4.3 Aggregate Material

4.3.1 Coarse Aggregate Material

(1) Investigation

Coarse aggregate was investigated and tested in the laboratory at a total four sites located around Gg.Sembung, Gg.Patafaan, Gg.Kecapi and Gg.Lengis.
A Total of five crushed stone sites were investigated.

The materials quality tests were conducted in accordance with the apparent specific gravity and absorption test for coarse aggregate (ASTM C-127-77) and the Abrasion test (ASTM C- 535-69) and Soundness test (ASTM C-88).
The test results are compiled in Appendix II

(2) Evaluation of quality

The coarse aggregate is specified as follows.

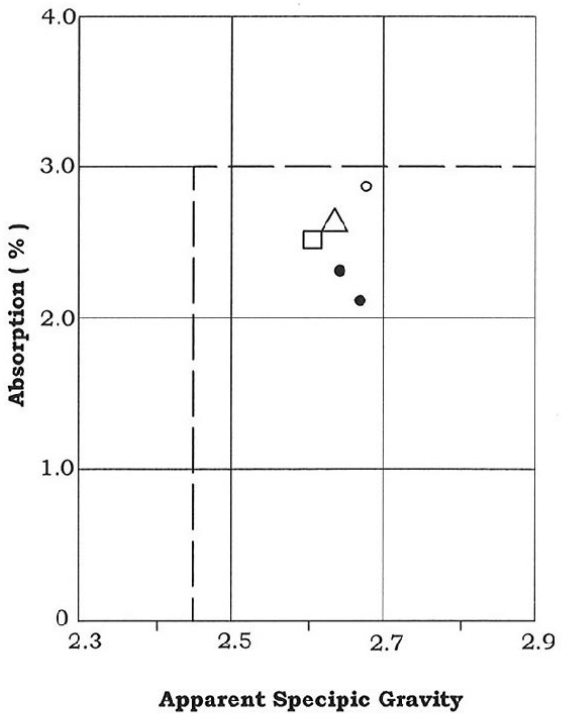
Item	AASHTO	JIS A 5001
Apparent Specific Gravity.	-	> 2.5
Absorption (%)	-	< 3.0
Abrasion ratio (%)	< 40	< 35.0
Soundness (%)	< 12	< 12.0

All samples (Fig. 3-1) show appropriate values for coarse aggregate for the project.

Apparent Specific Gravity	2.600~2.668	> 2.5
Absorption (%).	2.154~2.870	< 3.0
Abrasion ratio (%)	14.3~18.1	< 35.0
Soundness (%)	1.22~4.17	< 12.0

The production of crushed stone was given by direct interview as 350~600 m^3/day For large sized companies.

Sampling Location	Apparent Specific Gravity	Absortion (%)	Soundness (%)	Abrasion (%)	Distance From Bekasi	Symbols	Capacity (m^3/Day)
Q - CA - 1 Gg. Sembung	2.668	2.870	1.22	18.1	62 km	○	450
Q - CA - 2 Gg. Patapaan	2.632	2.766	4.17	15.4	65 km	△	600
Q - CA - 3 - 1 Gg. Kecapi	2.643	2.385	4.17	14.3	69 km	●	1000
Q - CA - 3 - 2 Gg. Kecapi	2.658	2.154	1.69	15.1	69 km	●	
Q - CA - 4 Gg. Lengis	2.600	2.503	1.56	15.3	76 km	□	350
STANDARD	> 2.5	< 3.0	< 12.0	< 35.0			



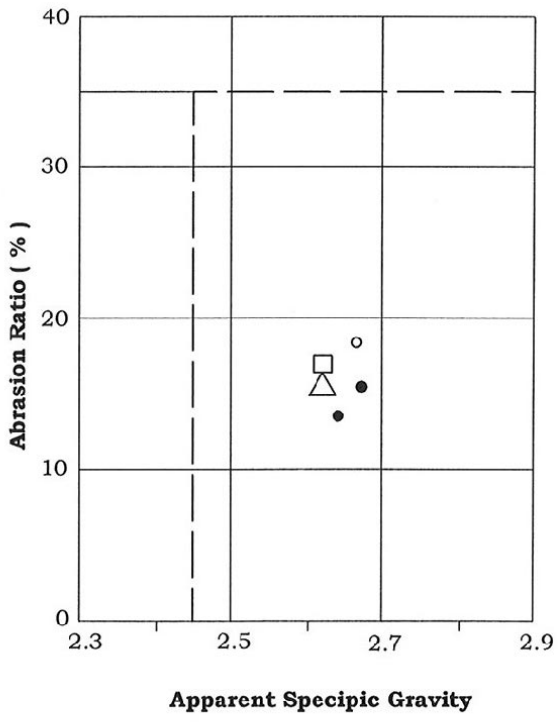


Figure 4.3.1

THE DETAILED DESIGN STUDY OF RAILWAY ELECTRIFICATION AND DOUBLE-DOUBLE TRACKING OF THE JAVA MAIN LINE PROJECT

TEST RESULT FOR COARSE AGGREGATE MATERIAL

4.3.2 Fine Aggregate Material

(1) Investigation

Fine aggregates were investigated at four locations along the Jarong River (terrace deposits) and Tarum river (river/ terrace deposit) and other. The materials quality test were conducted in accordance with the apparent specific gravity and absorption test for fine aggregate (ASTM C-128-79) and Soundness test (ASTM C-88).

The test data are compiled in Appendix II

(2) Evaluation of quality

The fine aggregate is specified by JIS as shown in Table 4-3-1 below:

Table 4.3.1 Grading Requirement

		Cumulative passing-percentage by weight	
		Coarse Sand	Fine Sand
9.5	m m (3/8 in)	100	-
4.75	m m (No. 4)	90 – 100	100
2.36	m m (No. 8)	80 – 100	95-100
1.18	m m (No.16)	50- 90	-
0.600	m m (No.30)	25- 65	65-100
0.300	m m (No.50)	10- 35	10- 85
0.150	m m (No.100)	2- 10	0- 15
0.074	m m (No.200)	0- 5	0- 5

Item	AASHTO	JIS A 5001
Apparent Specific Gravity.	-	> 2.5
Absorption (%)	-	< 3.0
Soundness (%)	< 10	< 10.0

The test results of samples taken (Fig.4.3.2 and Fig.4.3.3) show appropriate values for the fine aggregate for the project, as show Fig.4.3.2, Fig.4.3.3 and Table 4.3.2

Sampling Location	Apparent Specific Gravity	Absortion (%)	Soundness (%)	Grading	Distance From Bekasi	Symbols	Capacity (m^3/Day)
Q - FA - 1-1 Kandali	2.605	2.805	4.47	**Gravelly Coarse Sand**	55 km	●	800
Q - FA - 1-2 Kandali	2.651	3.648	1.29	**Gravelly Coarse Sand**	55 km	●	
Q - FA - 2 TP.Abadi	2.700	3.257	4.94	**Gravelly Coarse Sand**	65 km	○	350
Q - FA - 3 Ciparungsari	2.894	3.621	3.66	**Gravelly Coarse Sand**	61 km	△	100
Q - FA - 4 Bongas	2.590	3.391	2.81	**Gravelly Coarse Sand**	65 km	□	250
STANDARD	> 2.5	< 3.0	< 10.0	**Gravelly Coarse Sand**			

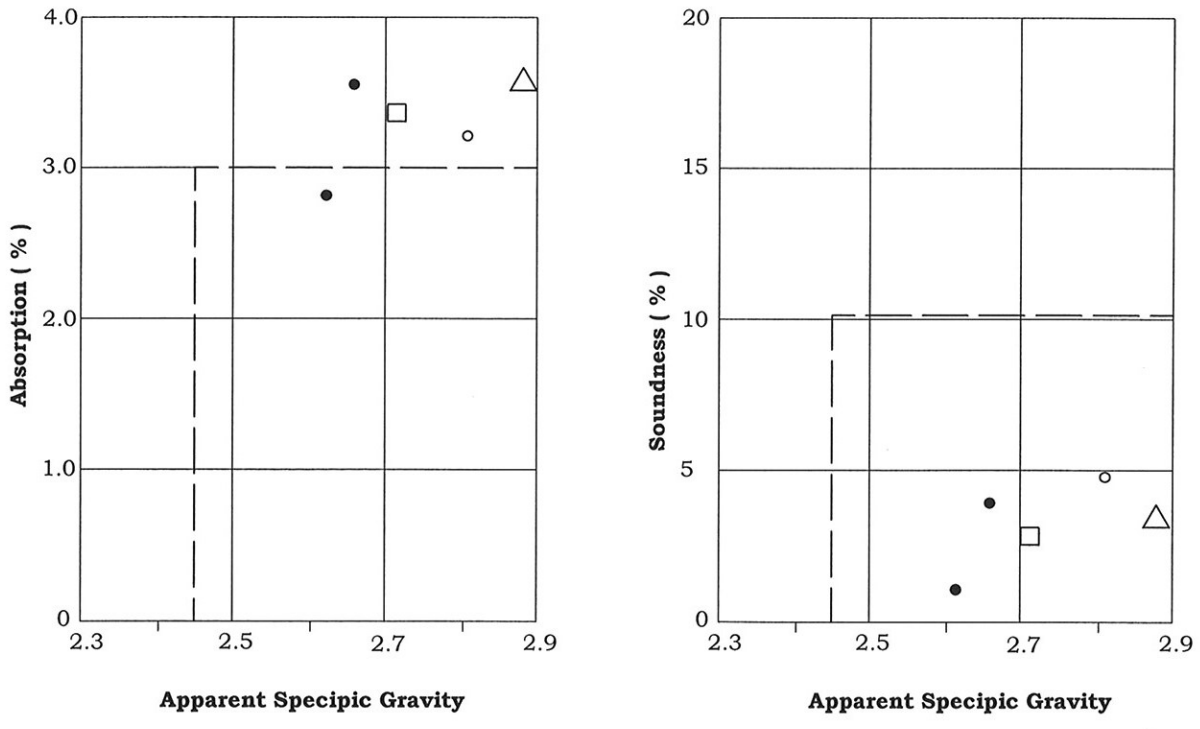


Figure 4.3.2

THE DETAILED DESIGN STUDY OF RAILWAY ELECTRIFICATION AND DOUBLE-DOUBLE TRACKING OF THE JAVA MAIN LINE PROJECT

TEST RESULT FOR FINE AGGREGATE MATERIAL

Item \ Sampling location				Q FA-1-1 Kandali	Q FA-1-2 Kandali	Q FA- 2 TP. Abadi	Q FA- 3 Ciparung sari	Q FA- 4 Bongas
Gradation	Gravel		(%)	28	36	33	20	21
	Sand		(%)	68	61,5	64	78	77
	Silt		(%)	4	2,5	3	2	2
	Clay		(%)					
	Classified grading pass	No. 4	5 mm	100	100	100	100	100
		No. 8	2.5 mm	78	72	74	87	85
		No. 10	2.0 mm					
		No. 16	1.2 mm	59	54	54	56	61
		No. 20	0.841 mm					
		No. 30	0.600 mm	41	48	42	33	34
		No. 40	0.420 mm					
		No. 50	0.300 mm	23	22	22	17	16
		No. 60	0.250 mm					
		No. 100	0.15 mm	10	7	7	6	6
		No. 200	0.074 mm	4	2.5	3	2	2
	D 10 : 10 % Dia. of soil particel			0,15	0,20	0,19	0,20	0,21
	D 30 : 30 % Dia. of soil particel			0,42	0,36	0,36	0,55	0,54
	D 60 : 60 % Dia. of soil particel			1,30	1,70	1,60	1,30	1,20
	Uniformity Coeffient Uc			8,7	8,5	8,4	6,5	5,7
	Coefficient of Curvature Uc			0,91	0,38	0,43	1,17	1,16
Specific gravity Gs				2,208	2,651	2,808	2,894	2,703
Valuation				Gravelly Coarse Sand	Gravelly Coarse Sand	Gravelly Coarse Sand	Gravelly Coarse Sand	Gravelly Coarse Sand

Note, Please, see grain size distribution Curve

Table 4-3-2

THE DETAILED DESIGH STUDY OF RAILWAY ELECTRIFICATION AND DOUBLE-DOUBLE OF THE JAVA MAIN LINE PROJECT

TEST RESULT FOR FINE AGGREGATE MATERIALS

FIG. 4-3-3 GRAIN SIZE DISTRIBUTION CURVE