3. Construction Schedule

3.1. Preparation Construction・・・Preparation work: 3 months、Clearance: 3 months

(1) Preparation Construction・・・3months

The following items including study items may be considered as preliminary works, and all items above should be implemented within three months.

1) Planning

2) Investigation

①Home investigation

②Well investigation

③Water sentence and groundwater investigation

3) Surveying

①Basic surveying (temporary ＢＭ、reference point setting)

②Construction surveying

(2) Clearance　　3 months

3.2. Existing roadbed Improvement work・・・8 months

Improvement of existing roadbeds is carried out within sections that are severely damaged due to mud pumping.

(1) Target Extension

①Section A (between Lahat and Muara Enim)　　L=8,787m.

②Section C (between Prabumulih and Kertapati)　　L=19,324m.

③Total extension　L=28,111m=28.1km. (Target Volume　V=78,711m^3)

(2) Term of Works

Construction rate is set to 20-30m/day/track per one party (10 manpower), i.e., 40 days per km.

N=28.1km×40days per km=1124 days, 1124 days per 30 days = 37.5 months.

When it is said that I spend 5 groups, 37.5 months per 5 groups ≒ 7.5 months.

→ 8.0 months.

3.3. Track Rehabilitation Work

(1) Track Rehabilitation Work (Section A and Section B)・・・21 months

Replacement of track material, replenishment of ballast, and the like within sections that are severely damaged.

1) Target Extension

①Section A (between Lahat and Muara Enim)　L=38.07km.

②Section B (between Muara Enim and Prabumulih)　L=70.58km.

③Total extension　L=108.65km=108,650m.

2) Term of Works

Length to be actually improved may be considered to be about one third of a target length, but the schedule will be calculated based on the whole length due to the necessity of inspection over the whole length.

Construction rate is set to 30 m / day / track per one party (10 manpower), i.e., 30 days per km.

N=108.65km×30 days per km=3260 days.

3260 days per 30 days=108.7 months.

When it is said that I spend five groups, 108.7 months per 5 groups ≒21.7 months.

→ 21 months are required.

The same period will also be ensured within a critical path in the second phase, including possible repair.

(2) The 1st Stage Enforcement:R54 track exchange work (C section)・・・27 months

Sleeper replacement work, which is included in track replacement works from R42 to R54, is carried out in advance.

1) Target Extension

・Section C (between Prabumulih X6 and Kertapati) L=80.6km.

2) Term of Works

Assuming that a train interval is 1.5 hours and 5 works per day are carried out, construction rate is set to 10-15 m/day/track per one party (10 manpower), i.e., 80 days per km.

Allocating one group per 10 km results in allocating eight groups as a whole.

Therefore, the work days,N=80.6km×80days per km=6448days,

6448 days per 30 days=214.9 months, 214.9 months per 8 groups=26.9 months

→ 27 months are required.

(3) The 2nd Stage Enforcement:R54 track exchange work(C section)・・・21 months

Rail exchange work, which is included in track replacement works from R42 to R54, is carried out.

1) Target Extension

・Section C (between Prabumulih X6 and Kertapati) L=80.6km.

2) Term of Works

Since a critical path in the second phase consists of bridge work and track laying work in

construction works for double tracking (1) (B section), the schedule is set to 21 months of the period.

3.4. Improvement Work of Civil Engineering Facilities

The 1st stage 27 months**,** the 2nd stage 18 months**,** the 3rd stage 18 months.

(1) Improvement Work of Station Facilities

The 1st stage 27 months**,** the 2nd stage 18 months**,** the 3rd stage 18 months.

1) The 1st Stage

(400m, 4 places, Total extension L=58+175+263+58=554m)

There is few it for the work load, but the schedule is set during critical path 27 months because it is dotted.

2) The 2nd stage

(700m, 6 places, Total extension L=207+239+300×4=1646m)

Because it does not become the critical path, the schedule is set it by a reason like the above in around 18 months.

3) The 3rd stage

(1000m,10 places, all out deferred extension L=294+300×8+339=3033m)

Because it does not become the critical path, the schedule is set around 18 months.

(2) Improvement and New Installation Work of Signal and Telecom Equipment

・・・18 months.

1) The 2nd Stage

(700m, 2 places of new establishments by for each one place of the section of A and C in total. Total extension L=700+700=1400m)

Because it does not become the critical path, the schedule is set around 18 months.

2) The 3rd stage (1000m,2 places, Total Extension L=300+300=600m)

Because it does not become the critical path, the schedule is set around 18 months.

3.5. Branch Line Construction between Merapi and Coal Storage Yard

Because it does not become the critical path, the schedule is set around 18 months.

3.6. Double Tracking

3.6.1. Double Tracking (2), (3) :(Section A and C)

The 3rd stage (Target Extension 27.54+80.6=108.14km)

(1) Site Access Road

1) Between Kertapati and Prabumulih

Because there is not the section concerned in the slip road apart from a national highway in a damp area part either, the road for construction is installed at 6.0m in width parallel to a plan line outside of a plan line.

In addition, because the basic ground is soft, the road for construction gives a soil stabilization by cement of 1.0m and does it with the structure that 1.0m extra earth laid on the ground did on the top.

・Site Access Road, Width=6.0m、Extension=20km.

・Soil Stabilization by Cement, Area=6.0m×20,000m=120,000.0m^2

・Embankment: Volume=6.0m×1.0m×20000m=120,000.0m^3 (purchase soil)

・Cost of Construction:M=2,500 yen per m^3×120,000m^3+2300 yen per m^2×120,000.0m^3

=576,000,000 yen .(local cost)

→The cost of construction includes 50% in consideration of Indonesia and a Japanese price level.

=288,000,000 yen.

(When We convert it as 1 yen =110Rp,26,180≒31,680 million Rp.) (local cost)

・Term of Works : N=120,000.0m^3 per 600m^3 per day per / 5 groups+120,000m^3 / 200m^2 per day / 5 groups=160 days.

≒5.0～6.0 months.

2) Between Muara Enim and Lahat

A national highway parallels the section concerned and because the ground is good, the road for construction uses a trajectory planning line to use in the future as a double track.

Therefore, it is the simple management and the road for construction shall include it in permanent work cost include it to easily for a cost of construction, term of works because the slip road formation is possible.

(2) Ground Improvement Work

Double track section (Pyakabung - Kertapati interval) of 20.8km belongs to the damp ground part and carries out a ground improvement by the pile net method of construction because the basic ground is soft. (6m in width, extension 20.8km)

The construction speed assumes it 150m^2 per day (25m in depth) per one group, when spend five groups, the construction days is,

N= (6m×20800m) / (150m^2 per day) per 5 groups ≒ 166days.

→166days per 30days≒6 months →6 months are required.

(3) Drainage Work

Drainage work carry out the during a roadwork for construction, a period same as ground improved construction.

12 months are required.

(4) Civil work

Because the cost of work multiplies it separately, the earthwork calculate only term of works.

1) Embankment

① Quantity

・Between Muara Enim and Lahat V=209,979m^3.

・Between Kertapati and Prabumulih V=293,137m^3 , Total V=587,116m^3.

② Term of Works

・Bulldozer Spreading,Compaction 600mm^3 per day.

N=587,116m^3 / 600mm^3=979days, 979days / 30days per month≒33 months.

When it is said that I spend 4 groups, 33 months / 4 groups≒ 8 months.

・Compaction of pneumatic-tire roller 600mm^3 per day.

N=587,116 / 600=979days, 979days / 30day per month≒ 33 months.

When it is said that I spend 4 groups,33 months / 4 groups≒ 8 months.

・Term of Works N=8+8=**16 months.**

2) Cut Work

① Quantity

・Between Muara Enim and Lahat V=228,882m^3.

・Between Kertapati and Prabumulih V=330,334m^3 , Total V=559,214m^3.

② Term of Works

・Excavation: backhoe 300m^3per day, quantity of target soil (we assume it one-third of cut) V=186,400m^3.

N=186,400m^3 / 300m^3=621days, 621days / 30days per month≒ 21 months.

・Quantity of digging soil: Bulldozer 350m^3 per day, quantity of target soil V=372,814m^3.

N=372,814 / 350=1065days, 1065 / 30days per month≒36 months.

・Compaction of Pneumatic-tire roller 700m^2 per day.

target area A=6.0m×51,951m=311,706m^2.

N=311,706 / 700=445days, 445days / 30days per month≒15 months.

・Term of Works

N=21+36+15=72 months.

When it is said that I spend 4 groups,N=72 /4 ≒ **18 months.**

3) Term of Civil work

Embankment section and cut section shall undertake construction at the same time and do it with 18 months for the term of works.

(5) Temporary Work

The falsework between, ① Kertapati – Prabumulih, ② Muara Enim – Lahat becoming the section targeted for a double track includes steel sheet pilings earth retaining closure and piled pier for construction.

1) Piled Pier for Work

① Cost of Work

■ Bearing Pile

(H-300×300, L=10mper pile, all weight W=736.2t, All number N=792)

・Material cost (all loss) :79,000 yen per t×736.2t=58,159,800 yen. (foreign cost)

・Cost of punch (vibro) :

(12,360 yen+4,700 yen) per pile×792 piles=13,511,520 yen. (local cost)

・Subtotal:71,671,320 yen.

■ Cross Beam Decking (H－300×300,all weight W=810.8t)

・Material cost (all loss) 79,000 yen per t ×810.8t=64,053,200 yen. (foreign cost)

・Setting・removal cost

(22,710 yen +12,670 yen) per t ×810.8t=28,686,104 yen. (local cost)

・Subtotal 92,739,304 yen.

■ Decking (all setting area A=5650m^2)

・Material Cost (all loss) :

(450 yen per m^2×36 months) ×5650m^2=91,530,000 yen. (local cost)

・Setting・Removal cost: (1500 yen +800 yen) per m^2×5650m^2=12,995,000 yen. (local cost)

・Subtotal 104,525,000 yen.

■ Total: 268,935,624 yen. (foreign cost 122,213,000 and local cost 146,722,624)

・The cost of construction includes 50% in consideration of a price level and assumes it 195,574,312 yen.

・Unit price of Indonesia: 195.6×110≒21,516 million Rp. (foreign cost 13,443, local cost 8,073)

②Term of Works (It calculate s at the longest 160m pier)

・Bearing pile punching: (205 piles per point / 10 piles per day) +

(205 piles per point /20 piles per day) ≒31 days.

・Cross beam decking setting, removal: (221.9t per point /10t per day) +
(221.9t per point /20t per day) ≒33 days.

・Decking setting・removal: (1600m^2 per 150m^2 per day) ×2≒22 days.

・The work days per one group: 86 days.

・Term of Works: Both sides undertake construction in two groups,86 days per 2 groups≒ 43days. → 40 days are required.

2) Steel Sheet Closure

①Cost of Work

■Steel Sheet Pilings (Ⅲ Form, Average L≒7.5m per pile, All weight W=1311.8t,All number of sheets N=3008 piles)

・Material cost (all loss) :127,000 yen per t×1311.8t=166,598,600 yen. (foreign cost)

・Cost of placing (vibrator) :

・ (6,800yen+4,700yen) per sheet×3008 piles=34,592,000 yen. (local cost)

・Subtotal: 201,190,600 yen

■Earth retaining Support (H－300×300,all weight W=185.4t)

・Material Cost (all loss) 79,000 yen per t ×185.4 t =14,646,600yen. (foreign cost)

・Setting・Removal Cost: (22,710yen+12,670yen) per t×185.4 t =6,559,452yen. (local cost)

・Subtotal 21,206,052 yen.

■Total: 222,396,652 yen. (foreign cost 181,245,200 and local cost 41,151,452)

・The cost of work includes 50% in consideration of a price level and assumes it 201,820,926 yen.

・Unit price of Indonesia: 201.8×110≒22,198 million Rp. (foreign cost 19, 936 and local cost 2,262)

②Term of Works (By one hit)

・Steel Sheet Pile Punching: (100piles per point/10 piles per day) + (100 piles per point / 20 piles per day) ≒ 25 days.

・Earth Retaining Support Setting・Removal: (7.44t per one/10t per day) + (7.44t per point/20t per day) ≒ 2 days.

・The work days per one: 27 days.

・Term of Works: It includes one abutment pier and one bridge pier for the term of works. → 50 months are required.

3) Temporary work term of works: N=40+50=90 days → 3 months are required.

(6) Bridge work

Superstructure 6 months, substructure 12 months. Total: 18 months.

In addition, the work of all bridges assumes it construction at the same time.

(7) NeW Track Bed Work

1) Quantity

① Between Muara Enim and Lahat L=19,507+17130=36,637m

A=163,860+130,188=294,048m^2.

V=40,965+32,547=73,512m^3. (thicknesst=25cm)

② Between Kertapati and Prabumulih L=39,521+34,821=74,342m.

A=331,976+264,640=596,616m^2.

V=82,994+66,160=149,154m^3. (thicknesst=25cm)

③ Total

A=294,048+596,616=890,664m^2.

V=73,512+149,154=222,666m^3. (thicknesst=25cm)

2) Term of Works

① Track Bed

The track bed assumes moo it two levels of finish by a motor grader, a road roller, the combination of tire rollers.

The quantity of construction assumes it 1200m^3 per day.

N=890,664m^2/1200×2=742 days×2=1484 days, 1484 days / 30 days=49 months.

When I spend 8 groups,49 months /8 groups ≒ 6 months.

② Asphalt Pavement: coarse-graded asphalt concrete t=5cm(finish it still more)

It of a asphalt finisher, a road roller, a tire roller, the vibratory roller put together.

The quantity of construction per day assumes it 2,300m^2 per day.

N=890,664m^2÷2300m^2=387days, 387days/30 days ≒ 13 months.

When I spend 5 groups, 13months/5 groups ≒ 3 months.

③ Term of Track Bed

It is not assumed that the asphalt pavement undertakes construction parallel to track bed construction than the part which a roadbed finished with the object of a thought, the term of works.

Therefore, the term of works of the roadbed is 6 months.

(8) New track work

1) Laying Extension

①Between Muara Enim and Lahat　L=38.066km.

②Between Prabumulih X6 and Kertapati　L=2.804+77.807=80.611 km.

③Total laying extension　L=38.066+80.611=118.677km.

2) Term of Work

Work is set to 20th per 1km.　(50m / group per day)

The work days:　N=118.677km×20 days per km ≒ 2374 days.

2374 days / 30 days=79 months.

The work spends 9 groups and as a work condition, I assume it parallel work for roadbed construction and around three months.

8.8－3.0≒**6.0 months.**

3.6.2. Double Tracking (1) (Section B), the 2nd Stage

(1) Target Extension

The environmental group setting that the construction extension which PT.KAI enforces it alone is 70.58km a double track.

This work delays, and the doubtful situation includes the completion by the project enforcement concerned.

Therefore, I shall maintain the construction of non-enforcement section by the project concerned, and the maintenance extension intends for approximately 30km based on a field work result.

(2) Term of Works

As for the extension of the double tracking the (2) (Section B) is approximately a one-third 30km a double track for the double tracking the (2) (Section A) and extension L=27.54+80.6=108.14km of the double tracking (2) (Section C).

Therefore, you should secure the term of works appropriate to the extension ratio basically.

A tall and stout bridge of bridge long 40-50m is that a 2 bridge exists in this section, and the critical path of the 1 work (Section B) is decided a double track in total 24 months for 18 months and track laying work three months for preparations work three months and the term of works of the bridge concerned.

In addition, the details schedule of work itemization includes in reference to the work process of the double tracking the (2) (Section A) and the double tracking the (2) (Section C) appropriately.

3.7. Installation of Additional Crossing

Because it cannot become the critical path, I find the term of works for around six months with the appearance that kept room in the work latter half.

3.8. Improvement and New Installation of Signal and Telecom Equipment

Because it cannot become the critical path as well as the above, I find the term of works for around 12 months with the appearance that kept room in the work latter half.

3.9. Improvement and New Installation of Electromechanical Equipment

Similarly, I find the term of works for around 12 months with the appearance that gave you room in the work latter half because it cannot become the critical path.

3.10. Reinforcement of Rolling Stock Repair Facility

Similarly, I find term of works of the degree with the appearance that gave you room in the construction latter half for 12-15 months because it cannot become the critical path.

3.11. Reinforcement of Loading and Unloading Equipment

Similarly, because it cannot become the critical path, give enough me room at the first, the second stage and find term of works and find 15 months for true term of works in the latter half at the third stage.

3.12. Rolling Stock Procurement (Locomotives and Wagons)

According to the past example and the maker hearing, 2-3 years are usually required. Therefore, I secure term of works appropriate to the procurement amount of each stage in the form that planned adjustment with the whole term of works during the period concerned.

3.13. The Site Acquisition and Inhabitants Move

We carry out environmental assessment (AMDAL) for one year from enforcement six years ago for the third stage to plan facilitation of the construction and carry out the site acquisition and inhabitants move afterwards for five years.

4. Quantity of temporary work

4.1. Quantity of temporary work generalization list

(1) Temporary Earth Retaining Support

Type of work	Bridge pier			Abutment		
	One hit	Section A (unit)	Section C (unit)	One hit	Section A (unit)	Section C (unit)
Steel sheet pile number (sheets)	100	5	0	66	6	32
Steel sheet pile full length (m)	560	5	0	501.6	6	32
Steel sheet pile weight (t)	33.6	5	0	30.1	6	32
Strut number (n)	4	5	0	2	6	32
Strut weight (t)	3.72	5	0	1.30	6	32
Waling weight (t)	3.72	5	0	2.60	6	32

Type of work	Subtotal		Total
	Section A	Section C	
Steel sheet pile number (sheets)	896	2112	3008
Steel sheet pile full length (m)	5809.6	16051.2	21860.8
Steel sheet pile weight (t)	348.6	963.2	1311.8
Strut number (n)	32	64	96
Strut weight (t)	26.40	41.60	68.00
Waling weight (t)	34.20	83.20	117.40

(2) Temporary piled pier

Type of work	Bridge length 160m			Bridge length 100m		
	One hit	Section A (unit)	Section C (unit)	One hit	Section A (unit)	Section C (unit)
Area (m^2)	1600	1	0	1000	1	0
Decking sheet	800	1	0	500	1	0
Maingirder weight (t)	165.1	1	0	103.2	1	0
Beam seat weight (t)	56.8	1	0	36.1	1	0
Bearing pile weight (t)	184.1	1	0	117.2	1	0

Type of work	Bridge length 40m			Bridge length 15m		
	One hit	Section A (unit)	Section C (unit)	One hit	Section A (unit)	Section C (unit)
Area (m^2)	400	1	1	150	0	15
Decking sheet	200	1	1	75	0	15
Maingirder weight (t)	41.3	1	1	15.5	0	15
Beam seat weight (t)	15.5	1	1	6.9	0	15
Bearing pile weight (t)	50.2	1	1	22.3	0	15

Type of work	Subtotal		Total
	Section A	Section C	
Area (m^2)	3000	2650	5650
Decking sheet	1500	1325	2825
Maingirder weight (t)	309.6	273.8	583.4
Beam seat weight (t)	108.4	119.0	227.4
Bearing pile weight (t)	351.5	384.7	736.2

Amount of temporary between Prabumulih and Kertapati

Temporary earth retaining support for abutment work

		Footing			Excavation		
		Direction L m	Direction C m	Area m^2	Direction L m	Direction C m	Area m^2
Bridge pier	Truss bridge	8.000	8.000	64.000	10.000	10.000	100.000
	Plate girder	5.000	5.000	25.000	7.000	7.000	49.000

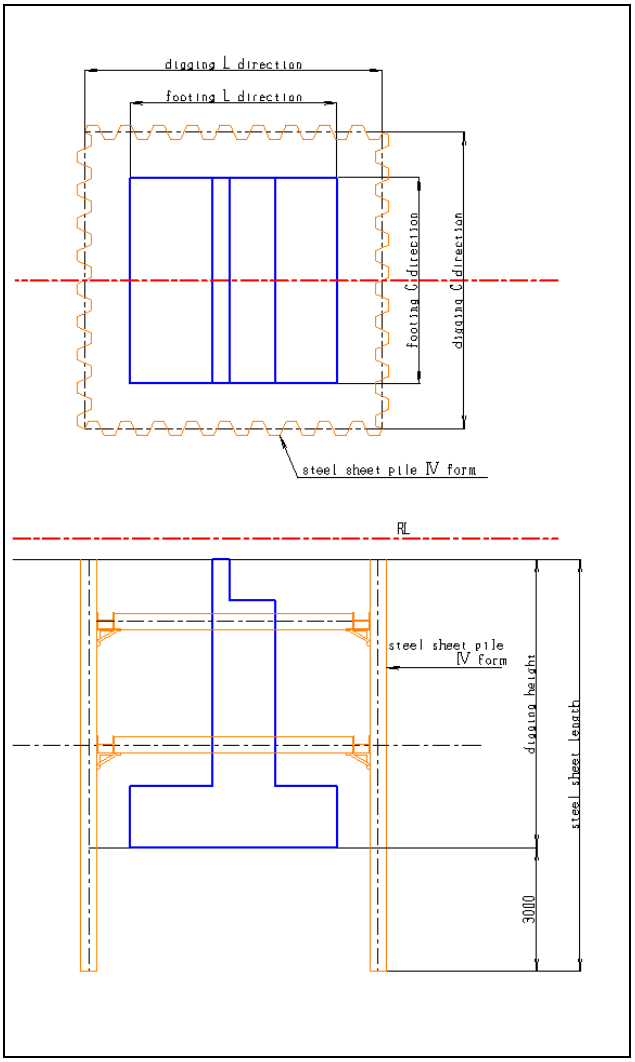
		Dogging amout m	Steel sheet pile length m	Steel sheet pile extension (Ⅳform) m	Support weight (H-300) t	Excavation volume m^3
Abutment	Truss bridge	7.000	10.000	1000	14.2848	700
	Plate girder	7.000	10.000	700	7.3656	343
				One hit		

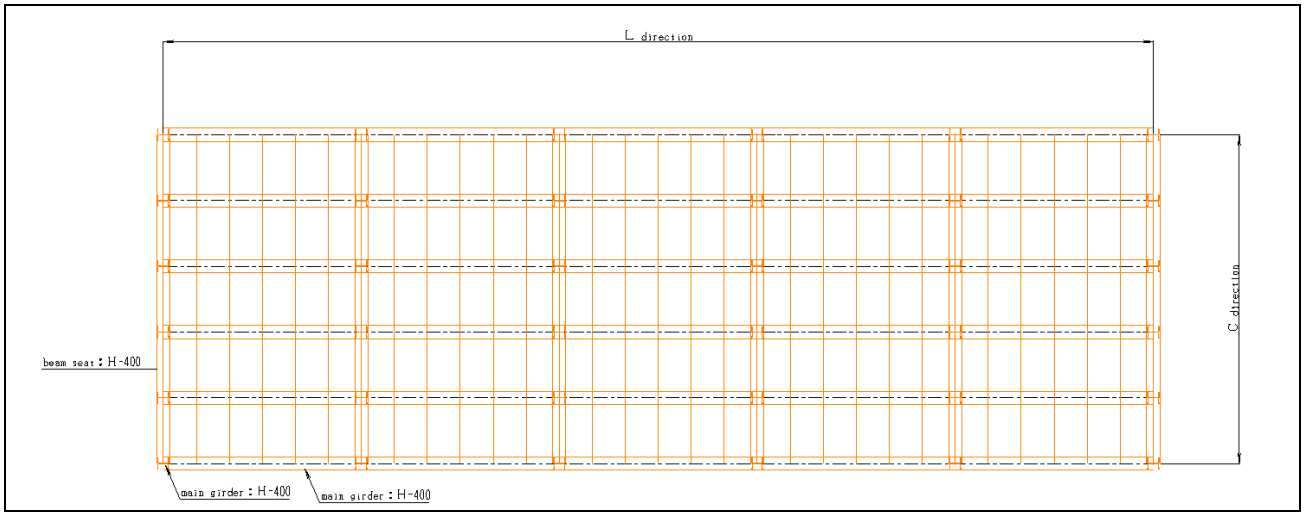
Temporary piled pier for erection girder of truss bridge

		Temporary piled pier			Pile lenght m
		Direction L m	Direction C m	Area m^2	
	Truss bridge	30.000	10.000	300.000	15.000
		Decking area	Decking sheet	H-steel weight (H-400) t	H-steel weight (H-400) t
	Truss bridge	300.00	150	41.28	92.88
		One hit			

4.2. Unit quanitity

(1) Common Dimensional Drawing





(2) Quantity of Temporary Earth Retaining Support

1) Calculation Condition

①The amount between Muaraenim - PbrX6 where it is carried out becoming it removes a double track now.

②I do the dimensions of substructure and the digging with a value same as quantity of bridge substructure・superstructure.

③The wall of the temporary earth-retaining support assumes it steel sheet pile type III and does it with a root case by length same as the amount of digging.

④The temporary sand guards mechanic assumes it strut type (one step) and I raise a stomach and do strut together with H-300.

The strut interval assumes it around 3.0m.

Bridge pier	:	Plane shape	B×L	(m)	=	9.0	×	9.0
		Height	H	(m)	=	1.8		
		Overburden	h	(m)	=	1.0		
		Basic height	h′	(m)	=	1.5		
		Overbreak	b	(m)	=	0.5		
		Leveling concrete	c	(m)	=	0.3		
Abutment	:	Plane shape	B×L	(m)	=	6.0	×	6.0
		Height	H	(m)	=	1.5		
		Overburden	h	(m)	=	2.0		
		Basic height	h′	(m)	=	1.5		
		Overbreak	b	(m)	=	0.5		
		Leveling concrete	c	(m)	=	0.3		

2) Amount Calculation of Temporary Earth Retaining Support (One bridge pier hit)

①steel sheet pile number	n1	=	(9.0+9.0+0.5×4.0) ×2/0.4					=	100	(sheets)
②steel sheet pile full length	L1	=	(1.0+1.5+0.3) ×2×n					=	560	(m)
③steel sheet pile weight		=	0.060×560					=	33.6	(t)
④strut number	n2	=	(10.0	/	3.0	－1) + (10.0/3.00－1)		≒	4	(n)
⑤strut weight		=	(10.0	×	4)	×0.093		=	3.72	(t)
⑥waling weight		=	(10.0	+	10.0)	×2×0.093		=	3.72	(t)

3) Amount Calculation of Temporary Earth Retaining Support (One abutment hit)

①Steel sheet pile number	n1	=	(6.0+6.0+0.3×4.0) ×2/0.4				=	66 (sheets)
②Steel sheet pile full length	L1	=	(2.0+1.5+0.3) ×2×n				=	501.6 (m)
③Steel sheet pile weight		=	0.060×501.6				=	30.1 (t)
④Strut number	n2	=	(7.0	/	3.0	−1) + (7.0/3.0−1)	≒	2 (n)
⑤Strut weight		=	(7.0	×	2)	×0.093	=	1.30 (t)
⑥Waling weight		=	(7.0	+	7.0)	×2×0.093	=	2.60 (t)

(3) Quantity of Temporary Piled Pier

1) Calculation Condition

①The amount between Muaraenim - PbrX6 where it is carried out becoming it removes a double track now.

②As for the plane dimensions, the track direction assumes length of bridge and the equivalent, Track crossing direction 10m.

③The main girder distance receives 2.0m and does the figure (bearing pile) distance with 5.0m and the main girder and the material of the beam seat both adopt H-300.

④The length of the bearing pile is assumed 10m, and assumed to be H-300.

⑤The length of bridge assumes it four types of total of 160m (1 bridge) of the truss bridge, 100m (1 bridge), 40m (1 bridge) and 15m (the mean head of the 15 bridge) of the plate girder bridge.

160m	Plane shape	B×L	(m)	=	160.0	×	10.0
	Bearing pile length	H	(m)	=	10.0		
100m	Plane shape	B×L	(m)	=	100.0	×	10.0
	Bearing pile length	H	(m)	=	10.0		
40m	Plane shape	B×L	(m)	=	40.0	×	10.0
	Bearing pile length	H	(m)	=	10.0		
15m	Plane shape	B×L	(m)	=	15.0	×	10.0
	Bearing pile length	H	(m)	=	10.0		

2)Amount Calculation of Temporary Piled Pier (1 bridge (160m) hit)

①Temporary piled pier area	=160.0×10.0	=	1600 (m^2)
②Deck sheets	=1600.0/2.0	=	800.0 (sheets)
③Main girder weight	= (10.0/2.0+1) ×160.0×0.172	=	165.1 (t)
④Beam seat weight	= (160.0/5.0+1) ×10.0×0.172	=	56.8 (t)
⑤Bearing pile weight	= (10.0/2.0+1) × (160.0/5.0+1) ×10.0×0.093		
	=184.1 (t)		

3) Amount calculation of temporary piled pier (1 bridge (100m) hit)

①Temporary piled pier area	=100.0×10.0	=	1000 (m^2)
②Deck sheets	=1000.0/2.0	=	500.0 (sheets)

③Main girder weight	= (10.0/2.0+1) ×100.0×0.172	=	103.2 (t)
④Beam seat weight	= (100.0/5.0+1) ×10.0×0.172	=	36.1 (t)
⑤Bearing pile weight	= (10.0/2.0+1) × (100.0/5.0+1) ×10.0×0.093		
	=117.2 (t)		

4) Amount Calculation of Temporary Piled Pier (1 bridge (40m) hit)

①Temporary piled pier area	=40.0×10	=	400.0 (m^2)
②Deck sheets	=400.0/2.0	=	200.0 (sheets)
③Main girder weight	= (10.0/2.0+1) ×40.0×0.172	=	41.3 (t)
④Beam seat weight	= (40.0/5.0+1) ×10.0×0.172	=	15.5 (t)
⑤Bearing pile weight	= (10.0/2.0+1) × (40.0/5.0+1) ×10.0×0.093		
	= 50.2 (t)		

5) Amount Calculation of Temporary Piled Pier (1 bridge (15m) hit)

①Temporary piled pier area	=15.0×10	=	150.0 (m^2)
②Deck sheets	=150.0/2.0	=	75.0 (sheets)
③Main girder weight	= (10.0/2.0+1) ×15.0×0.172	=	15.5 (t)
④Beam seat weight	= (15.0/5.0+1) ×10.0×0.172	=	6.9 (t)
⑤Bearing pile weight	= (10.0/2.0+1) × (15.0/5.0+1) ×10.0×0.093		
	= 22.3 (t)		

[Appendix 5-4-1] Civil Works

1. Civil works Cost summary table - 1

The first stage(Single track improvement,Target transportation amount 2.5 million ton/year,395m in train organization length)

The second stage (Target transportation amount five million ton/year,615m in train organization length)

The third stage (Complete double-track line making,930m in train organization length during target transportation amount 20 million ton/year)

№	Work item	Unit	Unit price (Rp)	The first stage		The second stage		The third stage		Recapitulation
				Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	
	①Improvement work cost of existing roadbed									
	1. Existing sub ballast improvement	m^3	610,500	78,711	48,053,065,500	78,711	48,053,065,500	78,711	48,053,065,500	Reinforced roadbed
	①Accumulation total				**48,053,065,500**		**48,053,065,500**		**48,053,065,500**	
	①The increase total						**0**		**0**	
	②Improvement work cost of civil engineering structures									
	1.EARTH WORKS（Lahat～Muaraenim,PbrX6～Kertapati）									
	1.1. Existing station improvement(L>930m)									
	1.1.1. Land preparation	m^2	15,362	3,396	52,169,352	14,418	221,489,316	34,386	528,237,732	
	1.1.2. New sub ballast									
	(1) Fill section	m^3	610,500	542	330,891,000	2,892	1,765,566,000	5,599	3,418,189,500	Reinforced roadbed
	(2) Cut section	m^3	610,500	308	188,034,000	1,026	626,373,000	5,824	3,555,552,000	Reinforced roadbed
	1.1.3. Fill worker	m^3	177,280	2,438	432,208,640	12,182	2,159,624,960	20,564	3,645,585,920	Purchase soil use
	1.1.4. Pile net worker(Between Pyk-Kpt.)	m^2	1,462,164	0	0	0	0	2,934	4,289,989,176	Soft ground measures
	1.1.5. Cut worker	m^3	247,500	1,207	298,732,500	9,393	2,324,767,500	43,655	10,804,612,500	
	1.1.6. Vegetation worker									
	(1) Fill section	m^2	66,000	898	59,268,000	4,518	298,188,000	7,882	520,212,000	
	(2) Cut section	m^2	66,000	361	23,826,000	2,830	186,780,000	13,095	864,270,000	
	1.2.New station（L=1,000m）									
	1.2.1.Land preparation	m^2	15,362		0	8,400	129,040,800	12,000	184,344,000	
	1.2.2.New sub ballast									
	(1) Fill section	m^3	610,500		0	2,310	1,410,255,000	3,570	2,179,485,000	Reinforced roadbed
	(2) Cut section	m^3	610,500		0	300	183,150,000	570	347,985,000	Reinforced roadbed
	1.2.3.Fill worker	m^3	177,280		0	12,810	2,270,956,800	17,310	3,068,716,800	Purchase soil use
	1.2.4.Pile net worker（Btween Pyk～Kpt）	m^2	1,462,164		0	4,200	6,141,088,800	6,000	8,772,984,000	Soft ground measures
	1.2.5.Cut worker	m^3	247,500		0	3,450	853,875,000	3,450	853,875,000	
	1.2.6.Vegetation worker									
	(1) Fill section	m^2	66,000		0	4,541	299,706,000	6,283	414,678,000	
	(2) Cut section	m^2	66,000		0	1,038	68,508,000	1,038	68,508,000	
	2.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）									
	2.1.Existing station improvement（L>930m）									
	2.1.1.U type side ditch（direction of railway track）									
	(1) Fill section	m	591,512	258	152,610,096	1,377	814,512,024	2,666	1,576,970,992	
	(2) Cut section	m	591,512	308	182,185,696	1,026	606,891,312	3,065	1,812,984,280	
	2.1.2.Catchmento									
	(1) Fill section	no	4,125,000	5	20,625,000	28	115,500,000	44	181,500,000	
	(2) Cut section	no	4,125,000	6	24,750,000	20	82,500,000	42	173,250,000	

№	Work item	Unit	Unit price (Rp)	The first stage		The second stage		The third stage		Recapitulation
				Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	
	2.1.3.Crossing drain（Increase length　L=6.0m/no）									
	（1）Concrete pipe	no	17,488,692		0	6	104,932,152	8	139,909,536	with the Hume pipe
	（2）Box culvert,U type	no	2,622,431,256		0	4	10,489,725,024	9	23,601,881,304	Box＜2m
	2.2.New station（L=1,000m）									
	2.2.1.U type side ditch（direction of railway track）									
	(1) Fill section	m	591,512		0	1,100	650,663,200	1,700	1,005,570,400	
	(2) Cut section	m	591,512		0	300	177,453,600	300	177,453,600	
	2.2.2.Catchmento									
	(1) Fill section	no	4,125,000		0	22	90,750,000	34	140,250,000	
	(2) Cut section	no	4,125,000		0	6	24,750,000	6	24,750,000	
	2.2.3.Crossing drain（Increase length　L=6.0m/no）									
	（1）Concrete pipe	no	17,488,692		0	1	17,488,692	2	34,977,384	with the Hume pipe
	（2）Box culvert,U type	no	2,622,431,256		0	2	5,244,862,512	3	7,867,293,768	Box＜2m
	②Accumulation total				**1,765,300,284**		**37,359,397,692**		**80,254,015,892**	
	②The increase total						**＃ 35,594,097,408**		**＃ 42,894,618,200**	
	③Construction cost of new line									
	between Merapi and coal storage yard									
	1.EARTH WORKS（Lahat～Muaraenim,PbrX6～Kertapati）									
	1.1.New line construction（Merapi～Coal yard　L=700m）									
	1.1.1.Land preparation	m^2	15,362		0	21,140	324,752,680	21,140	324,752,680	Purchase soil use
	1.1.2.New sub ballast	m^3	610,500		0	6,030	3,681,315,000	6,030	3,681,315,000	Reinforced roadbed
	1.1.3.Fill worker	m^3	177,280		0	12,410	2,200,044,800	12,410	2,200,044,800	Purchase soil use
	1.1.4.Pile net worker（Btween Pyk～Kpt）	m^2	1,462,164		0	0	0	0	0	Soft ground measures
	1.1.5.Vegetation worker	m^2	66,000		0	6,490	428,340,000	6,490	428,340,000	
	2.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）									
	2.1.New line construction（Merapi～Coal yard　L=700m）									
	2.1.1.U type side ditch（direction of railway track）	m	591,512		0	3,600	2,129,443,200	3,600	2,129,443,200	
	2.1.2.Catchmento	no	4,125,000		0	72	297,000,000	72	297,000,000	
	2.1.3.Crossing drain	m	2,914,782		0	531	1,547,749,242	531	1,547,749,242	with the Hume pipe
	③Accumulation total				**0**		**10,608,644,922**		**10,608,644,922**	
	③The increase total						**＃ 10,608,644,922**		**0**	
	④Double tracking work (1) cost									
	1.Construction of making to double-track line section	km	8,860,313,329		0	28	249,860,835,878	28	249,860,835,878	Refer to the next page.
	（Muaraenim～PbrX6)EARTHWORK COST									
	④Accumulation total				**0**		**249,860,835,878**		**249,860,835,878**	
	④The increase total						**＃ 249,860,835,878**		**0**	
	⑤Double tracking work (2) and (3) cost									
	1.EARTH WORKS（Lahat～Muaraenim,PbrX6～Kertapati）									
	1.1.Double track line construction（Lt～Me,PbrX6～Kpt）									
	1.1.1.Levelling the land	m^2	15,362		0		0	713,388	10,959,066,456	
	1.1.2.New sub ballast									
	(1) Fill section	m^3	610,500		0		0	131,036	79,997,478,000	Reinforced roadbed
	(2) Cut section	m^3	610,500		0		0	107,350	65,537,175,000	Reinforced roadbed
	1.1.3.Fill worker	m^3	177,280		0		0	543,963	96,433,760,640	Purchase soil use

№	Work item	Unit	Unit price (Rp)	The first stage		The second stage		The third stage		Recapitulation
				Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	
	1.1.4.Pile net worker（Btween Pyk～Kpt）	m^2	1,462,164		0		0	131,814	192,733,685,496	Soft ground measures
	1.1.5.Cut worker	m^3	247,500		0		0	630,910	156,150,225,000	
	1.1.6.Vegetation worker									
	(1) Fill section	m^2	66,000		0		0	202,481	13,363,746,000	
	(2) Cut section	m^2	66,000		0		0	189,454	12,503,964,000	
	2.BRIDGE WORKS（Lahat～Muaraenim,PbrX6～Kertapati）									
	2.1.Superstructure worker									
	2.1.1.Steel girder（Truss）	t	99,000,000		0		0	847	83,827,854,000	Foreign currency
	2.1.2.Steel girder（I beam,Plate girder）	t	71,500,000		0		0	269	19,265,317,500	Foreign currency
	2.1.3.RC girder	m^3	2,159,777		0		0	13	28,077,101	
	2.1.4.H burial girder	m^3	6,600,000		0		0	31	204,600,000	
	2.1.5.Bearing and installation	no	2,788,033		0		0	108	301,107,564	
	2.2.Substructure worker									
	2.2.1.Pier・Abutment	m^3	1,943,115		0		0	10,807	20,999,243,805	
	2.2.2.Basic construstion tesi digging	m^3	690,695		0		0	9,734	6,723,225,130	
	2.3.Temporary housing construction	set	75,394,000,000		0		0	1	75,394,000,000	
	(road and pier for construction)									
	3.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）									
	3.1.Double track line construction（Lt～Me,PbrX6～Kpt）									
	3.1.1.U type side ditch（direction of railway track）									
	(1) Fill section	m	591,512		0		0	62,395	36,907,391,240	
	(2) Cut section	m	591,512		0		0	56,500	33,420,428,000	
	3.1.2.Catchmento									
	(1) Fill section	no	4,125,000		0		0	1,248	5,148,000,000	
	(2) Cut section	no	4,125,000		0		0	1,130	4,661,250,000	
	3.1.3.Crossing drain（Increase length L=6.0m/no）									
	（1）Concrete pipe	no	17,488,692		0		0	128	2,238,552,576	with the Hume pipe
	（2）Box culvert,U type	no	2,622,431,256		0		0	80	209,794,500,480	Box＜2m
	⑤Accumulation total				**0**		**0**		**1,126,592,647,988**	
	⑤The increase total						**0**		**₩ 1,126,592,647,988**	
	⑥Installation work cost of additional crossing									
	1.RAILLOAD CROSSING（Lt～Me,PbrX6～Kpt）									
	1.1.Existing station improvement（L>930m）									
	1.1.1.Railload crossing	no	300,000,000		0	9	2,700,000,000	13	3,900,000,000	1no/st.(assumption)
	1.2.Double track line construction									
	1.2.1.Railload crossing	no	300,000,000		0		0	39	11,700,000,000	3no/st.(assumption)
	⑥Accumulation total				**0**		**2,700,000,000**		**15,600,000,000**	
	⑥The increase total						**₩ 2,700,000,000**		**₩ 12,900,000,000**	
	Accumulation construction expense total	**Rp**			**49,818,365,784**		**348,581,943,992**		**1,530,969,210,180**	
	The increase construction expense total	**Rp**					**₩ 298,763,578,208**		**₩ 1,182,387,266,188**	
		100 million yen			**4.5**		**31.7**		**139.2**	1 yen＝110RP

2. Civil works Cost summary table - 2

Whole line double-track line making(Only making Lahat-Muaraenim and PbrX6-Kertapati a double-track line)

;For the construction of making to double-track line expense calculation between Muaraenim-PbrX6

№	Work item	Unit	Unit price Rp	Quantity	Construction expense(Rp)	Recapitulation
	1.EARTH WORKS（Lahat～Muaraenim,PbrX6～Kertapati）					
	1.1. Existing sub ballast improvement	m^3	610,500	0	0	Reinforced roadb
	1.2.Land preparation					
	1 industrial sector;Lt～Me	m^2	15,362	234,876	3,608,165,112	
	2 industrial sectors;X6～Pyk	m^2	15,362	325,098	4,994,155,476	
	3 industrial sectors;Pyk～Kpt	m^2	15,362	153,414	2,356,745,868	
	Total			713,388		
	1.3.New sub ballast					
	1.3.1.Fill section					
	1 industrial sector;Lt～Me	m^3	610,500	42,412	25,892,526,000	Reinforced roadb
	2 industrial sectors;X6～Pyk	m^3	610,500	42,489	25,939,534,500	Reinforced roadb
	3 industrial sectors;Pyk～Kpt	m^3	610,500	46,135	28,165,417,500	Reinforced roadb
	Total			131,036		
	1.3.2.Cut section					
	1 industrial sector;Lt～Me	m^3	610,500	36,005	21,981,052,500	Reinforced roadb
	2 industrial sectors;X6～Pyk	m^3	610,500	64,505	39,380,302,500	Reinforced roadb
	3 industrial sectors;Pyk～Kpt	m^3	610,500	6,840	4,175,820,000	Reinforced roadb
	Total			107,350		
	1.4.Fill worker					
	1 industrial sector;Lt～Me	m^3	177,280	229,657	40,713,592,960	Purchase soil use
	2 industrial sectors;X6～Pyk	m^3	177,280	149,037	26,421,279,360	Purchase soil use
	3 industrial sectors;Pyk～Kpt	m^3	177,280	165,269	29,298,888,320	Purchase soil use
	Total			543,963		
	1.5.Pile net worker（Btween Pyk～Kpt）					
	1 industrial sector;Lt～Me	m^2	1,462,164	0	0	Soft ground measures
	2 industrial sectors;X6～Pyk	m^2	1,462,164	0	0	Soft ground measures
	3 industrial sectors;Pyk～Kpt	m^2	1,462,164	131,814	192,733,685,496	Soft ground measures
	Total			131,814		
	1.6.Cut worker					
	1 industrial sector;Lt～Me	m^3	247,500	266,285	65,905,537,500	
	2 industrial sectors;X6～Pyk	m^3	247,500	321,065	79,463,587,500	
	3 industrial sectors;Pyk～Kpt	m^3	247,500	43,560	10,781,100,000	
	Total			630,910		
	1.7.Vegetation worker					
	1.7.1.Fill section					
	1 industrial sector;Lt～Me	m^2	66,000	65,536	4,325,376,000	
	2 industrial sectors;X6～Pyk	m^2	66,000	65,656	4,333,296,000	
	3 industrial sectors;Pyk～Kpt	m^2	66,000	71,289	4,705,074,000	
	Total			202,481		
	1.7.2.Cut section					
	1 industrial sector;Lt～Me	m^2	66,000	63,542	4,193,772,000	
	2 industrial sectors;X6～Pyk	m^2	66,000	113,840	7,513,440,000	
	3 industrial sectors;Pyk～Kpt	m^2	66,000	12,072	796,752,000	
	Total			189,454		

№	Work item	Unit	Unit price Rp	Quantity	Construction expense(Rp)	Recapitulation
	2.BRIDGE WORKS（Lahat～Muaraenim,PbrX6～Kertapati）					
	2.1.Superstructure worker					
	2.1.1.Steel girder（Truss）					
	1 industrial sector;Lt～Me	t	99,000,000	711	70,398,504,000	Foreign currency
	2 industrial sectors;X6～Pyk	t	99,000,000	0	0	Foreign currency
	3 industrial sectors;Pyk～Kpt	t	99,000,000	136	13,429,350,000	Foreign currency
	Total			847		
	2.1.2.Steel girder（I beam,Plate girder）					
	1 industrial sector;Lt～Me	t	71,500,000	0	0	Foreign currency
	2 industrial sectors;X6～Pyk	t	71,500,000	19	1,338,623,000	Foreign currency
	3 industrial sectors;Pyk～Kpt	t	71,500,000	251	17,926,694,500	Foreign currency
	Total			269		
	2.1.3.RC girder					
	1 industrial sector;Lt～Me	m^3	2,159,777	13	28,077,101	
	2 industrial sectors;X6～Pyk	m^3	2,159,777	0	0	
	3 industrial sectors;Pyk～Kpt	m^3	2,159,777	0	0	
	Total			13		
	2.1.4.H burial girder					
	1 industrial sector;Lt～Me	m^3	6,600,000	31	204,600,000	
	2 industrial sectors;X6～Pyk	m^3	6,600,000	0	0	
	3 industrial sectors;Pyk～Kpt	m^3	6,600,000	0	0	
	Total			31		
	2.1.5.Bearing and installation					
	1 industrial sector;Lt～Me	no	2,788,033	44	122,673,452	
	2 industrial sectors;X6～Pyk	no	2,788,033	4	11,152,132	
	3 industrial sectors;Pyk～Kpt	no	2,788,033	60	167,281,980	
	Total			108		
	2.2.Substructure worker					
	2.2.1.Pier・Abutment					
	1 industrial sector;Lt～Me	m^3	1,943,115	6,077	11,808,309,855	
	2 industrial sectors;X6～Pyk	m^3	1,943,115	288	559,617,120	
	3 industrial sectors;Pyk～Kpt	m^3	1,943,115	4,442	8,631,316,830	
	Total			10,807		
	2.2.2.Basic construstion tesi digging					
	1 industrial sector;Lt～Me	m^3	690,695	3,782	2,612,208,490	
	2 industrial sectors;X6～Pyk	m^3	690,695	372	256,938,540	
	3 industrial sectors;Pyk～Kpt	m^3	690,695	5,580	3,854,078,100	
	Total			9,734		
	3.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）					
	3.1.U type side ditch（direction of railway track）					
	3.1.1.Fill section					
	1 industrial sector;Lt～Me	m	591,512	20,196	11,946,176,352	
	2 industrial sectors;X6～Pyk	m	591,512	20,233	11,968,062,296	
	3 industrial sectors;Pyk～Kpt	m	591,512	21,969	12,994,927,128	
	Total			62,398		

№	Work item	Unit	Unit price Rp	Quantity	Construction expense(Rp)	Recapitulation
	3.1.2.Cut section					
	1 industrial sector;Lt～Me	m	591,512	18,950	11,209,152,400	
	2 industrial sectors;X6～Pyk	m	591,512	33,950	20,081,832,400	
	3 industrial sectors;Pyk～Kpt	m	591,512	3,600	2,129,443,200	
	Total			56,500		
	3.2.Catchmento					
	3.2.1.Fill section					
	1 industrial sector;Lt～Me	no	4,125,000	404	1,666,500,000	
	2 industrial sectors;X6～Pyk	no	4,125,000	405	1,670,625,000	
	3 industrial sectors;Pyk～Kpt	no	4,125,000	439	1,810,875,000	
	Total			1,248		
	3.2.2.Cut section					
	1 industrial sector;Lt～Me	no	4,125,000	379	1,563,375,000	
	2 industrial sectors;X6～Pyk	no	4,125,000	679	2,800,875,000	
	3 industrial sectors;Pyk～Kpt	no	4,125,000	72	297,000,000	
	Total			1,130		
	3.3.Crossing drain（Increase length　L=6.0ｍ/no）					
	3.3.1.Concrete pipe					
	1 industrial sector;Lt～Me	no	17,488,692	96	1,678,914,432	with the Hume pipe
	2 industrial sectors;X6～Pyk	no	17,488,692	25	437,217,300	with the Hume pipe
	3 industrial sectors;Pyk～Kpt	no	17,488,692	7	122,420,844	with the Hume pipe
	Total			128		
	3.3.2.Box culvert,U type					
	1 industrial sector;Lt～Me	no	2,622,431,256	35	91,785,093,960	Box＜2m
	2 industrial sectors;X6～Pyk	no	2,622,431,256	38	99,652,387,728	Box＜2m
	3 industrial sectors;Pyk～Kpt	no	2,622,431,256	7	18,357,018,792	Box＜2m
	Total			80		
	4.RAILLOAD CROSSING（Lt～Me,PbrX6～Kpt）					
	4.1.Railload crossing					6m×6m×39no
	1 industrial sector;Lt～Me	m^2	369,494	432	159,621,408	12no
	2 industrial sectors;X6～Pyk	m^2	369,494	756	279,337,464	21no
	3 industrial sectors;Pyk～Kpt	m^2	369,494	216	79,810,704	6no
	Total			1,404		
	Construction Total Cost	**Rp**			**1,051,719,192,100**	
		100 million yen			**95.6**	1 yen＝110RP

3. Civil works Cost summary table - 3

④ idea: The coal unloading equipment is constructed in Musi river away from Simpang at about 7km.

⑤ idea: The coale unloading equipment is constructed in Mariana away from Simpang at about 35km.

⑥ idea: The coal unloading equipment is constructed in Gasing away from Simpang at about 45km.

№	Work item	Unit	Unit price (Rp)	④ idea		⑤ idea		⑥ idea		Recapitulation
				Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	Quantity	Construction expense(Rp)	
	1.EARTH WORKS（Simpang～Gaing）									
	1.1.New sub ballast	m^3	610,500	20,478	12,501,819,000	99,402	60,684,921,000	95,072	58,041,456,000	Reinforced roadbed
	1.2.Levelling the land	m^2	15,362	90,008	1,382,702,896	436,812	6,710,305,944	417,842	6,418,888,804	
	1.3.Fill worker	m^3	177,280	117,778	20,879,683,840	567,582	100,620,936,960	545,372	96,683,548,160	Purchase soil use
	1.4.Pile net worker（Btween Pyk～Kpt）	m^2	1,462,164	90,008	131,606,457,312	436,812	638,690,781,168	417,842	610,953,530,088	Soft ground measures
	1.5.Vegetation worker	m^2	66,000	50,189	3,312,474,000	248,350	16,391,100,000	234,649	15,486,834,000	
	2.BRIDGE WORKS									
	2.1.Superstructure worker									
	2.1.1.Steel girder（60ｍTruss）	t	110,000,000		0	1,040	114,400,000,000	975	107,250,000,000	Foreign currency
	2.1.2.Steel girder（40ｍTruss）	t	99,000,000	90	8,910,000,000	360	35,640,000,000	360	35,640,000,000	Foreign currency
	2.2.Substructure worker									
	2.2.1.Pier・Abutment	m^3	1,943,115	408	792,790,920	3,714	7,216,729,110	4,296	8,347,622,040	
	2.2.2.Basic construstion tesi digging	m^3	690,695	372	256,938,540	1,860	1,284,692,700	1,488	1,027,754,160	
	2.2.2.Steel pipe yaita idutsu base	m	5,500,000		0	2,640	14,520,000,000	3,168	17,424,000,000	
	3.GIRDER VIADUCT WORKS									
	3.1.Superstructure worker									
	3.1.1.Steel girder（Composite beam,I beam）	t	71,500,000		0		0	15,000	1,072,500,000,000	Foreign currency
	3.2.Substructure worker									
	3.2.1.Pier・Abutment	m^3	1,943,115		0		0	35,400	68,786,271,000	
	3.2.2.Basic construstion tesi digging	m^3	690,695		0		0	32,400	22,378,518,000	
	3.2.3.Steel pipe yaita idutsu base	m	5,500,000		0		0	27,600	151,800,000,000	
	4.DRAIN WORKER									
	4.1.U type side ditch（direction of railway track）	m	591,512	13,920	8,233,847,040	68,880	40,743,346,560	65,080	38,495,600,960	
	4.2.Catchmento	no	4,125,000	278	1,146,750,000	1,376	5,676,000,000	1,300	5,362,500,000	
	4.3.Crossing drain	m	2,914,782	1,798	5,240,778,036	8,728	25,440,217,296	8,349	24,335,514,918	with the Hume pipe
	Construction Total Cost	**Rp**			**194,264,241,584**		**1,068,019,030,738**		**2,340,932,038,130**	
		100 million yen			**17.7**		**97.1**		**212.8**	1 yen＝110RP

4. Civil works unit price table

No	Work item	Unit	Unit price (Rp)	Recapitulation
1.0	CIVIL WORKS			
1.1	Land preparation	m^2	15,362	
1.2	Cut worker	m^3	247,500	
1.3	Fill worker （Excavated Material）	m^3	101,424	
1.4	Fill worker （Borrow Material）	m^3	177,280	
1.5	Vegetation worker	m^2	66,000	
1.6	(Track Bed Worker	m^3	610,500	Reinforced roadbed
1.7	Pile net worker	m^2	1,462,164	
1.10	Temporary Soil Detainment	m^3	690,695	
1.11	RAILLOAD CROSSING	no	300,000,000	
2.0	BRIDGE WORKS・Superstructure worker			
2.1	Structural Concrete, for Abutments & Pier	m^3	1,943,115	
2.2	Steel pipe	m	5,500,000	
3.0	BRIDGE WORKS・Substructure worker			
3.1	Truss Girder （Crane construction）	ton	99,000,000	Foreign currency
3.2	Truss Girder （Girder construction）		110,000,000	Foreign currency
3.3	Plate Girder	ton	71,500,000	Foreign currency
3.4	Single T Girder	m^3	2,159,777	
3.5	Slab Girder	m^3	1,963,434	
3.6	CHS Girder (H Burial)	m^3	6,600,000	
3.7	Prestress Concrete for Deck Girder	m^3	10,589,000	
3.8	Prestress Concrete for Trough Girder	m^3	11,646,961	
3.9	Bearing and Installation	no	2,788,033	
4.0	DRAIN WORKER			
4.1	Box Culvert ＜2m	m	437,071,876	
4.2	Box Culvert ＞2m	m	713,959,135	
4.3	U type side ditch	m	2,914,782	
4.4	Concrete Open U - Dicth	m	591,512	
4.5	Catchmento	no	4,125,000	

5. Civil works Quantity summary table - 1

The first stage(Single track improvement,Target transportation amount 2.5 million ton/year,395m in train organization length)

The second stage (Target transportation amount five million ton/year,615m in train organization length)

The third stage (Complete double-track line making,930m in train organization length during target transportation amount 20 million ton/year)

№	Work item	Unit	The first stage	The second stage	The third stage	Recapitulation
			Quantity	Quantity	Quantity	
	①Improvement work cost of existing roadbed					
	1. Existing sub ballast improvement	m^3	78,711	78,711	78,711	Reinforced roadbed
	②Improvement work cost of civil engineering structures					
	1.CIVIL WORKS（Lahat～Muaraenim,PbrX6～Kertapati）					
	1.1. Existing station improvement(L>930m)					
	1.1.1. Land preparation	m^2	3,396	14,418	34,386	
	1.1.2. New sub ballast					
	(1) Fill section	m^3	542	2,892	5,599	Reinforced roadbed
	(2) Cut section	m^3	308	1,026	5,824	Reinforced roadbed
	1.1.3. Fill worker	m^3	2,438	12,182	20,564	Purchase soil use
	1.1.4. Pile net worker(Between Pyk-Kpt.)	m^2	0	0	2,934	Soft ground measures
	1.1.5. Cut worker	m^3	1,207	9,393	43,655	
	1.1.6. Vegetation worker					
	(1) Fill section	m^2	898	4,518	7,882	
	(2) Cut section	m^2	361	2,830	13,095	
	1.2.New station（L=1,000m）					
	1.2.1.Land preparation	m^2		8,400	12,000	
	1.2.2.New sub ballast					
	(1) Fill section	m^3		2,310	3,570	Reinforced roadbed
	(2) Cut section	m^3		300	570	Reinforced roadbed
	1.2.3.Fill worker	m^3		12,810	17,310	Purchase soil use
	1.2.4.Pile net worker（Btween Pyk～Kpt）	m^2		4,200	6,000	Soft ground measures
	1.2.5.Cut worker	m^3		3,450	3,450	
	1.2.6.Vegetation worker					
	(1) Fill section	m^2		4,541	6,283	
	(2) Cut section	m^2		1,038	1,038	
	2.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）					
	2.1.Existing station improvement（L>930m）					
	2.1.1.U type side ditch（direction of railway track）					
	(1) Fill section	m	258	1,377	2,666	
	(2) Cut section	m	308	1,026	3,065	
	2.1.2.Catchmento					
	(1) Fill section	no	5	28	44	
	(2) Cut section	no	6	20	42	
	2.1.3.Crossing drain（Increase length L=6.0m/no）					
	（1）Concrete pipe	no		6	8	with the Hume pipe
	（2）Box culvert,U type	no		4	9	Box＜2m
	2.2.New station（L=1,000m）					
	2.2.1.U type side ditch（direction of railway track）					
	(1) Fill section	m		1,100	1,700	
	(2) Cut section	m		300	300	
	2.2.2.Catchmento					
	(1) Fill section	no		22	34	
	(2) Cut section	no		6	6	
	2.2.3.Crossing drain（Increase length L=6.0m/no）					
	（1）Concrete pipe	no		1	2	with the Hume pipe
	（2）Box culvert,U type	no		2	3	Box＜2m
	③Construction cost of new line between Merapi and coal storage yard					
	1.CIVIL WORKS（Lahat～Muaraenim,PbrX6～Kertapati）					
	1.1.New line construction（Merapi～Coal yard L=700m）					
	1.1.1.Land preparation	m^2		21,140	21,140	Purchase soil use

№	Work item	Unit	The first stage	The second stage	The third stage	Recapitulation
			Quantity	Quantity	Quantity	
	1.1.2.New sub ballast	m^3		6,030	6,030	Reinforced roadbed
	1.1.3.Fill worker	m^3		12,410	12,410	Purchase soil use
	1.1.4.Pile net worker（Btween Pyk～Kpt）	m^2		0	0	Soft ground measures
	1.1.5.Vegetation worker	m^2		6,490	6,490	
	2.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）					
	2.1.New line construction（Merapi～Coal yard L=700m）					
	2.1.1.U type side ditch（direction of railway track）	m		3,600	3,600	
	2.1.2.Catchmento	no		72	72	
	2.1.3.Crossing drain	m		531	531	with the Hume pipe
	④Double tracking work (1) cost					
	1.Construction of making to double-track line section	km		28	28	Refer to the next page.
	（Muaraenim～PbrX6)EARTHWORK COST					
	⑤Double tracking work (2) and (3) cost					
	1.CIVIL WORKS（Lahat～Muaraenim,PbrX6～Kertapati）					
	1.1.Double track line construction（Lt～Me,PbrX6～Kpt）					
	1.1.1.Levelling the land	m^2			713,388	
	1.1.2.New sub ballast					
	(1) Fill section	m^3			131,036	Reinforced roadbed
	(2) Cut section	m^3			107,350	Reinforced roadbed
	1.1.3.Fill worker	m^3			543,963	Purchase soil use
	1.1.4.Pile net worker（Btween Pyk～Kpt）	m^2			131,814	Soft ground measures
	1.1.5.Cut worker	m^3			630,910	
	1.1.6.Vegetation worker					
	(1) Fill section	m^2			202,481	
	(2) Cut section	m^2			189,454	
	2.BRIDGE WORKS（Lahat～Muaraenim,PbrX6～Kertapati）					
	2.1.Superstructure worker					
	2.1.1.Steel girder（Truss）	t			847	Foreign currency
	2.1.2.Steel girder（I beam,Plate girder）	t			269	Foreign currency
	2.1.3.RC girder	m^3			13	
	2.1.4.H burial girder	m^3			31	
	2.1.5.Bearing and installation	no			108	
	2.2.Substructure worker					
	2.2.1.Pier・Abutment	m^3			10,807	
	2.2.2.Basic construstion tesi digging	m^3			9,734	
	2.3.Temporary housing construction	set			1	
	(road and pier for construction)					
	3.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）					
	3.1.Double track line construction（Lt～Me,PbrX6～Kpt）					
	3.1.1.U type side ditch（direction of railway track）					
	(1) Fill section	m			62,395	
	(2) Cut section	m			56,500	
	3.1.2.Catchmento					
	(1) Fill section	no			1,248	
	(2) Cut section	no			1,130	
	3.1.3.Crossing drain（Increase length L=6.0m/no）					
	（1） Concrete pipe	no			128	with the Hume pipe
	（2） Box culvert,U type	no			80	Box＜2m
	⑥Installation work cost of additional crossing					
	1.RAILLOAD CROSSING（Lt～Me,PbrX6～Kpt）					
	1.1.Existing station improvement（L>930m）					
	1.1.1.Railload crossing	no		9	13	1no/st.(assumption)
	1.2.Double track line construction					
	1.2.1.Railload crossing	no			39	3no/st.(assumption)

6. Civil works Quantity summary table - 2

Whole line double-track line making(Only making Lahat-Muaraenim and PbrX6-Kertapati a double-track line)

;For the construction of making to double-track line expense calculation between Muaraeni 1/2

№	Work item	Unit	Quantity	Recapitulation
	1.CIVIL WORKS（Lahat～Muaraenim,PbrX6～Kertapati）			
	1.1. Existing sub ballast improvement	m^3	0	Reinforced roadb
	1.2.Land preparation			
	1 industrial sector;Lt～Me	m^2	234,876	
	2 industrial sectors;X6～Pyk	m^2	325,098	
	3 industrial sectors;Pyk～Kpt	m^2	153,414	
	Total		713,388	
	1.3.New sub ballast			
	1.3.1.Fill section			
	1 industrial sector;Lt～Me	m^3	42,412	Reinforced roadb
	2 industrial sectors;X6～Pyk	m^3	42,489	Reinforced roadb
	3 industrial sectors;Pyk～Kpt	m^3	46,135	Reinforced roadb
	Total		131,036	
	1.3.2.Cut section			
	1 industrial sector;Lt～Me	m^3	36,005	Reinforced roadb
	2 industrial sectors;X6～Pyk	m^3	64,505	Reinforced roadb
	3 industrial sectors;Pyk～Kpt	m^3	6,840	Reinforced roadb
	Total		107,350	
	1.4.Fill worker			
	1 industrial sector;Lt～Me	m^3	229,657	Purchase soil use
	2 industrial sectors;X6～Pyk	m^3	149,037	Purchase soil use
	3 industrial sectors;Pyk～Kpt	m^3	165,269	Purchase soil use
	Total		543,963	
	1.5.Pile net worker（Btween Pyk～Kpt）			
	1 industrial sector;Lt～Me	m^2	0	Soft ground measures
	2 industrial sectors;X6～Pyk	m^2	0	Soft ground measures
	3 industrial sectors;Pyk～Kpt	m^2	131,814	Soft ground measures
	Total		131,814	
	1.6.Cut worker			
	1 industrial sector;Lt～Me	m^3	266,285	
	2 industrial sectors;X6～Pyk	m^3	321,065	
	3 industrial sectors;Pyk～Kpt	m^3	43,560	
	Total		630,910	
	1.7.Vegetation worker			
	1.7.1.Fill section			
	1 industrial sector;Lt～Me	m^2	65,536	
	2 industrial sectors;X6～Pyk	m^2	65,656	
	3 industrial sectors;Pyk～Kpt	m^2	71,289	
	Total		202,481	
	1.7.2.Cut section			
	1 industrial sector;Lt～Me	m^2	63,542	
	2 industrial sectors;X6～Pyk	m^2	113,840	
	3 industrial sectors;Pyk～Kpt	m^2	12,072	
	Total		189,454	
	2.BRIDGE WORKS（Lahat～Muaraenim,PbrX6～Kertapati）			
	2.1.Superstructure worker			
	2.1.1.Steel girder（Truss）			
	1 industrial sector;Lt～Me	t	711	Foreign currency
	2 industrial sectors;X6～Pyk	t	0	Foreign currency
	3 industrial sectors;Pyk～Kpt	t	136	Foreign currency
	Total		847	
	2.1.2.Steel girder（I beam,Plate girder）			
	1 industrial sector;Lt～Me	t	0	Foreign currency
	2 industrial sectors;X6～Pyk	t	19	Foreign currency
	3 industrial sectors;Pyk～Kpt	t	251	Foreign currency
	Total		269	
	2.1.3.RC girder			
	1 industrial sector;Lt～Me	m^3	13	
	2 industrial sectors;X6～Pyk	m^3	0	
	3 industrial sectors;Pyk～Kpt	m^3	0	
	Total		13	

№	Work item	Unit	Quantity	Recapitulation
	2.1.4.H burial girder			
	1 industrial sector;Lt～Me	m^3	31	
	2 industrial sectors;X6～Pyk	m^3	0	
	3 industrial sectors;Pyk～Kpt	m^3	0	
	Total		31	
	2.1.5.Bearing and installation			
	1 industrial sector;Lt～Me	no	44	
	2 industrial sectors;X6～Pyk	no	4	
	3 industrial sectors;Pyk～Kpt	no	60	
	Total		108	
	2.2.Substructure worker			
	2.2.1.Pier・Abutment			
	1 industrial sector;Lt～Me	m^3	6,077	
	2 industrial sectors;X6～Pyk	m^3	288	
	3 industrial sectors;Pyk～Kpt	m^3	4,442	
	Total		10,807	
	2.2.2.Basic construstion tesi digging			
	1 industrial sector;Lt～Me	m^3	3,782	
	2 industrial sectors;X6～Pyk	m^3	372	
	3 industrial sectors;Pyk～Kpt	m^3	5,580	
	Total		9,734	
	3.DRAIN WORKER（Lahat～Muaraenim,PbrX6～Kertapati）			
	3.1.U type side ditch（direction of railway track）			
	3.1.1.Fill section			
	1 industrial sector;Lt～Me	m	20,196	
	2 industrial sectors;X6～Pyk	m	20,233	
	3 industrial sectors;Pyk～Kpt	m	21,969	
	Total		62,398	
	3.1.2.Cut section			
	1 industrial sector;Lt～Me	m	18,950	
	2 industrial sectors;X6～Pyk	m	33,950	
	3 industrial sectors;Pyk～Kpt	m	3,600	
	Total		56,500	
	3.2.Catchmento			
	3.2.1.Fill section			
	1 industrial sector;Lt～Me	no	404	
	2 industrial sectors;X6～Pyk	no	405	
	3 industrial sectors;Pyk～Kpt	no	439	
	Total		1,248	
	3.2.2.Cut section			
	1 industrial sector;Lt～Me	no	379	
	2 industrial sectors;X6～Pyk	no	679	
	3 industrial sectors;Pyk～Kpt	no	72	
	Total		1,130	
	3.3.Crossing drain（Increase length　L=6.0m/no）			
	3.3.1.Concrete pipe			
	1 industrial sector;Lt～Me	no	96	with the Hume pipe
	2 industrial sectors;X6～Pyk	no	25	with the Hume pipe
	3 industrial sectors;Pyk～Kpt	no	7	with the Hume pipe
	Total		128	
	3.3.2.Box culvert,U type			
	1 industrial sector;Lt～Me	no	35	Box＜2m
	2 industrial sectors;X6～Pyk	no	38	Box＜2m
	3 industrial sectors;Pyk～Kpt	no	7	Box＜2m
	Total		80	
	4.RAILLOAD CROSSING（Lt～Me,PbrX6～Kpt）			
	4.1.Railload crossing			6m×6m×39no
	1 industrial sector;Lt～Me	m^2	432	12no
	2 industrial sectors;X6～Pyk	m^2	756	21no
	3 industrial sectors;Pyk～Kpt	m^2	216	6no
	Total		1,404	

7. Civil works Quantity summary table - 3

④ idea: The coal unloading equipment is constructed in Musi river away from Simpang at about 7km.

⑤ idea: The coale unloading equipment is constructed in Mariana away from Simpang at about 35km.

⑥ idea: The coal unloading equipment is constructed in Gasing away from Simpang at about 45km.

№	Work item	Unit	④ idea	⑤ idea	⑥ idea	Recapitulation
			Quantity	Quantity	Quantity	
	1.CIVIL WORKS（Simpang～Gaing）					
	1.1.New sub ballast	m^3	20,478	99,402	95,072	Reinforced roadbed
	1.2.Levelling the land	m^2	90,008	436,812	417,842	
	1.3.Fill worker	m^3	117,778	567,582	545,372	Purchase soil use
	1.4.Pile net worker（Btween Pyk～Kpt）	m^2	90,008	436,812	417,842	Soft ground measures
	1.5.Vegetation worker	m^2	50,189	248,350	234,649	
	2.BRIDGE WORKS					
	2.1.Superstructure worker					
	2.1.1.Steel girder（60ｍTruss）	t		1,040	975	Foreign currency
	2.1.2.Steel girder（40ｍTruss）	t	90	360	360	Foreign currency
	2.2.Substructure worker					
	2.2.1.Pier・Abutment	m^3	408	3,714	4,296	
	2.2.2.Basic construstion tesi digging	m^3	372	1,860	1,488	
	2.2.2.Steel pipe yaita idutsu base	m		2,640	3,168	
	3.GIRDER VIADUCT WORKS					
	3.1.Superstructure worker					
	3.1.1.Steel girder（Composite beam,I beam）	t			15,000	Foreign currency
	3.2.Substructure worker					
	3.2.1.Pier・Abutment	m^3			35,400	
	3.2.2.Basic construstion tesi digging	m^3			32,400	
	3.2.3.Steel pipe yaita idutsu base	m			27,600	
	4.DRAIN WORKER					
	4.1.U type side ditch（direction of railway track）	m	13,920	68,880	65,080	
	4.2.Catchmento	no	278	1,376	1,300	
	4.3.Crossing drain	m	1,798	8,728	8,349	with the Hume pipe