CHAPTER 13
CONSTRUCTION PLAN

13.1 Construction Planning Methodology

A PERT/CPM network method is used for preparing a construction plan of each contract package, which is composed of a PERT/CPM chart, a progress chart, together with major equipment allocation. The following conditions are considered:

1. Contract packaging and their temporary construction schedule based on an overall implementation period.
2. Contract conditions of DPWH Standard Specification (1995) and recommendation of Environmental Impact Assessment.
3. Site conditions such as weather and hauling distance of borrow materials
4. Scope of the contract package and its Bills of Quantity

Under the above conditions, the detailed schedule of major works are determined by the following inputs:

1. Assumption of starting date and finish date
2. Workable days
3. Work breakdown into activities
4. Resource allocation of main equipment
5. Estimate of duration, and
6. Order of work sequence

13.2 Work Classification

13.2.1 Permanent Works

Construction works are classified as permanent works and temporary works in accordance with DPWH Standard Specification. Among the permanent works, the major works that need heavy construction equipment are selected for computation of the work period by production of equipment or a set of equipment. The major works and its sequence order will be discussed in Section 13.5.

13.2.2 Temporary Works

Temporary works are classified as follows.

(1) Temporary works described as Special provisions

The temporary works described as special provisions or as noted in the Plans include, but are not limited to:

- Relocation and adjustment of utilities such as electric poles, telephone lines, water pipes, and any other utilities owned by public or private companies, and
- Temporary roads to be constructed as part of embankment inside the ROW acquired for the other contract package.

(2) Temporary works shown in the Plans as reference

The temporary works shown in the Plans as reference include, but are not limited to:

- Temporary roads out of ROW, and Temporary bridges,
- Borrow pits and quarries opening and closing,
- Disposal areas out of the ROW,
- Construction and maintenance of detour roads,
- Coffer dam closure and temporary diversion channel,
- Sheet pile wall for foundation excavation,
- Special arrangement for traffic safety such as expressway for interchange construction, and
- Public convenience and safety, and Maintenance of traffic

(3) Temporary works of the Contractors own facilities

The temporary works of the Contractors own facilities are, but are not limited to:

- Concrete plant and other plant, and
- Contractor's camp.

a. Concrete Plant

As there is no proper concrete plant at the Project site, temporary concrete plant will be installed at site. The size of lot is considered about one hectare including aggregate deposits, a batching plant, a laboratory, a car washing facility and a parking area.

b. Contractors camp

The Contractor's camp includes parking area, equipment yards, offices, shops, stores, laboratories, and workmen accommodations. A total area is about one hectare. At the peak period of the project, about 100 units of equipment are in operation every day. Motor pool for the maintenance and repair of the equipment is indispensable. The size of the repair shop will need an additional area of 0.5 ha. During the construction, equipment pools will be required close to the working place to station heavy equipment temporarily.

13.3 Work Volumes

To estimate the duration of each works, the Bill of Quantity prepared for bid documents are used.

13.4 Site Conditions

13.4.1 Number of Workable Days

(1) General

The number of workable days is calculated by subtracting unworkable days due to climate condition, national holidays and Sundays from the calendar days. Unworkable days are mainly due to unfavorable climate and river conditions for the works at the site. Rainfall, river water level, temperature, and wind will be taken into consideration. Idling days of equipment repairs and maintenance, and waiting days for antecedent activities are considered as productivity factors of the specific work in this Study.

(2) Number of un-workable days due to the rainfall

In this Study, unworkable days due to climate conditions are taken as the days having daily precipitation of more than 10mm. This will interrupt the works in the field. The numbers of the unworkable days are estimated by summarizing the rainfall records of the past ten years at Munoz Rainfall Station, as shown in Table 13.4-1. The 50 unworkable days due to the rainfall (P1) are estimated.

TABLE 13.4- 1 NUMBER OF UN-WORKABLE DAYS

Munoz, Nueva Ecija

YEAR / MONTH	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	TOTAL
1990	0	0	0	0	6	12	14	13	12	3	1	0	61
1991	0	0	0	1	2	3	9	19	14	5	1	0	54
1992	0	1	0	0	3	4	9	13	13	4	1	0	48
1993	0	0	0	2	0	6	12	7	10	5	1	1	44
1994	0	0	0	0	4	8	12	9	8	2	0	0	43
1995	0	0	0	0	6	8	14	6	8	6	3	2	53
1996	0	0	1	2	8	1	9	8	12	2	4	0	47
1997	0	1	0	2	5	9	9	10	8		0	0	44
1998	0	0	0	0	6	4	5	7	12	4	3	5	46
1999	0	0	1	4	4	11	10	13	11	5	3	0	62
Average	0	0	0	1.1	4.4	6.6	10.3	10.5	10.8	3.6	1.7	0.3	50.2

(3) The 9 unworkable days due to national holidays (P2) are estimated by counting numbers of national holidays.

TABLE 13.4- 2 NATIONAL HOLIDAYS

Date	Name of National Holiday
Jan 1	New Year's Day
April 9	Araw ng Kagitingan
April 12	Holy Thursday
April 13	Good Friday
May 1	Labor day
June 12	Independence Day
August 26	National Heroes Day
November 30	Bonifacio Day
December 25	Christmas Day

(4) The 52 unworkable days by Sundays (P3) is estimated as follows.

$$P3 = 365/7 = 52 \text{ days}$$

(5) Calculation of average workable day ratio a year is as follows.

A total number of unworkable days per year (P0) is a sum of P1, P2, and P3. Workable days (P) and net working ratio (WR) is calculated as follows:

$$P0 = P1 + P2 + P3 = 50+9+52 = 111$$
$$P = (1- P0) = 365-111 = 254$$
$$WR = P/365 = 254/365 = 0.696 = 70\%$$

13.4.2 Material Source

(1) Plaridel Bypass

1) Material Source

Information on material sources was collected from the DPWH Regional Office, DPWH District Offices and DENR Regional Office. DENR Regional Office recommended some hilly areas with no trees where borrow materials can be obtained. Table 13.4-3 shows the amount of deposits of each material source for Plaridel Bypass and Figure 13.4- 1 shows the location of each material source.

TABLE 13.4-3 AMOUNT OF DEPOSITS OF EACH MATERIAL SOURCE FOR PLARIDEL BYPASS

Symbol	Name of Pit	Amount of Deposits (m3)	Applicable Type of Works						Remarks
			(104) Embankment	(200) Sub-base Course	(201)Base Course	(202)Crushed Base Course	(311)PCCP	(504)Riprap Grout	
P-1	ANGAT River (Bridge Site)	50,000	-	O	O	O	O	-	Riverbed
P-2	ANGAT River.	50,000	-	O	O	O	O	-	Riverbed
P-3	MARONGEO	500,000	-	O	O	O	O	O	Riverbed
P-4	BAYBAY	1,000,000	O	-	-	-	-	-	Hilly Area
P-5	D.R.T.	7,000,000	O	-	-	-	-	-	Hilly area
P-6	CORAL NA BATO	5,000,000	O	-	-	-	-	-	Hilly Area
P-7	PALITIDO	1,000,000	O	-	-	-	-	-	Hilly Area

2) Access Road Condition

The survey of existing condition of the access road to the project site from major material sources was executed to estimate a hauling distance of borrow materials. Table 13.4-4 shows the condition of hauling routes and Figure 13.4-2 shows the location of each route.

3) Disposal Site

In Plaridel area, according to DPWH District Office staff, there will be many candidate landowners to reclaim their lands with unsuitable soil, which are flooded every year. Hence, the hauling distance to disposal site is estimated within 5 km.

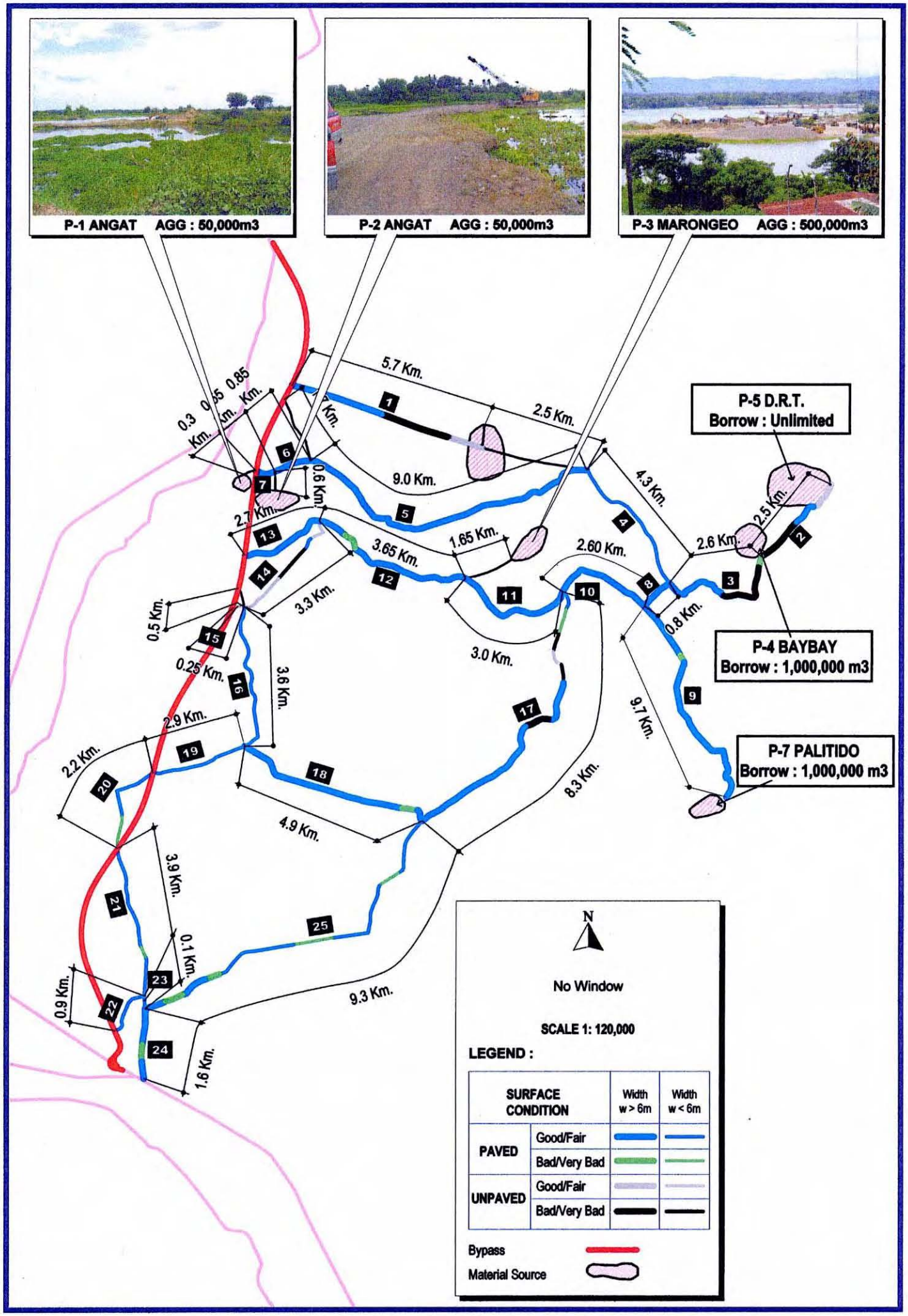


FIGURE MATERIAL SOURCES (PLARIDEL BYPASS)

TABLE 13.4-4 CONDITION OF HAULING ROUTES

Bypass	Hauling Route to	Hauling Route No.	Hauling Route Condition												
			Width more than 6m						Width less than 6m						Total
			Paved			Unpaved			Paved			Unpaved			
			G/F	B/VB	Sub Total	G/F	B/VB	Sub Total	G/F	B/VB	Sub Total	G/F	B/VB	Sub Total	
			(km)	(km)	(km)	(km)	(km)	(km)	(km)	(km)	(km)	(km)	(km)	(km)	(km)
Plaridel	Package 1	L1	12.30	0.00	12.30	0.00	1.60	1.60	8.10	1.20	9.30	0.00	1.40	1.40	24.60
	〃 2	L2	14.90	0.00	14.90	0.00	1.60	1.60	4.20	0.00	4.20	0.00	1.40	1.40	22.10
	〃 3	L3	14.25	0.00	14.25	0.00	1.10	1.10	0.00	0.00	0.00	0.00	0.00	0.00	15.35
	〃 4	L4	2.70	0.00	2.70	1.20	1.80	3.00	0.00	0.00	0.00	0.00	0.00	0.00	5.70

G/F : Good/Fair
B/VB : Bad/Very Bad

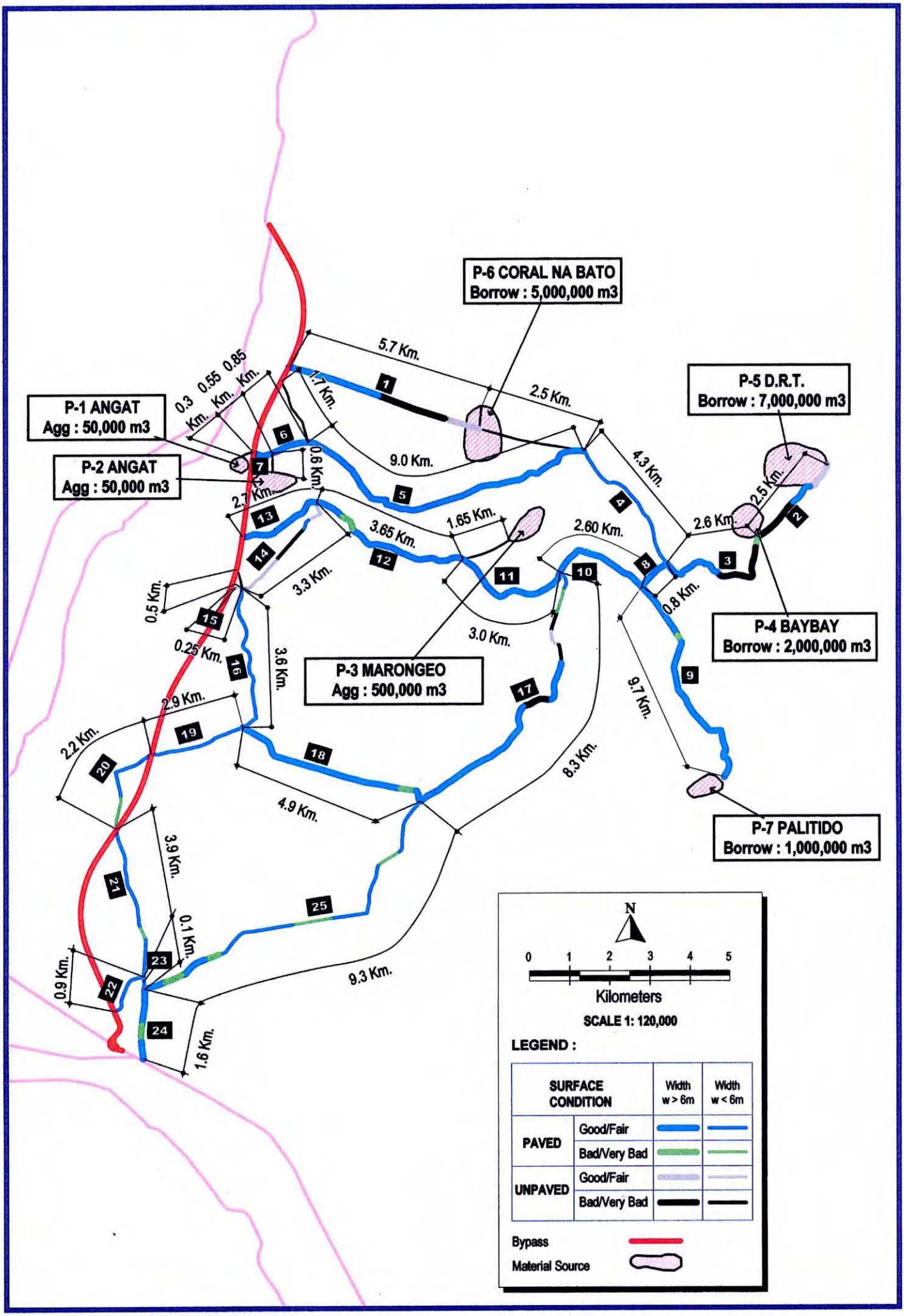


FIGURE 13.4-2 SURFACE CONDITION OF ACCESS ROADS (PLARIDEL BYPASS)

(2) Cabanatuan Bypass

1) Material Source

Information on material sources was collected from the DPWH Regional Office, DPWH District Offices and DENR Regional Office. DENR Regional Office recommended some hilly areas with no trees where borrow materials can be obtained. Table 13.4-5 shows the amount of deposits of each material source for Cabanatuan Bypass and Figure 13.4-3 shows the location of each material source.

TABLE 13.4-5 AMOUNT OF DEPOSITS OF EACH MATERIAL SOURCE FOR CABANATUAN BYPASS

Symbol	Name of Pit	Amount of Deposits (m3)	Applicable Type of Works						Remarks
			(104) Embank-ment	(200) Subbase	(201) Base Course	(202) Crushed Base	(311)P	(504) Riprap Grout	
C-1	RIO CHICO River	500,000	-	O	O	O	O	-	Riverbed
C-2	ATANTE River	100,000	-	O	O	O	O	-	Riverbed
C-3	MALLORCA River	1,000,000	-	O	O	O	O	O	Riverbed
C-4	PAMBUAN River	50,000	-	O	O	O	O	-	Riverbed
C-5	PAGAS River	50,000	-	O	O	O	O	-	Riverbed
C-6	VALUDEFUENTE R	500,000	-	O	O	O	O	-	Riverbed
C-7	TUMANA River	500,000	-	O	O	O	O	-	Riverbed
C-8	SICSICAN River	1,000,000	-	O	O	O	O	-	Riverbed
C-9	COMITANG River	50,000	O	-	-	-	-	-	Riverbank
C-10	COLONG River	100,000	O	-	-	-	-	-	Riverbank
C-11	ILOG BALIWAG River	500,000	O	-	-	-	-	-	Riverbank
C-12	EAST OF RIZAL	60,000,000	O	-	-	-	-	-	Hilly Area
C-13	EAST OF PALAYAN	20,000,000	O	-	-	-	-	-	Hilly Area
C-14	EAST OF BANGED	60,000,000	O	-	-	-	-	-	Hilly Area

Note: The places of C-1 to C-11 were surveyed and the quantity was estimated by JICA Study Team together with DPWH District Office Staff, including DPWH counter part.

The places of C-12 to 14 were recommended by DENR and JICA Study Team estimated the quantity based on hearing to DENR.

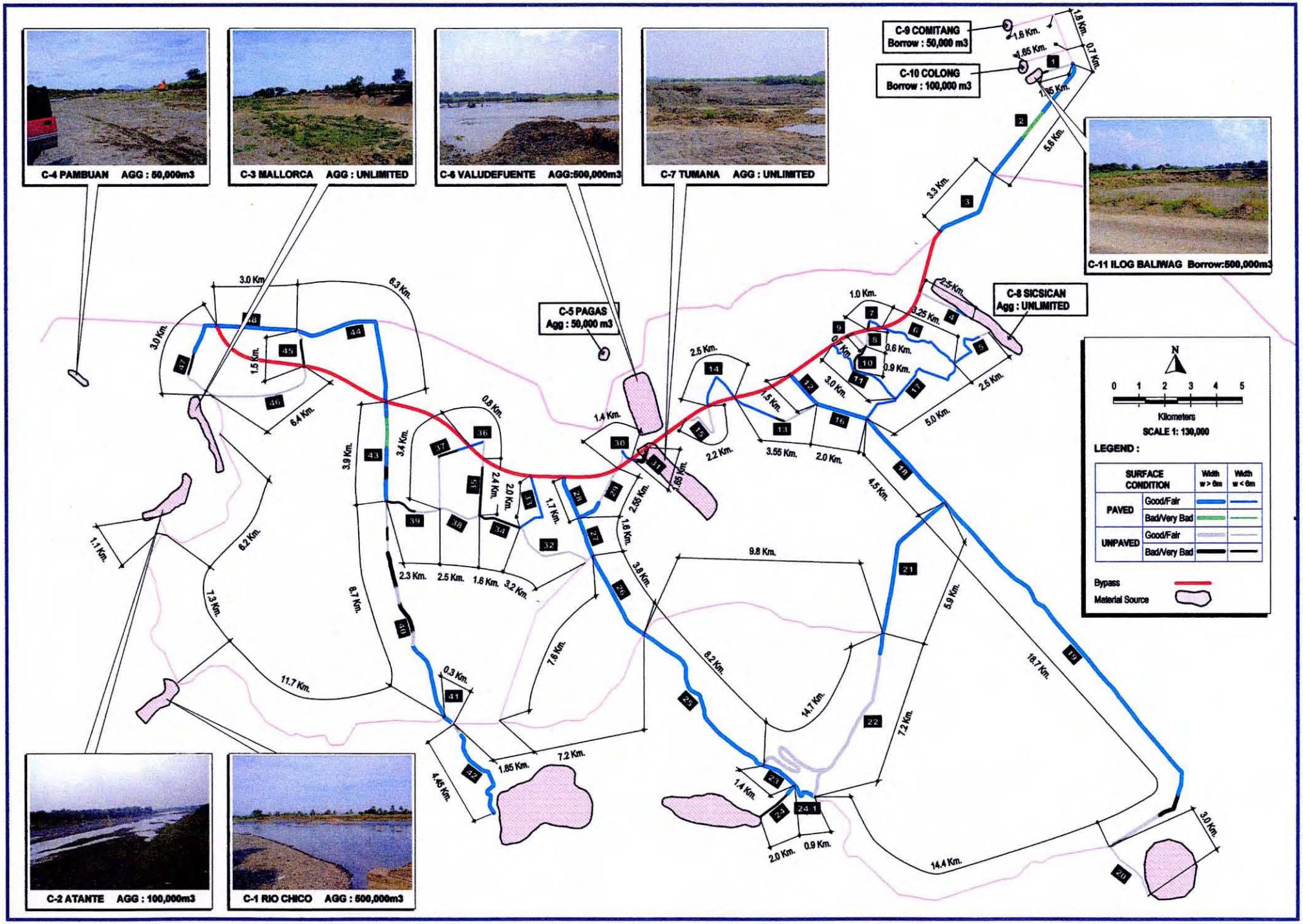


FIGURE 13.4-3 MATERIAL SOURCES (CABANATUAN BYPASS)

2) Access Road Condition

Table 13.4-6 shows the condition of hauling routes and Figure 13.4-4 shows the location of each route.

3) Disposal Site

Figure 13.4-5 shows the location of disposal sites where landowner agreed to fill those sites up with unsuitable soil.

(3) San Jose Bypass

1) Material Source

Information on material sources was collected from the DPWH Regional Office, DPWH District Offices and DENR Regional Office. Table 13.4-7 shows the quantity of deposits of each material source for San Jose Bypass. Figure 13.4-6 shows the location of each material source.

TABLE 13.4-7 QUANTITY OF DEPOSITS OF EACH MATERIAL SOURCE FOR SAN JOSE BYPASS

Symbol	Name of Pit	Amount of Deposits (m3)	Applicable Type of Works						Remarks
			(104) Embankment	(200) Subbase Course	(201)Base Course	(202)Crushed Base Course	(311)PCCP	(504)Riprap Grout	
S-1	DIGDIG River	3,000,000	-	O	O	O	O	O	Riverbed
S-2	PUNCAN River	200,000	-	O	O	O	O	O	Riverbed
S-3	KITA-KITA River	300,000	O	O	O	O	O	O	Riverbed
S-4	SIBIK River	600,000	-	O	O	O	O	O	Riverbed
S-5	CARIDAD River	200,000	-	O	O	O	O	-	Riverbed
S-6	SAN ANDRES River	100,000	-	O	O	O	O	-	Riverbed
S-7	GOMEZ River	100,000	-	O	O	O	O	-	Riverbed
S-8	MALASIN HILL	500,000	O	-	-	-	-	-	Hill

TABLE 13.4-6 CONDITION OF HAULING ROUTES

Bypass	Hauling Route to	Hauling Route No.	Hauling Route Condition												
			Width more than 6m						Width less than 6m						Total
			Paved			Unpaved			Paved			Unpaved			
			G/F (km)	B/VB (km)	Sub Total (km)	G/F (km)	B/VB (km)	Sub Total (km)	G/F (km)	B/VB (km)	Sub Total (km)	G/F (km)	B/VB (km)	Sub Total (km)	(km)
Cabanatuan	Package 1	L1	10.40	0.00	10.40	1.65	3.30	4.95	0.00	0.00	0.00	1.50	0.50	2.00	17.35
	〃 2	L2	17.10	0.00	17.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	1.60	18.70
	〃 3	L3	16.30	0.00	16.30	0.00	1.25	1.25	1.10	0.00	1.10	2.35	1.60	3.95	22.60
	〃 4	L4	16.40	0.00	16.40	6.00	0.00	6.00	0.00	0.00	0.00	0.00	1.60	1.60	24.00

G/F : Good/Fair

B/VB : Bad/Very Bad

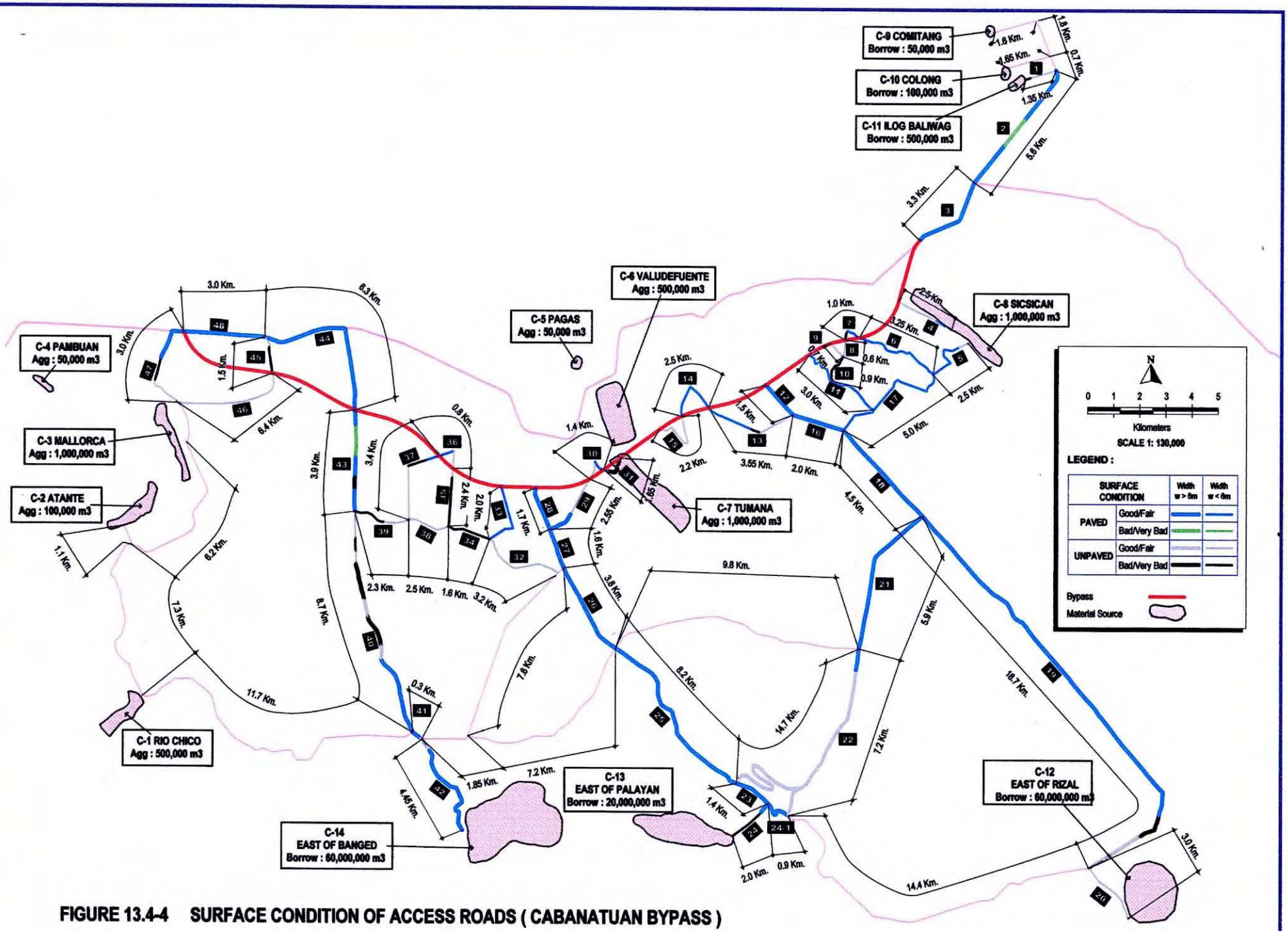


FIGURE 13.4-4 SURFACE CONDITION OF ACCESS ROADS (CABANATUAN BYPASS)

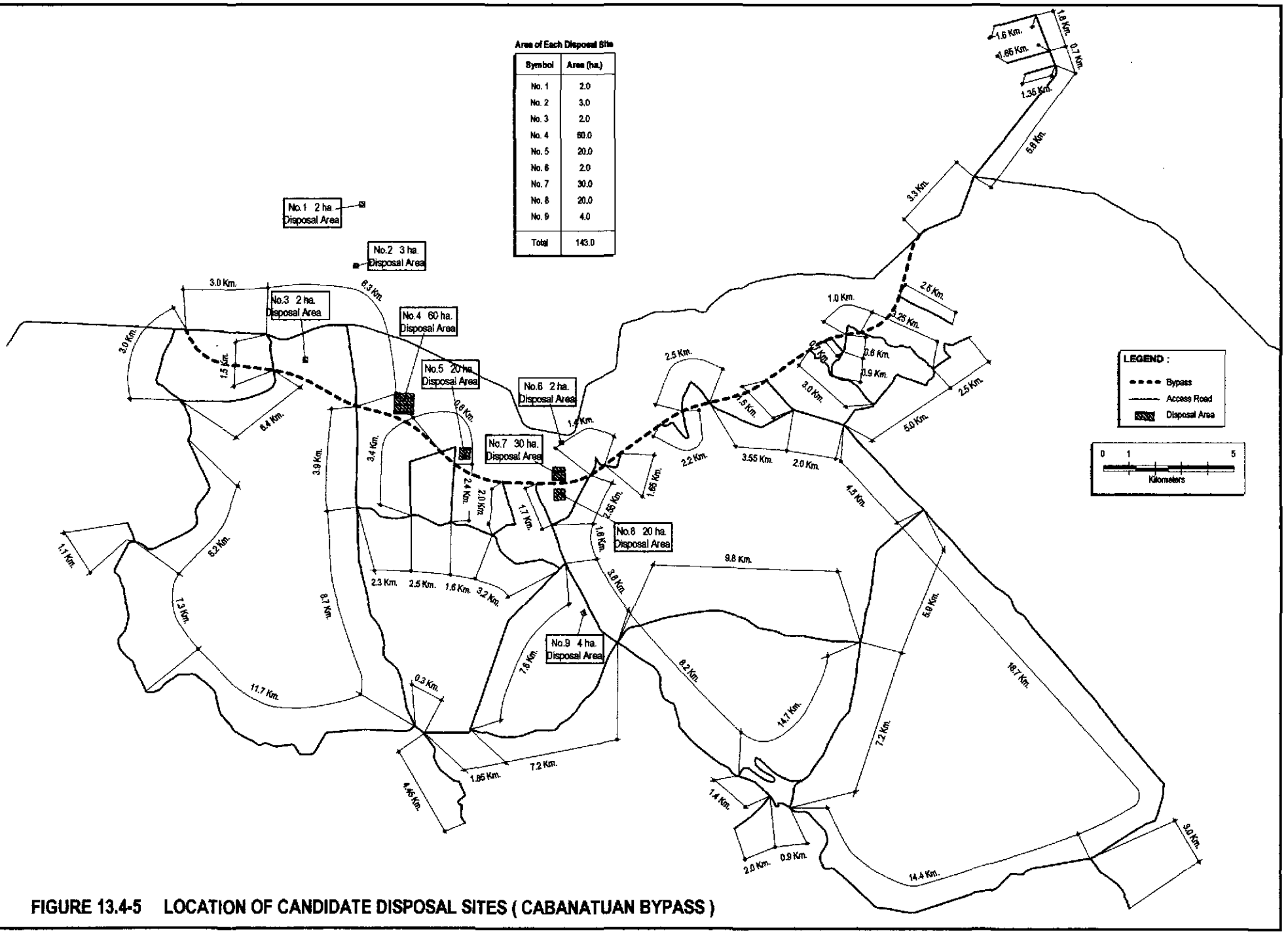


FIGURE 13.4-5 LOCATION OF CANDIDATE DISPOSAL SITES (CABANATUAN BYPASS)

2) Borrow Material

Fifty million cubic meters of borrow materials are required to construct the bypass. The land owner of Malasin Hill will allow to excavate the hill for the embankment and also permit to use the excavated site as disposal site of unsuitable soil.

Photo 13.4-1 PRESENT BORROW SOURCE CONDITION: MALASIN HILL

3) Aggregate Material for Concrete, Subbase Course and Gravel Surface

A temporary concrete plant is going to be set up at the site, because there is no commercial based concrete plant in the area. There are a lot of aggregate quarries in the nearby rivers as shown in Figure 13.4-6 and the good quality aggregate are taken.

4) Other Materials

Other materials can be purchased at local market.

5) Access Road

(1) Hauling Route

Borrow pit is located near the bypass construction site and the access road A-7 is used as a hauling route as shown in Figure 13.4-7.

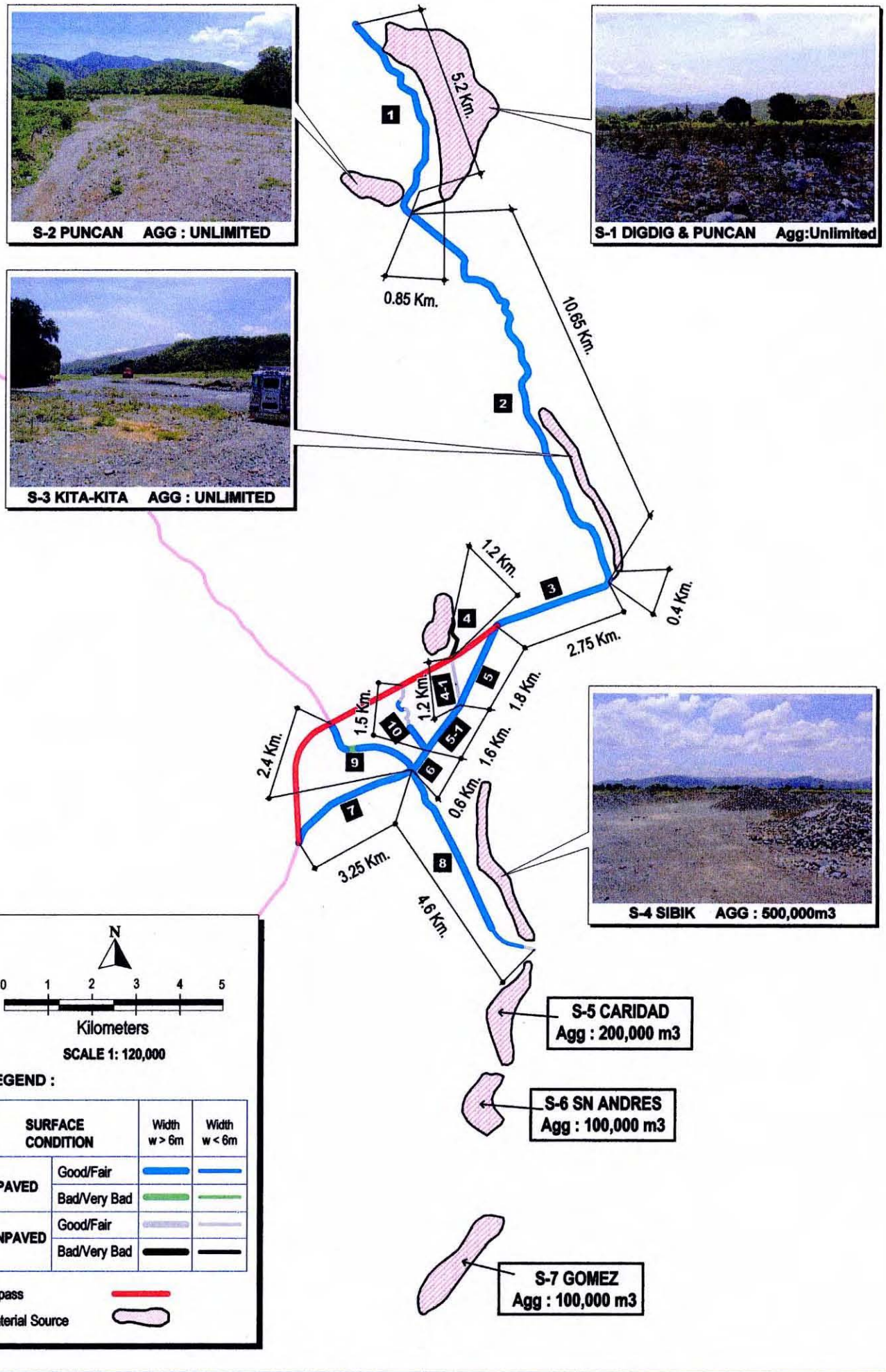


FIGURE 13.4-6 MATERIAL SOURCES (SAN JOSE BYPASS)

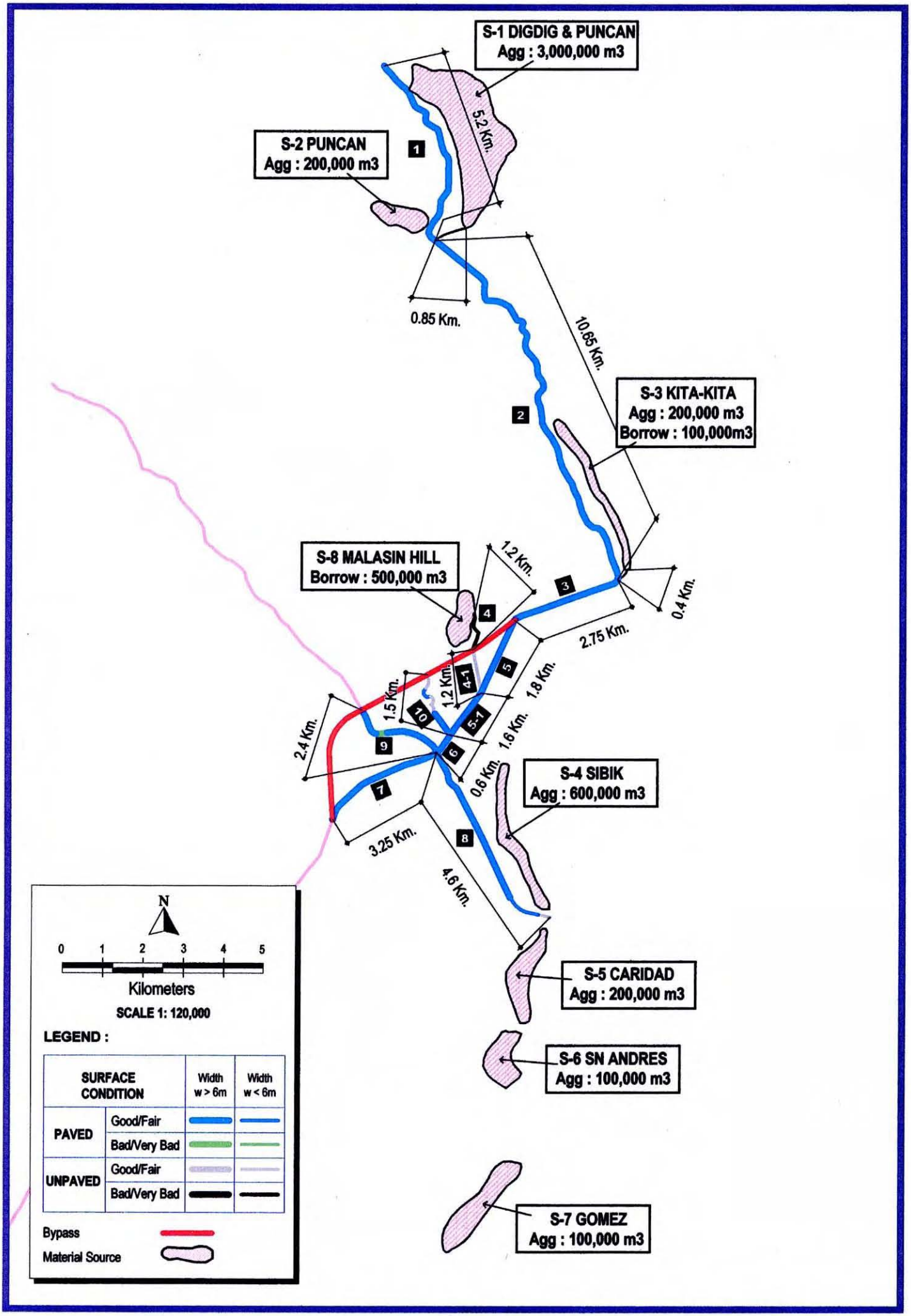


FIGURE 13.4-7 SURFACE CONDITION OF ACCESS ROADS (SAN JOSE BYPASS)

(2) Access Points to Construction Site

The access points to the bypass construction sites are selected as shown in Figure 13.4-8, with the condition of the access road. They are at the beginning of bypass, at the intersection of A-4 (Bonifacio Street) and A-7, and at the end of bypass. Averaged hauling distance for borrow materials is assessed at 7 km.

6) Disposal sites

Disposal sites where landowners agreed to backfill are shown in Figure 13.4-9. Averaged hauling distance for unsuitable materials is assumed at 5 km.

Possible Amount of Disposal

Candidate Site	Disposal Area (ha)	Possible Amount of Disposal (m3)
Site No. 1	8.0	80,000
Site No. 2	25.0	220,000
Total	33.0	300,000

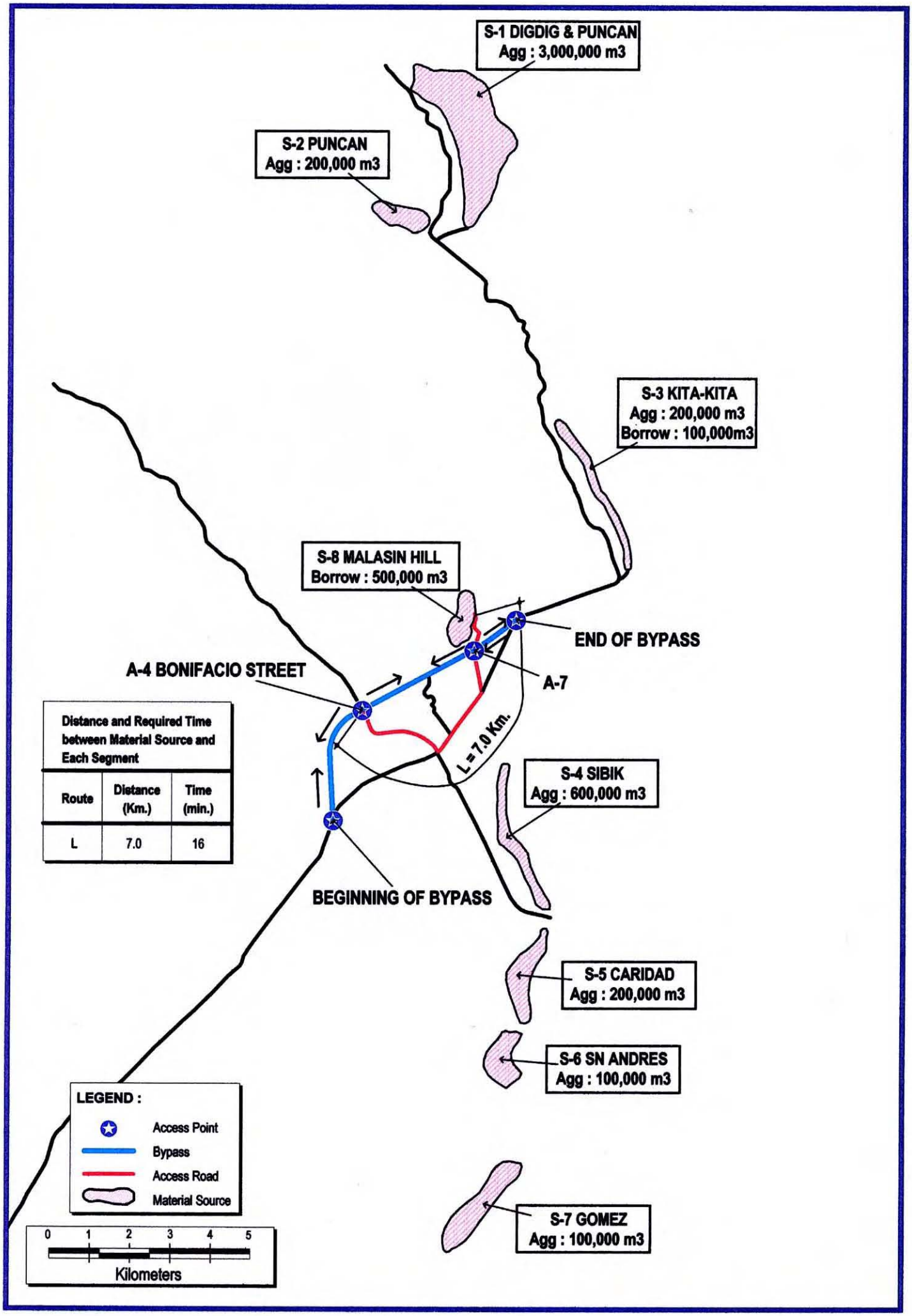
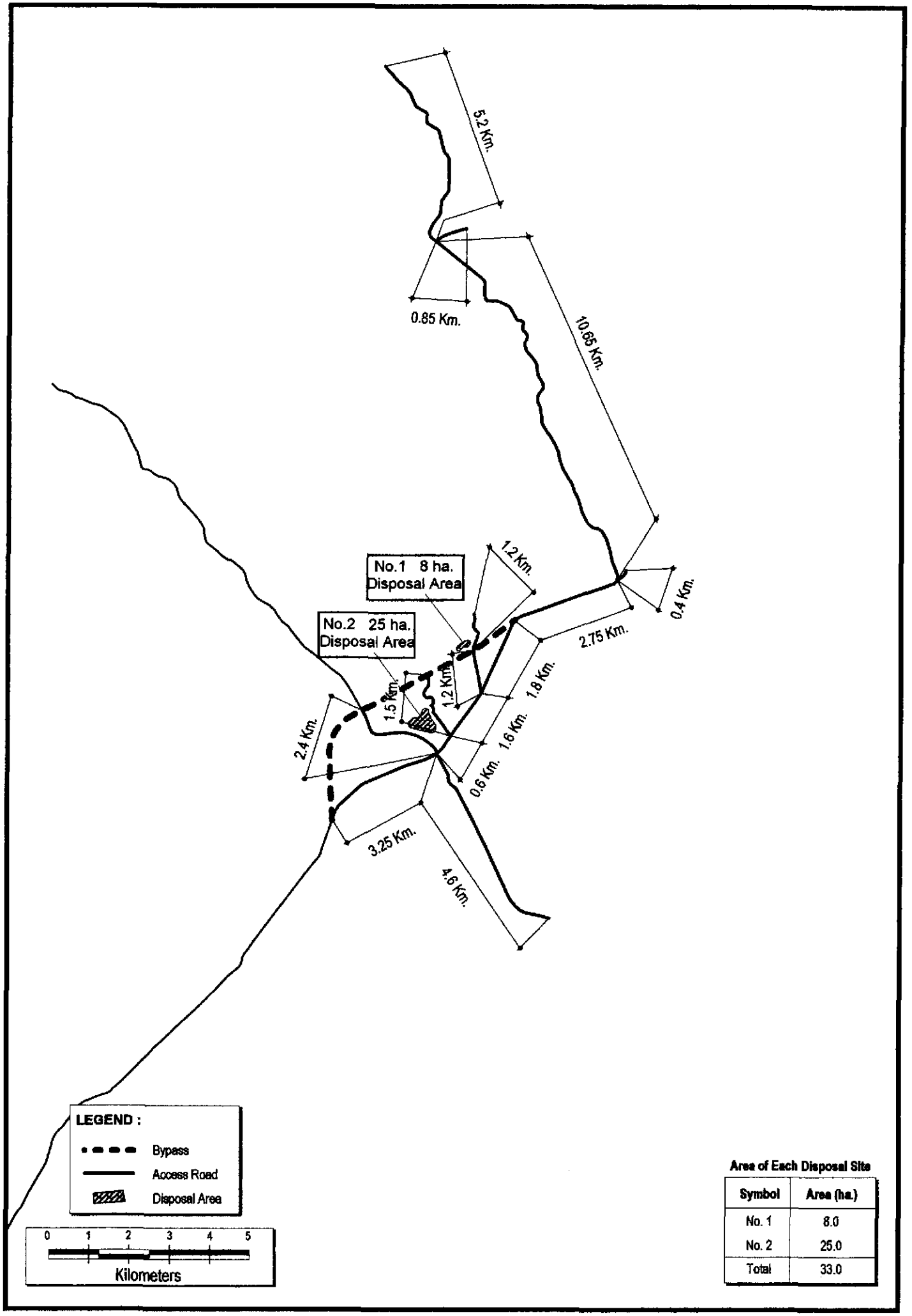


FIGURE 13.4-8 LOCATION OF MATERIAL SOURCES AND ACCESS POINTS (SAN JOSE BYPASS)



Area of Each Disposal Site

Symbol	Area (ha.)
No. 1	8.0
No. 2	25.0
Total	33.0

FIGURE 13.4-9 LOCATION OF CANDIDATE DISPOSAL SITES (SAN JOSE BYPASS)

13.5 Construction Method

13.5.1 Earth Work

The proposed routes mainly run through at the middle of rice fields where a few farmers' residences are observed. Most of road section will require embankment of selected borrow materials and the candidate borrow pits are found far at eastern hilly areas, about 10 to 25km from the project site. Aggregate materials can be found in the river beds, of which hauling distances are averagely within 5 km. Generally, construction traffic shall use and cross the existing national, provincial and community roads frequently, and will disturb the present local traffic and thereby increase congestion on the existing roads. To avoid them the following policies are established.

- The Contractor will construct temporary access roads and if required temporary bridges or causeways at the small river crossings within the acquired ROW at the beginning of mobilization, and then the construction traffic will keep an exclusive access to the site,
- After the temporary road construction, the following works will be commenced.

  ① Excavation of unsuitable surplus materials
  ② Installation of pipe culverts for drainage
  ③ Construction of under passes
  ④ Road embankment by borrow materials

- The borrow pits and hauling routes shall be so selected that construction activity will not worsen the existing traffic condition of the city, and
- Relocation of electrical poles and other utilities, and detours for existing roads and diversion of irrigation canals will be planned to minimize its construction duration, costs, and negative impacts.

13.5.2 Pavement

Pavement work is planned to carry out both in the dry season and during dry days in the rainy season. However, the work in the rainy season will require preparing precaution measures against sudden rainfalls and dry conditions of the subgrade in accordance with the requirement of the specifications,

Prior to commencing preparation of the subgrade, all culverts, cross drains, ducts and the like (including their fully compacted backfill), ditches, drains and drainage outlets shall be completed. Any work on the preparation of the subgrade shall not be started unless the Engineer shall have approved the prior work herein described,

It is suggested that a proof-rolling test shall be applied at the finishing stage of subgrade in order to inspect improper compacted places and remedy them before the subbase course work starts. The test will be carried out by using a tire roller or a road roller, the same compaction machinery as have been used in the

construction stage, or a dump truck. The equipment will pass on the surface of the finishing subgrade to observe how and whether the settlement occurs. This activity will be done during the period of preparation of subgrade.

13.5.3 Structures

For planning, the structure works are classified as follows.

- A structure work of a critical path for planning

The structure works of major bridges and flyovers need detailed and specific construction plan. (See construction plan in the relevant sections for the big bridges and interchange design)

- A structure work of a non- critical path for planning

The structure work of medium and small bridges and drainage structures will apply a construction period for structures as shown in Table 13.5-1 below.

TABLE 13.5-1 NET CONSTRUCTION PERIODS OF MAJOR STRUCTURES

Structure	Net Construction Period (days)	Remarks
Box culverts	60 – 100	L= 30 to 40m
Gravity Retaining Wall	20	L= approx. 20m
Cantilever Abutment	60 –75	L= approx. 20m
Counterfort retaining abutment	90 – 100	L= approx. 20m
Pier	60	
RC Hollow Slab	90 – 120	Slab area = 400 – 900 m2
PC Metal Slab	60 – 90	Slab area = 300 – 500m2

Source: Japan Public Highway Corporation and the Consultant's experiences
Note: Construction of substructures needs a breakdown for activity and a detailed plan.

The bridge construction schedule is planned based on hydrological data of the river. Generally the substructure will be constructed under the lower level in the first dry season. For medium and small bridges, the Contractor will construct bridges or temporary bridges in the first dry season so that construction traffic can pass without interruption during leveling up of river flows. Approximately a total of 147 days of net construction period is applied, which is estimated by the construction periods of 60 days of piers, 75 days of PC slab, and 17 days of miscellaneous works. This is equivalent to 210 calendar days (seven months) with a workable ratio of 70%.

13.5.4 Work Sequential Order

Work sequence order for major works is shown in Figure 13.5-1.

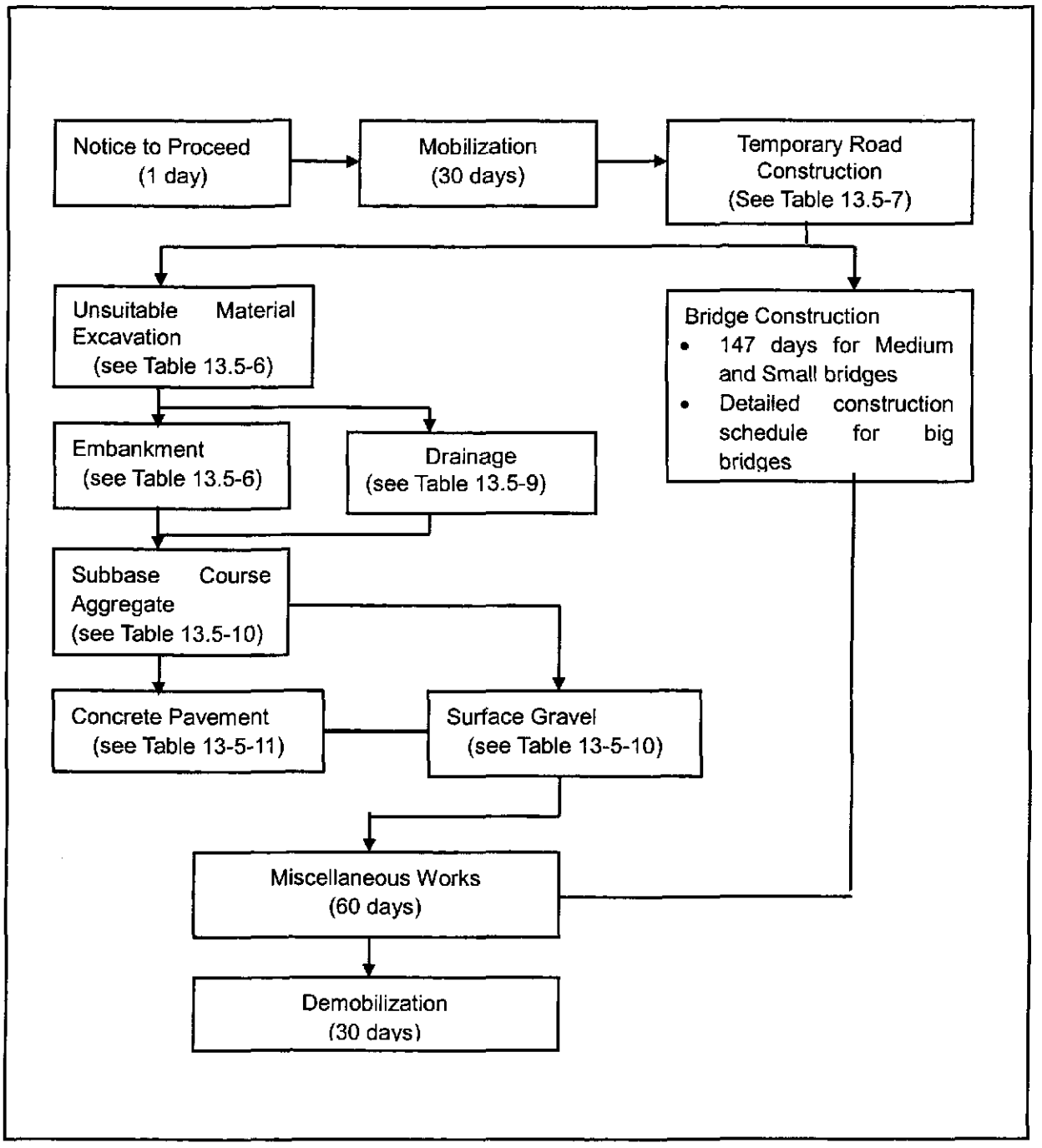


FIGURE 13.5-1 WORK SEQUENTIAL ORDER

13.5.5 Standard Capacity of Equipment

(1) Earthwork Equipment

The standard capacity of earthwork equipment is shown in Table 13.5-2.

TABLE 13.5-2 STANDARD CAPACITY OF EARTH WORK EQUIPMENT

Work Item	Name	Specification	Capacity (m^3/day)
Excavation	Bulldozer	15t	223
	〃	21t	313
	〃	32t	624
	Hydraulic Excavator	0.6m^3	310
	Wheel Loader	1.0m^3	520
Leveling	Bulldozer	15t(Subgrade)	540
	Motor Grader	L=3.5m	770
Leveling & Compaction	Bulldozer	21t(subgrade)	360
	〃	21t(fill up ground)	600
Compaction	Vibrating Roller	8 ~ 20t	580

(2) Pavement (Subbase course)

Standard capacity of the subbase and base course equipment is shown in Table 13.5-3.

TABLE 13.5-3 STANDARD CAPACITY OF PAVEMENT WORK EQUIPMENT

Work Item	Name	Specification	Capacity (m^2/day)
Leveling	Motor Grader	3.6m	1,200 (180m^3/day)
Compaction	Tire Roller	8~20t	
Compaction	Vibration Roller	6t	
Water Content Adjustment	Water Tank Truck	6m^3	

Note: Thickness of Layer =150mm
Calculation: Volume of Subgrade
1,200m^2/day/layer×0.15m/laye r =180m^3/day

(3) Pavement (Concrete Pavement)

Standard capacity of concrete pavement is shown in Table 13.5-4.

TABLE 13.5- 4 STANDARD CAPACITY OF PAVEMENT SET

Work Item	Name	Specification	Capacity (m^2/day)
Place Concrete	Paver/Finisher	3～7.5m	422
Concrete Cutter	Concrete Saw	ϕ300mm	($105m^3$/day)

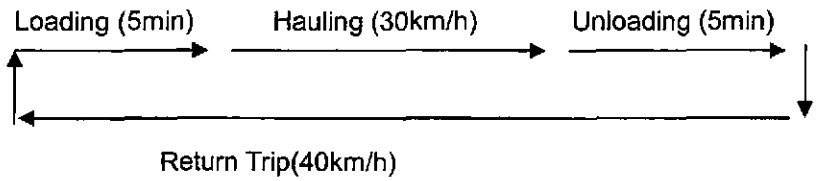
Note: Thickness of Layer =250mm
Calculation : Volume of Concrete
$422m^2$/day/layer×0.25m/layer=$105m^3$/day

13.5.6 Combination Capacity of Construction Equipment

(1) Earthwork

1) Cycle Time and Numbers of Trucks Required

Cycle time is estimated by the following scheme.



- Total Cycle Time = Loading (5 min)+Unloading (5 min)+Trip Time
- Trip Time (min) = (Hauling Dis/30 + Return Dis/40)x60min)
- Number of Cycle /Day: 8h/day×60min/h÷time (min) = No. of cycles per day

Note: Actual daily operating hours are assumed 8 hours out of 10 hours of total daily working hour.

b. Daily Hauling Volume

Daily hauling volume per truck is calculated as follows, shown in Table 13.5-5.

Original soil weight =1.9t/m^3: 10t÷1.9t/m^3=5.3m^3/truck/cycle

TABLE 13.5-5 DAILY HAULING VOLUMES PER TRUCK

Case	Distance	Hauling	Return	Tripl	Operation	Total	Cycle	Outputs
1	< 5km	5 min.	4 min.	9 min.	10 min.	19 min.	25.6 /day	135.7
2	5 - 10km	15	11	26	10	36	13.2	70.2
3	10 – 15km	25	19	44	10	54	8.9	47.3
4	15 – 20km	35	27	61	10	71	6.7	35.7
5	20 – 25km	45	34	79	10	89	5.4	28.7
6	25 – 30km	55	41	96	10	106	4.5	23.9

2) Removal of Unsuitable Soil

Combination of construction equipment for removal of unsuitable materials is shown in Table 13.5-6.

TABLE 13.5-6 SET OF EQUIPMENT FOR REMOVAL OF UNSUITABLE SOIL (CAPACITY OF SET 310 M^3/DAY)

Work Item	Name	Specification	Unit	Quantity	Capacity (m^3/day)	Capacity of Set
Excavation	Bulldozer	21t	each	1	313	310 m^3/day (6,500m^3/month)
Loading	Hydraulic Excavator	0.6 m^3	each	1	310	
Dewater	Submerged pump	2"～4"	each	2	—	
	Generator		each	1	—	
Hauling	Dump Truck	10 t	each	See below	360	
Leveling	Bulldozer	15 t	each	1	540	

a. Calculation of Outputs per month

Monthly outputs are calculated as follows.

- Workable day/month: 30days/month×0.721≒21days/month

b. Capacity of a Set and Numbers of dump trucks required by hauling distance.

Capacity of a set and numbers of dump trucks required by hauling distance is calculated as follows.

- Capacity of Set = 310 m^3/day:310m^3/day×21days/month≒6,500m^3/month
- Number of dump trucks: 310 m^3/day / 135.7 m^3/day = 2 units (< 5 km)

Case	Distance	Dump Trucks for 310m^3
1	< 5km	2units
2	5 - 10km	4
3	10 – 15km	7
4	15 – 20km	9
5	20 – 25km	11
6	25 – 30km	13

Note) See Table 13.5-5.

Hauling distance for deposit is assured within 5 km, hence the number of dump trucks required is 6 units.

3) Temporary Access Road Construction

Combination of equipment of temporary access road construction is shown in Table 13.5-7.

TABLE 13.5- 7 SET OF EQUIPMENT FOR TEMPORARY ACCESS ROAD CONSTRUCTION (CAPACITY OF SET : 520 M^3/DAY)

Work item	Machine Name	Specification	Unit	Quantity	Capacity (m^3/day)	Capacity of Set
Excavating & Loading	Bulldozer	32 t	Each	1	624	520m^3/day (11,000m^3/month)
	Wheel Shovel	1.0 m^3	Each	1	520	
	Dump Truck	10 t	Each	12	540	
Embankment	Bulldozer	21 t	Each	1	600	
//	Water Tank Truck	6 t	Each	1	—	

a. Calculation of Capacity per month

- Workable day/month: 30days/month×0.721≒21days/month

b. Capacity of a Set and numbers of dump trucks required by hauling distance.

- Capacity of Set : 520 m^3/day : 520m^3/day×21days/month ≒ 11,000m^3/month
- Number of dump trucks: 520 m^2/day / 135.7 m^2/day = 4 units (<5 km)

Case	Distance	Dump Trucks for 520m^3
1	< 5km	4units
2	5 - 10km	7
3	10 – 15km	11
4	15 – 20km	15
5	20 – 25km	18
6	25 – 30km	22

4) Embankment

Combination of equipment for embankment is shown in Table 13.5-8.

TABLE 13.5-8 SET OF EQUIPMENT FOR CAPACITY OF SET : 520 M^3/DAY

Work item	Machine name	Specification	Unit	Quantity	Capacity (m3/day)	Capacity of Set
Excavating	Bulldozer	32 t	each	1	624	520m^3/day (11,000m^3/month)
Loading	Wheel Shovel	1.0 m^3	each	1	520	
Hauling	Dump Truck	10 t	each	12	540	
Leveling	Motor Grader	L = 3.5m	each	1	770	
Compacting	Tamping Roller / Tire Roller	8~20t	each	1	580	
//	Water Tank Truck	6 t	each	1	—	

a. Calculation of Capacity per month

Workable day/month
30days/month×0.721≒21days/month

b. Capacity of Set per month

Capacity of Set : 520 m^3/day
520m^3/day×21days/month≒11,000m^3/month
520 m^2/day / 135.7 m^2/day per dump truck ≒ 4 units (<5 km)

Case	Distance	Outputs	Dump Trucks for 520m3
1	< 5km	121m^3/day	4units
2	5 - 10km	59	17
3	10 – 15km	39	11
4	15 – 20km	29	15
5	20 – 25km	23	18
6	25 – 30km	19	22

2) Drainage Work

Combination of equipment for drainage work is shown in Table 13.5-9.

TABLE 13.5-9 SET OF EQUIPMENT FOR DRAINAGE WORK

Work Item	Name	Specification	Unit	Quantity	Remarks
Excavation	Hydraulic Excavator	0.6m^3	each	1	Excavation
	Dump truck	10t, 2t	each	2	Soil transportation
	Bulldozer	15t	each	1	Level disposal
Dewater	Submerged pump	2"~4"	each	2	
	Generator		each	1	
Lay Pipe	Truck Crane	10t	each	1	
	Flatbed Truck	2t	each	1	Transportation
Concrete	Truck Crane	25t	each	1	
	Concrete Plant		each	1	
	Transit Mixer	10t	each	2	
Embankment	Hydraulic Excavator	0.6m^3	each	1	Loading
	Dump truck	10tt	each	2	Soil transportation
	Vibration roller	2t	each	1	Compaction
	Tamper	100kg	each	2	Compaction
	Bulldozer	3t	each	1	Leveling

3) Subbase Work

Combination of equipment for drainage work is shown in Table 13.5.-10.

TABLE 13.5-10 SET OF EQUIPMENT FOR PAVEMENT (SUBBASE COURSE) (CAPACITY OF SET 600M^2/DAY)

Work Item	Name	Specification	Unit	Quantity	Capacity (m^3/day)	Capacity of set (m^2/day)
Leveling	Grader	3.1m	Each	1	600m^2/layerx 2 layers = 1,200m^2/day	600m^2/day (150m^3/day) (25,000m^2/month) (3,800m^3/month)
Compaction	Tire Roller	8~20t	Each	1		
Compaction	Road Roller	10~12t	Each	1		
Hauling	Dump Truck	10t	Each	6	170m^3/day	
Compaction	Water Tank Truck	6m^3	Each	1	—	

a. Thickness of a subbase course is 250mm; compaction work shall be carried out by two lifts.

b. Calculation of Outputs per month

Workable day/month : 30days/month×0.721≒21days/month

c. Capacity of Set per month and Number of Dump trucks

- Capacity of Set : 660 m^2/day (150m^3/day): 600m^2/day×21days/month ≒12,000m^2/month
  (equivalent to 150m^3/day×21days/month≒3,100m^3/month)
- Number of dump trucks: 150 m^3/day / 121 m^2/day ≒ 1 unit (<5 km)

Case	Distance	Dump Trucks for 150m^3
1	< 5km	1unit
2	5 – 10km	2
3	10 – 15km	3
4	15 – 20km	4
5	20 – 25km	5
6	25 – 30km	6

4) Concrete Pavement

Combination of equipment for pavement work is shown in Table 13.5-11.

TABLE 13.5-11 SET OF EQUIPMENT FOR PAVEMENT (CONCRETE PAVEMENT) (CAPACITY OF SET 422M^2/DAY)

Work Item	Name	Specification	Unit	Quantity	Capacity	Capacity of Set (m^2/day)
Product Concrete	Concrete Plant		each	1	—	422 (105m^3/day) (8,800m^2/month) (2,200m^3/month)
Transport	Transit Mixer	10t	each	3	108 m^3/day	
Place Concrete	Paver/Finisher	3~7.5m	each	1	422m^2/day	
Cut Concrete for joint	Concrete Cutter	ϕ300	each	1	—	

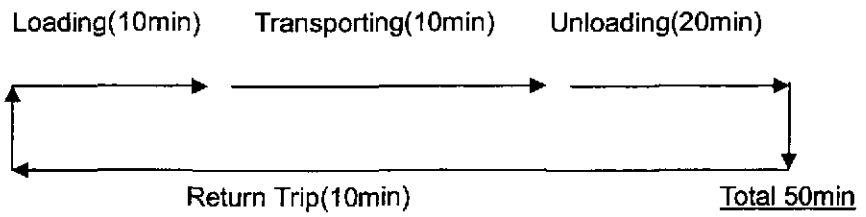
Note: Thickness of concrete pavement 250mm; Calculation of Capacity of a month
Workable day/month: 30days/month×0.721≒21days/month
Capacity of Set/month: 422m^2/day×21days/month≒8,800m^2/month
105m^3/day×21days/month≒2,200m^3/month

Calculation of transporting daily concrete volume per transit mixer is as follows.

1) Conditions: a concrete plant is located near the project site and average transport distance is assumed at 4 km.

2) Estimation of Cycle Time

Total cycle time is estimated by the scheme below.



The numbers of cycle per day is calculated;

6h/day×60min/h÷50min/cycle=7.2cycle/day.

Daily transport concrete volumes are calculated as follows.

Capacity of Cycle =5m^3/cycle/truck
5.0m^3/cycle/truck×7.2cycle/day=36m^3/day/truck
36m^3/day×3truck=108m^3/day

5) Bridge Works

Combination of equipment for bridge construction is shown in Table 13.5-12

TABLE 13.5-12 SET OF EQUIPMENT FOR BRIDGE (PC GIRDER)

Work item	Machine Name	Specification	Unit	Quantity	Remarks
Substructure	Hydraulic Excavator	0.6m^3	each	1	
	Dump truck	10t	each	2	
	Submerged pump	2"～4"	each	2	
	Generator		each	1	
	Vibro Plate	100kg	each	1	
	Bulldozer	21t	each	1	
	Crater Crane	40t	each	1	Pile
	Pile Driver	3.5t Hmmar	each	1	Pile
Girder Erection	Crane	150t	each	2	72t/Girder
Concrete	Concrete pump	50m^3/h	each	1	
	Concrete Plant		each	1	
	Transit Mixer	10t	each	3	
	Truck Crane	20t	each	1	
	Truck	4t	each	1	

6) Revetment Works

Combination of equipment for revetment is shown in Table 13.5-13.

TABLE 13.5-13 SET OF EQUIPMENT FOR REVETMENT

Work Item	Name	Specification	Unit	Quantity	Remarks
Sheet Piling	Crawler Crane	40t	each	1	Pile Driving
	Vibro Pile Driver	40kw	each	1	
	Generator		each	1	
	Truck	4t	each	1	Transportation
Concrete	Concrete Plant		each	1	
	Transit Mixer	10t	each	1	
Slope Forming	Hydraulic Excavator	0.6m^3	each	1	Loading
	Dump truck	10t, 2t	each	2	Soil transportation
	Tamper	100kg	each	2	Compaction
	Bulldozer	3t	each	1	Leveling

13.6 Detailed Construction Schedule

A detailed construction schedule for each contract package was prepared based on the following specific site conditions and type of works.

(1) Plaridel Bypass

Package	Specification and Type of Work
1. Package 1 • Phase I • Construction Period: 28 months • Start and finish date: 1st Sept. 2006~31 Dec. 2008	1) Traffic safety of North Luzon Highway during the construction of an interchange flyover. 2) Slow construction for ramp embankment due to soil condition of foundation (N=5) 3) Long distance of hauling borrow materials (l=25km) **RECOMMENDATION:** To construct a temporary road in the ROW of the package 2 in order to avoid construction traffic passing on the NR334.
2. Package 2 • Phase II • Construction Period: 28 months • Start and finish date: 1st Sept. 2006~31 Dec. 2010	1) Long distance of hauling borrow materials (l=22km) 2) Partial opening of public traffic from 39+625km to 41+166km within one year (l=1.6km) 3) Five medium & small bridge construction.
3. Package 3 • Phase II • Construction Period: 36 months • Start and finish date: 1st Sept. 2008~31st Dec. 2010	1) Angat river bridge construction (l=1120) 2) Long distance of hauling borrow materials (l=15km) **RECOMMENDATION:** To use river bed materials for embankment to reduce the hauling distances.
4. Package 4 • Phase III • Construction Period: 24 months • Start and finish date: 1st Jan. 2009~31st Dec. 2010	1) Connection of Pan-Philippine Highway at the end of bypass. 2) Short distance of hauling borrow materials (l=5km)

(2) Cabanatuan Bypass

Package	Specification and Type of Work
1. Package 1 • Phase I • Construction Period: 32 mos. • Start and finish date: 1st May 2008~31st Dec. 2010	1) Connecting with Pan-Philippine Highway at the beginning of bypass. 2) Long distance of hauling borrow materials (l=17km) with big volume of embankment.
2. Package 2 • Phase I • Construction Period: 32 mos. • Start and finish date: 1st Jan. 2006 to 31st Dec. 2010	1) New access road construction. 2) Long distance of hauling borrow materials (l=19km) with big volume of embankment. 3) Seven medium & small bridges.
3. Package 3 • Phase I • Construction Period: 36 mos. • Start and finish date: Jan. 2006~31st Dec. 2010	1) Pampanga river bridge (l=1,125m) 2) Long distance of hauling borrow materials (l=23km) **RECOMMENDATION:** To use river bed materials for embankment, if possible.
4. Package 4 • Phase II • Construction Period: 32 mos. • Start and finish date: 1st May 2008~31st Dec. 2010	1) Many bridge construction. - Talavera river bridge (l=360m) - Four medium and small bridges 2) Long distance of hauling borrow materials (l=24km) 3) 13km long road construction 4) Cut and fill (l=800m) at the end of bypass 5) Connecting with Pan-Philippine Highway at the end of bypass

(3) San Jose Bypass

Package	Specification and Type of Work
• Phase II • Construction Period: 28 mos. • Start and finish date: 1st Sept. 2008~31st Dec. 2010	1) One package construction. 2) Partial opening for public traffic from the beginning of the bypass. 3) Comparatively short distance of hauling borrow material (l=5km) **RECOMMENDATION:** To prepare a detailed partial opening schedule at the pre-construction stages.

13.7 Detailed Construction Schedule of Plaridel Bypass

13.7.1 Package 1: *Sta. 33+025.00 to Sta. 39+625.00*

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.7.1(1), Figure 13.7.1(2), and Table 13.7.1(3), respectively.

13.7.2 Package 2: Sta. 39+625.00 to Sta. 47+400.00

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.7.2(1), Figure 13.7.2(2), and Table 13.7.2(3), respectively.

13.7.3 Package 3: Sta. 47+400.00 to Sta. 49+625.00

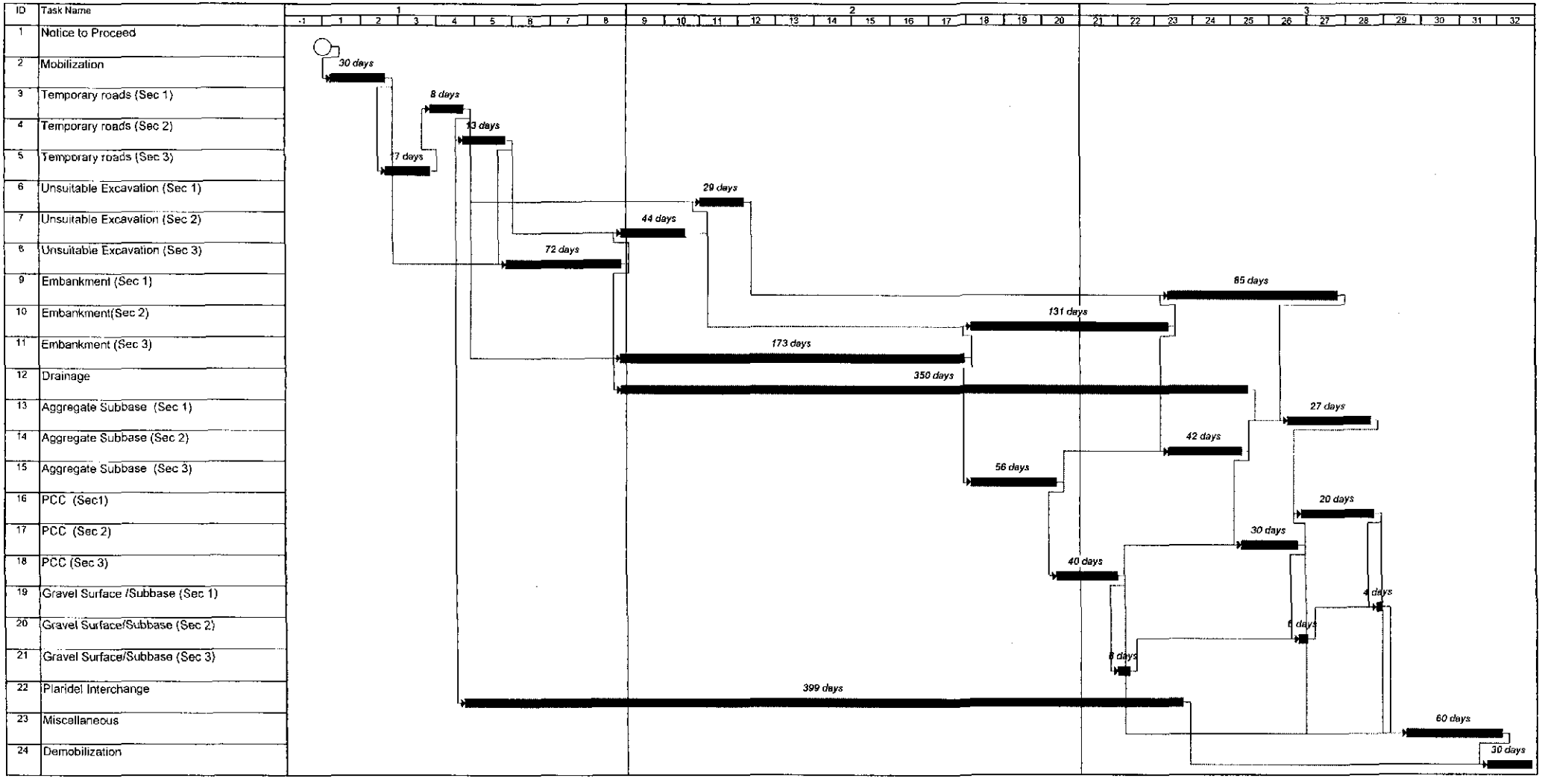
Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.7.3(1), Figure 13.7.3(2), and Table 13.7.3(3), respectively.

13.7.4 Package 4: Sta. 49+625.000 to Sta. 56+672.457

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.7.4(1), Figure 13.7.4(2), and Table 13.7.4(3), respectively.

Upgrading Inter-Urban Highway System Project

Table 13.7.-1 (1) Plaridel Bypass Initial Stage (Package 1) Construction Shcedule



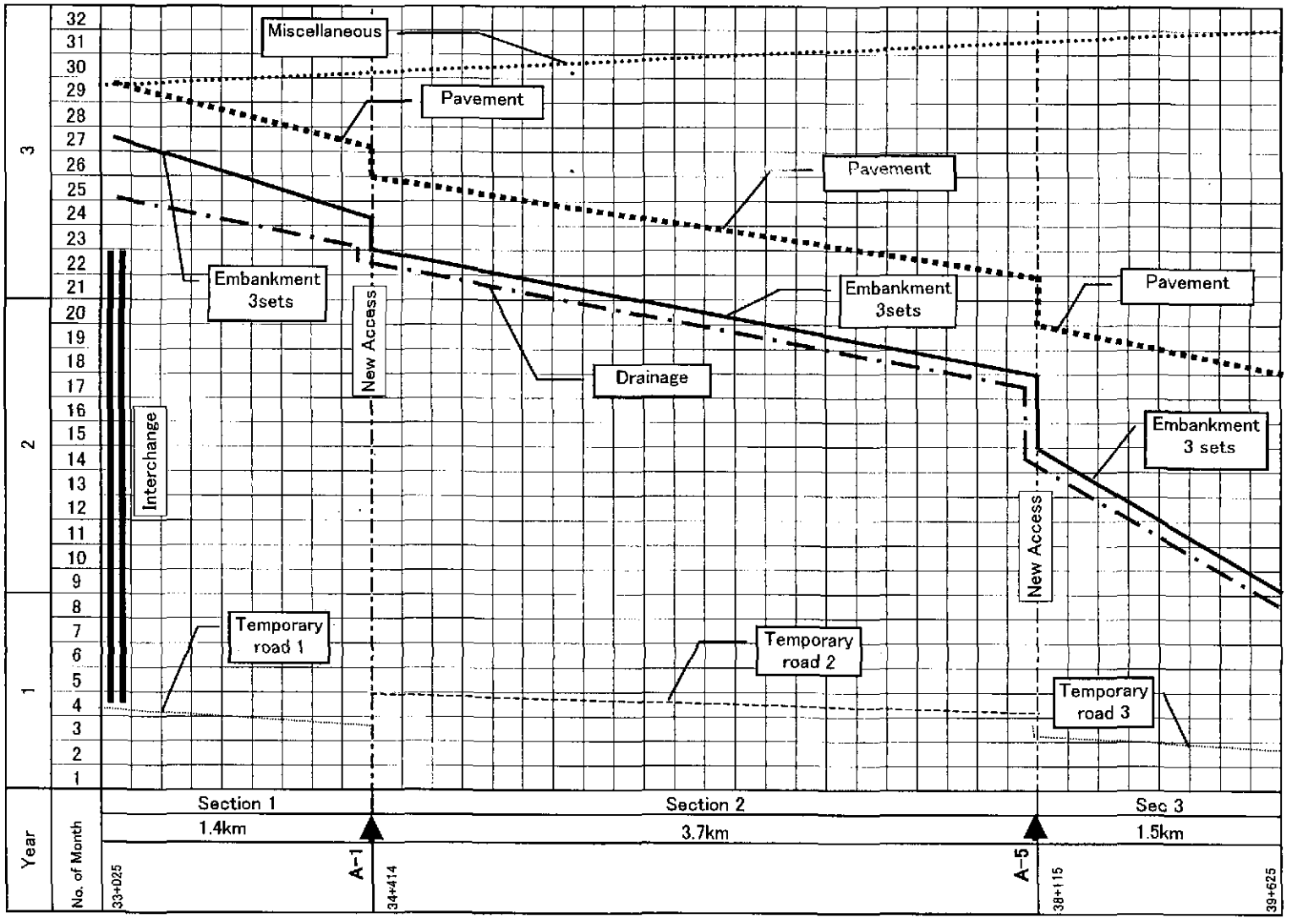


Figure 13.7-1(2) Construction Schedule: Plaridel Bypass Initial Stage Package 1

(Relation among temporary road,access road,bridge and embankment work)

Plaridel Bypass Initial Stage Package 1

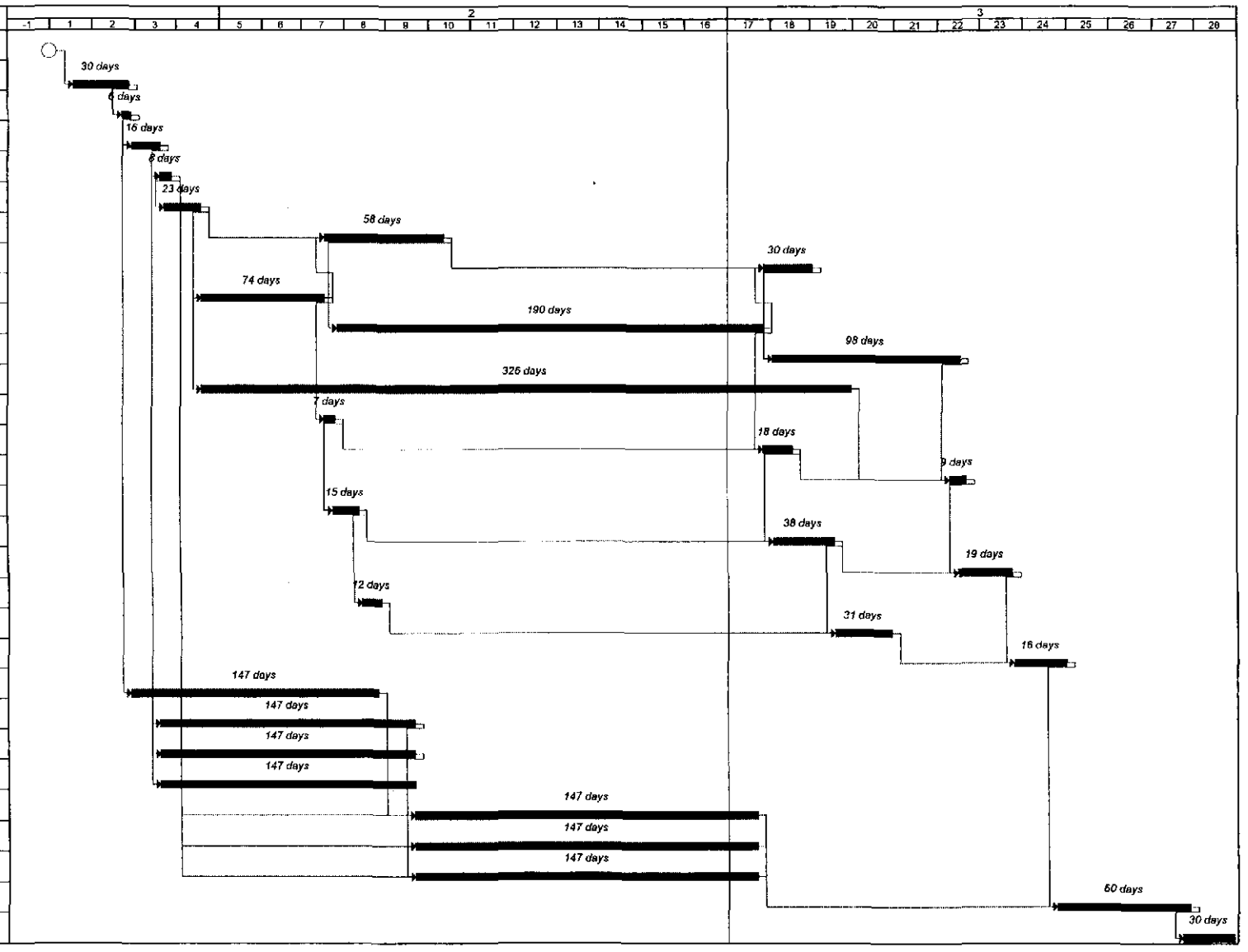
Table 13-7-1 (3) Major Equipment Allocation

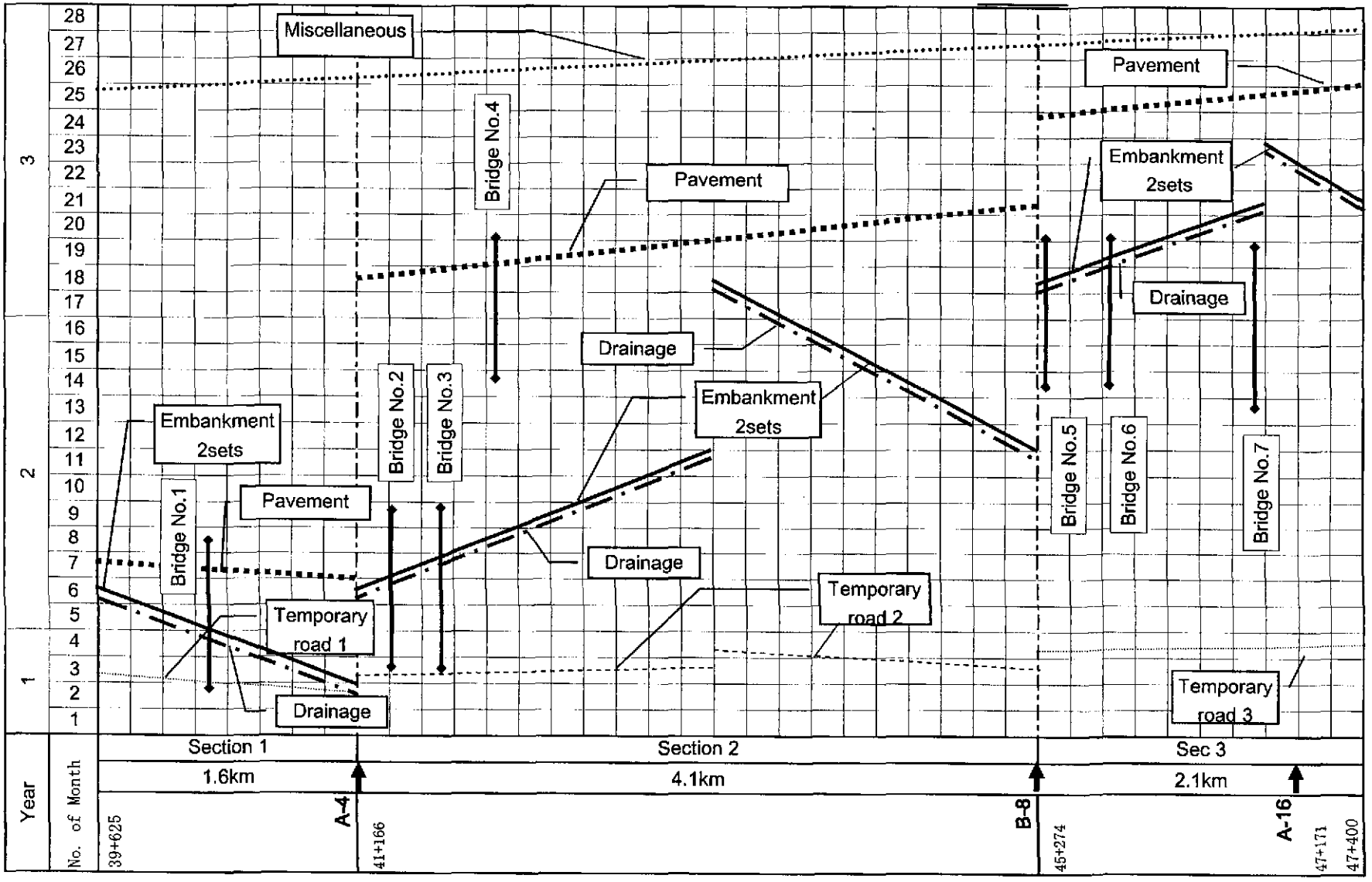
Year	1								2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Major Equipment																																
bulldozer 32t		2	2	2	2			3	3	3	3	3						3	3	3	3	3	3	3	3	3	3					
Temporary roads (Sec 1)			2	2																												
Temporary roads (Sec 2)				2	2																											
Temporary roads (Sec 3)		2	2																													
Embankment (Sec 1)																							3	3	3	3	3					
Embankment(Sec 2)																		3	3	3	3	3	3									
Embankment (Sec 3)								3	3	3	3	3																				
bulldozer 21t		2	2	2	3	3	3	6	6	6	6	6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
Temporary roads (Sec 1)			2	2																												
Temporary roads (Sec 2)				2																												
Temporary roads (Sec 3)		2																														
Unsuitable Excavation (Sec 1)											3	3																				
Unsuitable Excavation (Sec 2)								3	3	3	0																					
Unsuitable Excavation (Sec 3)					3	3	3	3																								
Embankment (Sec 1)																							3	3	3	3	3					
Embankment(Sec 2)																		3	3	3	3	3	3									
Embankment (Sec 3)								3	3	3	3	3	3	3	3	3	3															
hydr.excavator					3	3	3	3	3	3	3	3																				
wheel loader		2	2	2	2			3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6	6	6	9	6	3				
motor grader		2	2	2	2			3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6	6	6	9	6	3				
dump trucks		8	8	8	8	6	6	60	60	60	60	60	54	54	54	54	54	60	60	60	57	57	60	60	60	63	60	6				
Temporary roads (Sec 1)			8	8																												
Temporary roads (Sec 2)				8	8																											
Temporary roads (Sec 3)		8	8																													
Unsuitable Excavation (Sec 1)											6	6																				
Unsuitable Excavation (Sec 2)								6	6	6																						
Unsuitable Excavation (Sec 3)					6	6	6	6																								
Embankment (Sec 1)																							54	54	54	54	54					
Embankment(Sec 2)																		54	54	54	54	54	54									
Embankment (Sec 3)								54	54	54	54	54	54	54	54	54	54															
Aggregate Subbase (Sec 1)																										6	6	6				
Aggregate Subbase (Sec 2)																							6	6	6							
Aggregate Subbase (Sec 3)																		6	6	6												
Gravel Surface /Subbase (Sec 1)																												2				
Gravel Surface/Subbase (Sec 2)																										3						
Gravel Surface/Subbase (Sec 3)																					3	3										
tire roller		2	2	2	2			3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6	6	6	9	6	3				
road roller																		3	3	3	3	3	3	3	3	6	3	3				
tamping roller		2	2	2	2			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3					
concrete finisher																				3	3				3	3	3	3				
transit mixers																				9	9				9	9	9	9				
bridge equipment (set)				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									

Upgrading Inter-Urban Highway System Project

Table 13.7-2 (1) Plaridel Bypass Initial Stage (Package 2) Construction Schedule

ID	Task Name
1	Notice to Proceed
2	Mobilization
3	Temporary roads (Sec 1)
4	Temporary roads (Sec 2)
5	Temporary roads (Sec 3)
6	Unsuitable Excavation (Sec 1)
7	Unsuitable Excavation (Sec 2)
8	Unsuitable Excavation (Sec 3)
9	Embankment (Sec 1)
10	Embankment(Sec 2)
11	Embankment (Sec 3)
12	Drainage
13	Aggregate Subbase (Sec 1)
14	Aggregate Subbase (Sec 2)
15	Aggregate Subbase (Sec 3)
16	PCC (Sec1)
17	PCC (Sec 2)
18	PCC (Sec 3)
19	Gravel Surface/Subbase (Sec 1)
20	Gravel Surface/Subbase (Sec 2)
21	Gravel Surface/Subbase (Sec 3)
22	Bridge No.1
23	Bridge No.2
24	Bridge No.3
25	Bridge No.4
26	Bridge No.5
27	Bridge No.6
28	Bridge No.7
29	Miscellaneous
30	Demobilization





(Relation among temporary road, access road, bridge and embankment work)

FIGURE 13.7-2 (2) CONSTRUCTION SCHEDULE: PLARIDEL BYPASS INITIAL STAGE PACKAGE 2

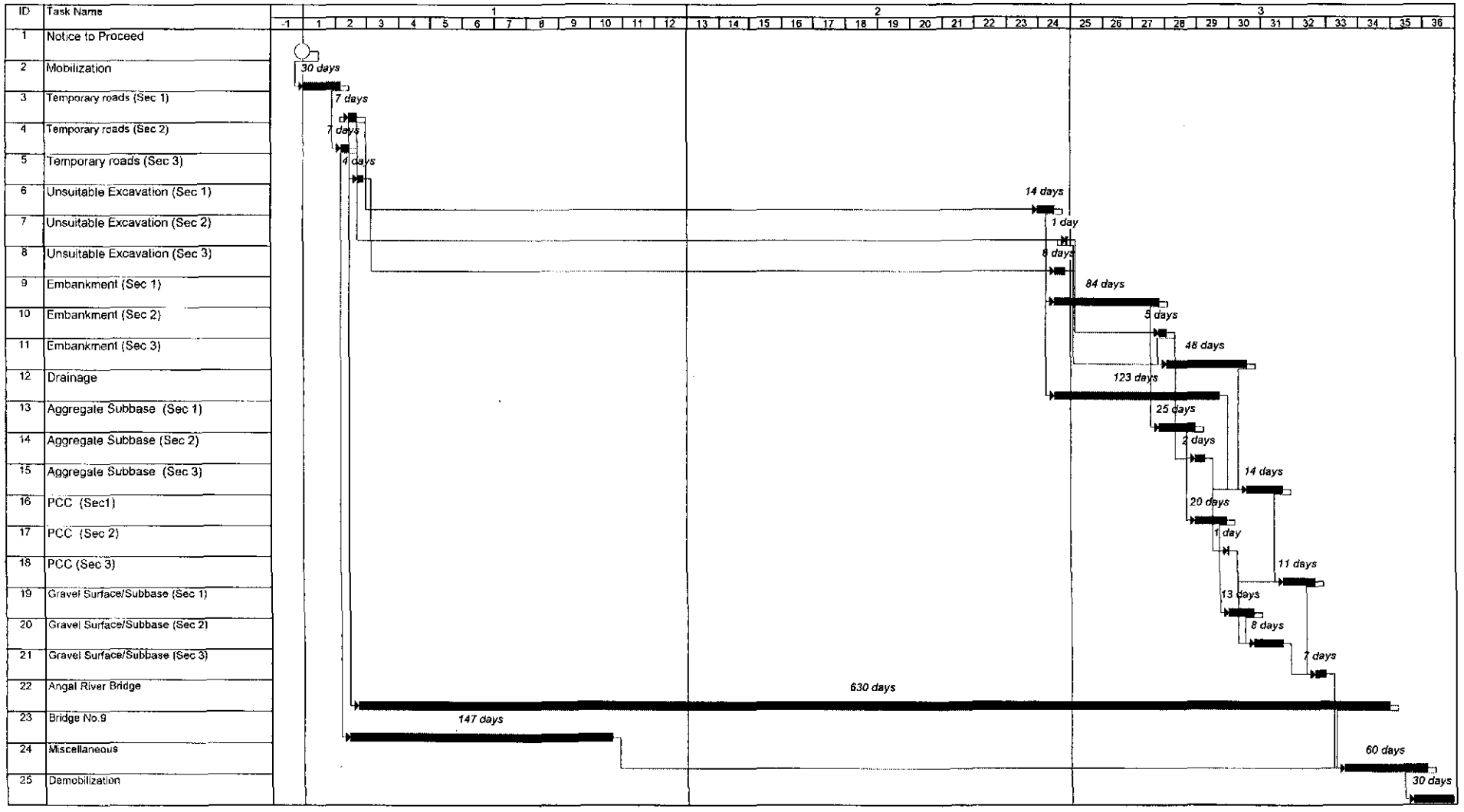
TABLE 13.7-2 (3) MAJOR EQUIPMENT ALLOCATION

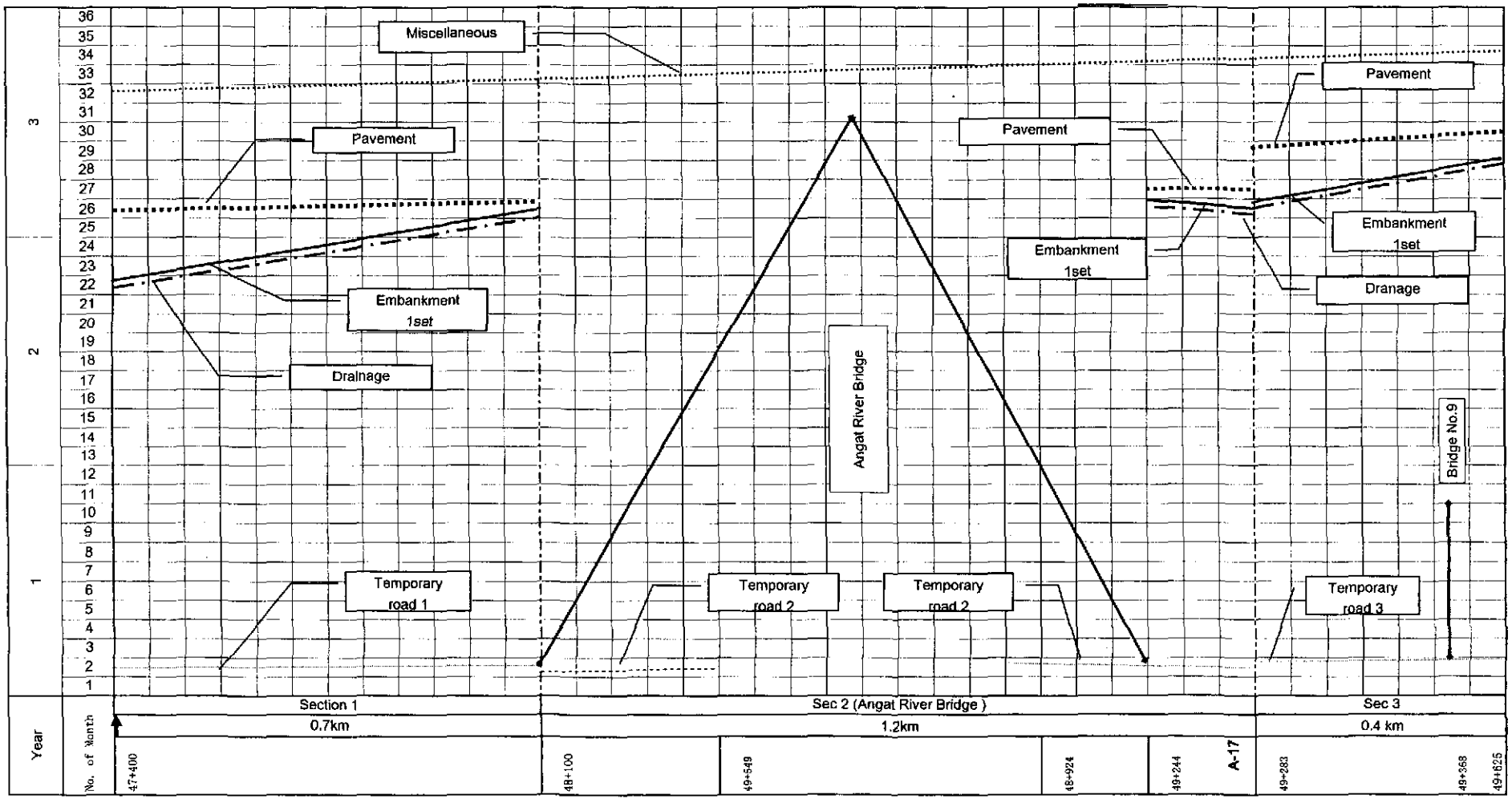
(Plaridel Bypass Initial Stage Package 2)

Year	1				2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Major Equipment																												
bulldozer 32t		4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
Temporary roads (Sec 1)		2	2																									
Temporary roads (Sec 2)			2	2																								
Temporary roads (Sec 3)				2																								
Embankment (Sec 1)		2	2	2	2	2																						
Embankment(Sec 2)						2	2	2	2	2	2	2	2	2	2	2	2	2										
Embankment (Sec 3)																		2	2	2	2	2	2					
bulldozer 21t		6	6	6	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
Temporary roads (Sec 1)		2	2																									
Temporary roads (Sec 2)			2	2																								
Temporary roads (Sec 3)				2																								
Unsuitable Excavation (Sec 1)		2	2																									
Unsuitable Excavation (Sec 2)				2	2	2																						
Unsuitable Excavation (Sec 3)						2	2																					
Embankment (Sec 1)		2	2	2	2	2																						
Embankment(Sec 2)						2	2	2	2	2	2	2	2	2	2	2	2	2										
Embankment (Sec 3)																		2	2	2	2	2	2					
hydr.excavator		2	2	2	2	2	2																					
wheel loader		4	4	4	2	4	4	2	2	2	2	2	2	2	2	2	2	4	2	4	4	2	4	2	2	2		
motor grader		4	4	4	2	4	4	2	2	2	2	2	2	2	2	2	2	4	2	4	4	2	4	2	2	2		
dump trucks		40	48	48	40	42	40	36	36	36	36	36	36	36	36	36	36	38	38	38	38	36	38	2	2	2		
Temporary roads (Sec 1)		8																										
Temporary roads (Sec 2)			8																									
Temporary roads (Sec 3)				8																								
Unsuitable Excavation (Sec 1)		4	4																									
Unsuitable Excavation (Sec 2)				4	4	4																						
Unsuitable Excavation (Sec 3)						4	4																					
Embankment (Sec 1)		36	36	36	36	36																						
Embankment(Sec 2)						36	36	36	36	36	36	36	36	36	36	36	36	36										
Embankment (Sec 3)																		36	36	36	36	36	36					
Aggregate Subbase (Sec 1)						2																						
Aggregate Subbase (Sec 2)																		2										
Aggregate Subbase (Sec 3)																							2	2				
Gravel Surface/Subbase (Sec 1)							2																					
Gravel Surface/Subbase (Sec 2)																				2	2							
Gravel Surface/Subbase (Sec 3)																									2	2		
tire roller		4	4	4	2	4	4	2	2	2	2	2	2	2	2	2	2	4	2	4	4	2	4	2	2	2		
road roller						2	2											2		2	2		2	2	2	2		
tamping roller		4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
concrete finisher						3	3											3	3	3				3	3			
transit mixers						9	9											9	9	9				9	9			

Upgrading Inter-Urban Highway System Project

Table 13.7-3 (1) Plaridel Bypass Initial Stage (Package 3) Construction Shcedule





(Relation among temporary road, access road, bridge and embankment work)

FIGURE 13.7-3(2) CONSTRUCTION SCHEDULE PLARIDEL BYPASS INITIAL STAGE PACKAGE 3

TABLE 13.7-3 (3) MAJOR EQUIPMENT ALLOCATION

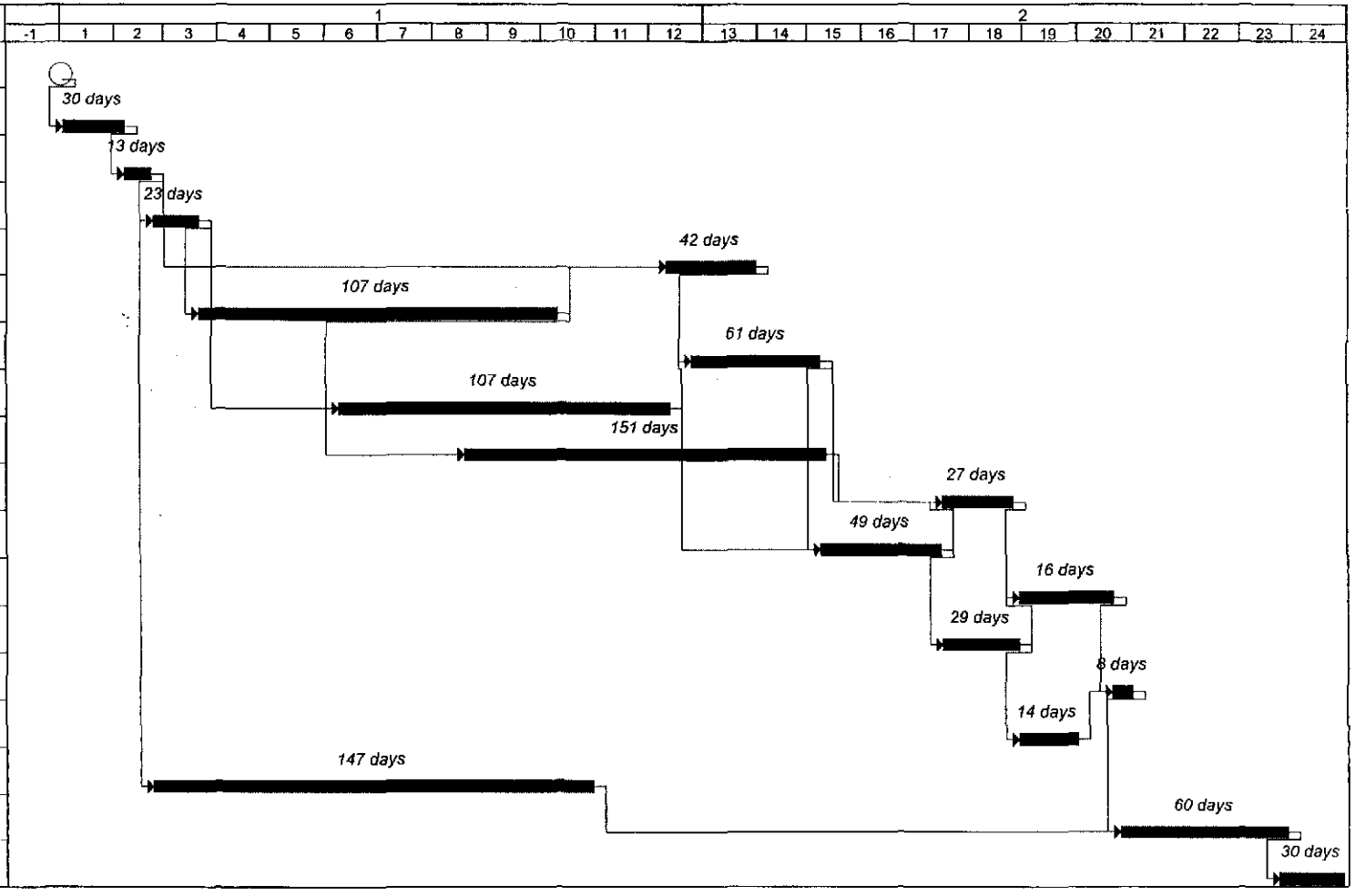
(Plaridel Bypass Initial Stage Package 3)

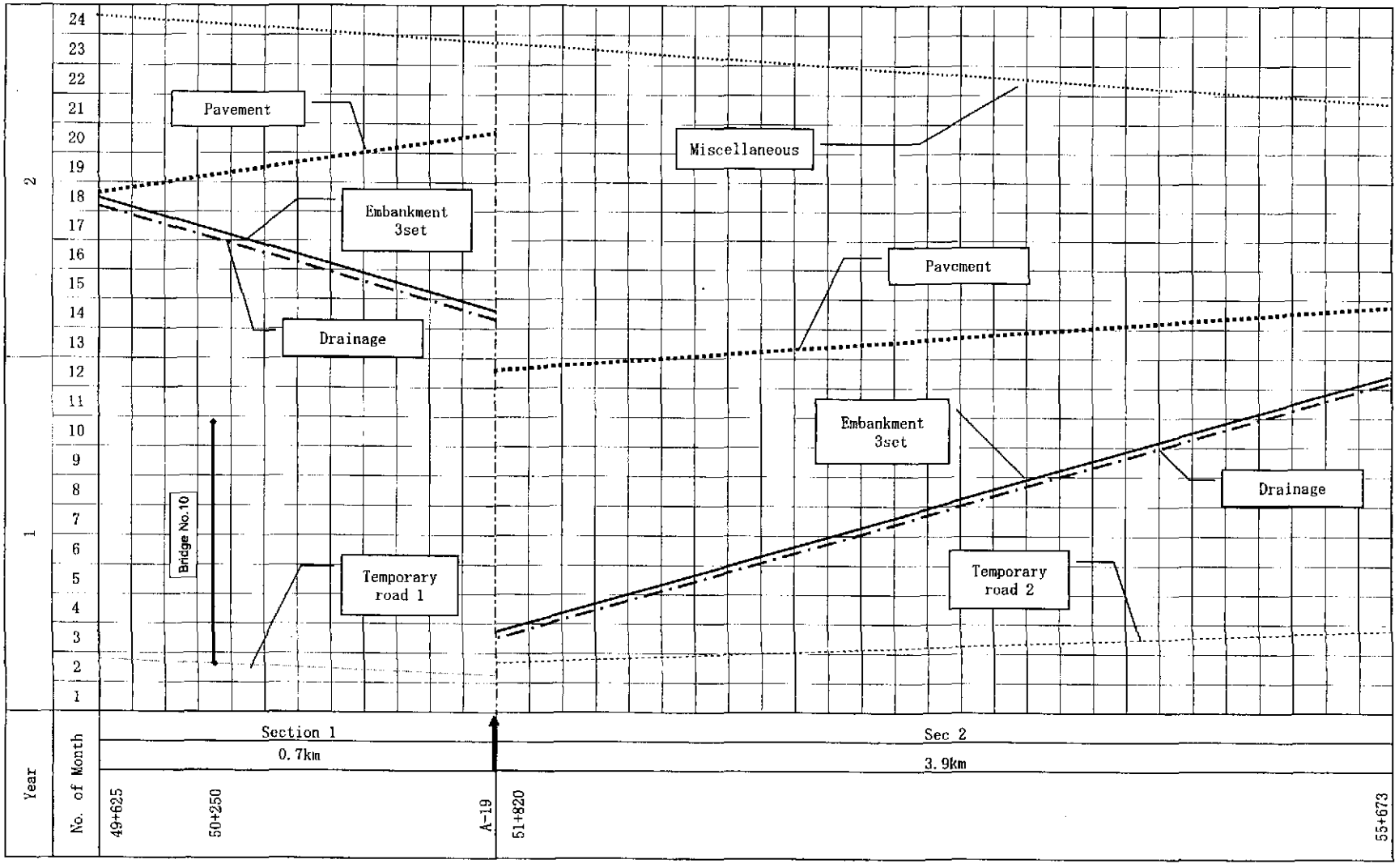
Year	1												2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Major Equipment																																				
bulldozer 32t		1																				2	2	2	2	2	2	2								
Temporary roads (Sec 1)		1																																		
Temporary roads (Sec 2)		1																																		
Temporary roads (Sec 3)		1																																		
Embankment (Sec 1)																						1	1	1	1	1										
Embankment (Sec 2)																										1										
Embankment (Sec 3)																										1	1	1								
bulldozer 21t		1																				2	2	1	1	1	1	1								
Temporary roads (Sec 1)		1																																		
Temporary roads (Sec 2)		1																																		
Temporary roads (Sec 3)		1																																		
Unsuitable Excavation (Sec 1)																						1														
Unsuitable Excavation (Sec 2)																							1													
Unsuitable Excavation (Sec 3)																						1	1													
Embankment (Sec 1)																						1	1	1	1	1										
Embankment (Sec 2)																										1										
Embankment (Sec 3)																										1	1	1								
hydr.excavator																						1	1													
wheel loader		1																				1	1	1	2	2	2	1	1	1						
motor grader		1																				1	1	1	2	2	2	1	1	1						
dump trucks		4																				13	13	11	12	12	12	11	1	1						
Temporary roads (Sec 1)		4																																		
Temporary roads (Sec 2)		4																																		
Temporary roads (Sec 3)		4																																		
Unsuitable Excavation (Sec 1)																						2														
Unsuitable Excavation (Sec 2)																							2													
Unsuitable Excavation (Sec 3)																						2	2													
Embankment (Sec 1)																						11	11	11	11	11										
Embankment (Sec 2)																										11										
Embankment (Sec 3)																										11	11	11								
Aggregate Subbase (Sec 1)																									1	1										
Aggregate Subbase (Sec 2)																										1										
Aggregate Subbase (Sec 3)																													1							
Gravel Surface/Subbase (Sec 1)																											1									
Gravel Surface/Subbase (Sec 2)																											1									
Gravel Surface/Subbase (Sec 3)																														1						
tire roller		1																				1	1	1	2	2	2	1	1	1						
road roller																									1	1	1		1	1						
tamping roller		1																				1	1	1	1	1	1	1								
concrete finisher																										1	1		1	1						
transit mixers																										3	3		3	3						

Upgrading Inter-Urban Highway System Project

Table 13.7-4(1) Plaridel Bypass Initial Stage (Package 4) Construction Shcedule

ID	Task Name
1	Notice to Proceed
2	Mobilization
3	Temporary roads (Sec 1)
4	Temporary roads (Sec 2)
5	Unsuitable Excavation (Sec 1)
6	Unsuitable Excavation (Sec 2)
7	Embankment (Sec 1)
8	Embankment (Sec 2)
9	Drainage
10	Aggregate Subbase (Sec 1)
11	Aggregate Subbase (Sec 2)
12	PCC (Sec1)
13	PCC (Sec 2)
14	Gravel Surface/Subbase (Sec 1)
15	Gravel Surface/Subbase (Sec 2)
16	Bridge No.10
17	Miscellaneous
18	Demobilization





(Relation among temporary road, access road, bridge and embankment work)

FIGURE 13.7-4 (2) CONSTRUCTION SCHEDULE PLARIDEL BYPASS INITIAL STAGE PACKAGE 4

TABLE 13.7-4 (3) MAJOR EQUIPMENT ALLOCATION

(Plaridel Bypass Initial Stage Package 4)

Year	1												2											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Major Equipment																								
bulldozer 32t		2	2	2	2	2	2	2	2	2	2	2		2	2	2	2	2						
Temporary roads (Sec 1)		2																						
Temporary roads (Sec 2)		2	2																					
Embankment (Sec 1)														2	2	2	2	2						
Embankment (Sec 2)			2	2	2	2	2	2	2	2	2	2												
bulldozer 21t		2	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2						
Temporary roads (Sec 1)		2																						
Temporary roads (Sec 2)		2	2																					
Unsuitable Excavation (Sec 1)												2	2											
Unsuitable Excavation (Sec 2)			2	2	2																			
Embankment (Sec 1)														2	2	2	2	2						
Embankment (Sec 2)			2	2	2	2	2	2	2	2	2	2												
hydr.excavator			2	2	2							2	2											
wheel loader		2	2	2	2	2	2	2	2	4	4	4	2	4	4	4	4	4	4	4				
Temporary roads (Sec 1)		2																						
Temporary roads (Sec 2)		2	2																					
Embankment (Sec 1)														2	2	2	2	2						
Embankment (Sec 2)			2	2	2	2	2	2	2	2	2	2												
Aggregate Subbase (Sec 1)																		2	2	2				
Aggregate Subbase (Sec 2)										2	2	2												
Gravel Surface/Subbase (Sec 1)																	2	2	2	2				
Gravel Surface/Subbase (Sec 2)													2	2	2	2								
motor grader		2	2	2	2	2	2	2	2	4	4	4	2	4	4	4	4	4	4	4				
dump trucks		8	18	18	18	18	18	18	18	16	16	16	6	16	16	16	16	14	2	2				
Temporary roads (Sec 1)		8																						
Temporary roads (Sec 2)		8	8																					
Unsuitable Excavation (Sec 1)												4	4	4										
Unsuitable Excavation (Sec 2)			4	4	4	4	4	4	4															
Embankment (Sec 1)														14	14	14	14	14						
Embankment (Sec 2)			14	14	14	14	14	14	14	14	14	14												
Aggregate Subbase (Sec 1)																		2	2	2				
Aggregate Subbase (Sec 2)										2	2	2												
Gravel Surface/Subbase (Sec 1)																	2							
Gravel Surface/Subbase (Sec 2)													2	2	2	2								
tire roller		2	2	2	2	2	2	2	2	4	4	4	2	4	4	4	4	4	4	4				
road roller										2	2	2	2	2	2	2	2	4	4	4				
tamping roller		2	2	2	2	2	2	2	2	2	2	2		2	2	2	2	2						
concrete finisher												2	2	2				2	2	2				
transit mixers												6	6	6				6	6	6				

13.8 Detailed Construction Schedule of Cabanatuan Bypass

13.8.1 Package 1: Sta. 100+480.00 to Sta. 109+920.00

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.8.1(1), Figure 13.8.1(2), and Table 13.8.1(3), respectively.

13.8.2 Package 2: Sta. 109+920.00 to Sta. 119+000.00

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.8.2(1), Figure 13.8.2(2), and Table 13.8.2(3), respectively.

13.8.3 Package 3: Sta. 119+000.00 to Sta. 121+600.00

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.8.3(1), Figure 13.8.3(2), and Table 13.8.3(3), respectively.

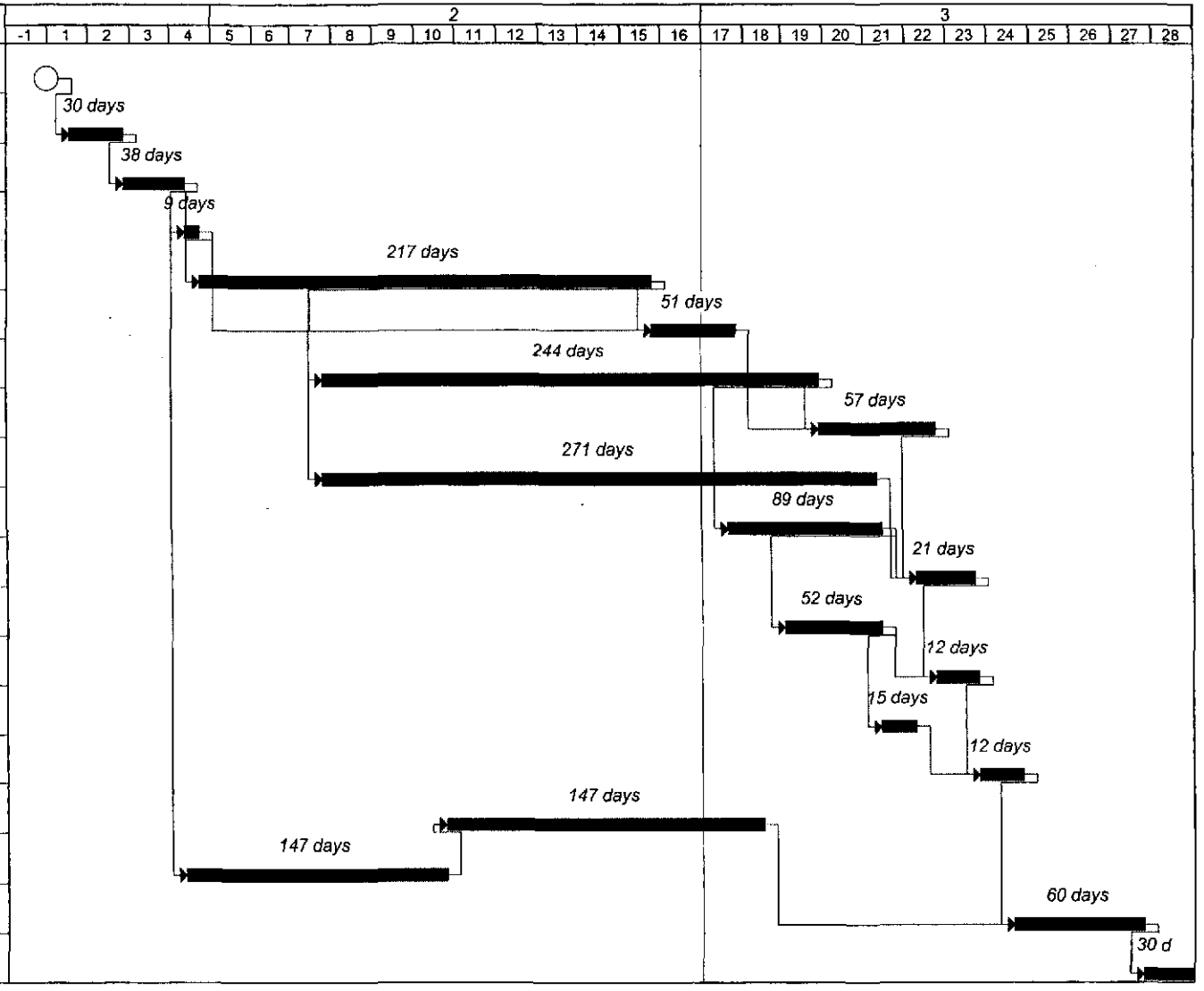
13.8.4 Package 4: Sta. 121+600.00 to Sta. 134+731.828

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.8.4(1), Figure 13.8.4(2), and Table 13.8.4(3), respectively.

Upgrading Inter-Urban Highway System Project

Table 13.8-1 (1) Cabanatuan Bypass Initial Stage (Package 1) Construction Shcedule

ID	Task Name
1	Notice to Proceed
2	Mobilization
3	Temporary roads (Sec 1)
4	Temporary roads (Sec 2)
5	Unsuitable Excavation (Sec 1)
6	Unsuitable Excavation (Sec 2)
7	Embankment (Sec 1)
8	Embankment (Sec 2)
9	Drainage
10	Aggregate Subbase (Sec 1)
11	Aggregate Subbase (Sec 2)
12	PCC (Sec1)
13	PCC (Sec 2)
14	Gravel Surface/Subbase (Sec 1)
15	Gravel Surface/Subbase (Sec 2)
16	Bridge No.1
17	Bridge No.2
18	Miscellaneous
19	Demobilization



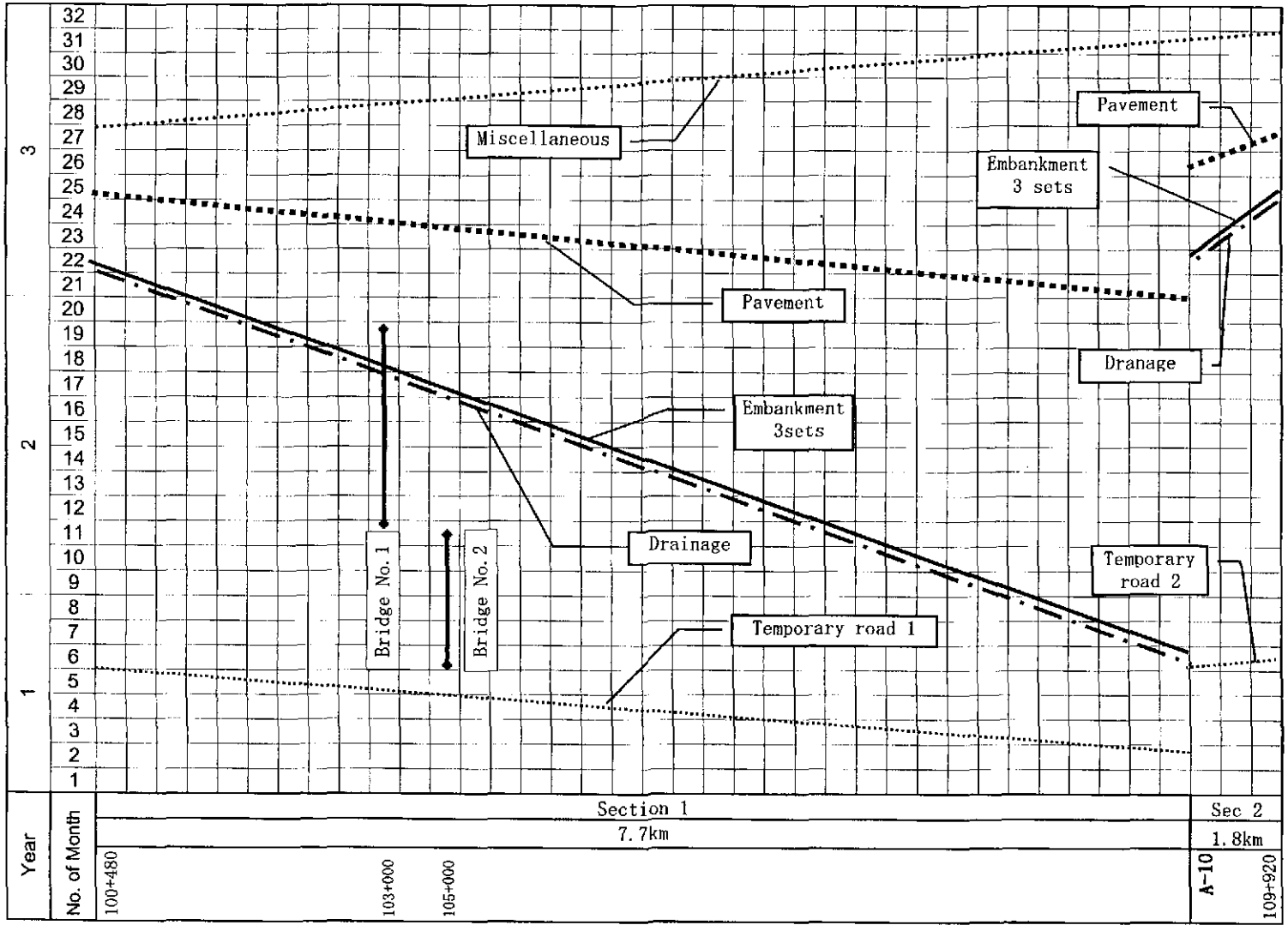


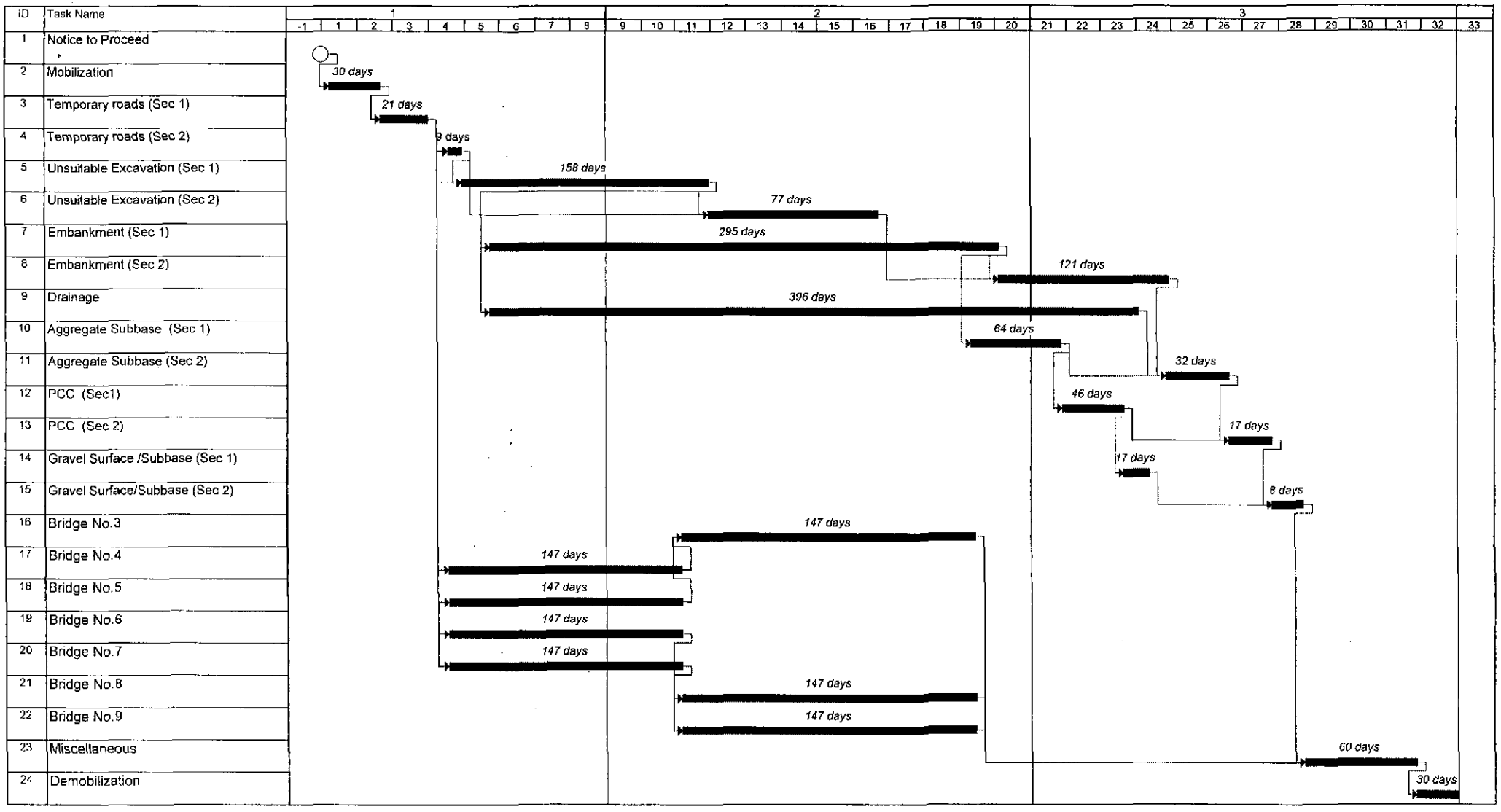
FIGURE 13.8-1(2) CABANATUAN BYPASS INITIAL STAGE PACKAGE I CONSTRUCTION SCEDULE
(Relation among temporary road,access road,bridge and embankment work)

CABANATUAN BYPASS INITIAL STAGE PACKAGE I
TABLE 13.8-1 (3) MAJOR EQUIPMENT ALLOCATION

Year	1																			2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32										
Major Equipment																																										
bulldozer 32t		4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																
Temporary roads (Sec 1)		4	4	4	4																																					
Temporary roads (Sec 2)					4	4																																			
Embankment (Sec 1)							3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																			
Embankment (Sec 2)																							3	3	3	3																
bulldozer 21t		4	4	4	4	4	6	6	6	6	6	6	6	6	3	6	6	6	6	3	3	3	3	3	3	3																
Temporary roads (Sec 1)		4	4	4	4																																					
Temporary roads (Sec 2)					4	4																																			
Unsuitable Excavation (Sec 1)						3	3	3	3	3	3	3	3	3																												
Unsuitable Excavation (Sec 2)																3	3	3	3																							
Embankment (Sec 1)							3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																			
Embankment (Sec 2)																							3	3	3	3																
hydr.excavator						3	3	3	3	3	3	3	3	3	3	3	3	3	3																							
wheel loader		4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6	6	3	3														
Temporary roads (Sec 1)		4	4	4	4																																					
Temporary roads (Sec 2)					4	4																																			
Embankment (Sec 1)							3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																			
Embankment (Sec 2)																							3	3	3	3																
Aggregate Subbase (Sec 1)																				3	3	3	3	3																		
Aggregate Subbase (Sec 2)																										3	3															
Gravel Surface/Subbase (Sec 1)																									3																	
Gravel Surface/Subbase (Sec 2)																											3	3														
motor grader		4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	6	6	3	3														
dump trucks		16	16	16	16	16	51	51	51	51	51	51	51	51	51	51	51	51	45	48	48	48	48	48	51	48	6	6														
Temporary roads (Sec 1)		16	16	16	16																																					
Temporary roads (Sec 2)					16	16																																			
Unsuitable Excavation (Sec 1)						6	6	6	6	6	6	6	6	6	6	6																										
Unsuitable Excavation (Sec 2)																6	6	6																								
Embankment (Sec 1)							45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45																			
Embankment (Sec 2)																							45	45	45	45																
Aggregate Subbase (Sec 1)																				3	3	3	3	3																		
Aggregate Subbase (Sec 2)																										3	3															
Gravel Surface/Subbase (Sec 1)																									6																	
Gravel Surface/Subbase (Sec 2)																											6	6														
tire roller		4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	6	6	3	6	3	3														
road roller																				3	3	3	3	3	3	3	3	3														
tamping roller		4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																
concrete finisher																							3	3	3	3	3															
transit mixers																							9	9	9	9	9															
bridge equipment set					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																						
Bridge No.1											1	1	1	1	1	1	1	1	1	1																						
Bridge No.2					1	1	1	1	1	1	1																															

Upgrading Inter-Urban Highway System Project

Table 13.8-2 (1) Cabanatuan Bypass Initial Stage (Package 2) Construction Shcedule



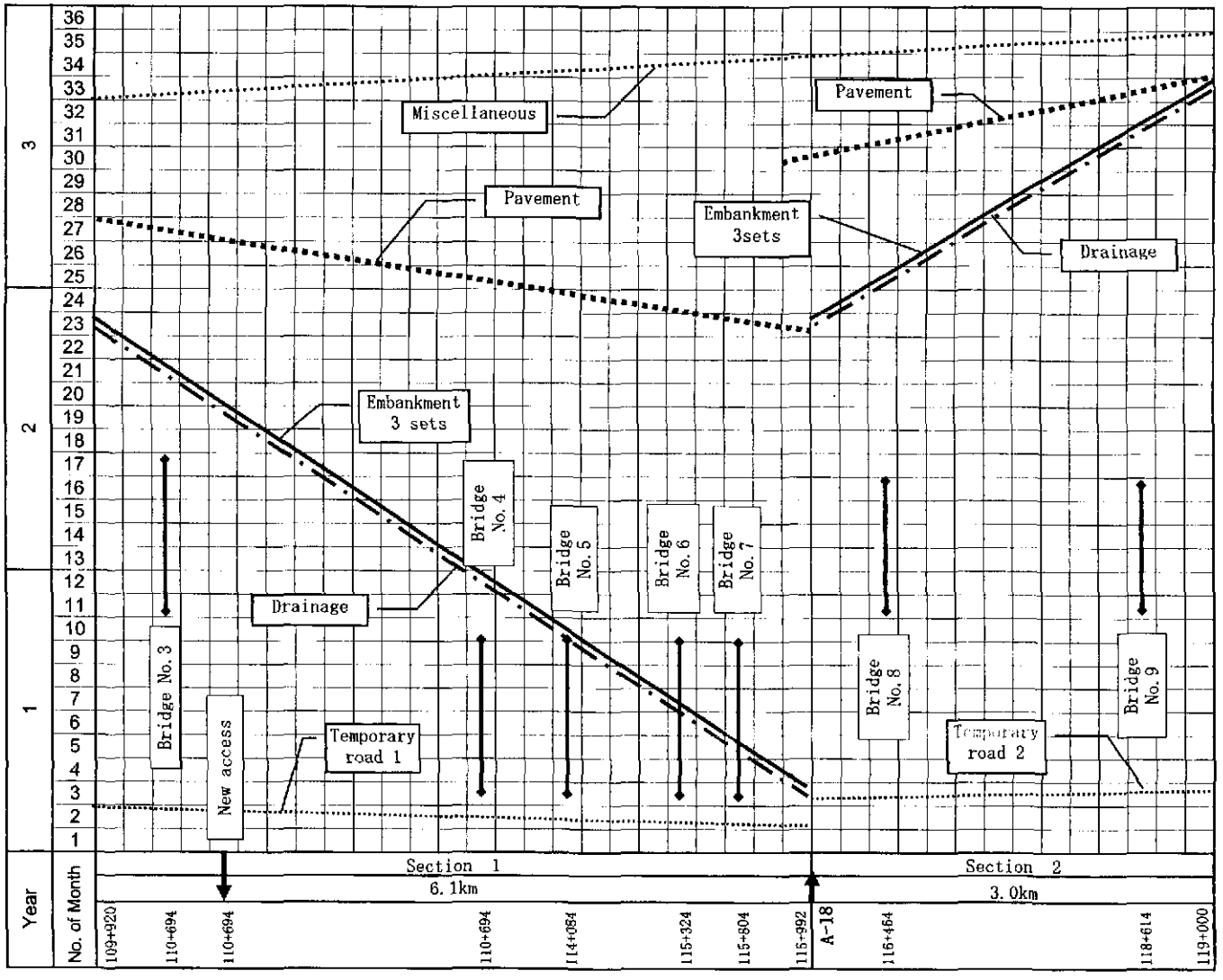


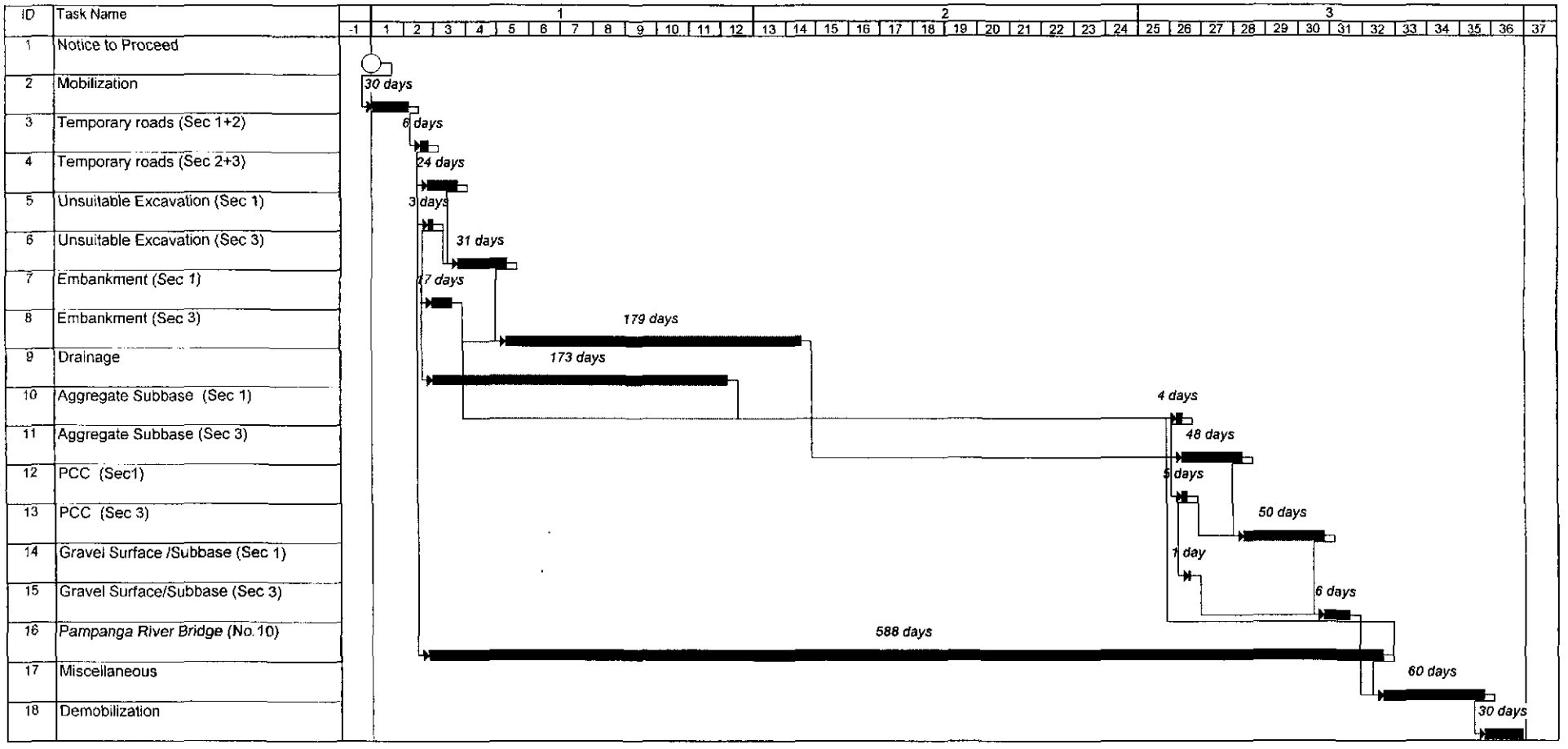
FIGURE 13.8-2(2) CABANATUAN BYPASS INITIAL STAGE PACKAGE II CONSTRUCTION SCHEDULE
(Relation among temporary road,access road,bridge and embankment work)

CABANATUAN BYPASS INITIAL STAGE PACKAGE 2
TABLE 13.8-2 (3) MAJOR EQUIPMENT ALLOCATION

Year	1												2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Major Equipment																																				
bulldozer 32t		4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3								
Temporary roads (Sec 1)		4	4																																	
Temporary roads (Sec 2)			4																																	
Embankment (Sec 1)			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3												
Embankment (Sec 2)																								3	3	3	3	3								
bulldozer 12t		4	7	7	7	7	7	7	7	7	3	7	7	7	7	3	3	3	3	3	3	3	3	3	3	3	3	3								
Temporary roads (Sec 1)		4	4																																	
Temporary roads (Sec 2)			4																																	
Unsuitable Excavation (Sec 1)			4	4	4	4	4	4	4	4																										
Unsuitable Excavation (Sec 2)												4	4	4	4																					
Embankment (Sec 1)			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3												
Embankment (Sec 2)																								3	3	3	3	3								
hydr.excavator			4	4	4	4	4	4	4	4		4	4	4	4																					
wheel loader		4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	7	7	7	3	7	7		4	4	4	8			
Temporary roads (Sec 1)		4	4																																	
Temporary roads (Sec 2)			4																																	
Embankment (Sec 1)			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3												
Embankment (Sec 2)																								3	3	3	3	3								
Aggregate Subbase (Sec 1)																							4	4	4											
Aggregate Subbase (Sec 2)																														4	4	4	4			
Gravel Surface /Subbase (Sec 1)																											4	4								
Gravel Surface/Subbase (Sec 2)																																	4			
motor grader		4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	7	7	7	3	7	7		4	4	4	8			
dump trucks		16	53	53	53	53	53	53	53	53	53	53	53	53	53	45	45	45	45	45	45	45	49	49	49	45	49	49	45	49	49	49	53			
Temporary roads (Sec 1)		16	16																																	
Temporary roads (Sec 2)			16																																	
Unsuitable Excavation (Sec 1)			8	8	8	8	8	8	8	8	8	8																								
Unsuitable Excavation (Sec 2)												8	8	8	8																					
Embankment (Sec 1)			45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45												
Embankment (Sec 2)																								45	45	45	45	45	45	45	45	45	45			
Aggregate Subbase (Sec 1)																							4	4	4											
Aggregate Subbase (Sec 2)																														4	4	4	4			
Gravel Surface /Subbase (Sec 1)																											4	4								
Gravel Surface/Subbase (Sec 2)																																	4			
tire roller		4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	7	7	7	3	3	3		4	4	4	8			
road roller																							4	4	4		4	4		4	4	4	8			
tamping roller		4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3								
concrete finisher																									4	4	4				4	4	4			
transit mixers																									12	12	12				12	12	12			
bridge equipment set			4	4	4	4	4	4	4	4	4	3	3	3	3	3	3																			
Bridge No.3											1	1	1	1	1	1	1																			
Bridge No.4			1	1	1	1	1	1	1	1	1																									
Bridge No.5			1	1	1	1	1	1	1	1	1																									
Bridge No.6			1	1	1	1	1	1	1	1	1																									
Bridge No.7			1	1	1	1	1	1	1	1	1																									
Bridge No.8											1	1	1	1	1	1	1																			
Bridge No.9											1	1	1	1	1	1	1																			

Upgrading Inter-Urban Highway System Project

Table 13.8-3 (1) Cabanatuan Bypass Initial Stage (Package 3) Construction Shcedule



Note: Section 2 : Pampanga River Bridge Construction only

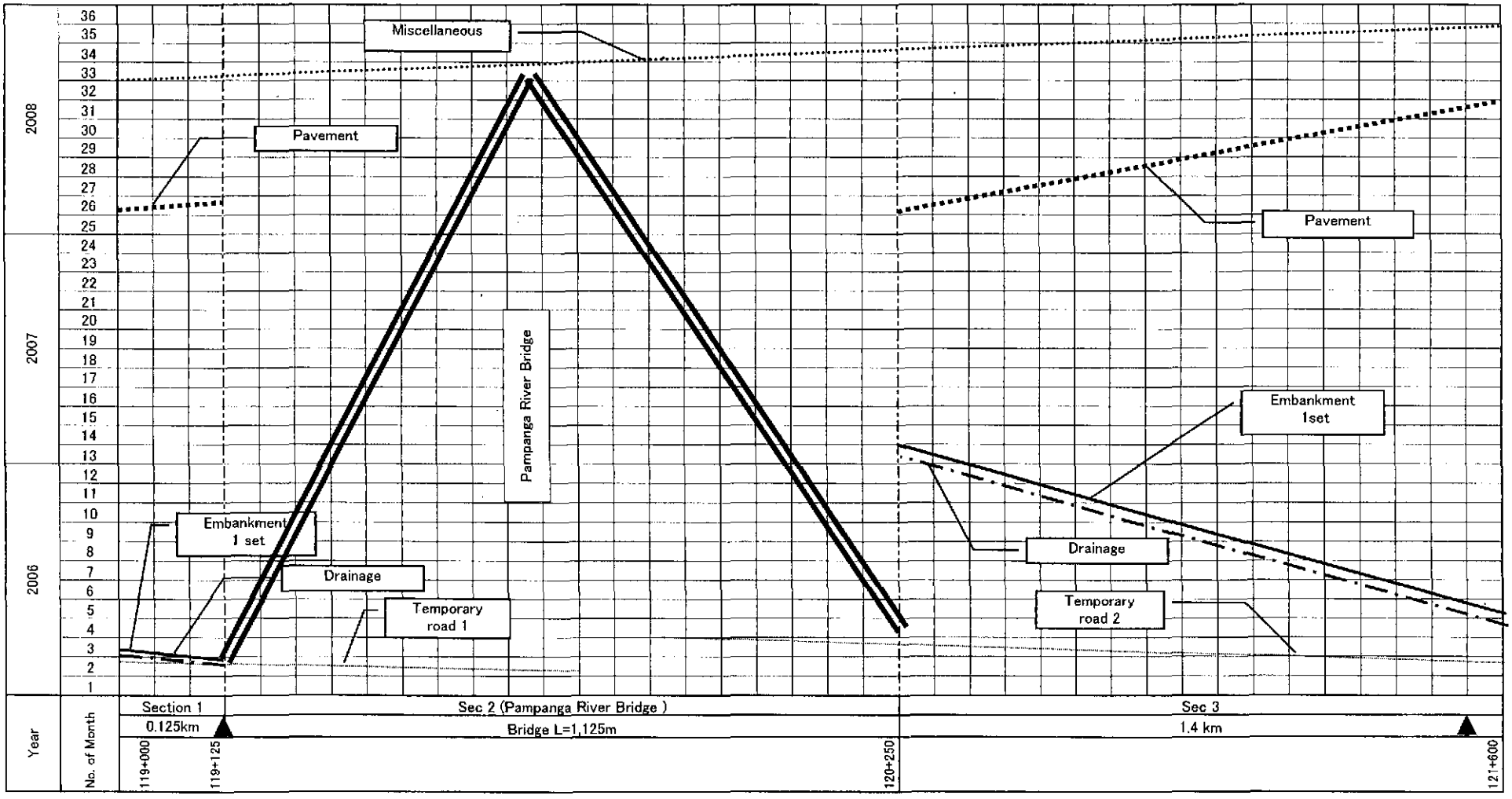


Figure 13.8-3(2) Cabanatuan Bypass Initial Stage Package 3 Construction Schedule (Relation among temporary road,access road,bridge and embankment work)

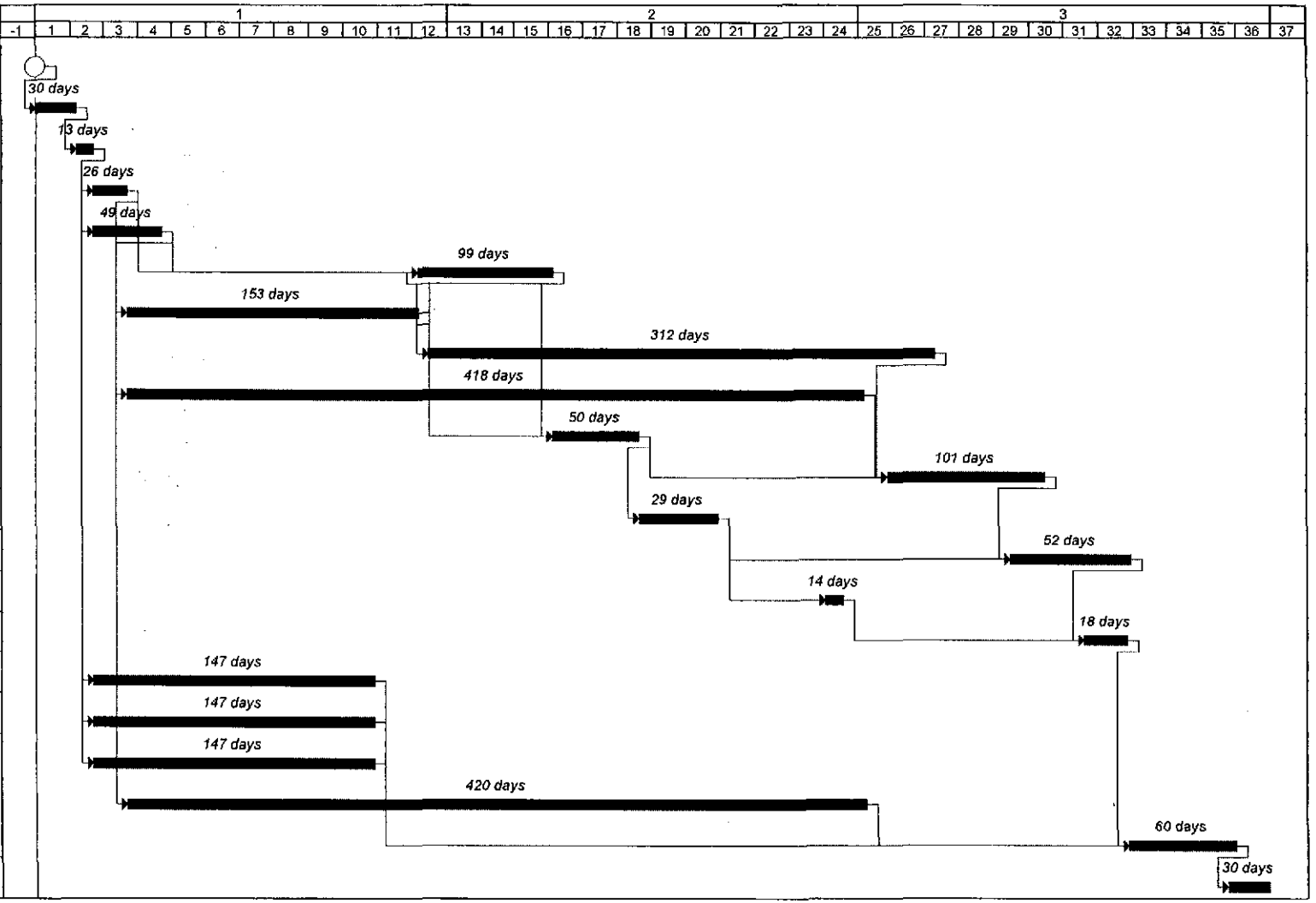
CABANATUAN BYPASS INITIAL STAGE PACKAGE 3
TABLE 13.8-3 (3) MAJOR EQUIPMENT ALLOCATION

Year	1												2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Major Equipment																																				
bulldozer 32t		2	2		1	1	1	1	1	1	1	1	1	1																						
Temporary roads (Sec 1+2)		1																																		
Temporary roads (Sec 2+3)		1	1																																	
Embankment (Sec 1)		1	1																																	
Embankment (Sec 3)					1	1	1	1	1	1	1	1	1	1																						
bulldozer 21t		2	2	1	1	1	1	1	1	1	1	1	1	1																						
Temporary roads (Sec 1+2)		1																																		
Temporary roads (Sec 2+3)		1	1																																	
Unsuitable Excavation (Sec 1)		1																																		
Unsuitable Excavation (Sec 3)			1	1	1																															
Embankment (Sec 1)		1	1																																	
Embankment (Sec 3)					1	1	1	1	1	1	1	1	1	1																						
hydr.excavator		1	1	1	1																															
wheel loader		2	2		1	1	1	1	1	1	1	1	1	1												2	1	1		1	1				
Temporary roads (Sec 1+2)		1																																		
Temporary roads (Sec 2+3)		1	1																																	
Embankment (Sec 1)		1	1																																	
Embankment (Sec 3)					1	1	1	1	1	1	1	1	1	1																						
Aggregate Subbase (Sec 1)																										1										
Aggregate Subbase (Sec 3)																										1	1	1								
Gravel Surface /Subbase (Sec 1)																										1										
Gravel Surface/Subbase (Sec 3)																														1	1					
motor grader		2	2		1	1	1	1	1	1	1	1	1	1												2	1	1		1	1				
dump trucks		22	22	2	18	18	18	18	18	18	18	18	18	18												2	1	1		1	1				
Temporary roads (Sec 1+2)		4																																		
Temporary roads (Sec 2+3)		4	4																																	
Unsuitable Excavation (Sec 1)		2																																		
Unsuitable Excavation (Sec 3)			2	2	2																															
Embankment (Sec 1)		18	18																																	
Embankment (Sec 3)					18	18	18	18	18	18	18	18	18	18																						
Aggregate Subbase (Sec 1)																										1										
Aggregate Subbase (Sec 3)																										1	1	1								
Gravel Surface /Subbase (Sec 1)																										1										
Gravel Surface/Subbase (Sec 3)																														1	1					
tire roller		2	2		1	1	1	1	1	1	1	1	1	1												1	1	1		1	1				
road roller																										2	1	1		1	1				
tamping roller		2	2		1	1	1	1	1	1	1	1	1	1																						
concrete finisher																										1		1	1	1						
transit mixers																										3		3	3	3						
bridge equipment set		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
Pampanga River Bridge (No.10)		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				

Upgrading Inter-Urban Highway System Project

Table 13.8-4 (1) Cabanatuan Bypass Initial Stage (Package 4) Construction Shcedule

ID	Task Name
1	Notice to Proceed
2	Mobilization
3	Temporary roads (Sec 1)
4	Temporary roads (Sec 2)
5	Unsuitable Excavation (Sec 1)
6	Unsuitable Excavation (Sec 2)
7	Embankment (Sec 1)
8	Embankment (Sec 2)
9	Drainage
10	Aggregate Subbase (Sec 1)
11	Aggregate Subbase (Sec 2)
12	PCC (Sec1)
13	PCC (Sec2)
14	Gravel Surface /Subbase (Sec 1)
15	Gravel Surface /Subbase (Sec 2)
16	Bridge No.11
17	Bridge No.12
18	Bridge No.13
19	Talavera River Bridge (Bridge No.14)
20	Miscellaneous
21	Demobilization



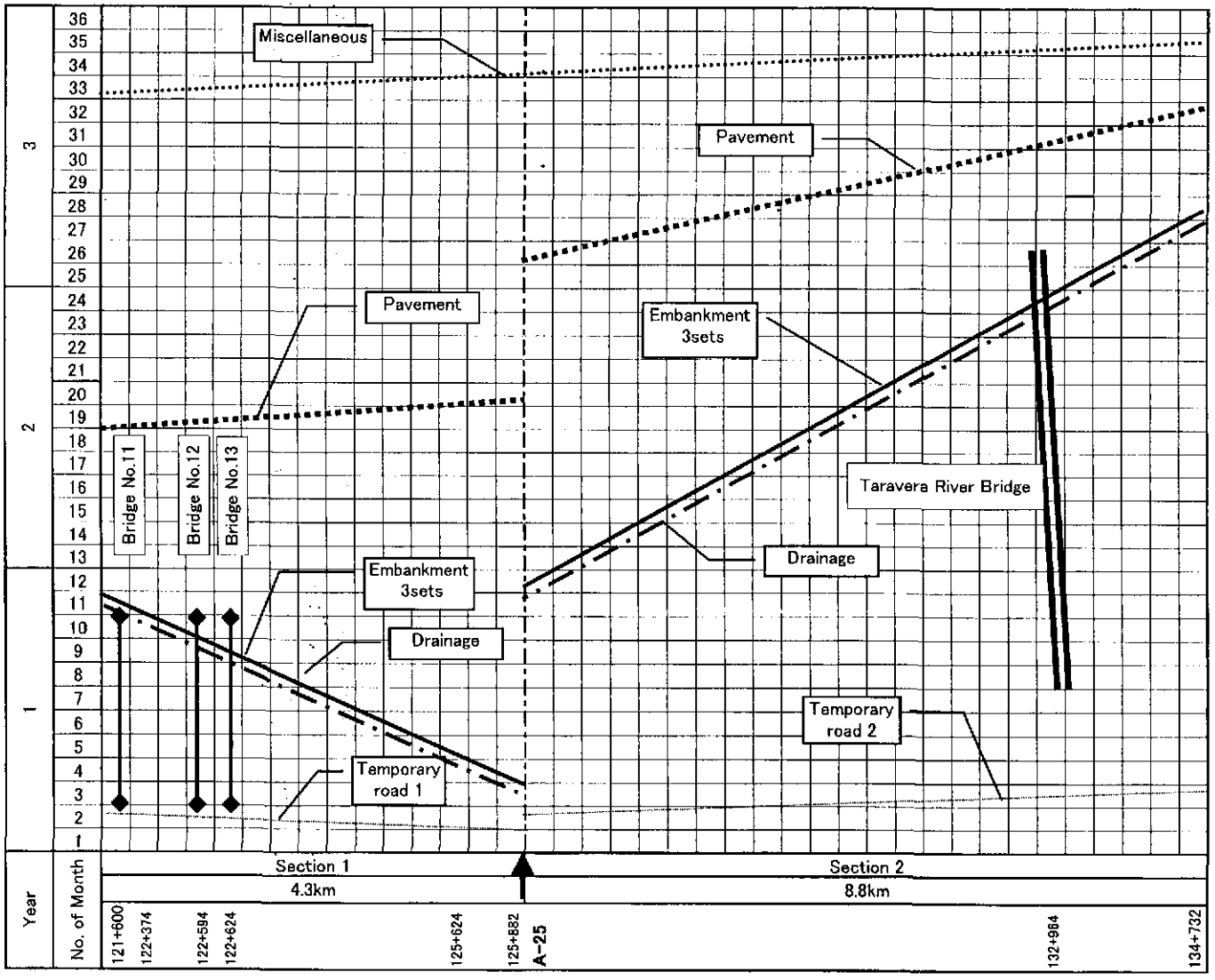


Figure 13.8-4(2) Cabanatuan Bypass Initial Stage Package 4 Construction Schedule (Relation among temporary road,access road,bridge and embankment work)

TABLE 13-8-4 (3) CABANATUAN BYPASS INITIAL STAGE PACKAGE IV MAJOR EQUIPMENT ALLOCATION

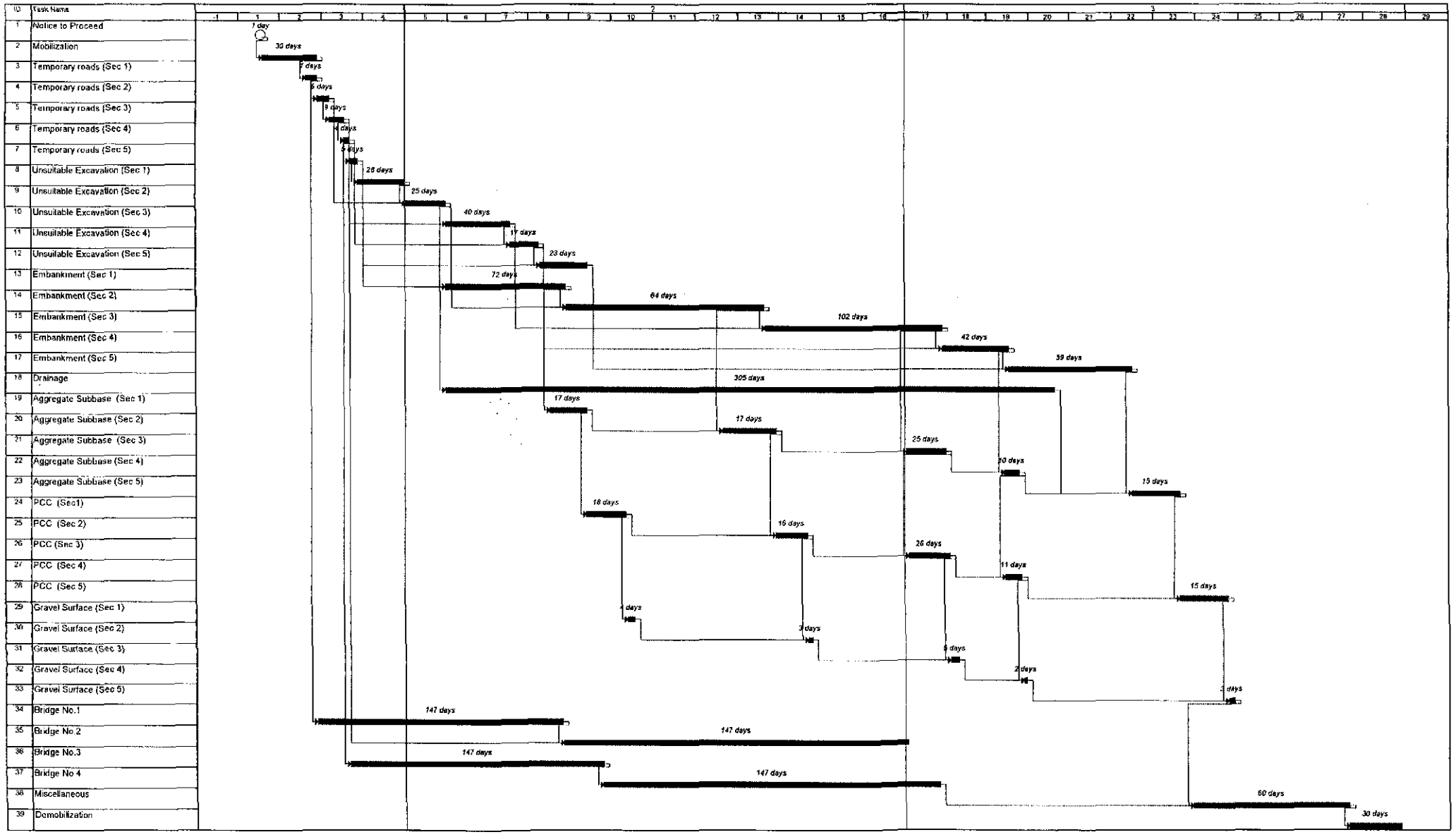
Year	1												2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Major Equipment																																				
bulldozer 32t		4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3										
Temporary roads (Sec 1)		4																																		
Temporary roads (Sec 2)		4	4																																	
Embankment (Sec 1)			3	3	3	3	3	3	3	3	3	3																								
Embankment (Sec 2)												3	3	3	3	3	3	3	3	3	3	3	3	3	3	3										
bulldozer 21t		7	7	6	3	3	3	3	3	3	3	6	6	6	6	6	3	3	3	3	3	3	3	3	3	3										
Temporary roads (Sec 1)		4																																		
Temporary roads (Sec 2)		4	4																																	
Unsuitable Excavation (Sec 1)		3	3	3																																
Unsuitable Excavation (Sec 2)												3	3	3	3	3																				
Embankment (Sec 1)			3	3	3	3	3	3	3	3	3	3																								
Embankment (Sec 2)												3	3	3	3	3	3	3	3	3	3	3	3	3	3	3										
hydr.excavator		3	3	3								3	3	3	3	3																				
wheel loader		4	4	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	3	3	3	3	3	8	6	6	3	3			3	3				
Temporary roads (Sec 1)		4																																		
Temporary roads (Sec 2)		4	4																																	
Embankment (Sec 1)			3	3	3	3	3	3	3	3	3	3																								
Embankment (Sec 2)												3	3	3	3	3	3	3	3	3	3	3	3	3	3	3										
Aggregate Subbase (Sec 1)																3	3	3																		
Aggregate Subbase (Sec 2)																									3	3	3	3								
Gravel Surface /Subbase (Sec 1)																								5												
Gravel Surface /Subbase (Sec 2)																															3	3				
motor grader		4	4	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	3	3	3	3	3	8	6	6	3	3			3	3				
dump trucks		22	60	60	54	54	54	54	54	54	54	60	60	60	60	60	57	57	54	54	54	54	54	59	57	57	57	3	3	3	3	3				
Temporary roads (Sec 1)		16																																		
Temporary roads (Sec 2)		16	16																																	
Unsuitable Excavation (Sec 1)		6	6	6																																
Unsuitable Excavation (Sec 2)												6	6	6	6	6																				
Embankment (Sec 1)			54	54	54	54	54	54	54	54	54	54																								
Embankment (Sec 2)												54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54									
Aggregate Subbase (Sec 1)																3	3	3																		
Aggregate Subbase (Sec 2)																									3	3	3	3	3	3						
Gravel Surface /Subbase (Sec 1)																								5												
Gravel Surface /Subbase (Sec 2)																															3	3				
tire roller		4	4	3	3	3	3	3	3	3	3	3	3	3	3	6	6	6	3	3	3	3	3	3	6	6	3	3			3	3				
road roller																3	3	3						5	3	3	3	3			3	3				
tamping roller		4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3										
concrete finisher																		3	3	3									3	3	3	3				
transit mixers																		9	9	9									9	9	9	9				
bridge equipment set		3	4	4	4	4	4	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
Bridge No.11		1	1	1	1	1	1	1	1	1																										
Bridge No.12		1	1	1	1	1	1	1	1	1																										
Bridge No.13		1	1	1	1	1	1	1	1	1																										
Talavera River Bridge (Bridge No.14)			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											

13.9 Detailed Construction Schedule of San Jose Bypass

Detailed construction schedules is composed of a PERT/CPM chart, a progress chart, and major equipment allocation sheet as shown in Table 13.9.1(1), Figure 13.9.1(2), and Table 13.9.1(3), respectively.

Upgrading Inter-Urban Highway System Project

Table 13.9-1 (1) San Jose Bypass Initial Stage (Package) Construction Shcedule



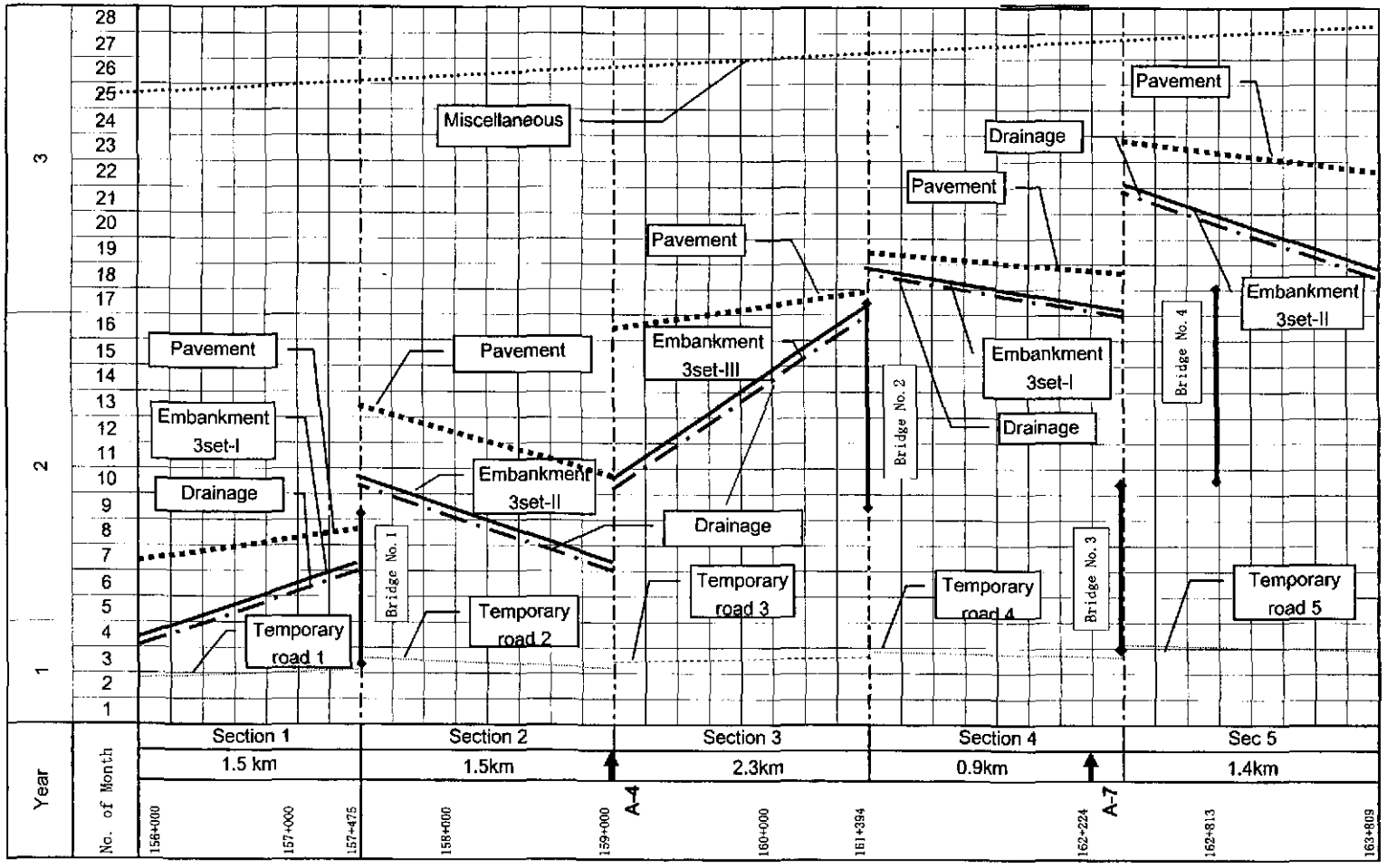


FIGURE 13.9-1(2) SAN JOSE BYPASS CONSTRUCTION SCHEDULE INITIAL STAGE

(Relation among temporary road, access road, bridge and embankment work)

Table 13-9-1 (3) MAJOR EQUIPMENT ALLOCATION

San Jose Bypass Initial Stage Pakage

Year	1				2												3											
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Major Equipment																												
bulldozer 32t		3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3						
bulldozer 21t		3	3	3	6	6	6	6	6	3	3	3	3	3	3	3	3	3	3	3	3	3						
hydr.excavator			3	3	3	3	3	3	3																			
wheel loader		3	3		3	3	3	6	6	6	3	6	6	6	3	3	6	6	6	3	3	3	3	3				
motor grader		3	3		3	3	3	6	6	6	3	6	6	6	3	3	6	6	6	3	3	3	3	3				
dump trucks		12	12	6	27	27	27	30	30	24	21	24	24	24	21	21	24	24	24	21	21	21	3	3				
Temporary roads (Sec 1)		12																										
Temporary roads (Sec 2)		12	12																									
Temporary roads (Sec 3)			12																									
Temporary roads (Sec 4)			12																									
Temporary roads (Sec 5)			12																									
Unsuitable Excavation (Sec 1)			6	6																								
Unsuitable Excavation (Sec 2)					6																							
Unsuitable Excavation (Sec 3)					6	6	6																					
Unsuitable Excavation (Sec 4)							6	6																				
Unsuitable Excavation (Sec 5)								6	6																			
Embankment (Sec 1)					21	21	21	21																				
Embankment (Sec 2)								21	21	21	21	21	21															
Embankment (Sec 3)													21	21	21	21	21											
Embankment (Sec 4)																	21	21	21									
Embankment (Sec 5)																			21	21	21	21						
Aggregate Subbase (Sec 1)								3	3																			
Aggregate Subbase (Sec 2)												3	3															
Aggregate Subbase (Sec 3)																	3											
Aggregate Subbase (Sec 4)																			3									
Aggregate Subbase (Sec 5)																						3	3					
Gravel Surface (Sec 1)										3																		
Gravel Surface (Sec 2)														3														
Gravel Surface (Sec 3)																		3										
Gravel Surface (Sec 4)																			3									
Gravel Surface (Sec 5)																								3				
tire roller		3	3		3	3	3	6	6	6	3	6	6	6	3	3	6	6	6	3	3	3	3	3				
road roller								3	3	3		3	3	3			3	3	3			3	3	3				
tamping roller		3	3		3	3	3	3	3	3	3	6	6	3	3	3	6	3	3	3	3	3						
concrete finisher									3	3			3	3			3	3	3				3	3				
transit mixers									9	9			9	9			9	9	9				9	9				
bridge equipment set		1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2											
Bridge No.1		1	1	1	1	1	1	1																				
Bridge No.2								1	1	1	1	1	1	1	1	1	1											
Bridge No.3			1	1	1	1	1	1	1																			
Bridge No.4									1	1	1	1	1	1	1	1	1											