can Tho province, water of Can Tho river is polluted by Coliforms, E-coli and pestisides. The water treatment process adopted to treat polluted water of Can Tho river will be complex and expensive. For that reason, water of Can Tho river will be not recommended to use as a raw water source for Hung Phu water supply system. For the same reason, the Ba Lang river water will not be recommended as a raw water source using for Chau Thanh site.

According to the report of Southern Hydraulic Planning Sub-institute and the results of analysis of Hau river water taken near the raw water pumping station of existing Can Tho Water Treatment Plant No.2, the water quality of Hau river is quite good. In the rainy season total suspended solids may reach 150 mg/l and total iron content may be up to 14mg/l.

Investigation report of the Hydrogeology group No.8 shows that underground water resources at Can Tho city and its surroundings (including Hung Phu and Chau Thanh areas) are quite good. There are 3 potential formations: Pleistocene at 80-120m depth, Pliocene at 180-200m depth and Miocene at 350-400m depth. The water quality of the sources may vary from well to well but it is uasually not too bad. It requires normal treatment (iron removal, pH adjustment and disinfection) before use.

In comparison with Hau river water source, the use of underground water as a raw water sources for Hung Phu and Chau Thanh water supply systems will have many advantages: investment and operation costs are lower, operation of water treatment plant is easier (remote control is not required), construction time is shorter.

III. DESIGN CONDITTIONS AND CRITERIA

3.1 Design and operating philosophy

All water treatment facilities shall be designed to operate on a 24 hours per day basis at constant flow rate.

The main parameters of raw water turbidity, colour, conductivity, pH, total iron, manganese and organic content shall be checked and recorded daily. Other parameters (ammonia, hardness, nitrate, nitrite) will be checked weekly.

Chemical dosing requirements for water treatment process (aluminium sulphate for coagulation, lime for pH adjustment and chlorine gas for disinfection) will be determined daily by laboratory analysis of clarified and final treated water quality and the appropriate dosing rates set manually.

Following disinfection (chlorination) treated water will be stored in ground water storage tank. This tank will provide sufficient contact time for disinfection as well as for fire fighting water storage. Elevated water tank will be also provided in each site. This will be used to provide gravity flow to the water distribution network. Volume of elevated tank shall be sufficient for reserve of water in the case of failures of power supplies and also to provide a filter backwash water storage.

Raw water pump(s) will operate automatically in response to water level signals from ground water storage tank. Treated water pump(s) operates automatically on receipt of water level signals from elevated tank. However the pump control system shall be designed so that it can be changed into manual control regime.

3.2 Design input flow of water treatment plants

All treatment plants shall be capable of producing treated water to the specified quality standard, throughout the specified range of raw water qualities, at the following design input flowrates:

- Binh Minh WTP : 9 m3/h
- Hung Phu WTP : 1.5 m3/h
- Chau Thanh WTP : 3.5 m3/h

3.3 Raw water quality to be treated

At Binh Minh site, the raw water quality to be treated is as follows:

pH	: 6.8 - 7.2
Suspended solids	: 40 - 150 mg/l
Total alkalinity	: 60 - 70 mg/l CaCO3
Total hardness	: < 120 mg/l CaCO3
Organic matters	: < 5 mg/l O2

At present time, the report on quality of well water at Hung Phu and Chau Thanh sites is not available. However the results of analysis of existing well water drilled in the surrouding areas (including UNICEF drilled wells) show that the water quality of wells drilled to a depth of 100-150m is not bad. It usually requires iron removal, pH adjustment and disinfection.

3.4 Treated water quality requirements

The treated water shall comply with the Vietnamese Standards for drinking water issued by Ministry of Medicine on 13/4/1992. Details of these standards are provided in Appendix 1 and Appendix 2.

IV. DESIGN OF WATER SUPPLY SYSTEMS

4.1 Water treatment plants

4.1.1 Water treatment processes

4.1.1.1 Water treatment plant at Binh Minh site

The raw water source will be Tra On river. The following water treatment process may be apopted:

- Water intake and raw water pumps
- Raw water transmittion pipelines
- Chemical coagulation and flocculation
- Sedimentation (or filtration with floating media)
- pH adjustment
- Gravity sand filtration
- Disinfection

4.1.1.2 Water treatment plants at Hung Phu and Chau Thanh sites

The raw water source will be deep well water. The following water treatment process may be adopted for both sites:

- Deep weels
- Weel water pumps
- Aeration
- pH adjustment
- Chemical coagulation and flocculation
- Sedimentation (or filtration with floating media)
- Gravity sand filtration
- Disinfection

In case the iron content is less than 10 mg/l, the chemical sedimentation may be not used.

Aluminium sulphate will be used for coagulation and flocculation. pH adjustment will be achieved using lime. Disinfection will be by chlorine gas.

Lamella clarifier will be used for sedimentation. Filtration with floating media was used effectively and economically in many water treatment plants installed in Mekong Delta area. This type of filtartion is fluently designed and constructed by the local water specialized companies such as the Water and Sanitation Engineering Consultants (WASE), Water and Sewerage Construction Company (WASECO), Water Construction Co., Ltd. (WACO) and even Can Tho Water Supply Company can design and construct this type of filter.

4.1.2 Sizing of water treatment facilities

4.1.2.1 Water traetment facilities at Binh Minh site

(i) Water intake and raw water pumps

Raw water intake pipes:	2
Diameter of pipe:	50 mm
Number of raw water pumps:	2 (1 stand-by)
Flowrate/Head:	9 m3/h, 45 m
Power supply:	50 Hz, 3 phases, 380 V, 3 Kw

(ii) Raw water transmittion pipelines

Velocity minimum:	0.3 m/s
Diameter maximum:	DN80
Length	~ 500 m

(iii) In-line static mixer

Diameter:	DN80
Mixing time:	1 - 3 mn.

(iv) Coagulation and flocculation tank

Number of tanks:	1
Retention time:	20 mn.
Volume of tank:	3.0 m3

(v) Lamella clarifier / Filter with floating media

Number of clarifiers:	1
Design flowrate:	9.0 m3/h
Surface loading rate:	4.0 m/h
Surface area:	2.25 m2
Length x Width:	2.25 x 1.0 m
Height:	3.5 m

In case of using filter with floating media:

Number of filters:	1
Design flowrate:	9.0 m3/h
Surface loading rate:	4.5 m/h
Surface area:	2.0 m2
Diameter of filter:	1.6 m
Height:	3.2 m

(vi) Gravity sand filter

Number of filters:	1
Design flowrate:	9.0 m3/h
Surface loading rate:	5.0 m/h
Surface area:	1.8 m2
Diameter of filter:	1.5 m
Height:	3.0 m

(vii) Treated water pumps (TWP)

Number of TWPs:	2 (1 stand-by)
Flowrate/Head:	9 m3/h, 25 m
Power supply:	50 Hz, 3 phases, 380 V, 2.2Kw

(viii) Alum dosing system

Number of dissolving tanks:	2
Volume of each tank:	100 liters
Number of dosing pumps:	2 (1 stand-by)
Capacity of dosing pump:	0 - 8 l/h

(ix) Lime dosing system

Number of slaking tanks:	1
Volume of slaking tank:	100 liters
Number of slurry tanks:	1
Volume of slurry tank:	100 liters
Number of dosing pumps:	2 (1 stand-by)
Capacity of dosing pump:	0 - 3 l/h

(x) Chlorine gas dosing system

Number of chlorinators:	2 (1 stand-by)
Capacity of each chlorinator:	0 - 1 kg/h
Chlorine gas drums:	2 drums x 60 kg/drum
Motive water pump:	1 unit, capacity 300 l/h, head 45 m

(xi) Instrumentation and control system

Flowmeters:	2
Pressure gauges:	8
Level meters:	2

(xii) Electrical system

1 power and control cabinet for river water pumps
1 power and control cabinet for treated water pumps
1 power and control cabinet for chemical building (mixers, dosing pumps, etc.)
1 control desk for filter
Lighting and service electrical system
Stand-by power generator 10 Kva

(xiii) Interconnecting pipework

1 set of uPVC / steel intercinnecting pipework including pipe fittings and valves

4.1.2.2 Water traetment facilities at Hung Phu and Chau Thanh sites

(i) Deep well and well water pumps

- At Hung Phu site

Number of well drilled:	1
Stable capacity of well:/ Depth	1.5 m3/h / 100 - 150 m
Number of well water pumps:	2 (1 stand-by)
Flowrate/Head:	1.5 m3/h, 10 m max.
Power supply:	50 Hz, 1 phase, 220 V, 0.75 kW

- At Chau Thanh site

Number of well drilled:	1
Stable capacity of well:/ Depth	3.5 m3/h / 100 - 150m
Number of well water pumps:	2 (1 stand-by)
Flowrate/Head:	3.5 m3/h, 10 m max.
Power supply:	50 Hz, 1 phase, 220 V, 1.1 kW

(ii) Well water transmittion pipelines

- At both Hung Phu and Chau Thanh side

Diameter maximum:	DN50
Material:	uPVC

(iii) Aerator

- At Hung Phu site

Surface loading rate:	5 m3/m2/h
Surface area:	0.3 m2

- At Chau Thanh site

Surface loading rate:	5 m3/m2/h
Surface area:	0.7 m2

(iv) Coagulation and flocculation tank

- At Hung Phu site

Number of tanks:	1
Retention time:	20 mn.
Volume of tank:	0.5 m3

- At Chau Thanh site

Number of tanks:	1
Retention time:	20 mn.
Volume of tank:	1.2 m3

(v) Lamella clarifier / Filter with floating media

- At Hung Phu site

Number of clarifiers:	1
Design flowrate:	1.5 m3/h
Surface loading rate:	2.5 m/h
Surface area:	0.6 m2
Length x Width:	1.0 x 0.6 m
Height:	3.5 m

In case of using filter with floating media:

Number of filters:	1
Design flowrate:	1.5 m3/h
Surface loading rate:	5.0 m/h
Surface area:	0.3 m2
Diameter of filter:	0.6 m
Height:	3.2 m

- At Chau Thanh site

Number of clarifiers:	1
Design flowrate:	3.5 m3/h
Surface loading rate:	2.5 m/h
Surface area:	1.4 m2
Length x Width:	1.4 x 1.0 m
Height:	3.5 m

In case of using filter with floating media:

Number of filters:	1
Design flowrate:	3.5 m3/h
Surface loading rate:	5.0 m/h
Surface area:	0.7 m2
Diameter of filter:	0.95 m
Height:	3.2 m

(vi) Gravity sand filter

- At Hung Phu site

Number of filters:	1
Design flowrate:	1.5 m3/h
Surface loading rate:	5.0 m/h
Surface area:	0.3 m2
Diameter of filter:	0.6 m
Height:	3.0 m

- At Chau Thanh site

Number of filters:	1
Design flowrate:	3.5 m3/h
Surface loading rate:	5.0 m/h
Surface area:	0.7 m2
Diameter of filter:	0.95 m
Height:	3.0 m

(vii) Treated water pumps (TWP)

- At Hung Phu site

Number of TWPs:	2 (1 stand-by)
Flowrate/Head:	1.5 m3/h, 20 m
Power supply:	50 Hz, 1 phase, 220 V, 0.75 kW

- At Chau Thanh site

Number of TWPs:	2 (1 stand-by)
Flowrate/Head:	3.5 m3/h, 20 m
Power supply:	50 Hz, 1 phase, 220 V, 1.1 kW

(viii) Alum dosing system

- At Hung Phu site

Number of dissolving tanks:	2
Volume of each tank:	50 liters
Number of dosing pumps:	2 (1 stand-by)
Capacity of dosing pump:	0 - 2 l/h

- At Chau Thanh site

Number of dissolving tanks:	2
Volume of each tank:	50 liters
Number of dosing pumps:	2 (1 stand-by)
Capacity of dosing pump:	0 - 4 l/h

(ix) Lime dosing system

- At Hung Phu site

Number of slaking tanks:	1
Volume of slaking tank:	50 liters
Number of slurry tanks:	1
Volume of slurry tank:	50 liters
Number of dosing pumps:	2 (1 stand-by)
Capacity of dosing pump:	0 - 1 l/h

- At Chau Thanh site

Number of slaking tanks:	1
Volume of slaking tank:	50 liters
Number of slurry tanks:	1
Volume of slurry tank:	50 liters
Number of dosing pumps:	2 (1 stand-by)
Capacity of dosing pump:	0 - 2 l/h

(x) Chlorine gas dosing system

- At Hung Phu site

Number of chlorinators:	2 (1 stand-by)
Capacity of each chlorinator:	0 - 1 kg/h
Chlorine gas drums:	2 drums x 60 kg/drum
Motive water pump:	1 unit, capacity 50 l/h, head 45 m

- At Chau Thanh site

Number of chlorinators:	2 (1 stand-by)
Capacity of each chlorinator:	0 - 1 kg/h
Chlorine gas drums:	2 drums x 60 kg/drum
Motive water pump:	1 unit, capacity 100 l/h, head 45 m

(xi) Instrumentation and control system

- At each of Hung Phu and Chau Thanh sites

Flowmeters:	2
Pressure gauges:	8
Level meters:	2

(xii) Electrical system

- At each of Hung Phu and Chau Thanh sites

1 power and control cabinet for river water pumps
1 power and control cabinet for treated water pumps
1 power and control cabinet for chemical building (mixers, dosing pumps, etc.)
1 control desk for filter
Lighting and service electrical system
Stand-by power generator 5 kVA

(xiii) Interconnecting pipework

- At each of Hung Phu and Chau Thanh sites

1 set of uPVC / steel intercinnecting pipework including pipe fittings and valves

4.2 Ground water storage tank

The ground water storage tank will be designed to provide a 60 minutes chlorine contact at design flow of WTP. In adittion, it will reserve water for fire fighting with a flowrate of 10 l/s (for Binh Minh site) and 5 l/s (for Hung Phu and Chau Thanh sites) for a duration of 3 hours.

- At Binh Minh site
  Volume of tank: 120 m3

- At Hung Phu site
  Volume of tank: 60 m3

- At Chau Thanh site
  Volume of tank: 60 m3

4.3 Elevated water tank

Elevated water tank will be to provide gravity flow to the water distribution network. Volume of elevated tank shall be sufficient for reserve of water in the case of failures of power supplies or damages in the water supply system and also to provide a filter backwash water storage.

- At Binh Minh site:

Volume of tank:	60 m3
Diameter of tank:	4.6 m
Height of tank:	3.6 m
Height of footings:	16.0 m

- At Hung Phu site:

Volume of tank:	20 m3
Diameter of tank:	3.2 m
Height of tank:	2.5 m
Height of footings:	12.0 m

- At Chau Thanh site:

Volume of tank:	40 m3
Diameter of tank:	4.0 m
Height of tank:	3.2 m
Height of footings:	14.0 m

4.4 Distribution piping network

According to Japanese Standard, the cast iron or ductile iron pipes will be used for distribution network. However, the Vietnamese standard allows to use uPVC pipes.

- At Binh Minh site

DN150	Total length:	m
DN100	Total length:	m
DN80	Total length:	m

- At Hung Phu site

DN80	Total length:	m
DN50	Total length:	m

- At Chau Thanh site

DN100	Total length:	m
DN80	Total length:	m

ANNEX 1

HYGIENNIC CRITERIA FOR DRINKING WATER ON PHYSICAL - CHEMICAL ASPECTS

(The temporary criteria issued according to the Decision N° 505 BYT/QĐ dated 13.4.1992)

N°	Parameter	Unit	Urban area	Country side
1	Clearness Sneller*	cm	> 30	> 25*
2	Colour	Degree	< 10	< 10
3	Odour, Taste	Point	0	0
4	Suspended solid	mg/l	5	20
5	Total dry solid	mg/l	500	1000
6	pH	-	6.5 - 8.5	6.5 - 8.5
7	Hardness	mg/l	500	500
8	Clorides (Cl^-) - Coastal area - Inland	 mg/l mg/l	 400 250	 500 250
9	Oxidation (Organic)	mg/l	0.5 - 2.0	2.0 - 4.0
10	Ammonium - Surface water - Ground water	 mg/l mg/l	 0 3.0	 0 3.0
11	Nittrites (NO_2^-)	mg/l	0	0
12	Nittrats (NO_3^-)	mg/l	10.0	10.0
13	Aluminium (Al)	mg/l	0.2	0.2
14	Copper (Cu)	mg/l	1.0	1.0
15	Iron (Fe)	mg/l	0.3	0.5
16	Maganese (Mn)	mg/l	0.1	0.1
17	Sodium (Na)	mg/l	200	200
18	Sulfates (SO_4)	mg/l	400	400
19	Zinc (Zn)	mg/l	5.0	5.0
20	Hydrogen sulfide (S)	mg/l	0	0

* Equivalent to the turbidity of 5 NTU or 5 mg/l SiO_2

Received 14/15
3rd Jan. '07
Mr. Cu 8:30 AM
in office.

ANNEX 2

HYGIENNIC CRITERIA FOR DRINKING WATER ON MICROBIOLOGICAL AND CREATURAL ASPECTS

(The temporary criteria issued according to the Decision N° 505 BYT/QĐ dated 13.4.1992)

N°	Parameters	Unit	Value	Remark
I	MICROBIOLOGICAL CRITERIA			
	A. Water supplied by piping system			
	A1. Treated water in network			Turbidity 1 NTU
	- Faecal coliforms /100 ml		0	- Desinffection with Chlorine, pH = 8.0
	- Coliform organisms /100 ml		0	- Contacting time 30 min and residual Chlorine 0.2 - 0.5 mg/l
	A2. No treatment performed in network			
	- Faecal Coliforms/100 ml		0	- With 98% admissible samples a year
	- Coliform organisms/100 ml		< 3	- Occationally
	A3. Water in the network			
	- Faecal Coliforms/100 ml		0	- With 98% admissible samples a year
	- Coliform organisms/100 ml		< 3	- Occationally
	B. Water supplied without piping system			
	- Faecal Coliforms/100 ml		0	- Not often. And if it is often, a sanitary check and water source protection measurement should be taken.
	- Coliform organisms/100 ml		10	
	C. Bottled water			
	- Faecal Coliforms/100 ml		0	
	- Coliform organisms/100 ml		0	
	D. Emergency water supply system			
	- Faecal Coliforms/100 ml		0	In case of emergency water should be boiled.
	- Coliform organisms/100 ml		0	
II	CREATURAL CRITERIA			
	- Protozoa		0	
	- Helminths		0	
	- Zoo plankton and algae		0	

PART 1 DESIGN REPORT

SECTION 5 DRAINAGE SYSTEM CALCULATION SHEET

COMPUTING THE PEAK RUNOFF OF STORM WATER & SEWAGE - BINH MINH

1 The peak runoff discharge of storm water is determined by following equation:

a - Based on Vietnam Standard " Design standard drainage out side system and works "

$$Q_1 = \boxed{C \times q_1 \times A} \quad \text{(Liter/second)}$$

Where:

A : Area of watershed = $A_1 + A_2$ (Ha)

A_1 : Grass area (Ha)

A_2 : Sidewalk (Concrete), AC pavement & Houses: (Ha)

C : Runoff coefficient = $\boxed{\dfrac{(C_1 \times A_1 + C_2 \times A_2)}{A_1 + A_2}}$

C_1 : runoff coefficient of grass

C_2 : runoff coefficient of House, Sidewalk or Ac pavement.

$$q_1 = \boxed{166.7 \times q} \text{(Liter/second/hecta)}$$

q : Rainfall intensity is decided 10 year frequency return period.
rainfall intensity refer to record on site attached (mm/minute)

b - Based on Japan Standard.

$$Q1 = \frac{1}{3.6 \times 10^6} C \times I \times A \quad (m^3/\text{second})$$

Where

A : Area of watershed = $A_1 + A_2$ (m^2)

A_1 : Grass area (m^2)

A_2 : Sidewalk (Concrete), AC pavement & Houses: (m^2)

C : Runoff coefficient = $\boxed{\dfrac{(C_1 \times A_1 + C_2 \times A_2)}{A_1 + A_2}}$

C_1 : runoff coefficient of grass

C_2 : runoff coefficient of House, Sidewalk or Ac pavement.

I : Rainfall intensity is decided 10 year frequency return period.
rainfall intensity (refer to record on site attached I= 81mm/hr)

2 The discharge of sewage:

Q_2 = (Number of house in watershed area) x $0.001 m^3$ / sec/ house

3 Total discharge :

$$Q = \boxed{Q_1 + Q_2} \, (m^3/\text{Sec})$$

COMPUTING HYROLOGY & HYDRAULIC OF DRAINAGE STORM WATER AND SEWAGE SYTEM - BINH MINH

Start	End	Symbol	Check	Computing hydrology										Computing Hydraulic			
				Storm water								Sewage	Discharge	Section of ditch			
				t	I	A	A1	A2	C1	C2	Q_1	Q_2	Q	W x H	I	Q	V
		Computed areas	Point	Minute	(mm/h)	m^2	m^2	m^2			m^3/s	m^3/s	m^3/s	mm	o/o	m^3/s	m/s
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Start	**1**	**1**	**1**	5	200	1273.38	350.00	923.38	0.4	1	0.059	0.004	0.063	**400x250**	0.20	0.074	0.738
Start	**2**	**1 + 2**	**2**	10	170	3644.75	1080.00	2564.75	0.4	1	0.142	0.012	0.154	**400x550**	0.30	0.163	1.021
Start	**3**	**3**	**3**	5	200	1273.38	350.00	923.38	0.4	1	0.059	0.004	0.063	**400x250**	0.20	0.074	0.738
Start	**4**	**3 + 4**	**4**	10	170	3644.75	1080.00	2564.75	0.4	1	0.142	0.012	0.154	**400x550**	0.30	0.163	1.021
			2 +4										**0.307**	**D 600**	0.30	0.312	1.105
Start	**5**	**5**	**5**	5	200	1098.00	360.00	738.00	0.4	1	0.049	0.004	0.053	**300x300**	2.30	0.087	1.926

2/19

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0020				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.5681	m/s			
7. Discharge Max Q = A x V	0.0256	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.6958	m/s			
7. Discharge Max Q = A x V	0.0313	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8983	m/s			
7. Discharge Max Q = A x V	0.0404	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0140				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.5031	m/s			
7. Discharge Max Q = A x V	0.0676	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0230				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.9265	m/s			
7. Discharge Max Q = A x V	0.0867	m^3/s			

3/19

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	300
1. Area of ditch A = W x H	0.0900	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1000	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0020				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.6882	m/s			
7. Discharge Max Q = A x V	0.0619	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	250
1. Area of ditch A = W x H	0.0750	m^2			
2. Perimeter of ditch X = W + 2 x H	0.8000	m			
3. Hydraulic radius R = A/X	0.0938	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8074	m/s			
7. Discharge Max Q = A x V	0.0606	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	250
1. Area of ditch A = W x H	0.0750	m^2			
2. Perimeter of ditch X = W + 2 x H	0.8000	m			
3. Hydraulic radius R = A/X	0.0938	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0423	m/s			
7. Discharge Max Q = A x V	0.0782	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	300
1. Area of ditch A = W x H	0.0900	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1000	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0020				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.6882	m/s			
7. Discharge Max Q = A x V	0.0619	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	300
1. Area of ditch A = W x H	0.0900	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1000	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8429	m/s			

7. Discharge Max Q = A x V 0.0759 m^3/s

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	300
1. Area of ditch A = W x H	0.0900	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1000	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0882	m/s			
7. Discharge Max Q = A x V	0.0979	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			400	x	250
1. Area of ditch A = W x H	0.1000	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1111	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0020				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.7383	m/s			
7. Discharge Max Q = A x V	0.0738	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			400	x	300
1. Area of ditch A = W x H	0.1200	m^2			
2. Perimeter of ditch X = W + 2 x H	1.0000	m			
3. Hydraulic radius R = A/X	0.1200	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.9518	m/s			
7. Discharge Max Q = A x V	0.1142	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			400	x	350
1. Area of ditch A = W x H	0.1400	m^2			
2. Perimeter of ditch X = W + 2 x H	1.1000	m			
3. Hydraulic radius R = A/X	0.1273	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0020				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8082	m/s			
7. Discharge Max Q = A x V	0.1132	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			400	x	350
1. Area of ditch A = W x H	0.1400	m^2			
2. Perimeter of ditch X = W + 2 x H	1.1000	m			
3. Hydraulic radius R = A/X	0.1273	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				

6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$ 0.9899 m/s
7. Discharge Max $Q = A \times V$ 0.1386 m^3/s

HYDRAULIC DISCHANGE

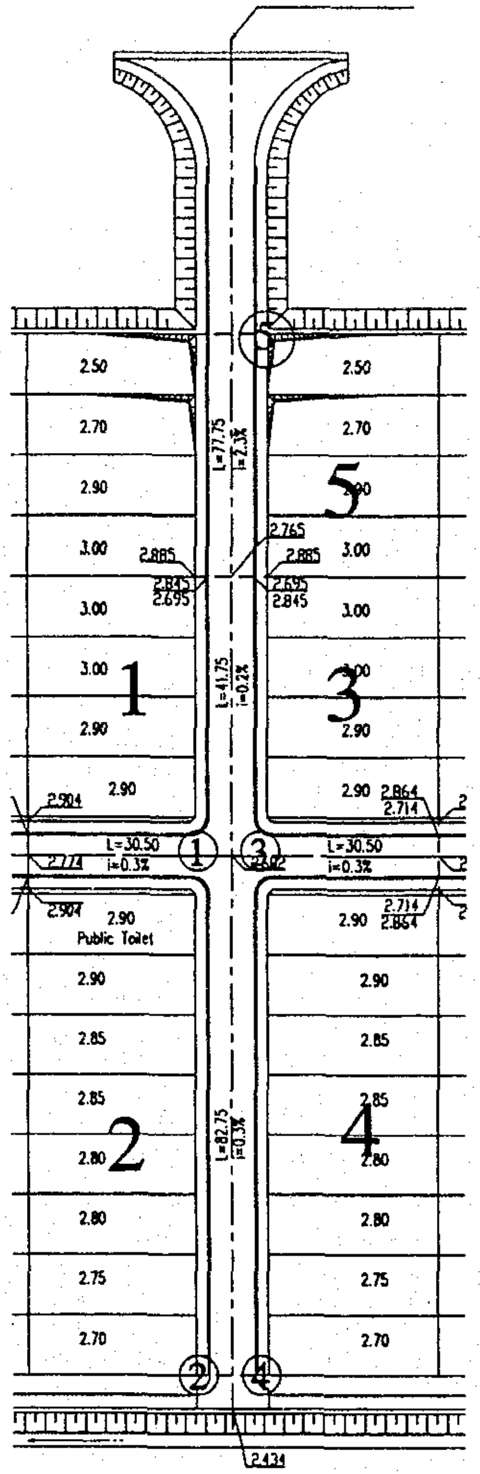
			W (mm)		H (mm)
			400	x	350
1. Area of ditch $A = W \times H$	0.1400	m^2			
2. Perimeter of ditch $X = W + 2 \times H$	1.1000	m			
3. Hydraulic radius $R = A/X$	0.1273	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.2780	m/s			
7. Discharge Max $Q = A \times V$	0.1789	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			400	x	400
1. Area of ditch $A = W \times H$	0.1600	m^2			
2. Perimeter of ditch $X = W + 2 \times H$	1.2000	m			
3. Hydraulic radius $R = A/X$	0.1333	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0211	m/s			
7. Discharge Max $Q = A \times V$	0.1634	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			400	x	400
1. Area of ditch $A = W \times H$	0.1600	m^2			
2. Perimeter of ditch $X = W + 2 \times H$	1.2000	m			
3. Hydraulic radius $R = A/X$	0.1333	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.3182	m/s			
7. Discharge Max $Q = A \times V$	0.2109	m^3/s			



L=77.75
i=2.3%
L=41.75
i=0.2%
L=30.50
i=0.3%
L=82.75
i=0.3%
2.765
2.885
2.845
2.695
2.904
2.774
2.864
2.714
2.434
Public Toilet
2.50
2.70
2.90
3.00
2.85
2.80
2.75
1
2
3
4
5

COMPUTING THE PEAK RUNOFF OF STORM WATER & SEWAGE - CHAU THANH

1 The peak runoff discharge of storm water is determined by following equation:

a - Based on Vietnam Standard " Design standard drainage out side system and works "

$$Q_1 = \boxed{C \times q_1 \times A} \quad \text{(Liter/second)}$$

Where:

A : Area of watershed = $A_1 + A_2$ (Ha)

A_1 : Grass area (Ha)

A_2 : Sidewalk (Concrete) , AC pavement & Houses: (Ha)

C : Runoff coefficient = $\boxed{\dfrac{(C_1 \times A_1 + C_2 \times A_2)}{A_1 + A_2}}$

C_1 : runoff coefficient of grass

C_2 : runoff coefficient of House, Sidewalk or Ac pavement.

$$q_1 = \boxed{166.7 \times q} \text{ (Liter/second/hecta)}$$

q : Rainfall intensity is decided 10 year frequency return period.

rainfall intensity refer to record on site attached (mm/minute)

b - Based on Japan Standard.

$$Q1 = \frac{1}{3.6 \times 10^6} C \times I \times A \quad (m^3 / \text{second})$$

Where

A : Area of watershed = $A_1 + A_2$ (m^2)

A_1 : Grass area (m^2)

A_2 : Sidewalk (Concrete) , AC pavement & Houses: (m^2)

C : Runoff coefficient = $\boxed{\dfrac{(C_1 \times A_1 + C_2 \times A_2)}{A_1 + A_2}}$

C_1 : runoff coefficient of grass

C_2 : runoff coefficient of House, Sidewalk or Ac pavement.

I : Rainfall intensity is decided 10 year frequency return period.

rainfall intensity (refer to record on site attached I= 81mm/hr)

2 The discharge of sewage:

Q_2 = (Number of house in watershed area) $0.001 m^3$ / sec/ house

3 Total discharge :

$$Q = \boxed{Q_1 + Q_2} \text{ (} m^3\text{/Sec)}$$

8/1c

COMPUTING HYROLOGY & HYDRAULIC OF DRAINAGE STORM WATER AND SEWAGE SYTEM - CHAU THANH

				Computing hydrology										Computing Hydraulic			
				Storm water								Sewage	Discharge	Section of ditch			
Start	End	Symbol	Check	t	I	A	A1	A2	C1	C2	Q_1	Q_2	Q	W x H	I	Q	V
		Computed areas	Point	Minute	(mm/h)	m^2	m^2	m^2			m^3/s	m^3/s	m^3/s	mm	o/oo	m^3/s	m/s
1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	2	A1	1	5	200	809.38	200.00	609.38	0.4	1	0.038	0.003	0.041	300x400	5.0	0.078	1.042
1	2	A1 + A2	2	10	170	1789.38	480.00	1309.38	0.4	1	0.071	0.006	0.077	300x400	5.0	0.078	1.042
4	3	A3	1	5	200	472.50	105.00	367.50	0.4	1	0.023	0.001	0.024	300x300	5.0	0.040	0.898
4	3	A3 + A4	2	5	200	1229.38	320.00	909.38	0.4	1	0.058	0.004	0.062	300x400	5.0	0.078	1.042

9/10

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.6958	m/s			
7. Discharge Max Q = A x V	0.0313	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0038				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.7820	m/s			
7. Discharge Max Q = A x V	0.0352	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8983	m/s			
7. Discharge Max Q = A x V	0.0404	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	150
1. Area of ditch A = W x H	0.0450	m^2			
2. Perimeter of ditch X = W + 2 x H	0.6000	m			
3. Hydraulic radius R = A/X	0.0750	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0100				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.2703	m/s			
7. Discharge Max Q = A x V	0.0572	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	250
1. Area of ditch A = W x H	0.0750	m^2			
2. Perimeter of ditch X = W + 2 x H	0.8000	m			
3. Hydraulic radius R = A/X	0.0938	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8074	m/s			

7. Discharge Max Q = A x V	0.0606	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	250
1. Area of ditch A = W x H	0.0750	m^2			
2. Perimeter of ditch X = W + 2 x H	0.8000	m			
3. Hydraulic radius R = A/X	0.0938	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0038				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.9075	m/s			
7. Discharge Max Q = A x V	0.0681	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	250
1. Area of ditch A = W x H	0.0750	m^2			
2. Perimeter of ditch X = W + 2 x H	0.8000	m			
3. Hydraulic radius R = A/X	0.0938	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0423	m/s			
7. Discharge Max Q = A x V	0.0782	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	300
1. Area of ditch A = W x H	0.0900	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1000	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0882	m/s			
7. Discharge Max Q = A x V	0.0979	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	300
1. Area of ditch A = W x H	0.0900	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1000	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0030				
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8429	m/s			
7. Discharge Max Q = A x V	0.0759	m^3/s			

HYDRAULIC DISCHANGE

			W (mm)		H (mm)
			300	x	300
1. Area of ditch A = W x H	0.0900	m^2			
2. Perimeter of ditch X = W + 2 x H	0.9000	m			
3. Hydraulic radius R = A/X	0.1000	m			
4. Roughness factor n :	0.0140				
5. Hydrawlic gradient i :	0.0050				

6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0882	m/s
7. Discharge Max $Q = A \times V$	0.0979	m^3/s

HYDRAULIC DISCHANGE

W (mm) x H (mm): 400 x 250

1. Area of ditch $A = W \times H$	0.1000	m^2
2. Perimeter of ditch $X = W + 2 \times H$	0.9000	m
3. Hydraulic radius $R = A/X$	0.1111	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0050	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.1673	m/s
7. Discharge Max $Q = A \times V$	0.1167	m^3/s

HYDRAULIC DISCHANGE

W (mm) x H (mm): 400 x 300

1. Area of ditch $A = W \times H$	0.1200	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.0000	m
3. Hydraulic radius $R = A/X$	0.1200	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0030	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.9518	m/s
7. Discharge Max $Q = A \times V$	0.1142	m^3/s

HYDRAULIC DISCHANGE

W (mm) x H (mm): 400 x 300

1. Area of ditch $A = W \times H$	0.1200	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.0000	m
3. Hydraulic radius $R = A/X$	0.1200	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0030	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.9518	m/s
7. Discharge Max $Q = A \times V$	0.1142	m^3/s

HYDRAULIC DISCHANGE

W (mm) x H (mm): 400 x 300

1. Area of ditch $A = W \times H$	0.1200	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.0000	m
3. Hydraulic radius $R = A/X$	0.1200	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0053	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.2699	m/s
7. Discharge Max $Q = A \times V$	0.1524	m^3/s

HYDRAULIC DISCHANGE

W (mm) x H (mm): 400 x 350

1. Area of ditch $A = W \times H$	0.1400	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.1000	m
3. Hydraulic radius $R = A/X$	0.1273	m
4. Roughness factor n :	0.0140	

5. Hydrawlic gradient i :	0.0030	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.9899	m/s
7. Discharge Max $Q = A \times V$	0.1386	m^3/s

HYDRAULIC DISCHANGE — W (mm) 400 x H (mm) 350

1. Area of ditch $A = W \times H$	0.1400	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.1000	m
3. Hydraulic radius $R = A/X$	0.1273	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0050	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.2780	m/s
7. Discharge Max $Q = A \times V$	0.1789	m^3/s

HYDRAULIC DISCHANGE — W (mm) 400 x H (mm) 400

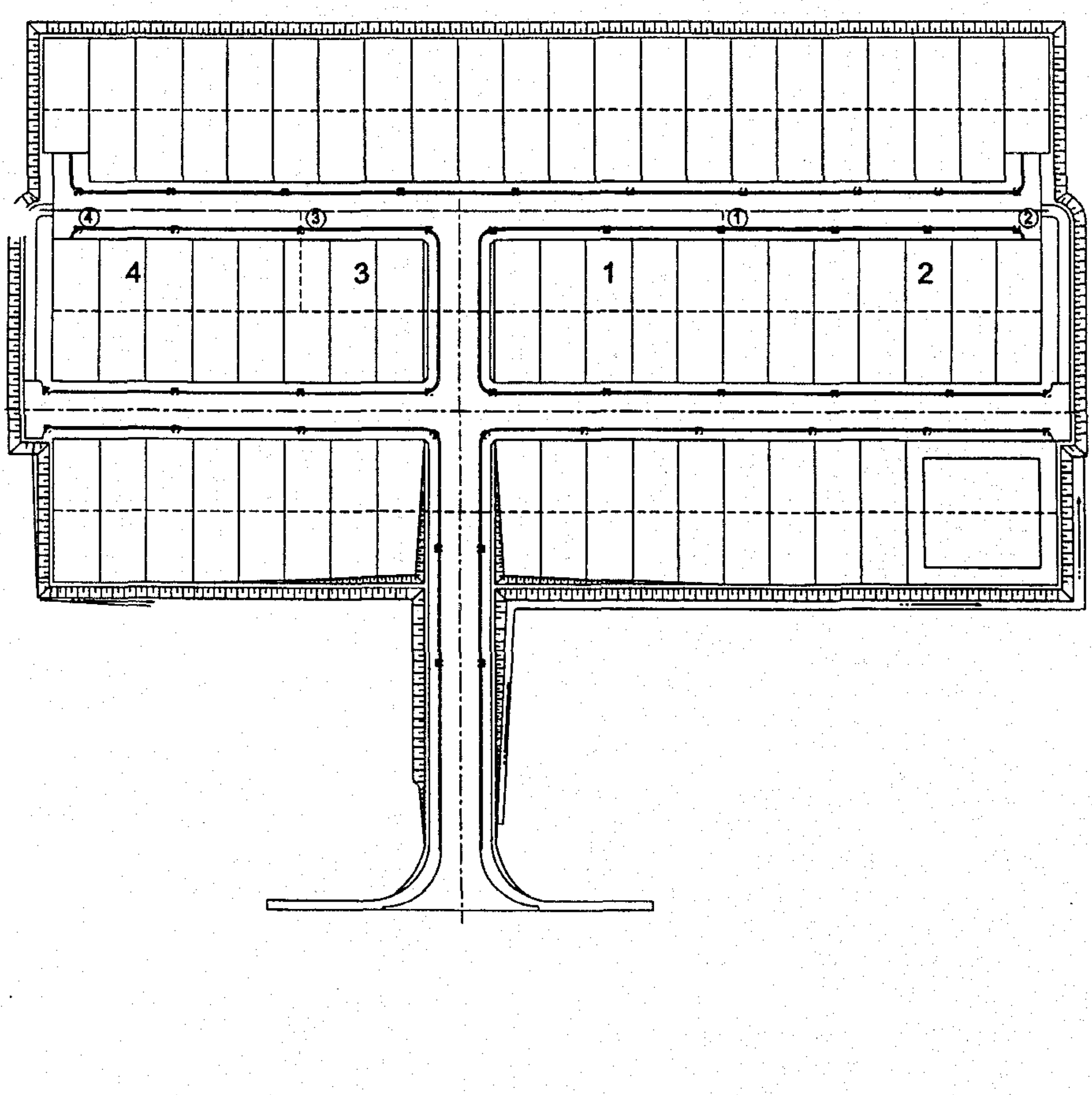
1. Area of ditch $A = W \times H$	0.1600	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.2000	m
3. Hydraulic radius $R = A/X$	0.1333	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0040	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.1790	m/s
7. Discharge Max $Q = A \times V$	0.1886	m^3/s

HYDRAULIC DISCHANGE — W (mm) 500 x H (mm) 320

1. Area of ditch $A = W \times H$	0.1600	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.1400	m
3. Hydraulic radius $R = A/X$	0.1404	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0040	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.2201	m/s
7. Discharge Max $Q = A \times V$	0.1952	m^3/s

HYDRAULIC DISCHANGE — W (mm) 500 x H (mm) 450

1. Area of ditch $A = W \times H$	0.2250	m^2
2. Perimeter of ditch $X = W + 2 \times H$	1.4000	m
3. Hydraulic radius $R = A/X$	0.1607	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0030	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.1565	m/s
7. Discharge Max $Q = A \times V$	0.2602	m^3/s



4
3
1
2
4
3
1
2

COMPUTING THE PEAK RUNOFF OF STORM WATER & SEWAGE - HUNG PHU

1 The peak runoff discharge of storm water is determined by following equation:

a - Based on Vietnam Standard " Design standard drainage out side system and works "

$$Q_1 = \boxed{C \times q_1 \times A} \quad \text{(Liter/second)}$$

Where:

A : Area of watershed = $A_1 + A_2$ (Ha)

A_1 : Grass area (Ha)

A_2 : Sidewalk (Concrete) , AC pavement & Houses: (Ha)

C : Runoff coefficient = $\boxed{\dfrac{(C_1 \times A_1 + C_2 \times A_2)}{A_1 + A_2}}$

C_1 : runoff coefficient of grass

C_2 : runoff coefficient of House, Sidewalk or Ac pavement.

$$q_1 = \boxed{166.7 \times q} \text{(Liter/second/hecta)}$$

q : Rainfall intensity is decided 10 year frequency return period.

rainfall intensity refer to record on site attached (mm/minute)

b - Based on Japan Standard.

$$Q1 = \frac{1}{3.6 \times 10^6} C \times I \times A \quad (m^3 / \text{second})$$

Where

A : Area of watershed = $A_1 + A_2$ (m^2)

A_1 : Grass area (m^2)

A_2 : Sidewalk (Concrete) , AC pavement & Houses: (m^2)

C : Runoff coefficient = $\boxed{\dfrac{(C_1 \times A_1 + C_2 \times A_2)}{A_1 + A_2}}$

C_1 : runoff coefficient of grass

C_2 : runoff coefficient of House, Sidewalk or Ac pavement.

I : Rainfall intensity is decided 10 year frequency return period.

rainfall intensity (refer to record on site attached I= 81mm/hr)

2 The discharge of sewage:

Q_2 = (Number of house in watershed area) $0.001 m^3$ / sec/ house

3 Total discharge :

$$Q = \boxed{Q_1 + Q_2} \text{(} m^3/\text{Sec)}$$

COMPUTING HYROLOGY & HYDRAULIC OF DRAINAGE STORM WATER AND SEWAGE SYTEM - HUNG PHU

Start	End	Symbol	Check	Computing hydrology										Computing Hydraulic			
				Storm water								Sewage	Discharge	Section of ditch			
				t	I	A	A1	A2	CI	C2	Q_1	Q_2	Q	W x H	I	Q	V
		Computed areas	Point	Minute	(mm/h)	m^2	m^2	m^2			m^3/s	m^3/s	m^3/s	mm	o/o	m^3/s	m/s
1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Start	1	A1	1	5	200	900.00	145.00	755.00	0.4	1	0.045	0.005	0.050	300x400	1.0	0.116	1.474
1	2	A1 + A2	2	5	200	1494.00	290.00	1204.00	0.4	1	0.073	0.005	0.078	300x400	0.5	0.078	1.042
2	3	A1 + A2 + A3	3	10	170	3548.25	685.00	2863.25	0.4	1	0.148	0.013	0.161	400x400	0.5	0.189	1.179

16/1

HYDRAULIC DISCHANGE W (mm) H (mm)

300 x 150

1. Area of ditch A = W x H	0.0450	m^2
2. Perimeter of ditch X = W + 2 x H	0.6000	m
3. Hydraulic radius R = A/X	0.0750	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0047	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.8709	m/s
7. Discharge Max Q = A x V	0.0392	m^3/s

HYDRAULIC DISCHANGE W (mm) H (mm)

300 x 150

1. Area of ditch A = W x H	0.0450	m^2
2. Perimeter of ditch X = W + 2 x H	0.6000	m
3. Hydraulic radius R = A/X	0.0750	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0100	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.2703	m/s
7. Discharge Max Q = A x V	0.0572	m^3/s

HYDRAULIC DISCHANGE W (mm) H (mm)

300 x 250

1. Area of ditch A = W x H	0.0750	m^2
2. Perimeter of ditch X = W + 2 x H	0.8000	m
3. Hydraulic radius R = A/X	0.0938	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0050	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0423	m/s
7. Discharge Max Q = A x V	0.0782	m^3/s

HYDRAULIC DISCHANGE W (mm) H (mm)

300 x 300

1. Area of ditch A = W x H	0.0900	m^2
2. Perimeter of ditch X = W + 2 x H	0.9000	m
3. Hydraulic radius R = A/X	0.1000	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0050	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.0882	m/s
7. Discharge Max Q = A x V	0.0979	m^3/s

HYDRAULIC DISCHANGE W (mm) H (mm)

400 x 300

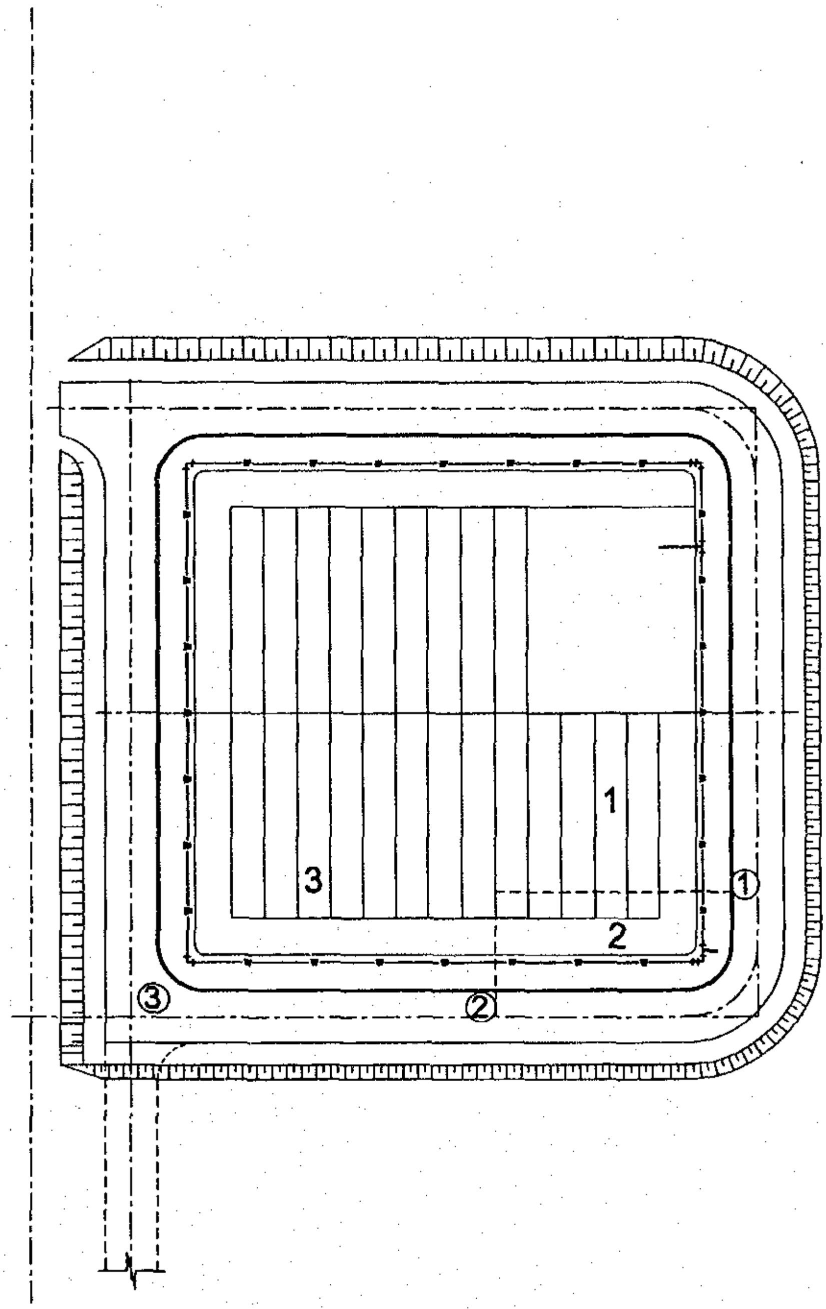
1. Area of ditch A = W x H	0.1200	m^2
2. Perimeter of ditch X = W + 2 x H	1.0000	m
3. Hydraulic radius R = A/X	0.1200	m
4. Roughness factor n :	0.0140	

5. Hydrawlic gradient i :	0.0030	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	0.9518	m/s
7. Discharge Max Q = A x V	0.1142	m^3/s

HYDRAULIC DISCHANGE

W (mm)		H (mm)
400	x	400

1. Area of ditch A = W x H	0.1600	m^2
2. Perimeter of ditch X = W + 2 x H	1.2000	m
3. Hydraulic radius R = A/X	0.1333	m
4. Roughness factor n :	0.0140	
5. Hydrawlic gradient i :	0.0040	
6. Velocity of flow in ditch $V=(1/n) \times R^{2/3} \times i^{1/2}$	1.1790	m/s
7. Discharge Max Q = A x V	0.1886	m^3/s


1
2
3
①
②
③

PART 1 DESIGN REPORT

SECTION 6 ATTACHMENT

Attachment

BỘ THƯƠNG MẠI

CÔNG TY THIẾT KẾ VÀ TƯ VẤN XÂY DỰNG

CHI NHÁNH CẦN THƠ

THUYẾT MINH

Planning Detail

計 画

QUY HOẠCH CHI TIẾT TL 1/500

CÔNG VIÊN VEN SÔNG CẦN THƠ

New Residential Area

VÀ KHU DÂN CƯ MỚI

PHƯỜNG HƯNG PHÚ THÀNH PHỐ CẦN THƠ

Planning Details
of
New Park and Residential Area
on
River Side
at
Hung Phu Ward in Can Tho City

CẦN THƠ

1998

Attachment ①

ỦY BAN NHÂN DÂN
TỈNH CẦN THƠ

Số : 1747/1998.Ct.KT

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc Lập Tự Do Hạnh Phúc
----oOo----
Cần Thơ, ngày 23 tháng 7 năm 1998

QUYẾT ĐỊNH CỦA UBND TỈNH CẦN THƠ

V/V PHÊ DUYỆT QUY HOẠCH CHI TIẾT TỶ LỆ 1/500
CÔNG VIÊN VEN SÔNG CẦN THƠ VÀ KHU DÂN CƯ MỚI
PHƯỜNG HƯNG PHÚ TP. CẦN THƠ

ỦY BAN NHÂN DÂN TỈNH CẦN THƠ

- Căn cứ Luật tổ chức Hội đồng nhân dân và Ủy ban nhân dân ngày 21/6/1994.

- Căn cứ Quyết định số 606/TTg ngày 20/12/1993 của Thủ tướng Chính phủ phê duyệt quy hoạch chung cải tạo và xây dựng TPCT.

- Căn cứ Quyết định số 3236/QĐ.UBT.97 ngày 16/12/1997 của UBND Tỉnh Cần Thơ v/v phê duyệt quy hoạch chung Khu dân cư và cảng phía nam Cần Thơ.

- Theo đề nghị của Sở Xây dựng Tỉnh Cần Thơ và UBND Thành phố Cần Thơ

QUYẾT ĐỊNH :

Điều 1 : Phê duyệt quy hoạch chi tiết tỷ lệ 1/500 Công viên ven Sông Cần Thơ và Khu dân cư mới Phường Hưng Phú TPCT, do Công ty Thiết kế và tư vấn xây dựng thuộc Bộ Thương Mại, chi nhánh Cần Thơ lập ngày 01-01-1998.

Giai đoạn 1 của quy hoạch đợt đầu, công viên ven sông Cần Thơ 10,4ha, Khu dân cư mới 35,419 ha. Vị trí cụ thể như sau :

: Công viên ven sông Cần Thơ nằm cặp bờ Sông Cần Thơ, từ bờ sông lên chổ hẹp nhứt 30m, chổ rộng nhứt 120m. Giới hạn từ hướng đông bắc tại vị trí tiếp giáp giữa Sông Hậu và Sông Cần Thơ đến hướng tây nam tại vị trí xây dựng cầu Quang Trung.

Khu dân cư mới :

- Hướng đông bắc cách bờ Sông Hậu khoảng 400m.
- Hướng tây nam cách bờ Sông Hậu khoảng 1.400m.
- Hướng đông nam cách bờ Sông Cần Thơ khoảng 550m.
- Hướng tây bắc cách bờ Sông Cần Thơ khoảng 200m.

Điều 2 : Công viên ven Sông Cần Thơ được xây dựng để phục vụ công cộng, đồng thời có tạo nguồn thu để tái đầu tư và duy trì hoạt động của công viên.

2

Khu dân cư mới được quy hoạch theo dạng chia lô để xây dựng nhà phố. Kích thước mỗi lô đất ngang 4,5m, thâm hậu 28m, diện tích $126m^2$. Diện tích xây dựng chiếm 72% diện tích lô đất, diện tích còn lại để trồng cây xanh.

Điều 3 : Giao cho Sở Xây dựng, Sở Kế hoạch và đầu tư, UBND Thành phố Cần Thơ phối hợp cùng các cơ quan có liên quan tổ chức thực hiện một số việc sau :

a/- Quản lý quy hoạch và xây dựng theo điều lệ quản lý quy hoạch.

b/- Công bố đồ án quy hoạch được duyệt.

c/- Lập dự án và thực hiện các bước tiếp theo.

Điều 4 : Chánh Văn phòng UBND Tỉnh, Giám đốc Sở Xây dựng, Giám đốc Sở Kế Hoạch Đầu tư, Chủ tịch UBND. Thành phố Cần Thơ và các đơn vị có liên quan chịu trách nhiệm thi hành Quyết định này kể từ ngày ký ./.

TM. UBND TỈNH CẦN THƠ
KT. CHỦ TỊCH
PHÓ CHỦ TỊCH

VÕ VĂN LŨY

QUYẾT ĐỊNH SỐ 592/1999/QĐ-GTVT NGÀY 11-03-1999 CỦA BỘ TRƯỞNG BỘ GIAO THÔNG VẬN TẢI

Land acquisition for Transportation work

Về việc ban hành những quy định về kĩ thuật, trình tự khi tiến hành giải phóng mặt bằng phục vụ các dự án xây dựng công trình giao thông

BỘ TRƯỞNG BỘ GIAO THÔNG VẬN TẢI

- Căn cứ Nghị định số 22/CP ngày 22-3-1994 của Chính phủ về nhiệm vụ, quyền hạn, trách nhiệm quản lí Nhà nước về cơ cấu tổ chức bộ máy của Bộ Giao thông vận tải; MOT decision

- Căn cứ Nghị định số 22/1998/NĐ-CP ngày 24-4-1998 của Chính phủ về việc đền bù thiệt hại khi Nhà nước thu hồi đất để sử dụng vào mục đích quốc phòng, an ninh, lợi ích quốc gia, lợi ích công cộng;

- Căn cứ vào tính chất đặc thù của các dự án xây dựng công trình giao thông và trải dài qua nhiều địa phương, kéo dài nhiều năm;

- Xét đề nghị của ông Cục trưởng Cục Giám định & QLCL CTGT;

QUYẾT ĐỊNH

Điều 1: Ban hành kèm theo quyết định này những quy định về kĩ thuật, trình tự khi tiến hành giải phóng mặt bằng phục vụ các dự án xây dựng công trình giao thông để làm cơ sở khi lập

phương án, kế hoạch GPMB cụ thể cho từng dự án; Những quy định về trình tự, yêu cầu ở các khâu, các bước làm căn cứ cơ bản để Chủ đầu tư và các tổ chức đền bù GPMB các cấp triển khai thực hiện.

Điều 2: Quyết định có hiệu lực sau 10 ngày kể từ ngày kí. Đối với các dự án đang triển khai dở dang :

- Các dự án đang triển khai dở dang và đã bắt đầu thực hiện chi trả đền bù được tiếp tục thực hiện theo kế hoạch phương án, chính sách (RAP) được Bộ GTVT đã phê duyệt. Riêng việc thực hiện kiểm kê trong hành lang bảo vệ đường bộ 20 m trong mục 3 của bản quy định nêu trên, các Ban QLDA báo cáo Bộ quyết định cụ thể.

- Các dự án mới bắt đầu triển khai và đã được Bộ GTVT phê duyệt kế hoạch, phương án và chính sách thì các Ban QLDA lập để trình Bộ duyệt sửa đổi bổ sung những điều khoản cần thiết cho phù hợp với quy định mới này.

Điều 3: Cục trưởng : GĐ & QLCL CTGT, ĐBVN, ĐSVN, HHVN, Vụ trưởng các Vụ liên quan, Tổng Giám đốc LHĐSVN, Tổng Giám đốc và Giám đốc các Ban quản lí dự án CTXDGT và Thủ trưởng các cơ quan liên quan căn cứ quyết định thi hành.

BỘ TRƯỞNG BỘ GIAO THÔNG VẬN TẢI
ĐÃ KÍ : LÊ NGỌC HOÀN

c.1. Đất thu hồi trong phạm vi B1 tiến hành đền bù vĩnh viễn tùy theo tính hợp pháp như các trường hợp nêu trên ở mục (3.2. a,b) nêu trên.

c.2. Đất bị thu hồi trong phạm vi B2.

c.2.1. Nếu đất nông lâm nghiệp hoặc đất nhàn rỗi: Chỉ giải tỏa mượn tạm thời trong thời kì xây dựng dự án, sau khi kết thúc dự án được hoàn trả lại cho mục đích cấy trồng cây nông, lâm nghiệp ngắn hạn và chỉ bồi thường giá trị thiệt hại hoa màu.

c.2.2. Nếu là đất thổ cư : Giải tỏa vĩnh viễn nhà, vật kiến trúc trên đất, nghiêm cấm mọi sự tái xây dựng trên dải đất này. Thực hiện đền bù 100% giá trị đất cho các trường hợp hợp pháp đối với đất trên đó đã có nhà, còn đối với đất thổ cư chưa có nhà chỉ đền bù phần chênh lệch giữa đất thổ cư với đất nông nghiệp.

5. Phương thức đền bù về đất thổ cư:

Để giảm chi ngân sách, phương thức đền bù đất thổ cư đề nghị các địa phương thực hiện :

a. Đối với đất đô thị:

a.1. Các hộ bị ảnh hưởng còn đất lùi lại phía sau để ở ≥ 40 m^2 thì coi như còn đủ để ở và không thu hồi, đền bù mảnh đất còn lại này. Nếu mảnh đất bị giải tỏa ở phía trước ≥ 40 m^2 thì đền bù bằng đổi đất ở các khu TĐC, nếu < 40 m^2 thì đền bù bằng tiền.

a.2. Các hộ bị ảnh hưởng còn đất lùi lại phía sau < 40 m^2, nếu phù hợp với quy hoạch của địa phương, và chủ hộ muốn ở lại thì đồng ý để lại không thu hồi, đền bù, nếu không thì đền bù cùng với đất bị giải tỏa ở phía trước.

- Nếu ở lại thì đền bù đất bị giải tỏa ở phía trước theo (a.1).

- Nếu di chuyển đi thì được đền bù:

+ Nếu tổng diện tích được đền bù < 40 m^2 thì được đền bằng tiền hoặc được di chuyển tới khu TĐC tập trung theo diện tích tối thiểu do địa phương quy định, có đối trừ chênh lệch, hoặc phù hợp vào điều kiện tham chiếu của đối tác tài trợ (Vốn ODA).

+ Nếu tổng diện tích được đền bù ≥ 40 m^2 thì chủ yếu đền bù bằng di chuyển tới khu TĐC tập trung. Nếu đất khu TĐC tập trung không thể đền bù đủ diện tích đất bị thu hồi thì phần còn lại mới tiến hành đền bằng tiền.

b. Đối với đất ở nông thôn:

Áp dụng tương tự như đối với đất ở đô thị nhưng với mức giới hạn là 100 m^2 (thay các chỉ số 40 m^2 bằng 100 m^2 ở các công thức trên)

c. Đơn giá đất:

Do UBND tỉnh, thành phố quyết định, hệ số K áp dụng cho giá đất phải được sự thỏa thuận của Bộ Tài chính nhằm khắc phục sự chênh lệch khác biệt giá giữa các địa phương gần kề nhau, cùng một dự án, cùng một loại đất. Đơn giá đất tại các khu TĐC do UBND tỉnh, thành phố quyết định nhưng nhất thiết phải có sự tham gia ý kiến của Chủ đầu tư để xác định tính hợp lí, phù hợp với chi phí đầu tư xây dựng và khắc phục hiện tượng giảm quá thấp giá đất ở các khu TĐC so với thực tiễn.

6. Các chính sách hỗ trợ :

Ngoài các chính sách hỗ trợ quy định tại NĐ 22/CP, bổ sung:

Những hỗ trợ mang tính xã hội, giải quyết cho các hộ dân phát sinh thêm do đặc thù của địa phương mà tỉnh, thành phố đề xuất thì phải có sự thỏa thuận của Bộ Tài chính và Bộ GTVT và

XDCTGT. cho phép tiến hành lựa chọn vị trí phù hợp với quy hoạch của địa phương.

b.2.3. Bản vẽ sơ họa đường bao mặt bằng dự kiến bố trí khu TĐC tỉ lệ 1/500 được cấp có thẩm quyền của địa phương chấp thuận.

b.3. *Một số nguyên tắc:*

b.3.1. *Các hộ đã kí vào kiểm kê cam kết vào TĐC thì ràng buộc phải vào TĐC, không được chuyển sang phương thức đền bù khác.*

b.3.2. Khu TĐC tập trung sau khi đã tiến hành xây dựng và bố trí các hộ dân vào có thể xảy ra các trường hợp:

* Không đủ diện tích vì số hộ phát sinh đăng kí thêm sau kiểm kê, trường hợp này tùy theo tình hình cụ thể mà giải quyết lập khu TĐC mới hoặc mở rộng thêm khu TĐC hiện tại nếu có thể, *hoặc điều tiết sang khu TĐC khác với cùng một dự án.*

* *Nếu trường hợp đặc biệt nào đó sau khi đã không thể bố trí* hết số dân tự nguyện vào TĐC mà có dư thừa diện tích >20% thì UBND tỉnh, thành phố cần có ý kiến đề xuất giải quyết, Bộ GTVT xem xét chấp thuận hoặc xử lí cụ thể.

c. Hình thức và quy mô các khu TĐC:

c.1. Khu TĐC tập trung:

* Quy mô khu TĐC:

- Khu TĐC loại nhỏ : từ 10 đến 30 hộ
- Khu TĐC loại vừa : từ 31 đến 60 hộ
- Khu TĐC loại lớn : trên 60 hộ

* Tổng diện tích khu TĐC (chưa kể đường dẫn):

$$St = (Sl + Scc) \times K.$$

Trong đó:

- St là tổng diện tích của khu TĐC (chưa kể chân ta-luy)

- Sl là tổng diện tích các loại lô đất cấp cho các hộ dân theo tổng hợp thống kê ban đầu nêu trên.

- Scc là diện tích dự phòng (tính bằng 10% của Sl) để có mặt bằng xây dựng các công trình phúc lợi công cộng mà dự án chấp thuận hoặc chia thêm lô.

- K là hệ số tính đến các diện tích phục vụ cho XD cơ sở hạ tầng cho khu TĐC như đường vào, đường giao thông nội bộ, cấp thoát nước, điện, hệ thống kĩ thuật khác, cây xanh. (Hệ số k = 1,3 đối với khu TĐC loại nhỏ; 1,25 đối với khu TĐC loại vừa và bằng 1,2 đối với khu TĐC loại lớn).

* Cơ sở hạ tầng các khu TĐC:

Cơ sở hạ tầng các khu TĐC bao gồm: đắp nền, cấp thoát *nước*, cấp điện, cây xanh, đường giao thông nội bộ và đường vào khu TĐC. Quy mô thiết kế phải được Cấp được ủy quyền phê duyệt của Bộ GTVT thỏa thuận thống nhất trước và duyệt.

c.2. Tái định cư phân tán:

c.2.1. Quy mô:

Trong trường hợp đặc biệt khi có tổng số hộ dân trong cụm nhỏ hơn 10 hộ hoặc lớn hơn, nhưng do sự đặc thù của địa phương không thể tổ chức gom lại cùng chung sống trên một khu TĐC tập trung, có yêu cầu phân tán chính đáng được địa phương xem xét chấp thuận thì dự án giải quyết phương án tái định cư phân tán.

4 10
Vĩnh Long , ngày 15 tháng 7 năm 1999

BIÊN BẢN CUỘC HỌP VỀ MỘT SỐ VẤN ĐỀ KỸ THUẬT CỦA CÔNG TÁC ĐỀN BÙ ĐẤT VÀ TÁI ĐỊNH CƯ THUỘC DỰ ÁN CẦU CẦN THƠ

I. THÀNH PHẦN THAM DỰ

1. Đại diện UBND tỉnh Vĩnh Long:

Ô. Trương Văn Sáu,	Phó Chủ Tịch UBND Tỉnh Vĩnh Long
O Trương Công Hải	Phó Giám đốc Sở GTVT Tỉnh Vĩnh Long
Ô. Hồng Minh Kim	Chuyên viên UBND Tỉnh Vĩnh Long
Ô. Nguyễn Quang Khải	Chuyên viên UBND Tỉnh Vĩnh Long.

2. Đại diện Ban QLDA Mỹ Thuận:

Ong Nguyễn Ngọc Lịch,	Trưởng phòng Giải Phóng Mặt Bằng.

3. Đại diện cơ quan Tư vấn:

Ong Koji Nakai,	Phó trưởng đoàn thiết kế của công ty Nippon Koei Nhật Bản cùng các thành viên.

II. NỘI DUNG THẢO LUẬN

1. Vị trí khu Tái định cư phía bờ Vĩnh Long.
2. Qui mô khu Tái định cư.
3. Các yêu cầu kỹ thuật chính của khu tái định cư .
4. Kinh phí đền bù và xây dựng khu tái định cư.

III . NHỮNG KẾT LUẬN SAU KHI THẢO LUẬN

1. Vị trí khu tái định cư :

Uỷ Ban Nhân Dân tỉnh Vĩnh Long thống nhất về vị trí khu tái định cư do Tư Vấn dự án đề xuất: Nằm trên khu đất giữa quốc lộ 54 và sông Trà On thuộc thị trấn Bình Minh tỉnh Vĩnh Long.Toạ độ của khu Tái định cư sẽ được xác định chi tiết trên thực địa trên cơ sở vị trí chỉ định của Tỉnh và quy mô được duyệt.

2. Qui mô khu tái định cư:

Uỷ Ban Nhân Dân tỉnh Vĩnh Long thống nhất với qui mô khu tái định cư do Tư Vấn dự án đề xuất:

- Tổng diện tích khu tái định cư : khoảng 8,3ha
- Số căn hộ dự kiến :190 hộ
- Diện tích trung bình mỗi căn hộ : 250 m^2

3. Các yêu cầu kỹ thuật chính của khu tái định cư Bình Minh Vĩnh Long.

Uỷ Ban Nhân Dân tỉnh Vĩnh Long thống nhất với qui mô khu tái định cư do Tư Vấn dự án đề xuất:

- Cao độ san nền : + 2,50
- Bố trí hệ thống đường nội bộ và cây xanh, đường nối từ quốc lộ 54 vào khu Tái định cư, hệ thống thoát nước, hệ thống cấp nước, hệ thống điện sinh hoạt, chiếu sáng, thông tin, một nhà trẻ, một trạm xá.

4. Kinh phí đền bù và xây dựng khu tái định cư.

Uỷ Ban Nhân Dân tỉnh Vĩnh Long sẽ cung cấp các đơn giá về đền bù đất, nhà và các loại hoa màu cùng giá hỗ trợ tái định cư hiện hành cho Tư Vấn dự án để tham khảo thực hiện việc tính Tổng mức đầu tư cho khu tái định cư.

Đại diện UBND Tỉnh Vĩnh Long.	Đại diện Ban QLDA Mỹ Thuận.	Đại diện Tư vấn thiết kế Nippon Koei Co., Ltd.
Trương Văn Sáu.	Nguyễn Ngọc Lịch.	Koji Nakai.

LETTER RECEIVED

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
ĐỘC LẬP - TỰ DO - HẠNH PHÚC
------ oOo -----

BIÊN BẢN CUỘC HỌP VỀ MỘT SỐ VẤN ĐỀ KỸ THUẬT CỦA CÔNG TÁC ĐỀN BÙ ĐẤT VÀ TÁI ĐỊNH CƯ THUỘC DỰ ÁN CẦU CẦN THƠ

Địa điểm: Ủy Ban Nhân Dân tỉnh Cần Thơ.

Thời gian: Ngày 5 tháng 10 năm 1999.

I. THÀNH PHẦN THAM DỰ

1. ĐẠI DIỆN ỦY BAN NHÂN DÂN TỈNH CẦN THƠ

1. Ong : Lư Văn Điền, Bí Thư Tỉnh Ủy
2. Ong : Võ Minh Cân, Phó Bí Thư Tỉnh Ủy
3. Ong : Võ Văn Lũy, Phó Chủ Tịch Ủy Ban Nhân Dân Tỉnh
   Và Đại Diện các Ban ngành trong Tỉnh và Tp. Cần Thơ

2. ĐẠI DIỆN BAN QLDA MỸ THUẬN

1. Ong : Nguyễn Ngọc Lịch, Trưởng Phòng Giải Phóng Mặt Bằng

3. ĐẠI DIỆN CƠ QUAN TƯ VẤN

1. Ong : Koji Nakai, Phó trưởng Đoàn nghiên cứu thiết kế và các thành viên của Đoàn.

II. NỘI DUNG CUỘC HỌP

NỘI DUNG THẢO LUẬN

1. Giới thiệu tổng quan công trình cầu Cần Thơ;
2. Thỏa thuận ranh giới giải tỏa dọc tuyến;
3. Vị trí các khu Tái định cư phía bờ Cần Thơ;
4. Qui mô các khu Tái định cư;
5. Các yêu cầu kỹ thuật chính của khu tái định cư;
6. Kinh phí đền bù và xây dựng khu tái định cư;

III . NHỮNG KẾT LUẬN SAU KHI THẢO LUẬN

1. **Vị trí khu tái định cư :**

Uỷ Ban Nhân Dân tỉnh Cần Thơ thống nhất về vị trí khu tái định cư do Tư Vấn dự án đề xuất

- Khu tái định cư Hưng Phú nằm trên khu đất thuộc khu dân cư mới Hưng Phú Tp. Cần Thơ
- Khu tái định cư Châu Thành sẽ được xây dựng tại khu đất nằm giữa sông Ba Láng và Quốc lộ 1 thuộc huyện Châu Thành tỉnh Cần Thơ.

Toạ độ của các khu Tái định cư sẽ được xác định chi tiết trên thực địa trên cơ sở vị trí chỉ định của Tỉnh và quy mộ được duyệt.

2. **Qui mô khu tái định cư:**

Uỷ Ban Nhân Dân tỉnh Cần Thơ thống nhất với qui mô khu tái định cư do Tư Vấn dự án đề xuất:

			Hưng Phú	Châu Thành
-	*Tổng diện tích khu tái định cư khoảng*	:	3,5ha	2,6ha
-	Số căn hộ dự kiến	:	96 hộ	68
-	Diện tích trung bình mỗi căn hộ	:	126 m^2	200 m^2

3. **Các yêu cầu kỹ thuật chính của các khu tái định cư của Tỉnh Cần Thơ.**

Uỷ Ban Nhân Dân tỉnh Cần Thơ thống nhất với qui mô khu tái định cư do Tư Vấn dự án đề xuất:

- Cao độ san nền : + 2,50
- Bố trí hệ thống đường nội bộ và cây xanh, đường nối từ đường dẫn Cầu Cần Thơ và Quốc lộ 1 vào các khu Tái định cư Hưng Phú, Châu Thành, hệ thống thoát nước, hệ thống cấp nước, hệ thống điện sinh hoạt, chiếu sáng, thông tin, nhà trẻ, trạm xá cho từng khu.

4. **Kinh phí đền bù và xây dựng khu tái định cư.**

Uỷ Ban Nhân Dân tỉnh Cần Thơ sẽ cung cấp các đơn giá, hệ số chênh lệch về đền bù đất, nhà và các loại hoa màu cùng giá hỗ trợ tái định cư hiện hành cho Tư Vấn dự án để tham khảo thực hiện việc tính Tổng mức đầu tư cho khu tái định cư.

Đại diện Uỷ Ban Nhân Dân Tỉnh Cần Thơ.	Đại diện Ban QLDA Mỹ Thuận.	Đại diện Tư vấn thiết kế Nippon Koei Co., Ltd.
KT. PHÓ CHỦ TỊCH		
Võ Văn Lũy	Nguyễn Ngọc Lịch.	Koji Nakai.