



JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)



MINISTRY OF PUBLIC WORKS
REPUBLIC OF INDONESIA

**DETAILED DESIGN STUDY
OF
NORTH JAVA CORRIDOR FLYOVER PROJECT
IN THE REPUBLIC OF INDONESIA**

MERAK FLYOVER

VOLUME IV DRAWINGS

**CONTRACT PACKAGE I
(MERAK - BALARAJA)**

DECEMBER 2006



KATAHIRA & ENGINEERS INTERNATIONAL



JAPAN INTERNATIONAL
COOPERATION AGENCY



DIRECTORATE GENERAL OF HIGHWAY
MINISTRY OF PUBLIC WORKS
REPUBLIC OF INDONESIA




GENERAL

 **KEI** KATAHIRA & ENGINEERS INTERNATIONAL

 JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL	DESIGNED BY	CHECKED BY	SUBMITTED BY	 REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF HIGHWAYS	PROJECT AND LOCATION : DETAILED DESIGN STUDY OF NORTH JAVA CORRIDOR FLYOVER PROJECT MERAK FLYOVER - CONTRACT PACKAGE 1 (MERAK - BALARAJA) BANTEN PROVINCE	SCALE :	DRAWING TITLE :	DRAWING NO. :
	Name	Name	Name			N T S	INDEX OF DRAWINGS	MGE-001
	Sign	Sign	Sign			FULL SIZE A3	1 OF 4	SHEET NO. :
	Date	Date	Date					
				APPROVED BY				
				Ir. HERRY VAZA M.Eng.Sc				
				NIP. : 110038400				

INDEX OF DRAWINGS 1 OF 4

TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.
GENERAL								
INDEX OF DRAWINGS 1 OF 4	MGE-001	01 / 22	DETAILED CONSTRUCTION LAYOUT PLAN 5 OF 9	MRD-029	29 / 84	STANDARD BRC FENCE AND STONE MASONRY RETAINING WALL	MRD-081	81 / 84
INDEX OF DRAWINGS 2 OF 4	MGE-002	02 / 22	DETAILED CONSTRUCTION LAYOUT PLAN 6 OF 9	MRD-030	30 / 84	STANDARD CURB - CUT RAMP DETAILS	MRD-082	82 / 84
INDEX OF DRAWINGS 3 OF 4	MGE-003	03 / 22	DETAILED CONSTRUCTION LAYOUT PLAN 7 OF 9	MRD-031	31 / 84	STANDARD COLUMN PROTECTION DETAILS	MRD-083	83 / 84
INDEX OF DRAWINGS 4 OF 4	MGE-004	04 / 22	DETAILED CONSTRUCTION LAYOUT PLAN 8 OF 9	MRD-032	32 / 84	RAILWAY CROSSING DETAILS	MRD-084	84 / 84
LOCATION/VICINITY MAP	MGE-005	05 / 22	DETAILED CONSTRUCTION LAYOUT PLAN 9 OF 9	MRD-033	33 / 84	DRAINAGE		
NOTATION AND LEGEND	MGE-006	06 / 22	CROSS SECTION MERAK-1 (STA. 0 + 500.00 TO STA. 0 + 560.00) 1 OF 14	MRD-034	34 / 84	AT - GRADE LEVEL		
ABBREVIATIONS	MGE-007	07 / 22	CROSS SECTION MERAK-1 (STA. 0 + 580.00 TO STA. 0 + 640.00) 2 OF 14	MRD-035	35 / 84	DRAINAGE SCHEDULE AT GRADE	MDG-001	01 / 19
GENERAL DEVELOPMENT PLAN	MGE-008	08 / 22	CROSS SECTION MERAK-1 (STA. 0 + 680.00 TO STA. 0 + 720.00) 3 OF 14	MRD-036	36 / 84	DRAINAGE LAYOUT PLAN 1 OF 4	MDG-002	02 / 19
FLYOVER GENERAL PLAN ELEVATION & SECTION MERAK-1	MGE-009	09 / 22	CROSS SECTION MERAK-1 (STA. 0 + 740.00 TO STA. 0 + 800.00) 4 OF 14	MRD-037	37 / 84	DRAINAGE LAYOUT PLAN 2 OF 4	MDG-003	03 / 19
FLYOVER GENERAL PLAN ELEVATION & SECTION MERAK-2	MGE-010	10 / 22	CROSS SECTION MERAK-1 (STA. 0 + 820.00 TO STA. 0 + 880.00) 5 OF 14	MRD-038	38 / 84	DRAINAGE LAYOUT PLAN 3 OF 4	MDG-004	04 / 19
GENERAL NOTES - ROADS AND DRAINAGE	MGE-011	11 / 22	CROSS SECTION MERAK-1 (STA. 0 + 900.00 TO STA. 0 + 960.00) 6 OF 14	MRD-039	39 / 84	DRAINAGE LAYOUT PLAN 4 OF 4	MDG-005	05 / 19
GENERAL NOTES FOR STRUCTURES 1 OF 3	MGE-012	12 / 22	CROSS SECTION MERAK-1 (STA. 0 + 980.00 TO STA. 1 + 040.00) 7 OF 14	MRD-040	40 / 84	DRAINAGE PROFILE, RIGHT SERVICE ROAD 1 OF 2	MDG-006	06 / 19
GENERAL NOTES FOR STRUCTURES 2 OF 3	MGE-013	13 / 22	CROSS SECTION MERAK-1 (STA. 1 + 060.00 TO STA. 1 + 080.00) 8 OF 14	MRD-041	41 / 84	DRAINAGE PROFILE, RIGHT SERVICE ROAD 2 OF 2	MDG-007	07 / 19
GENERAL NOTES FOR STRUCTURES 3 OF 3	MGE-014	14 / 22	CROSS SECTION MERAK-1 (STA. 1 + 000.00 TO STA. 1 + 120.00) 9 OF 14	MRD-042	42 / 84	DRAINAGE PROFILE, LEFT SERVICE ROAD 1 OF 2	MDG-008	08 / 19
TOPOGRAPHIC SURVEY CONTROL NETWORK GPS, TRAVERSE, BM	MGE-015	15 / 22	CROSS SECTION MERAK-1 (STA. 1 + 040.00 TO STA. 1 + 200.00) 10 OF 14	MRD-043	43 / 84	DRAINAGE PROFILE, LEFT SERVICE ROAD 2 OF 2	MDG-009	09 / 19
TOPOGRAPHIC PLAN 1 OF 5	MGE-016	16 / 22	CROSS SECTION MERAK-1 (STA. 1 + 220.00 TO STA. 1 + 280.00) 11 OF 14	MRD-044	44 / 84	DRAINAGE PROFILE OF FLYOVER (MERAK-2)	MDG-010	10 / 19
TOPOGRAPHIC PLAN 2 OF 5	MGE-017	17 / 22	CROSS SECTION MERAK-1 (STA. 1 + 300.00 TO STA. 1 + 360.00) 12 OF 14	MRD-045	45 / 84	STANDARD REINFORCED CONCRETE PIPE CULVERT	MDG-011	11 / 19
TOPOGRAPHIC PLAN 3 OF 5	MGE-018	18 / 22	CROSS SECTION MERAK-1 (STA. 1 + 380.00 TO STA. 1 + 440.00) 13 OF 14	MRD-046	46 / 84	STANDARD CURB INLET AND MANHOLE (I, II) 1 OF 3	MDG-012	12 / 19
TOPOGRAPHIC PLAN 4 OF 5	MGE-019	19 / 22	CROSS SECTION MERAK-1 (STA. 1 + 460.00 TO STA. 1 + 520.00) 14 OF 14	MRD-047	47 / 84	STANDARD CURB INLET AND MANHOLE (III, IV) 2 OF 3	MDG-013	13 / 19
TOPOGRAPHIC PLAN 5 OF 5	MGE-020	20 / 22	CROSS SECTION MERAK-2 (STA. 0 + 080.00 TO STA. 0 + 140.00) 1 OF 6	MRD-048	48 / 84	STANDARD CURB INLET AND MANHOLE (V, VI) 3 OF 3	MDG-014	14 / 19
SUMMARY OF QUANTITIES 1 OF 2	MGE-021	21 / 22	CROSS SECTION MERAK-2 (STA. 0 + 160.00 TO STA. 0 + 220.00) 2 OF 6	MRD-049	49 / 84	DETAILS OF CURB INLET & COVER MANHOLE	MDG-015	15 / 19
SUMMARY OF QUANTITIES 2 OF 2	MGE-022	22 / 22	CROSS SECTION MERAK-2 (STA. 0 + 240.00 TO STA. 0 + 300.00) 3 OF 6	MRD-050	50 / 84	DETAILS OF DRAINAGE DITCHES DS-1, DS-2, DS-3, DS-3A, DS-4 & DS-4A	MDG-016	16 / 19
ROADS			CROSS SECTION MERAK-2 (STA. 0 + 320.00 TO STA. 0 + 380.00) 4 OF 6	MRD-051	51 / 84	DETAILS OF DRAINAGE MORTAL STONE WORK TYPE I, II, III & BOX CULVERT	MDG-017	17 / 19
ROADWAY PLAN (FLYOVER) 1 OF 4	MRD-001	01 / 84	CROSS SECTION MERAK-2 (STA. 0 + 400.00 TO STA. 0 + 420.00) 5 OF 6	MRD-052	52 / 84	TRENCHING AND BEDDING DETAILS FOR CUT AREA	MDG-018	18 / 19
ROADWAY PLAN (FLYOVER) 2 OF 4	MRD-002	02 / 84	CROSS SECTION MERAK-2 (STA. 0 + 440.00 TO STA. 0 + 500.00) 6 OF 6	MRD-053	53 / 84	DRAINAGE DETAILS OF MANHOLE TYPE-IX & TYPE-X	MDG-019	19 / 19
ROADWAY PLAN (FLYOVER) 3 OF 4	MRD-003	03 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 1 OF 9	MRD-054	54 / 84	VIADUCT		
ROADWAY PLAN (FLYOVER) 4 OF 4	MRD-004	04 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 2 OF 9	MRD-055	55 / 84	DRAINAGE SCHEDULE AT FLYOVER	MDV-001	01 / 56
PROFILE OF FLYOVER MERAK-1	MRD-005	05 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 3 OF 9	MRD-056	56 / 84	DRAINAGE SCHEDULE UNDER FLYOVER	MDV-002	02 / 56
PROFILE OF FLYOVER MERAK-2	MRD-006	06 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 4 OF 9	MRD-057	57 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 1 OF 10	MDV-003	03 / 56
ROADWAY PLAN (AT GRADE) 1 OF 4	MRD-007	07 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 5 OF 9	MRD-058	58 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 2 OF 10	MDV-004	04 / 56
ROADWAY PLAN (AT GRADE) 2 OF 4	MRD-008	08 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 6 OF 9	MRD-059	59 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 3 OF 10	MDV-005	05 / 56
ROADWAY PLAN (AT GRADE) 3 OF 4	MRD-009	09 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 7 OF 9	MRD-060	60 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 4 OF 10	MDV-006	06 / 56
ROADWAY PLAN (AT GRADE) 4 OF 4	MRD-010	10 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 8 OF 9	MRD-061	61 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 5 OF 10	MDV-007	07 / 56
PROFILE OF MAIN ROAD & RIGHT SERVICE ROAD (MERAK-1) 1 OF 2	MRD-011	11 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-1) 9 OF 9	MRD-062	62 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 6 OF 10	MDV-008	08 / 56
PROFILE OF MAIN ROAD & RIGHT SERVICE ROAD (MERAK-1) 2 OF 2	MRD-012	12 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-2) 1 OF 3	MRD-063	63 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 7 OF 10	MDV-009	09 / 56
PROFILE OF MAIN ROAD & LEFT SERVICE ROAD (MERAK-1) 1 OF 2	MRD-013	13 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-2) 2 OF 3	MRD-064	64 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 8 OF 10	MDV-010	10 / 56
PROFILE OF MAIN ROAD & LEFT SERVICE ROAD (MERAK-1) 2 OF 2	MRD-014	14 / 84	CROSS SECTION AT ABUTMENT & PIER LOCATION (MERAK-2) 3 OF 3	MRD-065	65 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 9 OF 10	MDV-011	11 / 56
TYPICAL ROAD CROSS SECTION 1 OF 6	MRD-015	15 / 84	RIGHT-OF-WAY PLAN 1 OF 4	MRD-066	66 / 84	DRAINAGE LAYOUT PLAN AND ELEVATION AT VIADUCT 10 OF 10	MDV-012	12 / 56
TYPICAL ROAD CROSS SECTION 2 OF 6	MRD-016	16 / 84	RIGHT-OF-WAY PLAN 2 OF 4	MRD-067	67 / 84	DRAINAGE LAYOUT PLAN UNDER VIADUCT AT GRADE LEVEL 1 OF 4	MDV-013	13 / 56
TYPICAL ROAD CROSS SECTION 3 OF 6	MRD-017	17 / 84	RIGHT-OF-WAY PLAN 3 OF 4	MRD-068	68 / 84	DRAINAGE LAYOUT PLAN UNDER VIADUCT AT GRADE LEVEL 2 OF 4	MDV-014	14 / 56
TYPICAL ROAD CROSS SECTION 4 OF 6	MRD-018	18 / 84	RIGHT-OF-WAY PLAN 4 OF 4	MRD-069	69 / 84	DRAINAGE LAYOUT PLAN UNDER VIADUCT AT GRADE LEVEL 3 OF 4	MDV-015	15 / 56
TYPICAL ROAD CROSS SECTION 5 OF 6	MRD-019	19 / 84	GEOMETRIC DESIGN STANDARD 1 OF 3	MRD-070	70 / 84	DRAINAGE LAYOUT PLAN UNDER VIADUCT AT GRADE LEVEL 4 OF 4	MDV-016	16 / 56
TYPICAL ROAD CROSS SECTION 6 OF 6	MRD-020	20 / 84	GEOMETRIC DESIGN STANDARD 2 OF 3	MRD-071	71 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 1 OF 23	MDV-017	17 / 56
ALIGNMENT LAYOUT AND CURVE ELEMENTS 1 OF 2	MRD-021	21 / 84	GEOMETRIC DESIGN STANDARD 3 OF 3	MRD-072	72 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 2 OF 23	MDV-018	18 / 56
ALIGNMENT LAYOUT AND CURVE ELEMENTS 2 OF 2	MRD-022	22 / 84	STANDARD ROADWAY SUPERELEVATION	MRD-073	73 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 3 OF 23	MDV-019	19 / 56
GEOMETRIC LAYOUT PLAN AT INTERSECTION 1 OF 2	MRD-023	23 / 84	STANDARD THREE-LEG & FOUR-LEG INTERSECTIONS	MRD-074	74 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 4 OF 23	MDV-020	20 / 56
GEOMETRIC LAYOUT PLAN AT INTERSECTION 2 OF 2	MRD-024	24 / 84	STANDARD ASPHALT PAVEMENT	MRD-075	75 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 5 OF 23	MDV-021	21 / 56
DETAILED CONSTRUCTION LAYOUT PLAN 1 OF 9	MRD-025	25 / 84	STANDARD PCC PAVEMENT	MRD-076	76 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 6 OF 23	MDV-022	22 / 56
DETAILED CONSTRUCTION LAYOUT PLAN 2 OF 9	MRD-026	26 / 84	STANDARD PAVEMENT FOR RAILROAD CROSSING	MRD-077	77 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 7 OF 23	MDV-023	23 / 56
DETAILED CONSTRUCTION LAYOUT PLAN 3 OF 9	MRD-027	27 / 84	STANDARD PAVEMENT FOR RAILROAD CROSSING	MRD-078	78 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 8 OF 23	MDV-024	24 / 56
DETAILED CONSTRUCTION LAYOUT PLAN 4 OF 9	MRD-028	28 / 84	STANDARD COMBINATION CONCRETE CURB AND GUTTER	MRD-079	79 / 84	ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 9 OF 23	MDV-025	25 / 56
			STANDARD PUBLIC & PRIVATE ENTRANCE	MRD-080	80 / 84			
			STANDARD CONCRETE BARRIER AND MEDIAN IN FILL DETAILS					

 JAPAN INTERNATIONAL COOPERATION AGENCY  KATAHIRA & ENGINEERS INTERNATIONAL	DESIGNED BY		CHECKED BY		SUBMITTED BY		 REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF HIGHWAYS	PROJECT AND LOCATION :		SCALE :	DRAWING TITLE :	DRAWING NO. :
	Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI		DETAILED DESIGN STUDY OF NORTH JAVA CORRIDOR FLYOVER PROJECT MERAK FLYOVER - CONTRACT PACKAGE 1 (MERAK - BALARAJA) BANTEN PROVINCE		N T S	INDEX OF DRAWINGS 2 OF 4	MGE-002
	Sign		Sign		Sign			APPROVED BY	Ir. HERRY VAZA M.Eng.Sc			SHEET NO. :
	Date		Date		Date				NIP. : 110038400		FULL SIZE A3	02 / 22

INDEX OF DRAWINGS 2 OF 4

TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 10 OF 23	MDV-026	26 / 56	DETAIL OF GIRDER G1 (3 OF 10)	MST-019	19 / 74	DECK SLAB REINFORCEMENT ARRANGEMENT P12 - P13 (2 OF 3)	MST-071	71 / 74
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 11 OF 23	MDV-022	27 / 56	DETAIL OF GIRDER G1 (4 OF 10)	MST-020	20 / 74	DECK SLAB REINFORCEMENT ARRANGEMENT P12 - P13 (2 OF 3)	MST-072	72 / 74
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 12 OF 23	MDV-028	28 / 56	DETAIL OF GIRDER G1 (5 OF 10)	MST-021	21 / 74	DECK SLAB REINFORCEMENT SCHEDULE P12 - P13 (1 OF 2)	MST-073	73 / 74
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 13 OF 23	MDV-029	29 / 56	DETAIL OF GIRDER G1 (6 OF 10)	MST-022	22 / 74	DECK SLAB REINFORCEMENT SCHEDULE P12 - P13 (2 OF 2)	MST-074	74 / 74
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 14 OF 23	MDV-030	30 / 56	DETAIL OF GIRDER G1 (7 OF 10)	MST-023	23 / 74	CONCRETE SUPERSTRUCTURE		
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 15 OF 23	MDV-031	31 / 56	DETAIL OF GIRDER G1 (8 OF 10)	MST-024	24 / 74	PC LEFT SIDE (4 SPAN, A1-P4)		
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 16 OF 23	MDV-032	32 / 56	DETAIL OF GIRDER G1 (9 OF 10)	MST-025	25 / 74	COORDINATES AND ELEVATIONS FOR PC GIRDER A1-P4	MCL-001	01 / 59
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 17 OF 23	MDV-033	33 / 56	DETAIL OF GIRDER G1 (10 OF 10)	MST-026	26 / 74	SUMMARY OF QUANTITIES FOR PC SUPERSTRUCTURE A1-P4, P4-P8, AB1-PB3, P13-A2	MCL-002	02 / 59
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 18 OF 23	MDV-034	34 / 56	DETAIL OF GIRDER G2 (1 OF 8)	MST-027	27 / 74	DIMENSION PLAN OF PC SUPERSTRUCTURE A1-P4	MCL-003	03 / 59
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 19 OF 23	MDV-035	35 / 56	DETAIL OF GIRDER G2 (2 OF 8)	MST-028	28 / 74	TYPICAL CROSS SECTION A1-P4	MCL-004	04 / 59
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 20 OF 23	MDV-036	36 / 56	DETAIL OF GIRDER G2 (3 OF 8)	MST-029	29 / 74	ARRANGEMENT OF PC CABLES A1-P2	MCL-005	05 / 59
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 21 OF 23	MDV-037	37 / 56	DETAIL OF GIRDER G2 (4 OF 8)	MST-030	30 / 74	ARRANGEMENT OF PC CABLES P2-P4	MCL-006	06 / 59
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 22 OF 23	MDV-038	38 / 56	DETAIL OF GIRDER G2 (5 OF 8)	MST-031	31 / 74	ARRANGEMENT OF PC CABLES A1-P4	MCL-007	07 / 59
ABUTMENT AND PIER SECTIONS SHOWING DOWNSPOUT PIPE 23 OF 23	MDV-039	39 / 56	DETAIL OF GIRDER G2 (6 OF 8)	MST-032	32 / 74	PC CABLES SCHEDULE A1-P4	MCL-008	08 / 59
TYPICAL DETAILS OF DECK DRAIN	MDV-040	40 / 56	DETAIL OF GIRDER G2 (7 OF 8)	MST-033	33 / 74	TYPICAL DETAIL OF CROSS SECTION REINFORCEMENT A1-P4	MCL-009	09 / 59
DRAINAGE CATCH BASIN DETAILS	MDV-041	41 / 56	DETAIL OF GIRDER G2 (8 OF 8)	MST-034	34 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER A1-P2	MCL-010	10 / 59
DRAINAGE DETAILS OF MANHOLE TYPE VII	MDV-042	42 / 56	DETAIL OF GIRDER G2 (8 OF 8)	MST-035	35 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P2-P4	MCL-011	11 / 59
DRAINAGE DETAILS OF MANHOLE TYPE VIII	MDV-043	43 / 56	INTERMEDIATE DIAPHRAGM	MST-036	36 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER A1-P4 (1 OF 2)	MCL-012	12 / 59
STEEL GRATING DETAILS OF MANHOLE TYPE VIII	MDV-044	44 / 56	DIAPHRAGM TOP GIRDER	MST-037	37 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER A1-P4 (2 OF 2)	MCL-013	13 / 59
DRAINAGE MISCELLANEOUS VIADUCT DETAILS	MDV-045	45 / 56	INTERMEDIATE CROSS BEAM AND DIAPHRAGM (1 OF 2)	MST-038	38 / 74	REINFORCEMENT SCHEDULE FOR PC GIRDER A1-P4 (1 OF 3)	MCL-014	14 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 1) 1 OF 9	MDV-046	46 / 56	INTERMEDIATE CROSS BEAM AND DIAPHRAGM (2 OF 2)	MST-039	39 / 74	REINFORCEMENT SCHEDULE FOR PC GIRDER A1-P4 (2 OF 3)	MCL-015	15 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 1) 2 OF 9	MDV-047	47 / 56	END SUPPORT CROSS BEAM AND DIAPHRAGM (1 OF 2)	MST-040	40 / 74	REINFORCEMENT SCHEDULE FOR PC GIRDER A1-P4 (3 OF 3)	MCL-016	16 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 1) 3 OF 9	MDV-048	48 / 56	END SUPPORT CROSS BEAM AND DIAPHRAGM (2 OF 2)	MST-041	41 / 74	ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS DIAPHRAGMA A1-P4	MCL-017	17 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 1) 4 OF 9	MDV-049	49 / 56	DETAIL OF STRINGER	MST-042	42 / 74	ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS P1, P2, P3	MCL-018	18 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 1) 5 OF 9	MDV-050	50 / 56	DEAD LOAD CAMBER DIAGRAM G1	MST-043	43 / 74	ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS A1	MCL-019	19 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 1) 6 OF 9	MDV-051	51 / 56	DEAD LOAD CAMBER DIAGRAM G2	MST-044	44 / 74	ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS P4	MCL-020	20 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 2) 7 OF 9	MDV-052	52 / 56	DETAIL OF GIRDER P9 (1 OF 3)	MST-045	45 / 74	ARRANGEMENT OF REINFORCEMENT FOR ANCHORAGES A1-P4	MCL-021	21 / 59
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 2) 8 OF 9	MDV-053	53 / 56	DETAIL OF GIRDER P9 (2 OF 3)	MST-046	46 / 74	PC LEFT SIDE (4 SPAN, P4-P8)		
PLAN AND ELEVATION OF VIADUCT ALONG APPROACH (MERAK - 2) 9 OF 9	MDV-054	54 / 56	DETAIL OF GIRDER P9 (3 OF 3)	MST-047	47 / 74	COORDINATES AND ELEVATIONS FOR PC GIRDER P4-P8	MCL-022	22 / 59
TYPICAL DETAILS OF DECK DRAIN AND DS-S AT APPROACH	MDV-055	55 / 56	DETAIL OF GIRDER P12 (1 OF 4)	MST-048	48 / 74	DIMENSION PLAN OF PC SUPERSTRUCTURE P4-P8	MCL-023	23 / 59
TYPICAL DETAILS OF STEEL GUTTER	MDV-056	56 / 56	DETAIL OF GIRDER P12 (2 OF 4)	MST-049	49 / 74	TYPICAL CROSS SECTION P4-P8	MCL-024	24 / 59
STRUCTURES			DETAIL OF GIRDER P12 (3 OF 4)	MST-050	50 / 74	ARRANGEMENT OF PC CABLES P4-P6	MCL-025	25 / 59
STEEL SUPERSTRUCTURE			DETAIL OF GIRDER P12 (4 OF 4)	MST-051	51 / 74	ARRANGEMENT OF PC CABLES P6-P8	MCL-026	26 / 59
GENERAL DIMENSION OF STEEL SUPERSTRUCTURE (1 OF 5)	MST-001	01 / 74	DETAIL OF GIRDER PB4 (1 OF 4)	MST-052	52 / 74	ARRANGEMENT OF PC CABLES P4-P8	MCL-027	27 / 59
GENERAL DIMENSION OF STEEL SUPERSTRUCTURE (2 OF 5)	MST-002	02 / 74	DETAIL OF GIRDER PB4 (2 OF 4)	MST-053	53 / 74	PC CABLES SCHEDULE P4-P8	MCL-028	28 / 59
GENERAL DIMENSION OF STEEL SUPERSTRUCTURE (3 OF 5)	MST-003	03 / 74	DETAIL OF GIRDER PB4 (3 OF 4)	MST-054	54 / 74	TYPICAL DETAIL OF CROSS SECTION REINFORCEMENT P4-P8	MCL-029	29 / 59
GENERAL DIMENSION OF STEEL SUPERSTRUCTURE (4 OF 5)	MST-004	04 / 74	DETAIL OF GIRDER PB4 (4 OF 4)	MST-055	55 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P4-P6	MCL-030	30 / 59
GENERAL DIMENSION OF STEEL SUPERSTRUCTURE (5 OF 5)	MST-005	05 / 74	DETAIL OF GIRDER ACCESSORIES (1 OF 2)	MST-056	56 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P7-P8	MCL-031	31 / 59
COORDINATES AND ELEVATION P8 - P13 (1 OF 2)	MST-006	06 / 74	DETAIL OF GIRDER ACCESSORIES (2 OF 2)	MST-057	57 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P4-P8 (1 OF 2)	MCL-032	32 / 59
COORDINATES AND ELEVATION P8 - P13 (2 OF 2)	MST-007	07 / 74	DECK SLAB ARRANGEMENT OF PC CABLES P8 - P12 (1 OF 2)	MST-058	58 / 74	ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P4-P8 (2 OF 2)	MCL-033	33 / 59
COORDINATES AND ELEVATION PB3 - P13 (1 OF 2)	MST-008	08 / 74	DECK SLAB ARRANGEMENT OF PC CABLES P8 - P12 (2 OF 2)	MST-059	59 / 74	REINFORCEMENT SCHEDULE FOR PC GIRDER P4-P8 (1 OF 3)	MCL-034	34 / 59
COORDINATES AND ELEVATION PB3 - P13 (2 OF 2)	MST-009	09 / 74	DECK SLAB ARRANGEMENT OF PC CABLES P12 - P13	MST-060	60 / 74	REINFORCEMENT SCHEDULE FOR PC GIRDER P4-P8 (2 OF 3)	MCL-035	35 / 59
TABLE OF QUANTITIES	MST-010	10 / 74	DECK SLAB ARRANGEMENT OF PC CABLES P12 - P13	MST-061	61 / 74	REINFORCEMENT SCHEDULE FOR PC GIRDER P4-P8 (3 OF 3)	MCL-036	36 / 59
BLOCK WEIGHT OF GIRDER	MST-011	11 / 74	DECK SLAB ARRANGEMENT OF PC CABLES PB3 - PB6	MST-062	62 / 74	ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS DIAPHRAGMA P4-P8	MCL-037	37 / 59
SECTIONAL DIMENSION OF GIRDER G1	MST-012	12 / 74	DECK SLAB REINFORCEMENT ARRANGEMENT P8 - P12 (1 OF 3)	MST-063	63 / 74	ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS P5, P6, P7	MCL-038	38 / 59
SECTIONAL DIMENSION OF GIRDER G2	MST-013	13 / 74	DECK SLAB REINFORCEMENT ARRANGEMENT P8 - P12 (2 OF 3)	MST-064	64 / 74	ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS P8	MCL-039	39 / 59
SECTIONAL DIMENSION OF GIRDER P9	MST-014	14 / 74	DECK SLAB REINFORCEMENT ARRANGEMENT P8 - P12 (3 OF 3)	MST-065	65 / 74	ARRANGEMENT OF REINFORCEMENT FOR ANCHORAGES P4-P8	MCL-040	40 / 59
SECTIONAL DIMENSION OF GIRDER P12	MST-015	15 / 74	DECK SLAB ARRANGEMENT SCHEDULE P8 - P12 (1 OF 2)	MST-066	66 / 74			
SECTIONAL DIMENSION OF GIRDER PB4	MST-016	16 / 74	DECK SLAB ARRANGEMENT SCHEDULE P8 - P12 (2 OF 2)	MST-067	67 / 74			
DETAIL OF GIRDER G1 (1 OF 10)	MST-017	17 / 74	DECK SLAB REINFORCEMENT ARRANGEMENT PB3 - PB6 (1 OF 2)	MST-068	68 / 74			
DETAIL OF GIRDER G1 (2 OF 10)	MST-018	18 / 74	DECK SLAB REINFORCEMENT ARRANGEMENT PB3 - PB6 (2 OF 2)	MST-069	69 / 74			
			DECK SLAB REINFORCEMENT SCHEDULE PB3 - PB6 (1 OF 2)	MST-070	70 / 74			
			DECK SLAB REINFORCEMENT SCHEDULE PB3 - PB6 (2 OF 2)					
			DECK SLAB REINFORCEMENT SCHEDULE P12 - P13 (1 OF 3)					

 JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL	DESIGNED BY		CHECKED BY		SUBMITTED BY		 REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF HIGHWAYS	PROJECT AND LOCATION :		SCALE :	DRAWING TITLE :		DRAWING NO. :
	Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI		DETAILED DESIGN STUDY OF NORTH JAVA CORRIDOR FLYOVER PROJECT MERAK FLYOVER - CONTRACT PACKAGE 1 (MERAK - BALARAJA) BANTEN PROVINCE		N T S	INDEX OF DRAWINGS 3 OF 4		MGE-003
	Sign		Sign		Sign								
	Date		Date		Date								
		APPROVED BY		Ir. HERRY VAZA M.Eng.Sc								SHEET NO. :	
						NIP. : 110038400						03 / 22	

INDEX OF DRAWINGS 3 OF 4

TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.
PC LEFT SIDE (3 SPAN, AB1-PB3)			ARRANGEMENT OF BEARING, STOPPER AND RESTRAINER	MSM-005	05 / 18	PIER COLUMN REINFORCEMENT (PIER P9, P12)	MSB-034	34 / 94
COORDINATES AND ELEVATIONS FOR PC GIRDER AB1-PB3	MCL-041	41 / 59	DETAIL OF BEARING TYPE A1	MSM-006	06 / 18	PIER COLUMN REINFORCEMENT (PIER P13 - EXP.)	MSB-035	35 / 94
DIMENSION PLAN OF PC SUPERSTRUCTURE AB1-PB3	MCL-042	42 / 59	DETAIL OF BEARING TYPE A2	MSM-007	07 / 18	PIER COLUMN REINFORCEMENT (PIER P14, P15)	MSB-036	36 / 94
TYPICAL CROSS SECTION AB1-PB3	MCL-043	43 / 59	DETAIL OF BEARING TYPE B1	MSM-008	08 / 18	PIER COLUMN REINFORCEMENT (PIER PB1, PB2)	MSB-037	37 / 94
ARRANGEMENT OF PC CABLES AB1-PB3 (1)	MCL-044	44 / 59	DETAIL OF BEARING TYPE B2	MSM-009	09 / 18	PIER COLUMN REINFORCEMENT (PIER PB3)	MSB-038	38 / 94
ARRANGEMENT OF PC CABLES AB1-PB3 (2)	MCL-045	45 / 59	DETAIL OF BEARING TYPE C1	MSM-010	10 / 18	SCHEDULE OF REINFORCED CONCRETE COLUMN (1 OF 2)	MSB-039	39 / 94
ARRANGEMENT OF PC CABLES AB1-PB3 (3)	MCL-046	46 / 59	DETAIL OF BEARING TYPE C2	MSM-011	11 / 18	SCHEDULE OF REINFORCED CONCRETE COLUMN (2 OF 2)	MSB-040	40 / 94
PC CABLES SCHEDULE AB1-PB3	MCL-047	47 / 59	DETAIL OF BEARING TYPE C3	MSM-012	12 / 18	PIER COPING REINFORCEMENT (PIER P4) 1 OF 4	MSB-041	41 / 94
TYPICAL DETAIL OF CROSS SECTION REINFORCEMENT AB1-PB3	MCL-048	48 / 59	DETAIL OF BEARING TYPE C4	MSM-013	13 / 18	PIER COPING REINFORCEMENT (PIER P4) 2 OF 4	MSB-042	42 / 94
ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER AB1-PB1	MCL-049	49 / 59	DETAIL OF STOPPER	MSM-014	14 / 18	PIER COPING REINFORCEMENT (PIER P4) 3 OF 4	MSB-043	43 / 94
ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER PB1-PB3	MCL-050	50 / 59	DETAIL OF RESTRAINER TYPE 1	MSM-015	15 / 18	PIER COPING REINFORCEMENT (PIER P4) 4 OF 4	MSB-044	44 / 94
ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER AB1-PB3	MCL-051	51 / 59	DETAIL OF RESTRAINER TYPE 2	MSM-016	16 / 18	PIER COPING REINFORCEMENT (PIER P8 - EXP.) 1 OF 5	MSB-045	45 / 94
REINFORCEMENT SCHEDULE FOR PC GIRDER AB1-PB3 (1)	MCL-052	52 / 59	DETAIL OF PARAPET AND MEDIAN	MSM-017	17 / 18	PIER COPING REINFORCEMENT (PIER P8 - EXP.) 2 OF 5	MSB-046	46 / 94
REINFORCEMENT SCHEDULE FOR PC GIRDER AB1-PB3 (2)	MCL-053	53 / 59	SAFETY FENCE	MSM-018	18 / 18	PIER COPING REINFORCEMENT (PIER P8 - EXP.) 3 OF 5	MSB-047	47 / 94
REINFORCEMENT SCHEDULE FOR PC GIRDER AB1-PB3 (3)	MCL-054	54 / 59	SUBSTRUCTURES			PIER COPING REINFORCEMENT (PIER P8 - EXP.) 4 OF 5	MSB-048	48 / 94
ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS	MCL-055	55 / 59	ABUTMENT AND PIER LAYOUT & DIMENSIONS			PIER COPING REINFORCEMENT (PIER P8 - EXP.) 5 OF 5	MSB-049	49 / 94
DIAPHRAGMA AB1-PB3			ABUTMENT LAYOUT & DIMENSIONS (ABUTMENT A1)	MSB-001	01 / 94	PIER COPING REINFORCEMENT (PIER P13 - EXP.) 1 OF 4	MSB-050	50 / 94
ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS PB1, PB2	MCL-056	56 / 59	PIER LAYOUT (PIER P1, P2, P3 - FIXED)	MSB-002	02 / 94	PIER COPING REINFORCEMENT (PIER P13 - EXP.) 2 OF 4	MSB-051	51 / 94
ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS AB1	MCL-057	57 / 59	PIER LAYOUT (PIER P4 - EXP.)	MSB-003	03 / 94	PIER COPING REINFORCEMENT (PIER P13 - EXP.) 3 OF 4	MSB-052	52 / 94
ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS PB3	MCL-058	58 / 59	PIER LAYOUT (PIER P5, P6, P7 - FIX)	MSB-004	04 / 94	PIER COPING REINFORCEMENT (PIER P13 - EXP.) 4 OF 4	MSB-053	53 / 94
ARRANGEMENT OF REINFORCEMENT FOR ANCHORAGES AB1-PB3	MCL-059	59 / 59	PIER LAYOUT (PIER P8 - EXP.) 1 OF 2	MSB-005	05 / 94	PIER COPING REINFORCEMENT (PIER PB3) 1 OF 4	MSB-054	54 / 94
			PIER LAYOUT (PIER P8 - EXP.) 2 OF 2	MSB-006	06 / 94	PIER COPING REINFORCEMENT (PIER PB3) 2 OF 4	MSB-055	55 / 94
PC RIGHT SIDE (3 SPAN, P13-A2)			PIER LAYOUT (PIER P9 - PORTAL)	MSB-007	07 / 94	PIER COPING REINFORCEMENT (PIER PB3) 3 OF 4	MSB-056	56 / 94
COORDINATES AND ELEVATIONS FOR PC GIRDER P13-A2	MCR-001	01 / 21	PIER LAYOUT (PIER P10, P11 - FIXED)	MSB-008	08 / 94	PIER COPING REINFORCEMENT (PIER PB3) 4 OF 4	MSB-057	57 / 94
DIMENSION PLAN OF PC SUPERSTRUCTURE P13-A2 (1 OF 2)	MCR-002	02 / 21	PIER LAYOUT (PIER P12 - PORTAL)	MSB-009	09 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER P4 (1 OF 2)	MSB-058	58 / 94
DIMENSION PLAN OF PC SUPERSTRUCTURE P13-A2 (2 OF 2)	MCR-003	03 / 21	PIER LAYOUT (PIER P13 - EXP.) 1 OF 2	MSB-010	10 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER P4 (2 OF 2)	MSB-059	59 / 94
TYPICAL CROSS SECTION P13-A2 (1 OF 2)	MCR-004	04 / 21	PIER LAYOUT (PIER P13 - EXP.) 2 OF 2	MSB-011	11 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER P8 (1 OF 2)	MSB-060	60 / 94
TYPICAL CROSS SECTION P13-A2 (2 OF 2)	MCR-005	05 / 21	PIER LAYOUT (PIER P13 - EXP.) 2 OF 2	MSB-012	12 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER P8 (2 OF 2)	MSB-061	61 / 94
ARRANGEMENT OF PC CABLES P13-A2 (1 OF 3)	MCR-006	06 / 21	PIER LAYOUT (PIER P14)	MSB-013	13 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER P13 (1 OF 2)	MSB-062	62 / 94
ARRANGEMENT OF PC CABLES P13-A2 (2 OF 3)	MCR-007	07 / 21	PIER LAYOUT (PIER P15)	MSB-014	14 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER P13 (2 OF 2)	MSB-063	63 / 94
ARRANGEMENT OF PC CABLES P13-A2 (3 OF 3)	MCR-008	08 / 21	ABUTMENT LAYOUT & DIMENSIONS (ABUTMENT A2)	MSB-015	15 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER PB3 (1 OF 2)	MSB-064	64 / 94
PC CABLES SCHEDULE P13-A2	MCR-009	09 / 21	ABUTMENT LAYOUT & DIMENSIONS (ABUTMENT AB1)	MSB-016	16 / 94	SCHEDULE OF RISER REINF. AND ANCHOR BAR PIER PB3 (2 OF 2)	MSB-065	65 / 94
TYPICAL DETAIL OF CROSS SECTION REINFORCEMENT P13-A2	MCR-010	10 / 21	PIER LAYOUT (PIER PB1, PB2 - FIXED)	MSB-017	17 / 94	CONCRETE BARRIER REINF. AT PIER COPING P4, P8, P13, PB3 (EXP)	MSB-066	66 / 94
ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P13-P14	MCR-011	11 / 21	PIER LAYOUT (PIER PB3 - EXP.)	MSB-018	18 / 94	COMPOSITE COLUMN CASING DETAILS (PIER P10, P11)	MSB-067	67 / 94
ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P14-A2	MCR-012	12 / 21	PIER LAYOUT (PIER PB4 - PORTAL)	MSB-019	19 / 94	COMPOSITE COLUMN CASING DETAILS (PIER PB4L)	MSB-068	68 / 94
ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P13-A2 (1 OF 2)	MCR-013	13 / 21	PIER LAYOUT (PIER PB5 - FIXED)			COMPOSITE COLUMN CASING DETAILS (PIER PB4R)	MSB-069	69 / 94
ARRANGEMENT OF REINFORCEMENT FOR PC GIRDER P13-A2 (2 OF 2)	MCR-014	14 / 21	REINFORCEMENT			COMPOSITE COLUMN CASING DETAILS (PIER PB5)	MSB-070	70 / 94
REINFORCEMENT SCHEDULE FOR PC GIRDER P13-A2 (1 OF 3)	MCR-015	15 / 21	REINFORCEMENT OF COLUMN, ABUTMENT A1	MSB-020	20 / 94	COMPOSITE COLUMN SOCKET TYPE CONNECTION (PIER P10, P11)	MSB-071	71 / 94
REINFORCEMENT SCHEDULE FOR PC GIRDER P13-A2 (2 OF 3)	MCR-016	16 / 21	REINFORCEMENT OF COLUMN, ABUTMENT A2 (1 OF 2)	MSB-021	21 / 94	COMPOSITE COLUMN SOCKET TYPE CONNECTION (PIER PB4L, PB5)	MSB-072	72 / 94
REINFORCEMENT SCHEDULE FOR PC GIRDER P13-A2 (3 OF 3)	MCR-017	17 / 21	REINFORCEMENT OF COLUMN, ABUTMENT A2 (2 OF 2)	MSB-022	22 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P1, P2, P3, P4)	MSB-073	73 / 94
REINFORCEMENT SCHEDULE FOR PC GIRDER P13-A2 (3 OF 3)	MCR-018	18 / 21	REINFORCEMENT OF COLUMN, ABUTMENT AB1	MSB-023	23 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P5 & P6)	MSB-074	74 / 94
ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS P14, P15	MCR-019	19 / 21	REINFORCEMENT OF FOOTING, ABUTMENT A1 & AB1 (1 OF 2)	MSB-024	24 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P7)	MSB-075	75 / 94
ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS A2	MCR-020	20 / 21	REINFORCEMENT OF FOOTING, ABUTMENT A1 & AB1 (2 OF 2)	MSB-025	25 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P8)	MSB-076	76 / 94
ARRANGEMENT OF REINFORCEMENT FOR CROSS BEAMS P13	MCR-021	21 / 21	REINFORCEMENT OF FOOTING, ABUTMENT A2 (1 OF 2)	MSB-026	26 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P9)	MSB-077	77 / 94
ARRANGEMENT OF REINFORCEMENT FOR ANCHORAGES P13-A2			REINFORCEMENT OF FOOTING, ABUTMENT A2 (2 OF 2)	MSB-027	27 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P10, P11)	MSB-078	78 / 94
			PIER COLUMN REINFORCEMENT (PIER P1, P2)	MSB-028	28 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P12)	MSB-079	79 / 94
MISCELLANEOUS			PIER COLUMN REINFORCEMENT (PIER P3)	MSB-029	29 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P13)	MSB-080	80 / 94
QUANTITY SUMMARY FOR SUPERSTRUCTURE	MSM-001	01 / 18	PIER COLUMN REINFORCEMENT (PIER P4 - EXP.)	MSB-030	30 / 94	BORED PILE REINFORCEMENT DETAILS (PIER P14 & P15)	MSB-081	81 / 94
EXPANSION JOINT LAY OUT PLAN	MSM-002	02 / 18	PIER COLUMN REINFORCEMENT (PIER P5, P7)	MSB-031	31 / 94	BORED PILE REINFORCEMENT DETAILS (PIER PB1, PB2 & PB3)	MSB-082	82 / 94
DETAIL OF EXPANSION JOINT	MSM-003	03 / 18	PIER COLUMN REINFORCEMENT (PIER P6)	MSB-032	32 / 94	BORED PILE REINFORCEMENT DETAILS (PIER PB4L)	MSB-083	83 / 94
BEARING LAYOUT PLAN	MSM-004	04 / 18	PIER COLUMN REINFORCEMENT (PIER P8)	MSB-033	33 / 94	BORED PILE REINFORCEMENT DETAILS (PIER PB4R)	MSB-084	84 / 94
ARRANGEMENT OF BEARING, STOPPER AND RESTRAINER	MSM-005	05 / 18				BORED PILE REINFORCEMENT DETAILS (PIER PB5)	MSB-085	85 / 94

 JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL	DESIGNED BY		CHECKED BY		SUBMITTED BY		 REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF HIGHWAYS	PROJECT AND LOCATION :		SCALE :	DRAWING TITLE :	DRAWING NO. :	
	Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI		 APPROVED BY Ir. HERRY VAZA M.Eng.Sc NIP. : 110038400	DETAILED DESIGN STUDY OF NORTH JAVA CORRIDOR FLYOVER PROJECT MERAK FLYOVER - CONTRACT PACKAGE 1 (MERAK - BALARAJA) BANTEN PROVINCE		N T S	INDEX OF DRAWINGS 4 OF 4	MGE-004
	Sign		Sign		Sign						FULL SIZE A3		SHEET NO. :
	Date		Date		Date						04 / 22		

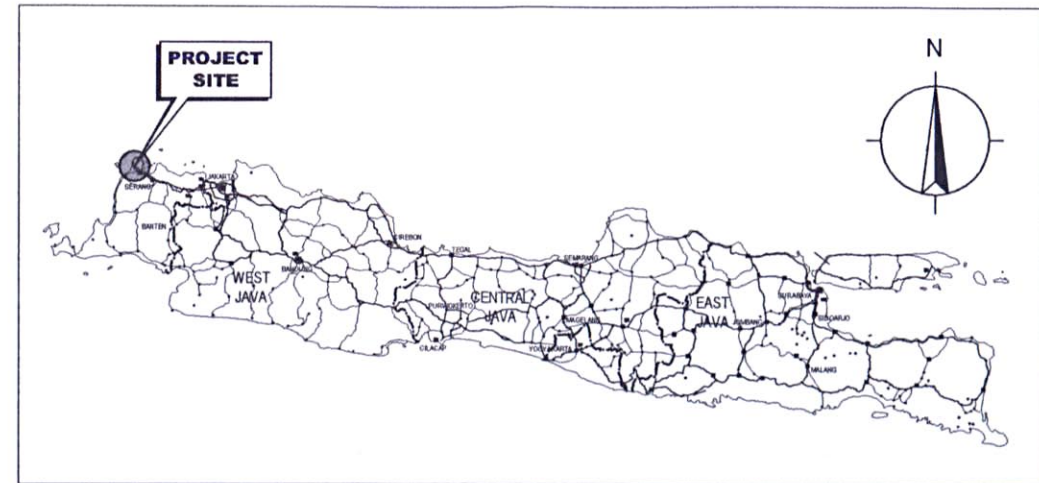
INDEX OF DRAWINGS 4 OF 4

TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.	TITLE OF DRAWING	DRAWING NO.	SHEET NO.
BORED PILE REINFORCEMENT DETAILS (ABUTMENT A1 - 1500mmØ)	MSB-086	86 / 94	UTILITIES					
BORED PILE REINFORCEMENT DETAILS (ABUTMENT A2 - 1800mmØ)	MSB-087	87 / 94	PUBLIC UTILITIES ABOVE GROUND 1 OF 9	MUT-001	01 / 19			
BORED PILE REINFORCEMENT DETAILS (ABUTMENT AB1 - 1500mmØ)	MSB-088	88 / 94	PUBLIC UTILITIES ABOVE GROUND 2 OF 9	MUT-002	02 / 19			
SCHEDULE OF BORED PILE (1 OF 2)	MSB-089	89 / 94	PUBLIC UTILITIES ABOVE GROUND 3 OF 9	MUT-003	03 / 19			
SCHEDULE OF BORED PILE (2 OF 2)	MSB-090	90 / 94	PUBLIC UTILITIES ABOVE GROUND 4 OF 9	MUT-004	04 / 19			
TYPICAL PPROACH SLAB DETAILS OF ABUTMENT A1	MSB-091	91 / 94	PUBLIC UTILITIES ABOVE GROUND 5 OF 9	MUT-005	05 / 19			
TYPICAL PPROACH SLAB DETAILS OF ABUTMENT A2	MSB-092	92 / 94	PUBLIC UTILITIES ABOVE GROUND 6 OF 9	MUT-006	06 / 19			
TYPICAL PPROACH SLAB DETAILS OF ABUTMENT AB1	MSB-093	93 / 94	PUBLIC UTILITIES ABOVE GROUND 7 OF 9	MUT-007	07 / 19			
SOIL IMPROVEMENT	MSB-094	94 / 94	PUBLIC UTILITIES ABOVE GROUND 8 OF 9	MUT-008	08 / 19			
MSE WALL			PUBLIC UTILITIES ABOVE GROUND 9 OF 9	MUT-009	09 / 19			
NOTES FOR MECHANICALLY STABILIZED EARTH WALL	MMS-001	01 / 17	PUBLIC UTILITIES UNDER GROUND 1 OF 6	MUT-010	10 / 19			
PLAN & PROFILE MSE WALL AT APPROACH ROAD ABUTMENT A1 (1 OF 2)	MMS-002	02 / 17	PUBLIC UTILITIES UNDER GROUND 2 OF 9	MUT-011	11 / 19			
PLAN & PROFILE MSE WALL AT APPROACH ROAD ABUTMENT A1 (2 OF 2)	MMS-003	03 / 17	PUBLIC UTILITIES UNDER GROUND 3 OF 9	MUT-012	12 / 19			
SECTION & DETAIL OF MSE WALL ABUTMENT A1 SIDE	MMS-004	04 / 17	PUBLIC UTILITIES UNDER GROUND 4 OF 9	MUT-013	13 / 19			
SECTION OF MSE WALL AT APPROACH ROAD ABUTMENT A1 SIDE	MMS-005	05 / 17	PUBLIC UTILITIES UNDER GROUND 5 OF 9	MUT-014	14 / 19			
PLAN & PROFILE MSE WALL AT APPROACH ROAD ABUTMENT A2 (1 OF 2)	MMS-006	06 / 17	PUBLIC UTILITIES UNDER GROUND 6 OF 9	MUT-015	15 / 19			
PLAN & PROFILE MSE WALL AT APPROACH ROAD ABUTMENT A2 (2 OF 2)	MMS-007	07 / 17	PUBLIC UTILITIES UNDER GROUND 7 OF 9	MUT-016	16 / 19			
SECTION & DETAIL OF MSE WALL ABUTMENT A2 SIDE	MMS-008	08 / 17	PUBLIC UTILITIES UNDER GROUND 8 OF 9	MUT-017	17 / 19			
SECTION OF MSE WALL AT APPROACH ROAD ABUTMENT A2 SIDE	MMS-009	09 / 17	PUBLIC UTILITIES UNDER GROUND 9 OF 9	MUT-018	18 / 19			
PLAN & PROFILE MSE WALL AT APPROACH ROAD ABUTMENT AB1 (1 OF 2)	MMS-010	10 / 17	STANDARD DETAILS OF RELOCATION & PROTECTION UTILITY UNDER GROUND	MUT-019	19 / 19			
PLAN & PROFILE MSE WALL AT APPROACH ROAD ABUTMENT AB1 (2 OF 2)	MMS-011	11 / 17	ROAD LIGHTING					
SECTION & DETAIL OF MSE WALL ABUTMENT AB1 SIDE	MMS-012	12 / 17	ABBREVIATIONS AND LEGEND	MRL-001	01 / 15			
SECTION OF MSE WALL AT APPROACH ROAD ABUTMENT AB1 SIDE	MMS-013	13 / 17	ROAD LIGHTING PLAN OF FLYOVER (MERAK-1&2) 1 OF 2	MRL-002	02 / 15			
MECHANICALLY STABILIZED EARTH WALL (MISCELLANEOUS DETAILS)	MMS-014	14 / 17	ROAD LIGHTING PLAN OF FLYOVER (MERAK-1&2) 2 OF 2	MRL-003	03 / 15			
STUBWALL LAYOUT & REINFORCEMENT DETAILS (ABUTMENT A1 SIDE)	MMS-015	15 / 17	ROAD LIGHTING PLAN OF SERVICE ROAD	MRL-004	04 / 15			
STUBWALL LAYOUT & REINFORCEMENT DETAILS (ABUTMENT A2 SIDE)	MMS-016	16 / 17	ROAD LIGHTING PLAN OF UNDER VIADUCT	MRL-005	05 / 15			
STUBWALL LAYOUT & REINFORCEMENT DETAILS (ABUTMENT AB1 SIDE)	MMS-017	17 / 17	DIAGRAM PANEL OF FLYOVER 1 OF 2	MRL-006	06 / 15			
TRAFFIC CONTROL			DIAGRAM PANEL OF FLYOVER 2 OF 2	MRL-007	07 / 15			
TRAFFIC SIGNS AND ROAD MARKINGS LAYOUT (FLYOVER) 1 OF 3	MTR-001	01 / 26	DIAGRAM PANEL OF SERVICE ROAD 1 OF 3	MRL-008	08 / 15			
TRAFFIC SIGNS AND ROAD MARKINGS LAYOUT (FLYOVER) 2 OF 3	MTR-002	02 / 26	DIAGRAM PANEL OF SERVICE ROAD 2 OF 3	MRL-009	09 / 15			
TRAFFIC SIGNS AND ROAD MARKINGS LAYOUT (FLYOVER) 3 OF 3	MTR-003	03 / 26	DIAGRAM PANEL OF SERVICE ROAD 3 OF 3	MRL-010	10 / 15			
TRAFFIC SIGNS AND ROAD MARKINGS LAYOUT (AT-GRADE) 1 OF 3	MTR-004	04 / 26	LIGHTING PANEL	MRL-011	11 / 15			
TRAFFIC SIGNS AND ROAD MARKINGS LAYOUT (AT-GRADE) 2 OF 3	MTR-005	05 / 26	LIGHTING POLE AT FLYOVER & PULL BOX DETAIL	MRL-012	12 / 15			
TRAFFIC SIGNS AND ROAD MARKINGS LAYOUT (AT-GRADE) 3 OF 3	MTR-006	06 / 26	LIGHTING POLE AT SERVICE ROAD	MRL-013	13 / 15			
STANDARD PAVEMENT MARKINGS DETAIL 1 OF 2	MTR-007	07 / 26	LIGHTING UNDER VIADUCT	MRL-014	14 / 15			
STANDARD PAVEMENT MARKINGS DETAIL 2 OF 2	MTR-008	08 / 26	CONDUIT & CABLE INSTALATION	MRL-015	15 / 15			
STANDARD PAVEMENT MARKINGS AT RAILROAD CROSSING	MTR-009	09 / 26						
CHEVRON MARKING DETAILS (FLYOVER APPROACHES)	MTR-010	10 / 26						
STANDARD TRAFFIC SIGNS 1 OF 4	MTR-011	11 / 26						
STANDARD TRAFFIC SIGNS 2 OF 4	MTR-012	12 / 26						
STANDARD TRAFFIC SIGNS 3 OF 4	MTR-013	13 / 26						
STANDARD TRAFFIC SIGNS 4 OF 4	MTR-014	14 / 26						
OVERHEAD GUIDE SIGNS	MTR-015	15 / 26						
ROAD SIGNS AND MOUNTING DETAILS	MTR-016	16 / 26						
OVERHEAD SIGN TRUSS STRUCTURAL FRAME DETAILS 1 OF 2	MTR-017	17 / 26						
OVERHEAD SIGN TRUSS STRUCTURAL FRAME DETAILS 2 OF 2	MTR-018	18 / 26						
STANDARD TRAFFIC MANAGEMENT SIGNS DURING CONSTRUCTION	MTR-019	19 / 26						
STANDARD TRAFFIC MANAGEMENT SAFETY DEVICE DETAILS	MTR-020	20 / 26						
STANDARD SIGN BOARD PANEL	MTR-021							
STAGES OF CONSTRUCTION	MTR-022	22 / 26						
TYPICAL BORED PILING METHODOLOGY	MTR-023	23 / 26						
TYPICAL INSTALLATION OF GIRDER	MTR-024	24 / 26						
TYPICAL TRAFFIC MANAGEMENT LAYOUT 1 OF 2	MTR-025	25 / 26						
TYPICAL TRAFFIC MANAGEMENT LAYOUT 2 OF 2	MTR-026	26 / 26						

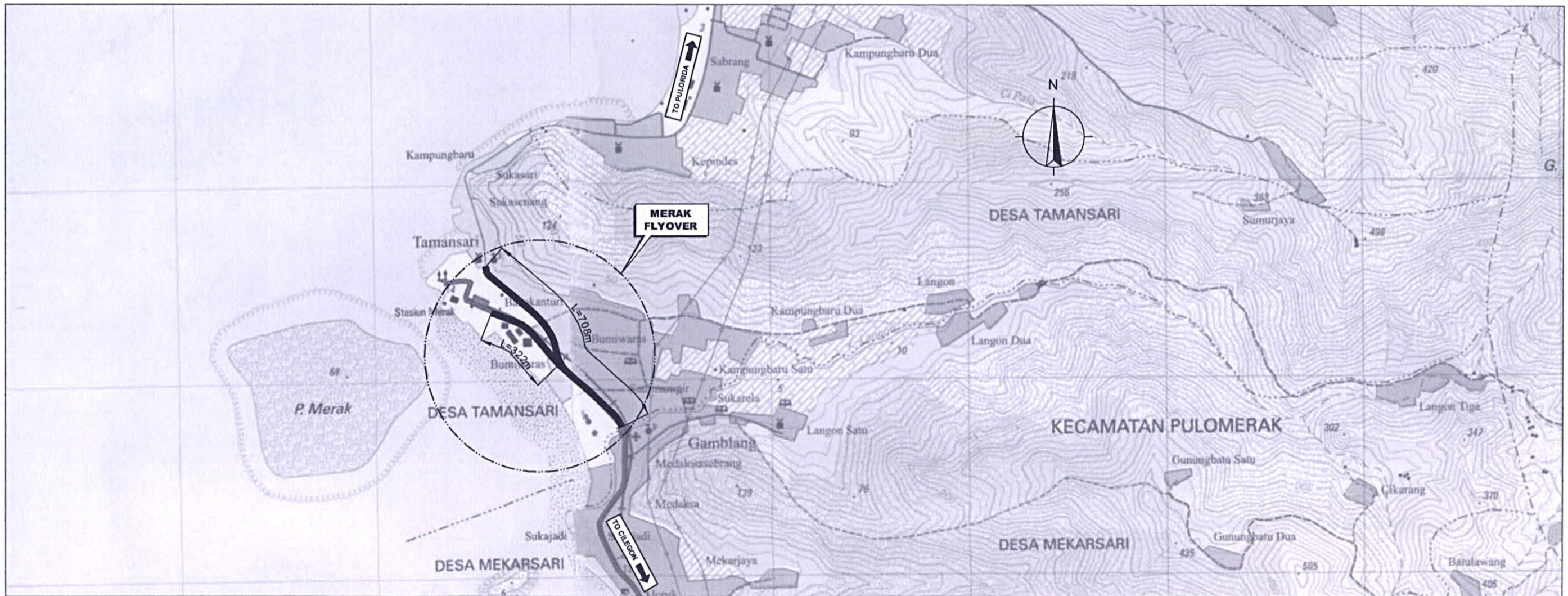
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name R. UENO	Name T. OKUMURA	Name M. KIUCHI
Sign	Sign	Sign
Date	Date	Date



2 INDONESIA MAP
 NOT TO SCALE



3 JAVA ISLAND MAP
 NOT TO SCALE



1 LOCATION / VICINITY MAP
 SCALE 1:20000



JAPAN INTERNATIONAL COOPERATION AGENCY
KAI KATAHIRA & ENGINEERS
 INTERNATIONAL

DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



REPUBLIC OF INDONESIA
 MINISTRY OF PUBLIC WORKS
 DIRECTORATE GENERAL OF HIGHWAYS

APPROVED BY Ir. HERRY VAZA M,Eng.Sc
 NIP. : 110038400

PROJECT AND LOCATION :
 DETAILED DESIGN STUDY OF
 NORTH JAVA CORRIDOR FLYOVER PROJECT
 MERAK FLYOVER - CONTRACT PACKAGE 1
 (MERAK - BALARAJA)
 BANTEN PROVINCE

SCALE :
 NTS
 FULL SIZE A3

DRAWING TITLE :
 NOTATION AND LEGEND

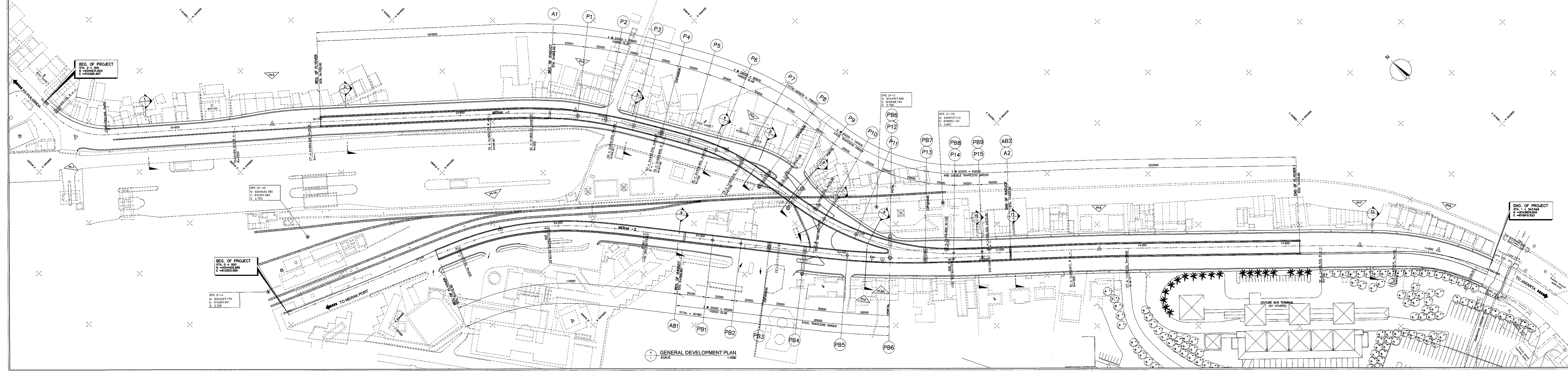
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 MGE-006
 SHEET NO :
 06 / 22

NOTATION AND LEGEND

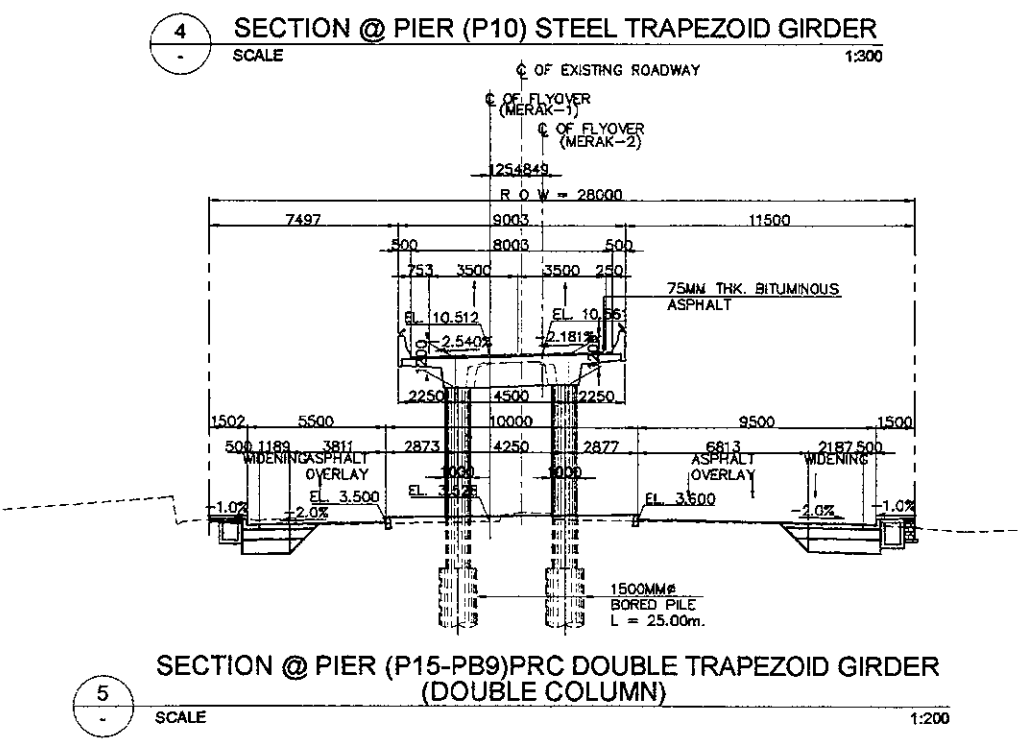
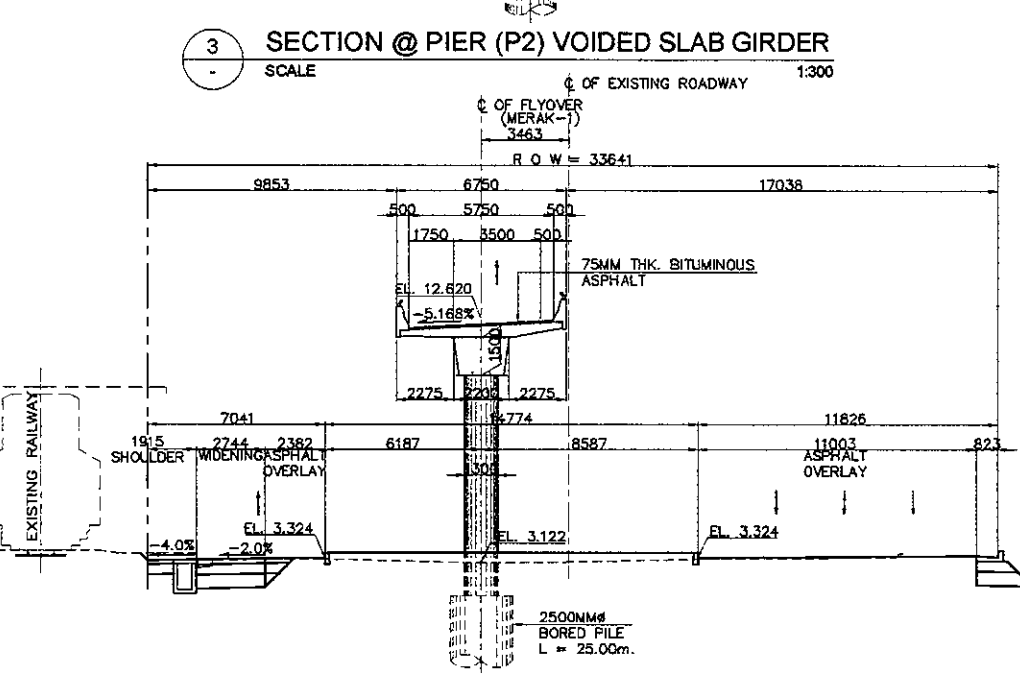
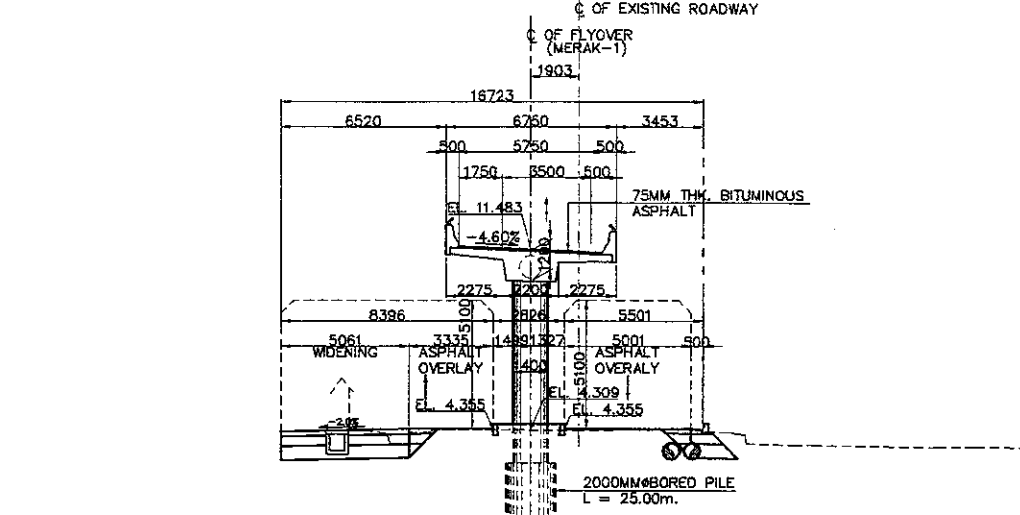
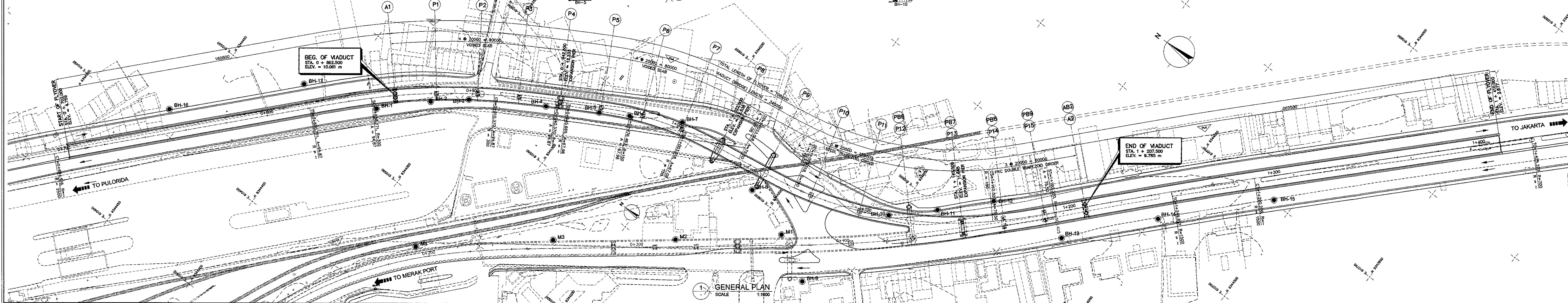
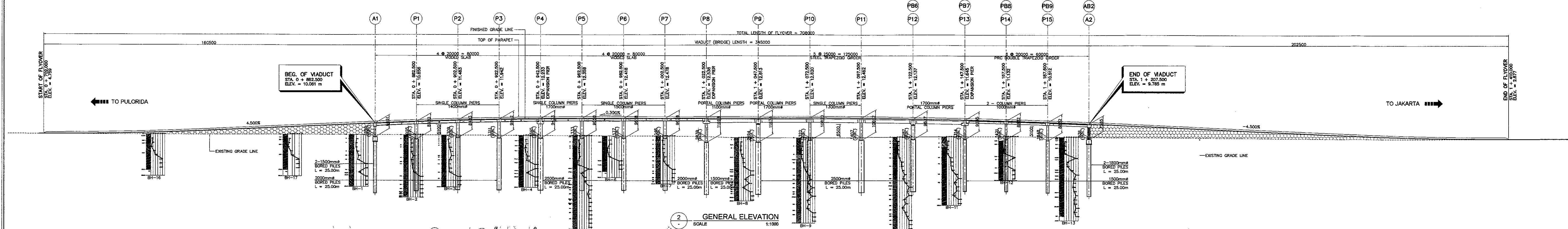
	PERMANENT BUILDING (1 FLOOR)		BANK		RIVER		RETAINING WALL
	PERMANENT BUILDING (2 FLOORS)		WAREHOUSE		POND (WATER)		RAILWAY
	PERMANENT BUILDING (3 FLOORS)		HOSPITAL/CLINIC		DRAINAGE		MAIN ROAD
	SEMI PERMANENT BUILDING		HOTEL		SWAMP		ROAD
	TEMPORARY		FACTORY		RICE FIELD		WATER SUPPLY
	SHED (BANGSAL)		FIRE STATION		WASTED LAND		TELEPHONE LINE
	STALL (KIOS)		POST OFFICE		MONUMENT		CABLE OPTIC LINE
	GOVERNMENT OFFICE		MARKET		EXISTING RCP		ELECTRICAL LINE
	SCHOOL		GASOLINE STATION		DESIGN RCP		GAS LINE
	MOSQUE		TELEPHONE POLE		EXISTING BOX CULVERT		OIL LINE
	CHURCH		ELECTRICAL POLE		DESIGN BOX CULVERT		BORE HOLE NO. 10
	TEMPLE		POWER HOUSE		EXISTING BRIDGE		SOUNDING NO.4 (DCP TEST)
	ISLAMIC CEMETERY		GPS STATION		DESIGN BRIDGE		DRAINAGE CATCH BASIN
	CHRISTIAN CEMETERY		BENCH MARK		EXISTING DRAINAGE LINE		DRAINAGE MANHOLE
	CHINESE CEMETERY		TRAVERSE POINT		NEW DRAINAGE LINE		
			TS, SC, CS, ST OR TC, CT OF HORIZONTAL CURVE		ROW		
			CONTOURS		MATCH LINE		
			STREAM		CENTER LINE		
					STATION NUMBER		

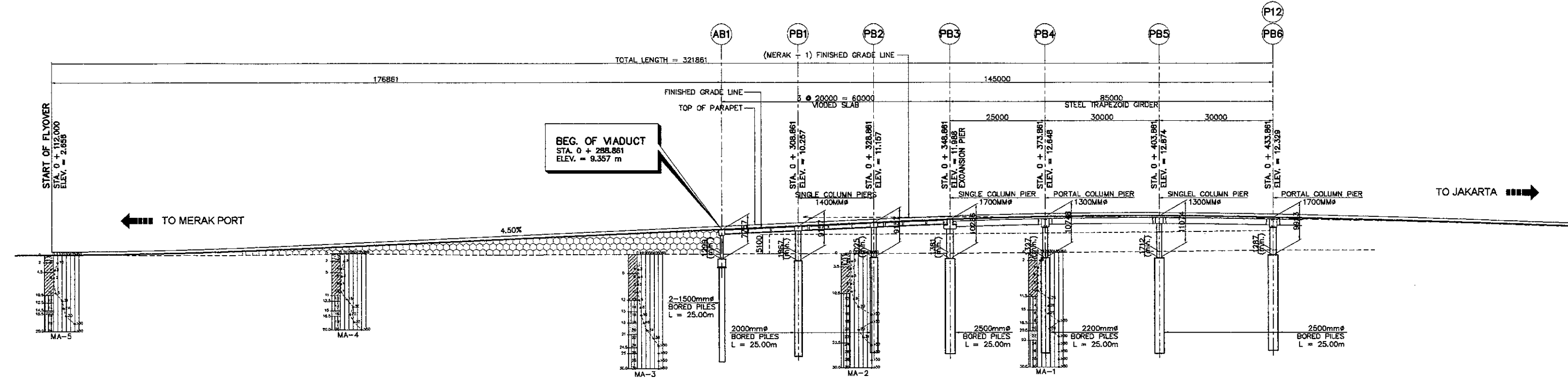
ABBREVIATIONS

<p>A</p> <p>A PARAMETER OF CLOTHOID CURVE AMPERE AT THE RATE ABUT ABUTMENT A.C ASPHALTIC CONCRETE A.D AVERAGE DEPTH ADD. ADDITIONAL A.D.T. AVERAGE DAILY TRAFFIC ALIGN ALIGNMENT AHD. AHEAD ALT. ALTERNATE APPR. APPROACH APPROX APPROXIMATE ASPH ASPHALT AVE AVERAGE AZ. AZIMUTH</p> <p>B</p> <p>B WIDTH b BOTTOM WIDTH b' WIDENING B/B BACK TO BACK B BASE COURSE BC BOX CULVERT BEG BEGINNING BIT BITUMINOUS BK BACK B BASELINE BLDGS BUILDINGS BLVD BOULEVARD B.M BENCH MARK BOT. BOTTOM BR. BRIDGE BP. BEGINNING POINT BRG. BEARING B.S BACK SLOPE B.S.T BITUMINOUS SURFACE TREATMENT B.T.C BEGINNING TRANSITION CURVE B.V.C.S. BEGINNING OF VERTICAL CURVE SPIRAL</p> <p>C</p> <p>c CUT (C) COMPUTED C/C CENTRE TO CENTRE C.A.C.P CORRUGATED ALUM CULVERT PIPE C.A.P.A. CORRUGATED ALUM PIPE ARCH CEM. CEMETERY C.F.P CORNER FENCE POST C.I.P CAST IRON PIPE C CENTER LINE CLASSIF CLASSIFICATION CLR. CLEARANCE CM CENTIMETER C.M.C.P. CORRUGATED METAL CULVERT PIPE C.M.P.A. CORRUGATED METAL PIPE ARCH COMB. COMBINE COMP. COMPACTED CONC. CONCRETE CONT CONTACTOR CORP. CORPORATION CORR. CORRUGATED C.R CRUSHED ROCK C.S. CIRCLE TO SPIRAL, CURVE SPIRAL CULV. CULVERT CU.M CUBIC METER X-SECTION CROSS SECTION</p>	<p>D</p> <p>D DIAMETER, ϕ DEFORMED REBAR INNER DIAMETER (PIPE) DEGREE OF CURVE DD DECK DRAIN Do OUTER DIAMETER d DISTANCE DMH DRAINAGE MANHOLE Δ DEFLECTION ANGLE OR CENTRAL ANGLE AT ANY P.I Δ_s FIELD ANGLE Δ_c DEFLECTION ANGLE OR CIRCULAR ARC OF LENGTH Lc DET. DETAIL DF. DRIFT D.H.V DESIGN HOUR VOLUME DIA.,ϕ DIAMETER DIM DIMENSION DIST DISTRICT D.I DROP INLET D.S.W DWARF STONE WALL D.B.S.T DOUBLE BITUMINOUS SURFACE TREATMENT DWG. DRAWING</p> <p>E</p> <p>E EXTERNAL DISTANCE OF CIRCULAR CURVE Es EXTERNAL DISTANCE OF SPIRAL -CIRCLE-SPIRAL Ev MIDDLE ORDINATE VERTICAL CURVE SUPERELEVATION CURVE e SUPERELEVATION CURVE e max MAX. SUPERELEVATION RATE EL ELEVATION EMB EMBANKMENT EP END POINT E.P.S.D EROSION PROTECTION TO SIDE DRAIN EST ESTATE E.T.C. END TRANSITION CURVE E.V.C.S. END OF VERTICAL CURVE SPIRAL E'WKS EARTH WORKS EXC EXCAVATION EXP EXPANSION EXIST EXISTING EXT EXTERIOR EXN EXTEND</p> <p>F</p> <p>F FILL F.C FULL CROWN FDN FOUNDATION F.D.P FULL DEPTH PAVEMENT F.G FINISH GRADE FL FLOOR F L FLOW LINE FR FRAME FT FOOT (FEET) FWD. FORWARD</p> <p>G</p> <p>G GARAGE G.F GUARD FENCE GL GROUND LEVEL G.R GUARD RAIL GOV.T. GOVERNMENT</p> <p>H</p> <p>H.C HALF CROWN HDWL HEADWALL HORIZ HORIZONTAL H.P HIGH POINT H.R HAND RAIL HT HEIGHT H.W.L HIGH WATER LEVEL H.W.Y HIGHWAY HZ FREQUENSY</p> <p>I</p> <p>ΔOR I INTERSECTION ANGLE INL INLET INT. INTERIOR INTERS INTERSECTION INV INVERT</p> <p>J</p> <p>JT. JOINT</p>	<p>K</p> <p>KG. KILOGRAM KM. KILOMETER KPH/kph KILOMETER PER HOUR KWH KILO WATT HOUR</p> <p>L</p> <p>LAB LABORATORY L OR LC LENGTH OF CIRCULAR CURVE L' LENGTH OF CIRCULAR CURVE IN SPIRALED CURVE Ln M LINEAR METER Ls LENGTH OF SPIRAL LL LENGTH OF LEFT OFFSET LP LIGHTING PANEL LR LENGTH OF RIGHT OFFSET Lt LENGTH OF TRANSITION Lv, V.C LENGTH OF VERTICAL CURVE LONG LONGTUDINAL L.S LEVELING SECTION L.S.D LINE SIDE DRAIN LT LEFT LTH LENGTH LF LEFT FORWARD</p> <p>M</p> <p>M METER M LINEAR METER M M, m/m METER PER METER MAINT MAINTENANCE MAX MAXIMUM MCB MINIATURE CIRCUIT BREAKER M.D MAXIMUM DEPTH MN MANHOLE MPa Mega Pascal MIN MINIMUM M.O MIDDLE ORDINATE MOD MODIFIED MON MONUMENT M.R METER RADIAL MSW MORTAR STONE WORK</p> <p>N</p> <p>N NEW N.C NORMAL CROWN N.E NORTH EAST NO. NUMBER N.S.D NEW SIDE DRAIN NTS NOT TO SCALE N.W NORTH WEST N.W.L NORMAL WATER LEVEL N.W.R NO WORK REQUIRED</p> <p>O</p> <p>OUTL. OUTLET</p> <p>P</p> <p>% PERCENT PART PARTIAL PAVMT PAVEMENT P.C POINT OF CURVATURE PC PRESTRESSED CONCRETE P/C PRE-CAST P.C. CONC PORTLAND CEMENT CONCRETE P.C.C POINT OF COMPOUND CURVE P.C.T POINT OF COMMON TANGENCY P.D PRIVATE DRIVE P.I POINT OF INTERSECTION P.JJ PENERANGAN JALAN UMUM (PUBLIC ROAD LIGHTING) P OR Φ PLATE P.L PROPERTY LINE P.O.C POINT ON CURVE P.O.T POINT ON TANGEN P.P POWER POLE P.R.C POINT ON REVERSE CURVE PREST PRESTRESSED PROJ PROJECTION PROP PROPOSED P.T POINT OF TANGENCY P.V.C POINT OF VERTICAL CURVATURE P.V.V.C POINT OF VERTICAL INTERSECTION P.V.R.C POINT OF VERTICAL REVERSE CURVATURE P.V.T POINT OF VERTICAL TANGENCY</p>	<p>R</p> <p>R RADIUS OF CURVE RCSC REINFORCED CONCRETE SLAB CULVERT RCBC REINFORCED CONCRETE BOX CULVERT R.C.P REINFORCED CONCRETE PIPE R.C.P.A REINFORCED CONCRETE PIPE ARCH RD ROAD RDWY ROADWAY REINF REINFORCING OR REINFORCEMENT REL RELOCATED REPL REPLACED REQ'D REQUIRED RES RESIDENTIAL RES'D RE-EXCAVATED SIDE DRAIN REST RESTAURANT R.H RIGHT HAND ROD RUN OF DRAIN ROW,R/W RIGHT OF WAY R.P REFERENCE POINT R.R RAILROAD RT RIGHT R.F RIGHT FORWARD RLWY RAILWAY REROD RE-EXCAVATED ROD</p> <p>S</p> <p>S SLOPE SALV SALVAGE S.C SPIRAL TO CIRCLE, SPIRAL - CURVE SCH SCHOOL SCN HIGH PRESSURE SODIUM LAMP S.C.S SPIRAL CURVE SPIRAL S.E SOUTH EAST SECT SECTION SEP SEPTIC TANK S.D SIDE DITCH S.G SUBGRADE SH SHOULDER SHR SHRINKAGE SL SLOPING SO SOUTH SP SPECIAL S.P.S STRUCTURAL PLATE ARCH SPECS SPECIFICATIONS S.P.P STRUCTURAL PLATE PIPE S.P.P.A STRUCTURAL PLATE PIPE ARCH SQ SQUARE SQM SQUARE METERS S.S SERVICE STATION SS SPIRAL - SPIRAL S.ST SINGLE SURFACE TREATMENT S.T SPIRAL OF TANGENT STA STATION STD STANDARD STIRR STIRRUP STR STRUCTURAL SUBD SUBDIVISION SUM SUMATRA SURF. SURFACE SW SIDEWALK S.W SOUTH WEST SYMM SYMMETRICAL</p>	<p>T</p> <p>T TANGENT LENGTH OF CURVE TAN TANGENT T.B.M TEMPORARY BENCH MARK TC TANGENT CURVE θ THETA ANGLE, CENTRAL ANGLE OF SPIRAL TEM TEMPORARY THK THICKNESS T.K.P TRAVERSE CONTROL POINT T.L TRANSIT LINE T.S TANGENT SPIRAL Ts TANGENT LENGTH OF SPIRALED CURVE T.T TRANSMISSION TOWER TYP TYPICAL</p> <p>U</p> <p>U URBAN</p> <p>V</p> <p>V VOLTAGE VA VOLT AMPERE VAR VARIES V,VEL VELOCITY V.C VERTICAL CURVE VERT VERTICAL</p> <p>W</p> <p>W WELL,WATT W.B WATER BOUND MACADAM WD WOOD WGT WEIGHT WH WAREHOUSE W/O WITHOUT W.R WORK REQUIRED W.S WATER SERVICE W.T WATER POWER W.W WING WALL</p> <p>1R NUMBER OF GROUP PHASE.R 2S NUMBER OF GROUP PHASE.S 3T NUMBER OF GROUP PHASE.T</p>
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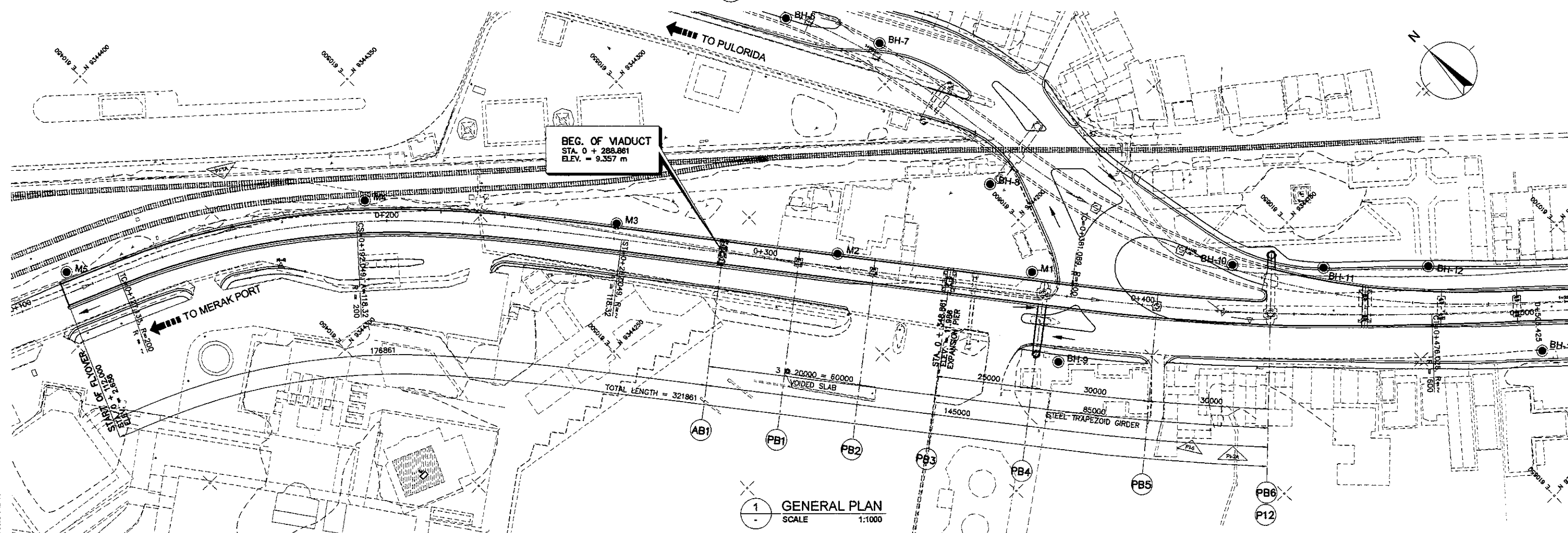
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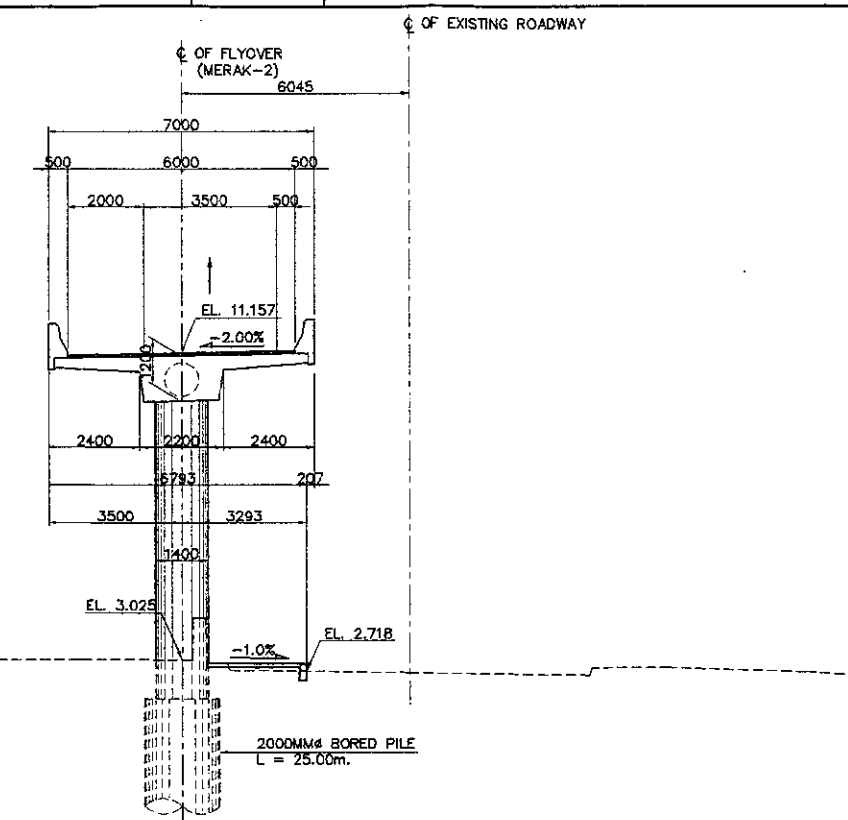
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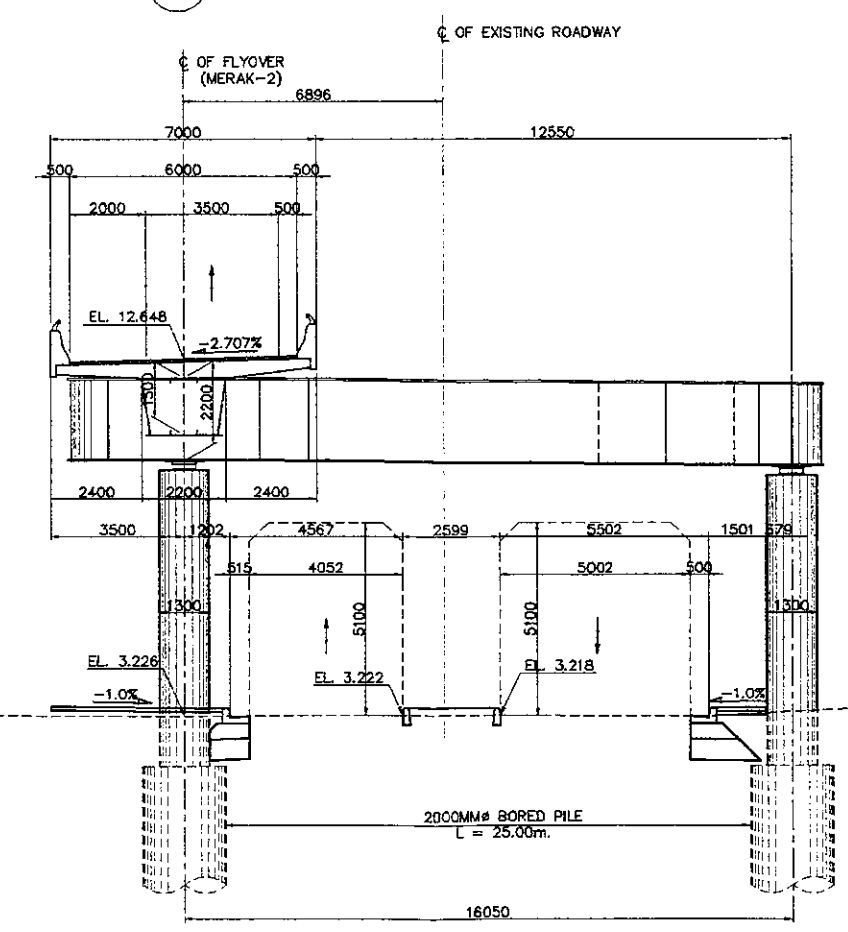
1 GENERAL PLAN

 SCALE 1:1000



3 SECTION @ PIER (PB2) VOIDED SLAB GIRDER

 SCALE 1:100



4 SECTION @ PIER (PB4) STEEL TRAPEZOID GIRDER

 SCALE 1:100

DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	

GENERAL NOTES ROADS AND DRAINAGE

1. DESIGN STANDARDS / SPECIFICATIONS

- 1.1. ALL GEOMETRIC AND PAVEMENT DESIGN STANDARDS SHALL COMPLY WITH THE VALUES PRESCRIBED IN:
- STANDARD SPECIFICATION FOR URBAN ROADS, RSNI T-14-2004
 - STANDARD SPECIFICATIONS FOR GEOMETRIC DESIGN OF URBAN ROAD, BINA MARGA, 1992.
 - A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, 2004 EDITION OF THE AMERICAN ASSOCIATION OF STATE HIGHWAYS AND TRANSPORTATION OFFICIALS (AASHTO).
 - ROADS STRUCTURE ORDINANCE JAPAN ROAD ASSOCIATION (JRA), 2004 EDITION
 - GUIDE FOR DESIGN OF PAVEMENT STRUCTURES, (AASHTO), 1993.
- 1.2. ALL WORKS SHALL COMPLY WITH THE BINA MARGA STANDARD SPECIFICATIONS , AND OTHER SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS PERTAINING TO THIS PROJECT.

2. SURVEY CONTROLS AND REFERENCES

- 2.1. HORIZONTAL CONTROL IS BASED THROUGH GLOBAL POSITIONING SYSTEM (GPS) ESTABLISHED BY PT. VIRAMA KARYA. LIST OF SURVEY CONTROLS ARE SHOWN IN THE SUCCEEDING SHEETS.
- 2.2. VERTICAL CONTROL IS REFERRED FROM "JARING KONTROL VERTIKAL NASIONAL (TITIK TINGGI GEODESI = TTD)" ESTABLISHED DATUM.
- 2.3. ALL CONTROLS SHALL BE VERIFIED BEFORE CONSTRUCTION, THE CONTRACTOR SHALL INVESTIGATE ALL DRAWING PLANS AND CONDUCT FIELD INVESTIGATION SURVEY TO DETERMINE ACTUAL FIELD CONDITION. THE CONTRACTOR SHALL REPORT TO THE ENGINEER IF THERE ARE DIFFERENCES BETWEEN DRAWING PLANS AND ACTUAL FIELD CONDITIONS .

3. ALIGNMENT CONTROLS AND REFERENCES

- 3.1. PROJECT IMPLEMENTATION OF ALL FLYOVERS SHALL BE DONE IN THREE (3) CONSTRUCTION PACKAGES:
- CONTRACT PACKAGE 1 – MERAK AND BALARAJA FLYOVERS
 - CONTRACT PACKAGE 2 – NAGREG AND GEBANG FLYOVERS
 - CONTRACT PACKAGE 3 – PETERONGAN AND TANGGULANGIN FLYOVERS
- 3.2. MERAK FLYOVER HAS THE FOLLOWING MAJOR CONTROL POINTS USED IN THE DESIGN OF HORIZONTAL AND VERTICAL ALIGNMENT:
- EXISTING RAILWAY CROSSING
 - ASDP PROPERTY
 - EXISTING RAILWAY GRADIENT
 - EXISTING ROADWAY WIDTH
 - ADJACENT BUILT - UP AREAS
 - FUTURE BUS TERMINAL

4. DIMENSIONS

- 4.1. DISTANCES AND ELEVATIONS SHOWN ON THE PLANS ARE IN MILLIMETERS (mm) AND METERS (m) UNLESS OTHERWISE SPECIFIED. OTHER UNITS OF MEASUREMENT ARE EXPRESSED IN THE MORE APPROPRIATE UNITS OF THE INTERNATIONAL SYSTEM OF UNIT (METRIC) .
- 4.2. CONTRACTOR SHALL CLARIFY TO THE ENGINEER ALL DIMENSIONS AND ELEVATIONS SHOWN IN THE DRAWINGS BEFORE CONSTRUCTION.

5. STATIONINGS

- 5.1. THE STATIONINGS OF HORIZONTAL ALIGNMENT OF THE PROJECT ROAD ARE RELATIVE TO THE CENTERLINE SHOWN ON THE PLANS.
- 5.2. STATIONING OF CURB INLET MANHOLE, MANHOLE, BEGINNING AND END OF FLYOVER AND OTHER STRUCTURES ARE RECKONED AT THE CENTERLINE STATIONINGS SHOWN ON THE PLANS.
- 5.3. ELEMENTS OF CURVE, BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE RELATIVE TO THE ROAD CENTERLINE.
- 5.4. SERVICE ROADS STATIONING ARE BASED FROM DESIGN CENTERLINE OF THE ROAD/ FLYOVER.

6. ELEVATIONS AND GRADES

- 6.1. FINISHED GRADE ELEVATIONS SHOWN ON PROFILE SHEETS REFER TO FINISHED ROAD LEVEL SHOWN IN TYPICAL ROADWAY SECTIONS.
- EXISTING GRADE LEVEL SHOWN ON PROFILE SHEETS REFER TO THE PAVEMENT ORIGINAL GROUND ALONG THE CENTERLINE OF THE PROJECT ROAD AS SHOWN IN THE TYPICAL ROADWAY SECTIONS, OR AS INDICATED IN THE PLANS.

7. REMOVAL OF EXISTING STRUCTURES AND RELOCATION OR PROTECTION OF EXISTING UTILITIES

- 7.1. REMOVAL OF EXISTING BUILDINGS, HOUSES, FENCES, UTILITY POLES, PUBLIC UTILITIES, ETC. WILL NOT BE THE RESPONSIBILITY OF THE CONTRACTOR; THEY WILL BE REMOVED BY THEIR RESPECTIVE OWNERS OR BY BINA MARGA PRIOR TO CONSTRUCTION.
- 7.2. DISPOSAL OR REPLACEMENT OF SACRED BUILDING SHALL BE APPROVED BY THE LOCAL GOVERNMENT.
- 7.3. PORTION OF UTILITIES, SUCH AS WATER LINES, TELEPHONE TRUNK LINES, ELECTRIC LINES, ETC., THAT MAY OBSTRUCT THE CONSTRUCTION OF THE PROJECT SHALL BE RELOCATED BY THE ENTITIES OR OWNERS CONCERNED. EXTREME PRECAUTION SHALL BE EXERCISED BY THE CONTRACTOR SO AS NOT TO DAMAGE THE EXISTING UTILITIES DURING CONSTRUCTION. ANY DAMAGE THEREOF SHALL BE ON THE ACCOUNT OF THE CONTRACTOR.
- 7.4. UTILITIES WHICH HAVE SPECIAL CHARACTER LIKE GAS AND OIL PIPE SHALL BE PECULIARY TREATED WITH MUCH IMPORTANCE. IF IT NEED TO BE RELOCATED OR PROTECTED, THEN IT MUST BE DONE BEFORE THE CONSTRUCTION COMMENCE. WRITTEN APPROVAL / PERMISSION SHALL BE GIVEN TO THE CONTRACTOR BY THE UTILITIES OWNER THROUGH THE ENGINEER OR THE SUPERVISION CONSULTANT.
- 7.5. SUPPORTS FOR ABOVE GROUND UTILITIES TO BE RELOCATED/ REPLACED SHALL BE PLACED IN SUCH A WAY THAT THEY WILL NOT OBSTRUCT VEHICULAR AND PEDESTRIAN MOVEMENTS.

8. ROAD CONNECTIONS AND PRIVATE ENTRANCES

- 8.1. APPROACHES AND CONNECTIONS SHALL BE CONSTRUCTED BY THE CONTRACTOR AS SHOWN ON THE PLAN OR AS DIRECTED BY THE ENGINEER IN SUCH MANNER AS TO ENSURE SMOOTH CONNECTION AND RIDING QUALITY.
- 8.2. EXACT LOCATIONS OF INTERSECTION ROADS, AND PRIVATE ENTRANCES OR DRIVEWAYS WHERE ITEM 8.1 ABOVE APPLIES, SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
- 8.3. DROP CURB AND GUTTER OR MOUNTABLE CURB AND GUTTER SHALL BE PROVIDED TO EXISTING ENTRANCES OR DRIVEWAYS AS SHOWN IN THE PLAN.
- 8.4. CURB - CUT RAMP SHALL BE PROVIDED AT SIDEWALK AND MEDIAN AS SHOWN IN THE STANDARD DRAWINGS THESE ARE INTENDED SPECIALLY FOR PEDESTRIANS WITH DISABILITY. LOCATIONS SHALL BE AS DIRECTED BY THE ENGINEER.
- 8.5. LIMIT OF CONSTRUCTION FOR ROAD CONNECTIONS AND PRIVATE ENTRANCES SHALL BE AS SHOWN IN THE DRAWING OR AS DIRECTED BY THE ENGINEER.

9. DRAINAGE STRUCTURE

- 9.1. EXACT LOCATIONS, SLOPES, OUTFALLS, AND INVERT ELEVATIONS OF DRAINAGE STRUCTURES SHALL BE CHECKED IN THE FIELD BY THE ENGINEER, MINOR ADJUSTMENTS MAY BE MADE TO SUIT ACTUAL FIELD CONDITIONS UPON APPROVAL BY THE ENGINEER.
- 9.2. EXISTING DRAINAGE STRUCTURES THAT ARE FAULTY, BROKEN DOWN, OR NOT IN GOOD WORKING CONDITION SHALL BE DETERMINED IN THE FIELD. RECONSTRUCTION, REPAIR AND / OR REPLACEMENT OF SAME SHALL BE DIRECTED BY THE ENGINEER, AND SHALL CONFORM TO THE STANDARDS SHOWN IN THE DRAWINGS.
- 9.3. EXISTING DRAINAGE STRUCTURES OR PARTS THEREOF REMOVED BY THE CONTRACTOR THAT ARE STILL SERVICEABLE SHALL BE TURNED OVER TO THE GOVERNMENT AND SHALL BE DEPOSITED AT A PLACE DESIGNATED BY THE ENGINEER. EXTREME PRECAUTIONS SHALL BE EXERCISED BY THE CONTRACTOR NOT TO DAMAGE THESE MATERIALS DURING REMOVAL AND HANDLING OPERATION.
- 9.4. CLEANING , UNBLOCKING AND/ OR RELAYING OF REINFORCED CONCRETE PIPES, CLEANING OF CHANNELS AND DITCHES AS DIRECTED BY THE ENGINEER SHALL BE UNDERTAKEN BY THE CONTRACTOR TO ENSURE AN OPERATIONAL TEMPORARY DRAINAGE SYSTEM DURING THE CONSTRUCTION PERIOD.
- 9.5. LAYOUT OF EXISTING SIDE DITCH, PIPE CULVERT, AND BOX CULVERT ARE BASED FROM TOPOGRAPHIC SURVEY. EXACT LOCATION AND DEPTH SHALL BE VERIFIED IN THE FIELD PRIOR TO THE CONSTRUCTION.
- 9.6. ALL INVERT ELEVATIONS OF EXISTING PIPES AND BOX CULVERTS SHALL BE VERIFIED PRIOR TO CONSTRUCTION IN ORDER TO SMOOTHLY JOIN TO THE NEW DRAINAGE SYSTEM.

10. ROAD SIGN AND PAVEMENT MARKINGS

- 10.1. ROAD SIGNS SHALL CONFORM WITH THE " DINAS PERHUBUNGAN LALU LINTAS DAN ANGKUTAN JALAN SETEMPAT "
- 10.2. PAVEMENT MARKINGS OR ROAD MARKINGS SHALL CONFORM WITH THE " DINAS PERHUBUNGAN LALU LINTAS DAN ANGKUTAN JALAN SETEMPAT "
- 10.3. INSTALLATION OF ROAD SIGNS AND PAVEMENT MARKINGS SHALL BE APPROVED BY THE ENGINEER.

11. TRAFFIC MANAGEMENT

- 11.1. DURING THE CONSTRUCTION PERIOD, THE CONTRACTOR SHALL INSTALL TRAFFIC MANAGEMENT SIGN WHICH WILL PROVIDE SAFETY, CONVENIENCE, AND SMOOTH RIDING QUALITY OF MOTORISTS IN ACCORDANCE WITH THE TRAFFIC REGULATIONS. WRITTEN APPROVAL / PERMISSION SHALL BE GIVEN BY THE ENGINEER AND THE " DINAS PERHUBUNGAN LALU LINTAS & ANGKUTAN SETEMPAT " TO THE CONTRACTOR PRIOR TO IMPLEMENTATION.

 JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL	DESIGNED BY	CHECKED BY	SUBMITTED BY	 REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF HIGHWAYS	PROJECT AND LOCATION :	SCALE :	DRAWING TITLE :	DRAWING NO. :			
	Name	A. GOURLEY	Name		T. OKUMURA	Name	M. KIUCHI	DETAILED DESIGN STUDY OF NORTH JAVA CORRIDOR FLYOVER PROJECT MERAK FLYOVER - CONTRACT PACKAGE 1 (MERAK - BALARAJA) BANTEN PROVINCE	NOT TO SCALE FULL SIZE A3	GENERAL NOTES FOR STRUCTURES (1 OF 3)	MGE-012
	Sign		Sign			Sign					SHEET NO. :
Date		Date		Date							
				APPROVED BY	Ir. HERRY VAZA M,Eng.Sc NIP. : 110038400						

GENERAL NOTES FOR STRUCTURES (1)

GENERAL

- IN THE INTERPRETATION OF DRAWINGS, INDICATED DIMENSIONS SHALL GOVERN ALL DIMENSIONS. DISTANCES AND SIZES SHALL NOT BE SCALED FOR CONSTRUCTION PURPOSES.
- ELEVATIONS, STATIONS AND COORDINATES ARE SHOWN IN METERS, OTHER DIMENSIONS AND MEMBER SIZES ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.

DESIGN CRITERIA

1. DESIGN SPECIFICATIONS

1.1 CODES AND STANDARDS

THE NORTH JAVA CORRIDOR FLYOVER PROJECT SHALL BE DESIGNED IN ACCORDANCE WITH THE FOLLOWING DESIGN CODES AND STANDARDS.

- BRIDGE DESIGN CODE, DRAFT, VOLUME 1 AND VOLUME 2-BRIDGE MANAGEMENT SYSTEM 1992, DIREKTORAT JENDERAL BINA MARGA DEPARTEMEN PEKERJAAN UMUM.
- BRIDGE DESIGN MANUAL, DRAFT, VOLUME 1 AND VOLUME 2-BRIDGE MANAGEMENT SYSTEM 1992, DIREKTORAT JENDERAL BINA MARGA DEPARTEMEN PEKERJAAN UMUM.
- PEMBEBANAN UNTUK JEMBATAN, RSNI4. (LOADING FOR BRIDGES)
- STANDAR PERENCANAAN KETAHANAN GEMPA UNTUK JEMBATAN, SNI. (DESIGN STANDARD OF EARTHQUAKE RESISTANCE FOR BRIDGES)
- PERENCANAAN STRUKTUR BETON UNTUK JEMBATAN, RSNI (DESIGN OF CONCRETE STRUCTURE FOR BRIDGE)
- PERENCANAAN STRUKTUR BAJA UNTUK JEMBATAN, RSNI4 (DESIGN OF STEEL STRUCTURE FOR BRIDGE)
- AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 3RD EDITION.

1.2 OTHER REFERENCE

FOR DESIGN REQUIREMENTS NOT COVERED BY THE ABOVE CODES AND STANDARDS THE FOLLOWING REFERENCES WILL BE USED AS REQUIRED:

- JAPANESE SPECIFICATIONS FOR HIGHWAY BRIDGES
- AS 5100, BRIDGE DESIGN, AUSTRALIAN STANDARD, 2004
- EN 1994 EUROCODE 4: DESIGN OF COMPOSITE STEEL AND CONCRETE STRUCTURES
- FHWA-IF-99-025, "DRILLED SHAFTS: CONSTRUCTION PROCEDURES AND DESIGN METHODS", 1999
- FHWA-NHI-00-043, "MECHANICALLY STABILIZED EARTH WALLS AND REINFORCED SOIL SLOPES, DESIGN & CONSTRUCTION GUIDELINES", 2001
- NCHRP REPORT 529, "GUIDELINES AND RECOMMENDED STANDARD FOR GEOFOAM APPLICATIONS IN HIGHWAY EMBANKMENTS", TRANSPORT RESEARCH BOARD, 2004

2. LOADING SPECIFICATIONS

THE LOADING SPECIFICATIONS TO BE USED FOR THE DESIGN OF STRUCTURES ARE THE "PEMBEBANAN UNTUK JEMBATAN, RSNI 4" (LOADING FOR BRIDGES). ACCORDING TO THE ABOVE SPECIFICATIONS, BASIC DESIGN CONDITION ARE AS FOLLOWS :

2.1 LOADING CLASSIFICATIONS

100% "D" (LANE LOADING) AND 100% "T" (TRUCK LOADING) ARE APPLIED

2.2 APPLICATION OF "D" LOADING

THE UDL MAY BE APPLIED IN BROKEN LENGTHS TO MAXIMIZE ITS EFFECTS ON CONTINUOUS BRIDGES OR UNUSUAL STRUCTURES

A SINGLE KEL PERPENDICULAR TO THE DIRECTION OF TRAFFIC SHALL BE PLACED IN ANY POSITION ALONG THE BRIDGE FOR CONTINUOUS BRIDGES, TO PRODUCE THE MAXIMUM NEGATIVE BENDING MOMENT.

2.3 DYNAMIC LOAD ALLOWANCE (IMPACT)

TO PROVIDE THE DYNAMIC STRENGTH AND VIBRATION INFLUENCE, STRESSES PRODUCED BY THE LOADING SHALL BE MULTIPLIED BY A DYNAMIC LOAD ALLOWANCE (IMPACT) COEFFICIENT. THIS IMPACT COEFFICIENT IS ONLY TO THE KNIFE EDGE LOAD (KEL). UNIFORM LOAD "D" LOADING ARE NOT APPLIED FOR IMPACT.

2.4 EARTHQUAKE FORCE

EARTHQUAKE FORCE WAS APPLIED IN ACCORDANCE WITH "PEMBEBANAN UNTUK JEMBATAN, RSNI 4 (LOADING FOR BRIDGES); STANDAR PERENCANAAN KETAHANAN GEMPA UNTUK JEMBATAN, SNI (DESIGN STANDARD OF EARTHQUAKE RESISTANCE FOR BRIDGES)"

THE PEAK GROUND ACCELERATION OF BEDROCK AT EACH OF THE PROJECT FLYOVER SITES, OBTAIN FROM MAP OF SEISMIC ZONES FOR INDONESIA WITH A 500 YEAR RETURN PERIOD, IS PRESENTED IN TABLE BELOW :

SEISMIC ZONE AND PEAK GROUND ACCELERATION

NAME OF FLYOVER	SEISMIC ZONE	PEAK GROUND ACCELERATION
MERAK	2	0.46 - 0.50
BALARAJA	3	0.36 - 0.40
NAGREG	3	0.36 - 0.40
GEBANG	3	0.36 - 0.40
PETERONGAN	4	0.26 - 0.30
TANGGULANGIN	4	0.26 - 0.30

SEISMIC PERFORMANCE CATEGORY D FOR ALL FLYOVER.

2.5 THERMAL FORCES

THE AMBIENT TEMPERATURE ASSUMED FOR DESIGN IS 28°C. TEMPERATURE VARIATION IS 15°C - 45°C FOR STEEL STRUCTURE AND 15°C - 40°C FOR CONCRETE STRUCTURE.

MATERIALS FOR STRUCTURES

1. CONCRETE

THE USE OF EACH CLASS OF CONCRETE SHALL BE USE FOLLOWS UNLESS OTHERWISE SHOWN ON THE DRAWINGS OR DIRECTED BY THE ENGINEER. DESIGN STRENGTH OF CONCRETE IS SPECIFIED AS FOLLOWS :

CONCRETE CLASS	CHARACTERISTIC COMPRESSIVE STRENGTH (MPa)	APPLICATION OF STRUCTURE
A - 1	40	PRE-CAST PRE-STRESSED CONCRETE STRUCTURE
A - 2	35	CAST-IN-SITU PRE-STRESSED CONCRETE STRUCTURE
B - 1	30	DECK SLAB, PIER HEADS AND COLUMNS, DIAPHRAGMS OF P.C.I-GIRDER, ABUTMENT, FOOTING CONCRETE BARRIER
B - 2	30	CAST-IN-SITU REINFORCED CONCRETE PILES, BORED PILES
C	20	RETAINING WALL
D	15	GRAVITY TYPE RETAINING WALLS
E	8	LEVELING CONCRETE

2. REINFORCING STEEL

2.1 TYPE, DESIGNATION AND MINIMUM YIELD STRENGTH OF REINFORCING STEEL FOR CONCRETE STRUCTURE ARE SPECIFIED AS FOLLOWS :

TYPE	GRADE	YIELD POINT (N/mm ²)	APPLICATION STANDARD		
			SII	JIS	BS
ROUND BARS	SR 24	240	SII 0136	G 3112	BS 4449
DEFORMED BARS	SD 40	390	SII	G 3112	BS 4449

2.2 REINFORCING STEEL SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH CONCRETE.

3. STRUCTURAL STEEL

TYPE, DESIGNATION AND MINIMUM YIELD POINT AND TENSILE STRENGTH OF STRUCTURAL STEEL AS FOLLOWS :

JIS STANDARD			APPLICATION STANDARD		
DESIGNATION	YIELD POINT (N/mm ²)	TENSILE STRENGTH (N/mm ²)	DESIGNATION	YIELD POINT (N/mm ²)	TENSILE STRENGTH (N/mm ²)
G 3101			A 36	250	400 - 500
SS 400	215 - 245	400 - 510			
G 3106			A 242	290 - 340	≥ 430
SM 400	215 - 245	400 - 510	A 440	290 - 340	430 - 480
SM 490	295 - 325	490 - 610	A 441	290 - 340	430 - 480
SM 490 Y	325 - 365	490 - 610	A 588	290 - 340	430 - 480
SM 520	325 - 365	520 - 640	A 572	410 - 450	510 - 550
SM 570	420 - 460	570 - 720			
G 3114					
SMA 400W	215 - 245	400 - 540			
SMA 490W	325 - 365	490 - 610			
SMA 570W	420 - 460	570 - 720	A 514	620 - 690	690 - 900

- G 3101 : ROLLED STEEL OF GENERAL STRUCTURE
- JIS G 3106 : ROLLED STEEL FOR WELDED STRUCTURE
- JIS G 3114 : HOT-ROLLED ATMOSPHERIC CORROSION RESISTING

4. PRESTRESSING TENDON

TYPE, DESIGNATION AND MINIMUM YIELD POINT AND TENSILE STRENGTH OF PRESTRESSING TENDON ARE SPECIFIED AS FOLLOWS :

NOTATION	UTILIZATION	NOMINAL DIAMETER (mm)	YIELD STRENGTH (Kg/mm ²)	BRAKING STRENGTH (Kg/mm ²)	APPLICATION STANDARD	
					JIS	ASTM
PC WIRE SWPR 1A	PC PILE	∅ 7	135	155	G 3536	A 421
PC 7 WIRE STRAND SWPR 7B	PC HOLLOW CORE SLAB UNIT AND PC DOUBLE TRAPEZOID GIRDER, PC I-GIRDER	T 12.7	160	190	G3536	A 416
PC 19 WIRE STRAND SWPR 19	TRANSVERSAL CABLE FOR DECK SLAB AND DIAPHRAGM OF PC STRUCTURE	T 21.8	160	190	G 3536	A 416
PC BAR		∅ 32				

GENERAL NOTES FOR STRUCTURES (2)

CONSTRUCTION

1. SETTING OUT

THE SETTING OUT AND ELEVATIONS OF THE DIFFERENT COMPONENTS OF THE STRUCTURE SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE START OF ANY CONSTRUCTION WORK.

2. REINFORCED CONCRETE

2.1 CODES AND STANDARDS

- 1) DESIGN OF CONCRETE MIX SHALL MEET THE DESIGN CONCRETE STRENGTH GIVEN UNDER ITEM 1 OF MATERIALS.
- 2) CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE WITH THE SPECIFICATIONS.
- 3) FOR CONCRETE DEPOSITED AGAINST THE GROUND. BLINDING CONCRETE WITH A MINIMUM THICKNESS OF 100MM SHALL BE LAID FIRST BEFORE INSTALLING THE REINFORCEMENT. THIS BLINDING CONCRETE SHALL NOT BE CONSIDERED IN MEASURING THE STRUCTURAL DEPTH OF CONCRETE SECTION.
- 4) THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL IN PLACING SEQUENCES FOR ALL CONCRETING WORKS.

2.2 REINFORCEMENT DETAILS

- 1) THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL DETAILED SHOP DRAWINGS INDICATING THE BONDING, CUTTING, SPLICING AND INSTALLATION OF ALL REINFORCING BARS.
- 2) BARS SHALL BE BENT, COLD BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE ENGINEER.
- 3) COVERING THICKNESS FOR REINFORCING BARS.

- (1) MINIMUM THICKNESS OF CONCRETE COVERING FOR REINFORCING STEEL BARS SHALL CONFORM TO THE TABLE BELOW COVERING THICKNESS SHALL CONFORM TO THE DESIGN DRAWINGS.
IF THE THICKNESS IS NOT INDICATED IN THE DESIGN DRAWINGS, IT SHALL BE DETERMINED IN ACCORDANCE WITH TABLE BELOW AND APPROVED BY THE ENGINEER.

MINIMUM CONCRETE COVER TO OUTERMOST REINFORCEMENT SHALL BE AS FOLLOWS :

FOR BALARAJA, NAGREG, PETERONGAN AND TANGGULANGIN FLYOVER

SURFACE IN CONTRACT WITH SOIL OR WATER	75 mm
COLUMNS	40 mm
GIRDER AND BEAM CAST-IN-SITU	35 mm
GIRDER AND BEAM PRECAST IN FACTORY	25 mm
SLABS, PARAPETS, ETC	30 mm

FOR MERAK AND GEBANG FLYOVER AT THE COASTAL AREA

SURFACE IN CONTRACT WITH SOIL OR WATER	75 mm
COLUMNS	55 mm
GIRDER AND BEAM CAST-IN-SITU	35 mm
GIRDER AND BEAM PRECAST IN FACTORY	25 mm
SLABS, PARAPETS, ETC	30 mm

- (2) 1.5 TIMES THE MAXIMUM NOMINAL SIZE OF THE AGGREGATE.
- (3) THE COVER IS NOT LESS THAN THE DIAMETER OF REINFORCING BARS.

4) DEVELOPMENT OF REINFORCEMENT

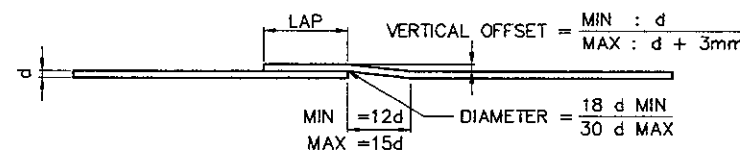
BASIC DEVELOPMENT FOR REBAR

DEVELOPMENT LENGTH/SPLICE LENGTH (mm)	BAR DIAMETER db					
	10	13	16	19	25	32
BASIC DEVELOPMENT LENGTH IN TENSION	300	312	384	456	717	1174
BASIC DEVELOPMENT LENGTH IN TENSION - PLASTIC HINGE	375	390	480	570	896	1468
BASIC DEVELOPMENT LENGTH IN COMPRESSION	200	229	282	334	440	563
BASIC HOOK DEVELOPMENT LENGTH	183	237	292	347	456	584
BASIC HOOK DEVELOPMENT LENGTH - PLASTIC HINGE	228	297	365	434	571	730

5) SPLICES OF REINFORCEMENT

- (1) WHEN PROVIDING SPLICES AT A LOCATION WHEN IT IS NOT INDICATED ON THE DRAWINGS, SUCH A LOCATION MUST BE APPROVED BY THE ENGINEER.
- (2) LAP SPLICES SHALL BE PERMITTED ONLY WITHIN THE CENTER HALF OF COLUMN HEIGHT.
- (3) LAP SPLICES LENGTH SHALL NOT BE LESS THAN 400MM OR 60 BAR DIAMETER, WHICHEVER IS GREATER.
- (4) INDIVIDUAL BAR SPLICES WITHIN A BUNDLES SHALL NOT OVERLAP. ENTIRE BUNDLES SHALL NOT BE LAP SPLICED.
- (5) THE MAXIMUM SPACING OF THE TRANSVERSE REINFORCEMENT OVER THE LENGTH OF THE SPLICE SHALL NOT EXCEED THE SMALLER ONE QUARTER OF THE MINIMUM MEMBER DIMENSION OR 100MM.
- (6) FULL WELDED OR FULL MECHANICAL SPLICES MAY BE USED PROVIDED THAT NOT MORE THAN ALTERNATE BARS IN EACH LAYER OF LONGITUDINAL REINFORCEMENT ARE SPLICED AT A SECTION AND THE DISTANCE BETWEEN SPLICES OF ADJACENT BARS SHALL BE GREATER THAN 600MM.
- (7) WELDING FOR WELDED SPLICES SHALL CONFORM TO THE CURRENT EDITION OF STRUCTURAL WELDING CODE - REINFORCING STEEL OF AWS (D1.4).
A FULL -WELDED SPLICES SHALL BE REQUIRED TO DEVELOP IN TENSION, AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF THE BAR.

5) CRANKED SPLICES



7) HOOKS AND BENDS

STANDARD HOOKS FOR LONGITUDINAL REINFORCEMENT SHALL BE AS FOLLOWS :

- 180° BEND PLUS A 4.0 db EXTENSION BUT NOT LESS THAN 65MM AT FREE END OF THE BAR.
- 90° BEND PLUS A 12.0 db EXTENSION AT THE FREE END OF THE BAR.

STANDARD HOOKS FOR TRANSVERSE REINFORCEMENT SHALL BE AS FOLLOWS :

- 16MM DIAMETER BARS AND SMALLER - 90° BEND PLUS A 6.0 db EXTENSION AT THE FREE END OF THE BAR.
- 19 TO 25MM DIAMETER BAR - 90° BEND PLUS A 12.0 db EXTENSION AT THE FREE END OF THE BAR.
- 25MM BAR AND GREATER - 135° BEND PLUS A 6.0 db EXTENSION AT THE FREE END OF THE BAR.

SEISMIC HOOKS

SEISMIC HOOKS SHALL CONSIST OF 135° BEND PLUS A 6.0 db EXTENSION, BUT NOT LESS THAN 75MM AT THE FREE END OF THE BAR.

STANDARD HOOK FOR TRANSVERSE REINFORCEMENT

BENDING ANGLE OF BARS	FIGURE	DIAMETER OF BARS	DIAMETER OF BEND OF BARS OUT TO OUT	STRAIGHT EXTENSION LENGTH	REMARKS
90°		D10 TO D16 GENERAL	6 db	6 db	
		D10 TO D16 STIRRUP AND TIES	4 db	6 db	
		D32	6 db	12 db	
135°		D10 TO D25	8 db	6 db	

STANDARD HOOK IN TENSION

BENDING ANGLE OF BARS	FIGURE	DIAMETER OF BARS	DIAMETER OF BEND OF BARS OUT TO OUT	STRAIGHT EXTENSION LENGTH	REMARKS
180°		D10 - D25	8 db	4 db OR 60 mm min	
		D29, D32, D36	10 db		
		D43, D57	12 db		
90°		D10 - D25	8 db	12 db	
		D29, D32, D36	10 db		
		D43, D57	12 db		

8) TIES

IN TIED COMPRESSION MEMBERS, ALL LONGITUDINAL BARS SHALL BE ENCLOSED BY LATERAL TIES THAT SHALL BE EQUIVALENT TO 10MM BARS FOR 32MM DIAMETER BARS OR SMALLER.

THE SPACING AT TIES SHALL NOT EXCEED THE LEAST DIMENSION OF THE MEMBER OR 300MM.

TIES SHALL BE LOCATED VERTICALLY NOT MORE THAN HALF A TIE SPACING ABOVE THE FOOTING AND NOT MORE THAN HALF A TIE SPACING BELOW THE LOWEST HORIZONTAL REINFORCEMENT IN THE SUPPORT MEMBER.

9) REBAR DESCRIPTION

BAR MARK	NO.	BAR DIAMETER	SPACING	NOTE
FOR COLUMNS REFERENCES TO BAR SPACING IS NOT GIVEN. BAR SHALL BE PLACED TO GIVE EQUAL SPACING IN COLUMNS UNLESS NOTED OTHERWISE.				

GENERAL NOTES FOR STRUCTURES (3)

10) PLACEMENT AND INSPECTION

- (1) MAINTAIN PROPER SPACING BETWEEN BARS, USING SPACERS, HANGERS OF BAR SUPPORT.
- (2) UNLESS OTHERWISE SHOWN ON THE PLANS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN A LAYER SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL BAR DIAMETER OF THE BAR NOR LESS THAN 1.5 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE.

FOR MULTILAYER, THE CLEAR DISTANCE BETWEEN LAYERS SHALL NOT BE LESS THAN 25MM OR THE NOMINAL DIAMETER. THE BARS IN THE UPPER LAYER SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.

11) CONSTRUCTION JOINT

- (1) THE POSITION AND FORM OF ANY CONSTRUCTION JOINT SHALL BE AS SHOWN ON DRAWINGS OR AS AGREED WITH THE ENGINEER.
- (2) THE INTERFACE BETWEEN THE FIRST AND SECOND POUR CONCRETES SHALL BE ROUGHENED WITH AN AMPLITUDE OF 6MM MINIMUM.

12) FALSEWORK

- (1) ALL FALSEWORK SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO THE APPROVAL OF THE ENGINEER.
- (2) DETAILED WORKING DRAWINGS AND SUPPORTING CALCULATIONS OF THE FALSEWORK SHALL BE FURNISHED BY THE CONTRACTOR TO THE ENGINEER FOR HIS APPROVAL.

13) FORMWORK

- (1) FORMWORK SHALL BE CONSTRUCTED SUCH THAT IT WILL NOT YIELD UNDER LOAD AND SHALL BE SUCH AS TO AVOID THE FORMATION OF FINS.
- (2) UNLESS OTHERWISE SHOWN ON THE PLANS, ALL EXPOSED EDGES SHALL BE CHAMFERED 20MM EXCEPT RAILINGS AND RE - ENTRANT ANGLES WHICH SHALL BE CHAMFERED AND FILLETED 13MM.
- (3) STRIPPING OF FORMS AND SHORINGS SHALL BE AS APPROVED BY THE ENGINEER. THE FOLLOWING MAY BE USED AS A GUIDE :

SHORING UNDER GIRDERS, BEAM, FRAMES	14 DAYS MIN. TIME
DECK SLABS	14 DAYS
WALLS	7 DAYS
COLUMNS	7 DAYS
SIDES OF BEAMS AND ALL OTHER VERTICAL SURFACES	2 DAYS








14) PROTECTION AND CURING OF CONCRETE

CONCRETE SURFACES SHALL BE PROTECTED FROM HARMFUL EFFECTS OF SUN, WIND AND RUNNING WATERS AND SHALL BE KEPT DAMP FOR AT LEAST 7 DAYS.

15) STRUCTURAL STEEL

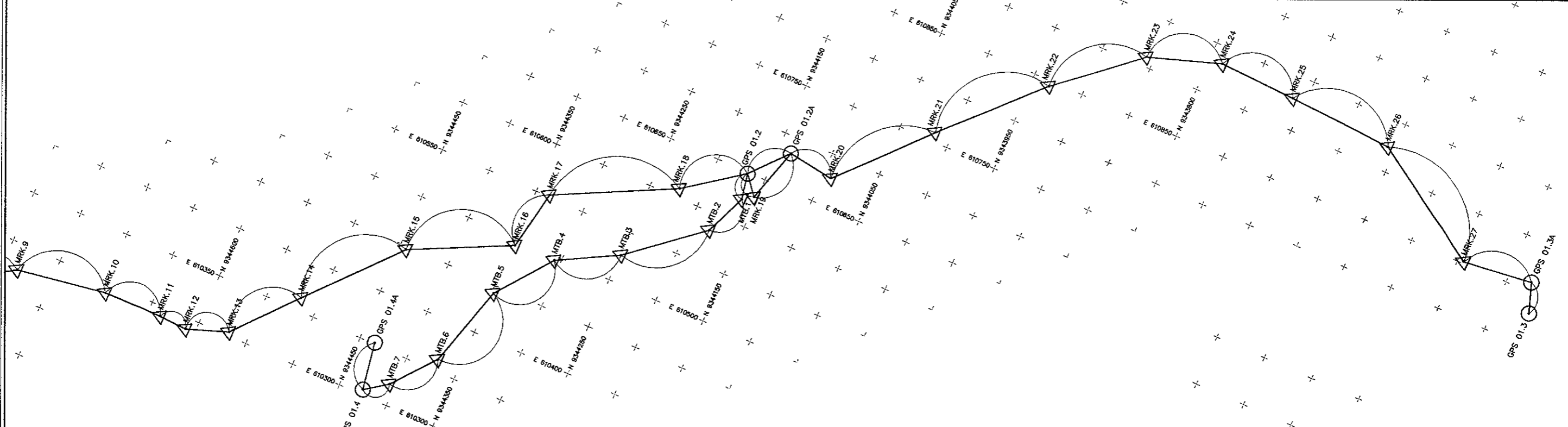
- (1) THE CONTRACTOR SHALL PREPARE AND SUBMIT SHOP DRAWINGS FOR ALL STRUCTURAL STEEL WORKS. THESE SHOP DRAWINGS SHALL BE APPROVED BY THE ENGINEER BEFORE ANY FABRICATION COMMENCES.
- (2) CONSTRUCTION OF STRUCTURAL STEEL.
 - WELDING REQUIREMENTS SHALL IN ALL RESPECT CONFORM TO THE GENERAL SPECIFICATIONS OF THIS PROJECT.
 - THE DIAMETER OF BOLT HOLES SHALL BE 2.5MM LARGER THAN THE NOMINAL DIAMETER OF BOLT.

SYMBOL AND INFORMATION FOR STEEL STRUCTURE DRAWINGS
WELDING SYMBOL

- | | |
|---|-----------------|
|  | SQUARE |
|  | FILLET |
|  | SINGLE V |
|  | DOUBLE V |
|  | BEVEL |
|  | WELD ALL AROUND |
|  | WELD ALL AROUND |

16) QUANTITIES

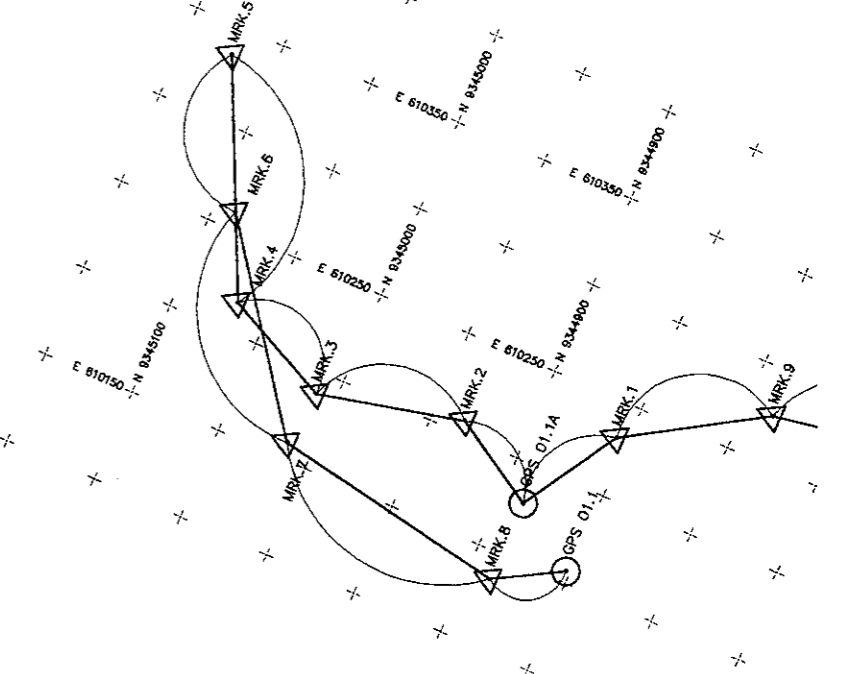
THE QUANTITIES FOR BRIDGE AND STRUCTURES SHOWN ON THE DRAWINGS ARE APPROXIMATELY AND FOR REFERENCE PURPOSES ONLY. ANY DISCREPANCY BETWEEN THESE ESTIMATED QUANTITIES AND THE FINALLY ACCEPTED QUANTITIES SHALL NOT BE A REASON FOR CLAIMS OR DISPUTE.



TRAVERSE DATA					
NO.	NORTHINGS	EASTINGS	AZIMUTH	DISTANCE	ELEVATION
GPS.01-1	9344852.1070	610155.8680	330°23'06"	40.65	2.055
MRK.8	9344887.4502	610135.7763	10°14'53"	128.58	1.883
MRK.7	9345013.9778	610158.6518	53°39'51"	125.01	2.962
MRK.6	9345088.0459	610259.3515	65°02'50"	83.25	5.462
MRK.5	9345123.1664	610334.8296	244°57'51"	131.34	8.280
MRK.4	9345067.5836	610215.8263	205°36'08"	63.41	4.125
MRK.3	9345010.4026	610188.4269	166°40'40"	79.49	2.996
MRK.2	9344933.0501	610206.7441	210°50'32"	52.30	2.781
GPS.01.1A	9344887.2882	610179.4217	121°22'42"	59.79	1.662
MRK.1	9344855.8834	610230.9145	148°15'23"	83.56	2.987
MRK.9	9344784.8272	610274.8745	170°43'26"	89.60	3.998
MRK.10	9344696.3954	610289.3180	178°50'58"	59.10	4.413
MRK.11	9344637.3064	610290.5046	183°03'46"	27.53	4.100
MRK.12	9344609.8193	610289.0339	160°11'00"	43.01	3.961
MRK.13	9344569.3604	610303.6134	130°55'45"	78.00	4.726
MRK.14	9344518.2579	610362.5471	131°40'50"	113.11	4.964
MRK.15	9344443.0433	610447.0240	154°05'48"	106.20	4.721
MRK.16	9344347.5090	610493.4198	100°47'19"	59.54	3.640
MRK.17	9344336.3645	610551.9048	153°25'27"	127.31	3.780
MRK.18	9344222.5077	610608.8597	143°48'33"	67.54	3.164
GPS 01.2	9344167.9960	610648.7440	230°49'30"	23.70	3.730
MRK.19	9344153.0260	610630.3694	106°36'18"	55.68	3.731
GPS 01.2A	9344137.1120	610683.7340	188°06'32"	45.94	3.697
MRK.20	9344091.6368	610677.2522	132°53'11"	111.22	3.908
MRK.21	9344015.9453	610758.7450	134°10'16"	119.57	3.227
MRK.22	9343932.6258	610844.5106	139°06'16"	99.30	3.043
MRK.23	9343857.5631	610909.5217	161°23'06"	74.55	3.938
MRK.24	9343786.9128	610933.3188	182°22'05"	75.70	4.312
MRK.25	9343711.2790	610930.1911	183°49'28"	104.44	4.730
MRK.26	9343607.0717	610923.2248	212°29'03"	133.35	4.514
MRK.27	9343494.5896	610851.6093	173°34'08"	67.41	4.571
GPS 01.3A	9343427.6003	610859.1671	250°52'18"	30.36	3.598
GPS.3	9343417.6481	610830.4740	70°52'18"	151.85	3.952
NBM TTG	-	-	-	-	13.341

TRAVERSE DATA					
NO.	NORTHINGS	EASTINGS	AZIMUTH	DISTANCE	ELEVATION
GPS 01.2A	9344137.1120	610683.7340	311°26'01"	46.67	3.697
GPS 01.2	9344167.9960	610648.7440	258°44'40"	25.62	3.730
MTB.1	9344162.9951	610623.6165	292°57'12"	43.57	-
MTB.2	9344179.9831	610583.5041	320°24'56"	89.25	-
MTB.3	9344248.7497	610526.6477	331°49'23"	65.55	-
MTB.4	9344306.5237	610495.7002	307°55'53"	67.80	-
MTB.5	9344348.193	610442.2343	286°11'57"	83.79	-
MTB.6	9344371.5643	610361.7846	309°21'03"	53.41	-
MTB.7	9344405.4236	610320.4919	324°26'08"	36.75	-
GPS.01-4	9344427.1753	610304.9413	80°43'47"	47.24	2.326
GPS.01-4A	9344434.7852	610351.5645	-	-	2.783

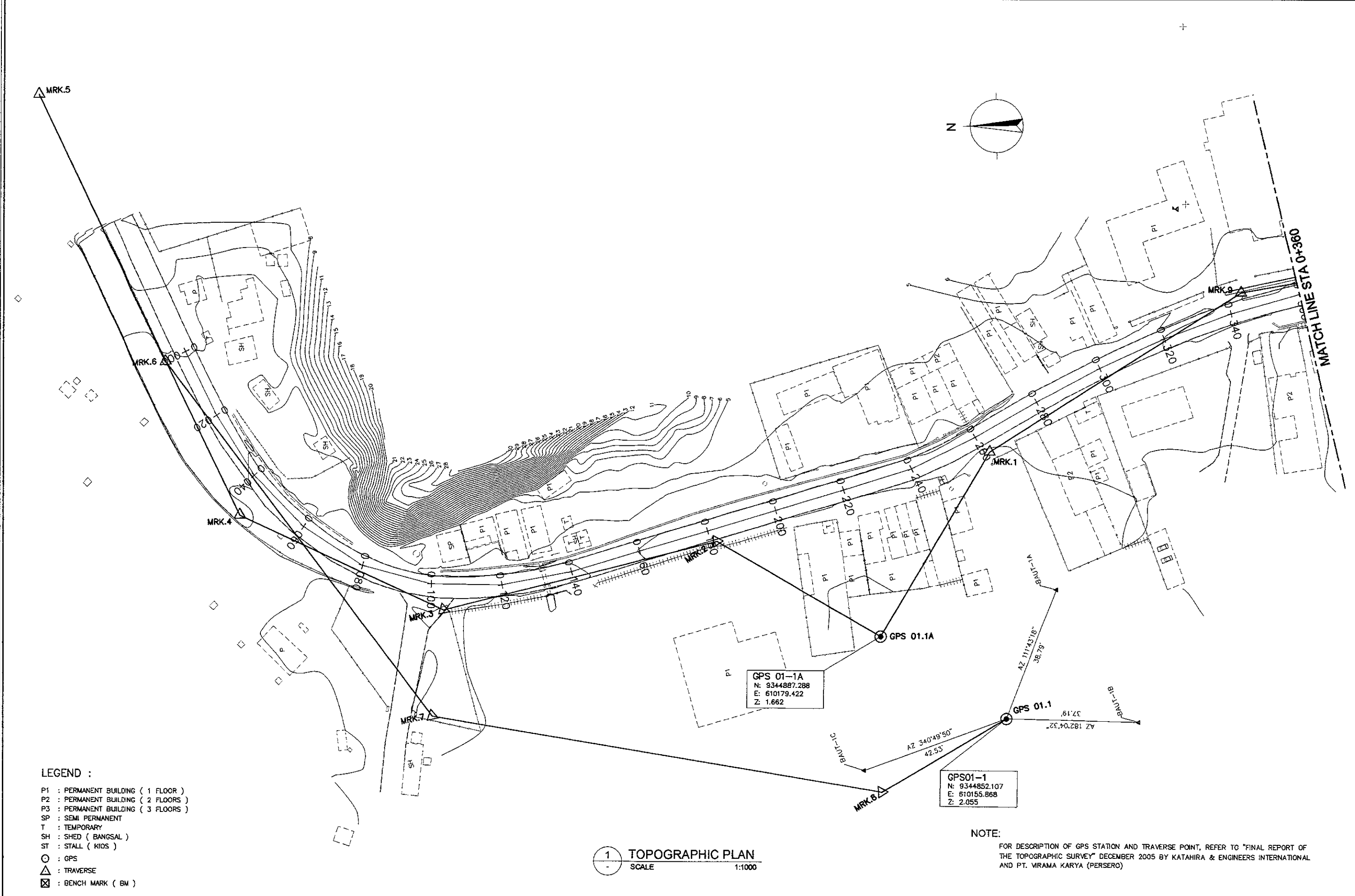
NOTE:
 FOR DESCRIPTION OF GPS STATION AND TRAVERSE POINT, REFER TO "FINAL REPORT OF THE TOPOGRAPHIC SURVEY" DECEMBER 2005 BY KATAHIRA & ENGINEERS INTERNATIONAL AND PT. VIRAMA KARYA (PERSERO)



1 TOPOGRAPHIC SURVEY CONTROL NETWORK GPS, TRAVERSE, BM
 SCALE 1:3500

LEGEND :
 ○ : GPS
 △ : TRAVERSE
 ⊠ : BENCH MARK (BM)

DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



LEGEND :

- P1 : PERMANENT BUILDING (1 FLOOR)
- P2 : PERMANENT BUILDING (2 FLOORS)
- P3 : PERMANENT BUILDING (3 FLOORS)
- SP : SEMI PERMANENT
- T : TEMPORARY
- SH : SHED (BANGSAL)
- ST : STALL (KIOS)
- ⊙ : GPS
- △ : TRAVERSE
- ⊠ : BENCH MARK (BM)

1 TOPOGRAPHIC PLAN
 SCALE 1:1000

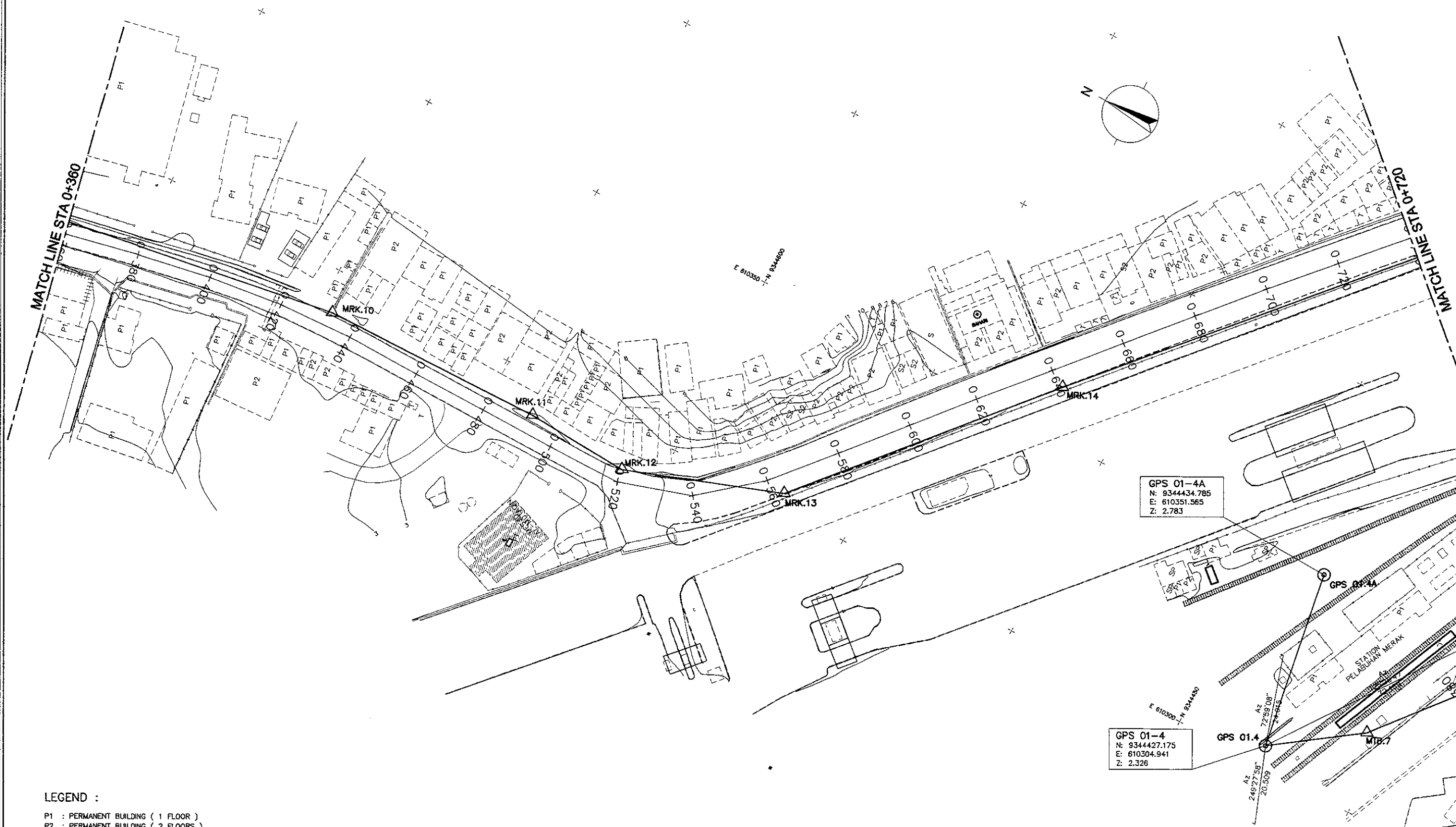
GPS01-1
 N: 9344852.107
 E: 610155.868
 Z: 2.055

GPS 01-1A
 N: 9344887.288
 E: 610179.422
 Z: 1.662

NOTE:

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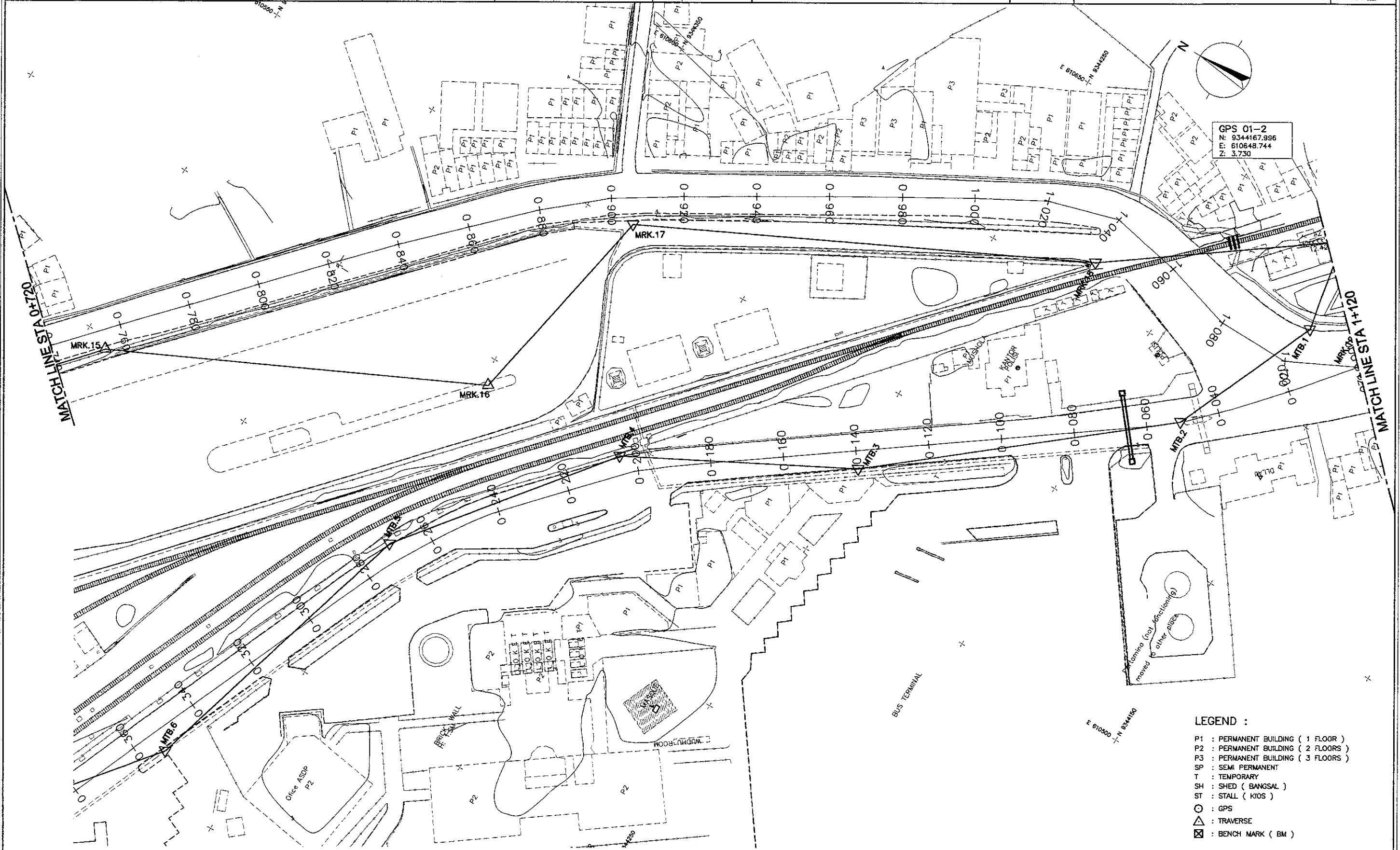
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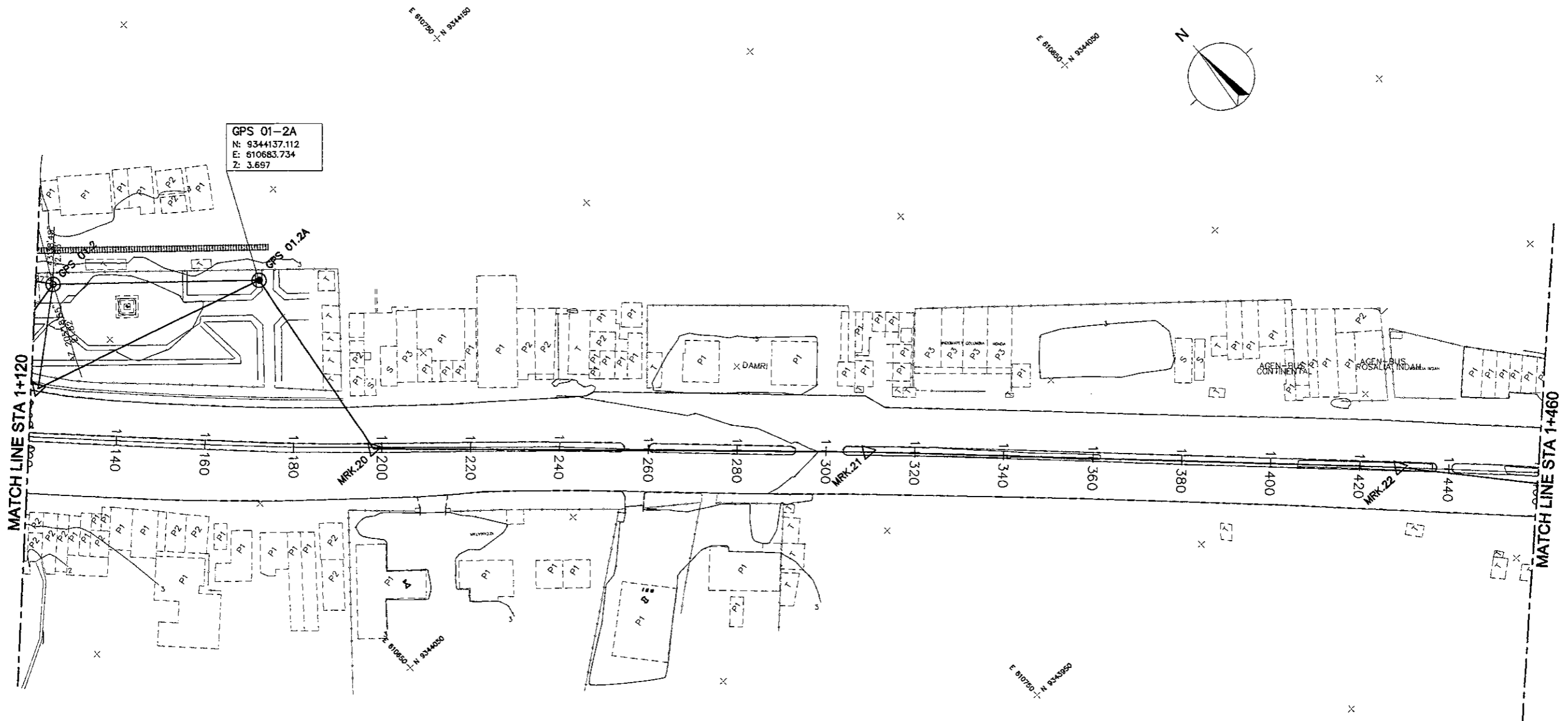
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 N: 9344167.996
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 Z: 3.730

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
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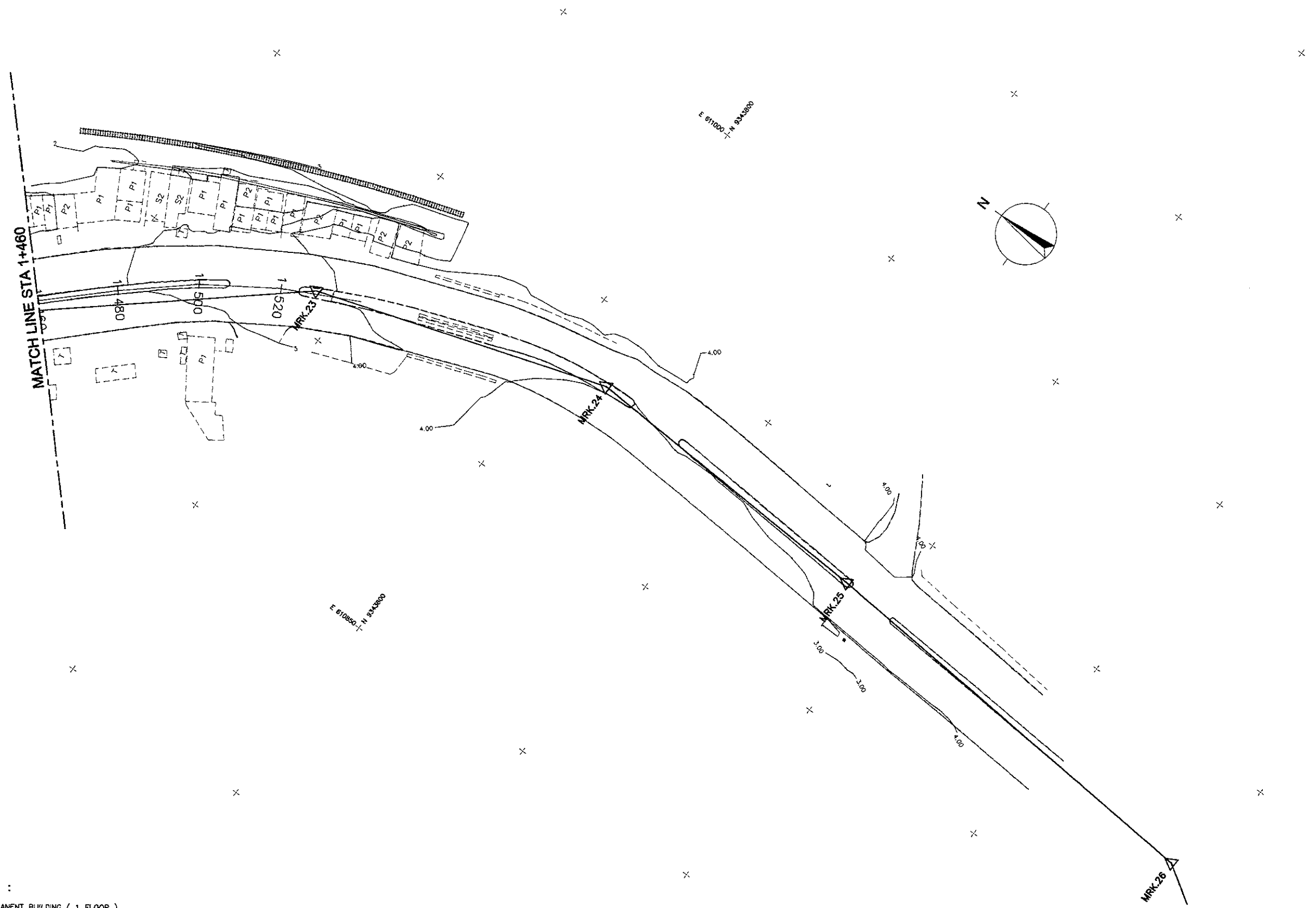
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1 TOPOGRAPHIC PLAN

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Sign		Sign		Sign	
Date		Date		Date	

No. PAY ITEMS	DESCRIPTION	UNIT	TOTAL QUANTITY	REMARKS
DIVISION 1 - GENERAL				
1.2	Mobilization and Demobilization	LS	1.00	
1.2(1)b	Engineer Facilities	LS	1.00	
1.8	Maintenance and Protection of Traffic	LS	1.00	
DIVISION 2 - DRAINAGE				
2.1(1)	Common Excavation for drainage ditches and waterways	Cu.M	150.00	
2.2(1)	Mortared Stonework for drainage channel	Cu.M	10.56	
2.3(1)	Reinforced Concrete Pipe Culvert Inn.Dim. 40 cm Type A	Ln.M	0.00	
2.3(2)	Reinforced Concrete Pipe Culvert Inn.Dim. 40 cm Type B	Ln.M	0.00	
2.3(3)	Reinforced Concrete Pipe Culvert Inn.Dim. 60 cm Type A	Ln.M	0.00	
2.3(4)	Reinforced Concrete Pipe Culvert Inn.Dim. 60 cm Type B	Ln.M	39.70	
2.3(5)	Reinforced Concrete Pipe Culvert Inn.Dim. 80 cm Type A	Ln.M	631.70	
2.3(6)	Reinforced Concrete Pipe Culvert Inn.Dim. 80 cm Type B	Ln.M	401.10	
2.3(7)	Reinforced Concrete Pipe Culvert Inn.Dim. 100 cm Type A	Ln.M	0.00	
2.3(8)	Reinforced Concrete Pipe Culvert Inn.Dim. 100 cm Type B	Ln.M	0.00	
2.3(9)a	Manhole Type I	Each	60.00	
2.3(9)b	Manhole Type II	Each	0.00	
2.3(9)c	Manhole Type III	Each	17.00	
2.3(9)d	Manhole Type IV	Each	0.00	
2.3(9)e	Manhole Type V	Each	6.00	
2.3(9)f	Manhole Type VI	Each	9.00	
2.3(9)g	Manhole Type VII	Each	21.00	
2.3(9)h	Manhole Type VIII	Each	1.00	
2.3(9)i	Manhole Type IX	Each	33.00	
2.3(9)j	Manhole Type X	Each	3.00	
2.3(10)	Catch Basin Type I	Each	18.00	
2.3(12)a	U - Ditch, DS - 1	Each	201.60	
2.3(12)b	U - Ditch, DS - 2	Ln.M	0.00	
2.3(12)c	U - Ditch, DS - 3	Ln.M	0.00	
2.3(12)d	U - Ditch, DS - 3 A	Ln.M	0.00	
2.3(12)e	U - Ditch, DS - 4	Ln.M	1148.50	
2.3(12)f	U - Ditch, DS - 4 A	Ln.M	60.00	
2.3(12)g	U - Ditch, DS - 5	Ln.M	260.00	
2.3(13)	Drain Pipe Dia 150 mm	Ln.M	232.34	
2.3(14)	Drain Pipe Dia 200 mm	Ln.M	213.30	
2.3(15)	Drain Pipe Dia 250 mm	Ln.M	0.00	
2.3(16)	Deck Drain Type I	Each	37.00	
2.3(17)	Deck Drain Type II	Each	0.00	
2.3(18)	Steel Gutter drain screen	Ln.M	28.00	
2.3(19)	Outer Ditch Elevated	Ln.M	105.00	
DIVISION 3 - EARTHWORKS				
3.1(1)	Clearing and Grubbing	Sq.M	4147.44	
3.1(2)	Selected Tree Removal Diameter Ø200 mm Ø300 mm	Each	3.00	
3.1(3)	Selected Tree Removal Diameter > 300 mm	Each	2.00	
3.2(1)	Common Excavation	Cu. M	4723.86	
3.2(2)	Excavation of Existing Pavement	Cu. M	666.41	
3.2(3)	Structure Excavation to a depth not exceeding 2 m	Cu. M	759.35	
3.2(4)	Structure Excavation to a depth greater than 2 m but not exceeding 4 m	Cu. M	72.66	
3.2(5)	Structure Excavation to a depth greater than 4 m	Cu. M	0.00	
3.2(7)	Rock Excavation	Cu. M	0.00	
3.3(1)	Borrow materials and common backfill	Cu. M	12672.32	
3.3(2)	Structural Backfill	Cu. M	0.00	
3.3(3)	Permeable Backfill	Cu. M	9.31	
SS 3.3	Soil Cement Improvement	Cu. M	3957.17	
3.3(4)	Lightweight Embankment	Cu. M	0.00	
3.3(6)	Intermediate Concrete Slab	Sq.M	0.00	
3.4(1)	Sub Grade Preparation	Sq.M	9774.00	
SS 3.4 (1)	Mechanical Stabilized Earthwall and Accessories	Sq.M	3339.11	
SS 3.4 (2)	Retaining Wall for Lightweight Embankment	Sq.M	0.00	

No. PAY ITEMS	DESCRIPTION	UNIT	TOTAL QUANTITY	REMARKS
DIVISION 4 - PAVEMENT WIDENING AND SHOULDERS				
4.2(1)	Aggregate Sub Base Class B	Cu. M	99.60	
DIVISION 5 GRANULAR PAVEMENT				
5.1(1)	Aggregate Sub Base Class A	Cu. M	3909.60	
5.1(2)	Aggregate Sub Base Class B	Cu. M	5334.00	
DIVISION 6 ASPHALT PAVEMENT				
6.1(1)	Prime Coat	Litre	10496.68	
6.1(2)	Tack Coat	Litre	18385.85	
6.3(1)	Asphalt Concrete Wearing Course (AC-WC)	Ton	2254.84	
6.3(2)	Asphalt Concrete Binder Course (AC-BC)	Ton	1734.90	
6.3(3)	Asphalt Concrete Base (AC-Base)	Ton	2345.55	
DIVISION 7 - STRUCTURE				
7.1(1)a	Structure Concrete, Class A - (F _c ' = 35 Mpa) for Post Tension Double Girder	Cu m	1084.84	
7.1(1)b	Structure Concrete, Class A - (F _c ' = 35 Mpa) for Steel Girder	Cu m	526.44	
7.1(2)a	Structure Concrete, Class B - (F _c ' = 30 Mpa) for Pier Head	Cu m	161.79	
7.1(2)b	Structure Concrete, Class B - (F _c ' = 30 Mpa) for Column	Cu m	254.06	
7.1(2)c	Structure Concrete, Class B - (F _c ' = 30 Mpa) for Composite Column	Cu m	72.47	
7.1(2)d	Structure Concrete, Class B - (F _c ' = 30 Mpa) for Abutment	Cu m	151.36	
7.1(3)a	Structure Concrete, Class B-1 (F _c ' = 28 Mpa) for Barrier, Median	Cu m	0.00	
7.1(3)b	Structure Concrete, Class B-1 (F _c ' = 28 Mpa) for Parapet Wall	Cu m	1263.13	
7.1(5)	Structure Concrete, Class C (F _c ' = 24 Mpa) for Footing, Approach Slab, Retaining Wall	Cu m	384.91	
7.1(6)	Structure Concrete, Class D (F _c ' = 20 Mpa)	Cu m	0.00	
7.1(8)	Structure Concrete, Class E (F _c ' = 17 Mpa)	Cu m	30.22	
SS 7.1(9)	Waterproofing on Deck	SqM	3216.49	
SS 7.1(10)	Structure Casing for Bored Pile (Ribber inner Surface t = 13 mm)	Kg	33629.40	
SS 7.1(11)	Structure Casing for Bored Pile (Erected)	Kg	33629.40	
7.2(9)	PC Strand Size 12.7 mm	Kg	22997.00	
7.2(9)a	PC Strand Size 21.8 mm	Kg	4072.52	
7.3(3)	PC Bar	Kg	27369.34	
7.3(4)	Reinforcing Steel Bars Grade 40	Kg	578520.84	
7.5(1)	Furnish and Delivery of Steel Girder	Ton	338.41	
7.5(1)a	Furnish and Delivery of Steel Coping and Portal	Ton	114.49	
7.5(3)	Erection of Steel Girder	Ton	338.41	
7.5(4)	Erection of Steel Coping and Portal	Ton	114.49	
7.6(22)	Cast in Place Concrete Bored Pile Dia 1500 mm	Ln. M	128.00	
7.6(23)	Cast in Place Concrete Bored Pile Dia 1800 mm	Ln. M	248.00	
7.6(26)	Cast in Place Concrete Bored Pile Dia 2500 mm	Ln. M	461.00	
7.6(27)	Pile Integrity Test	Each	33.00	
SS 7.6(28)	Pile Dynamic Analysis (PDA) Dia 1500 mm	Each	1.00	
SS 7.6(29)a	Pile Dynamic Analysis (PDA) Dia 1800 mm	Each	1.00	
SS 7.6(29)b	Pile Dynamic Analysis (PDA) Dia 2500 mm	Each	1.00	
7.9(1)	Stone masonry	Cu. M	103.69	
7.9(2)	Blinding Stone	Cu. M	0.00	
7.11(2)	Expansion Joint (Type A)	Ln. M	55.34	
7.11(3)	Expansion Joint (Type B)	Ln. M	0.00	
SS 7.11(4)	Restrainer Type - A	Set	4.00	
SS 7.11(5)	Restrainer Type - B	Set	4.00	
SS 7.11(6)	Stopper for Steel Girder	Set	4.00	
7.12(2)	Elastomeric Bearing Pad Type - A1	Set	6.00	
7.12(2)a	Elastomeric Bearing Pad Type - A2	Set	2.00	
7.12(2)b	Elastomeric Bearing Pad Type - A3	Set	0.00	
7.12(2)c	Elastomeric Bearing Pad Type - A4	Set	0.00	
7.12(2)a	Bridge Bearing for Steel Girder, Type - B1	Set	2.00	
7.12(2)b	Bridge Bearing for Steel Girder, Type - B2	Set	4.00	
7.12(2)c	Bridge Bearing for Steel Girder, Type - C1	Set	2.00	
7.12(2)d	Bridge Bearing for Steel Girder, Type - C2	Set	1.00	
7.12(2)e	Bridge Bearing for Steel Girder, Type - C3	Set	2.00	
7.12(2)f	Bridge Bearing for Steel Girder, Type - C4	Set	1.00	

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No. PAY ITEMS	DESCRIPTION	UNIT	TOTAL QUANTITY	REMARKS
7.13	Steel Bridge Railings	Ln. M	2063.52	
7.14	Bridge Name Plate	Each	2.00	
7.15.(1)	Demolition of Existing Structure Masonry	Cu. m	111.84	
7.15.(2)	Demolition of Existing Structure Concrete	Cu. m	60.02	
7.15.(10)	Demolition of Existing Rigid Pavement	Sq. M	0.00	
7.15.(11)	Demolition of Existing Hedge of Fence	Ln. M	264.13	
7.15.(12)	Demolition of Existing Concrete Side Walk	Sq. M	697.15	
7.15.(13)	Demolition of Existing Concrete Curb	Ln. M	354.54	
7.15.(7)	Demolition of Existing Bridge	Ls	0.00	
7.16.(2)	Rigid Pavement (t= 270 mm)	Sq. M	0.00	
7.17.(1)	Lean Concrete for Rigid Pavement (t= 100 mm)	Sq. M	0.00	
DIVISION 8 - MISCELLANEOUS				
8.1.(1)	Solid Sodding	Sq. M	2314.57	
8.3.(1)	Vehicle Guardrail Type - A	Ln. M	0.00	
8.3.(13)	BRC Fence	Ln. M	0.00	
8.3.(16)	Guard Fence Over Railway	Ln. M	0.00	
8.4.(1)	Regulatory and Warning Sign, Type A	Each	44.00	
8.4.(2)	Regulatory and Warning Sign, Type B	Each	11.00	
8.5.(17)	Overhead Sign, Type A	Each	5.00	
8.5.(18)	Overhead Sign, Type B	Each	0.00	
8.5.(19)	Overhead Sign, Type C	Each	0.00	
8.6.(6)	Reflective Thermoplastic Pavement Marking	Sq. M	918.20	
8.8.(1)	Precast Concrete Curb Type A	Ln. M	2170.74	
8.8.(2)	Precast Concrete Curb Type B	Ln. M	2454.56	
8.8.(3)	Concrete Median Type A	Ln. M	0.00	
8.8.(4)	Concrete Median Type B	Ln. M	0.00	
8.8.(5)	Concrete Sidewalk	Sq. M	1090.36	
DIVISION 9 - UTILITIES				
9.1.1	Street Lighting Pole, Type A (11 m)	Each	79.00	
9.1.2	Street Lighting Ceiling, Type A - Sort 150 watt	Each	17.00	
9.1.3	Street Lighting Ceiling, Type B - Sort 250 watt	Each	6.00	
9.1.4 (a)	Panel Type LP-PJU.FO	Each	1.00	
9.1.4 (b)	Panel Type LP-PJU.1	Each	1.00	
9.1.4 (c)	Panel Type LP-PJU.2	Each	1.00	
9.1.4 (d)	Panel Type LP-PJU.3	Each	1.00	
9.1.4 (e)	Panel Type LP-PJU.4	Each	1.00	
9.1.4 (f)	Panel Type LP-PJU.5	Each	1.00	
9.1.4 (g)	Panel Type LP-PJU.6	Each	0.00	
9.1.5 (a)	Traffic Signal Head, Type A	Each	0.00	
9.1.5 (b)	Traffic Signal Head, Type B	Each	0.00	
9.1.6	Traffic Signal Pole, Type I	Each	0.00	
9.1.7	Traffic Signal Pole, Type II	Each	0.00	
9.1.8	Cable Type - 1 (NYFGBY 2C - 2.5 mm2)	Ln. M	1495.50	
9.1.9	Cable Type - 3 (NYFGBY 4C - 10 mm2)	Ln. M	3191.00	
9.1.10	Cable Type - 5 (NYFGBY 4C - 25 mm2)	Ln. M	1100.00	
9.1.11	Cable Type - 7 (NYFGBY 4C - 50 mm2)	Ln. M	200.00	
9.1.12	Removal of Lighting Pole to stockpile	Each	16.00	
9.1.13	Removal of Lighting Signal to stockpile	Each	0.00	