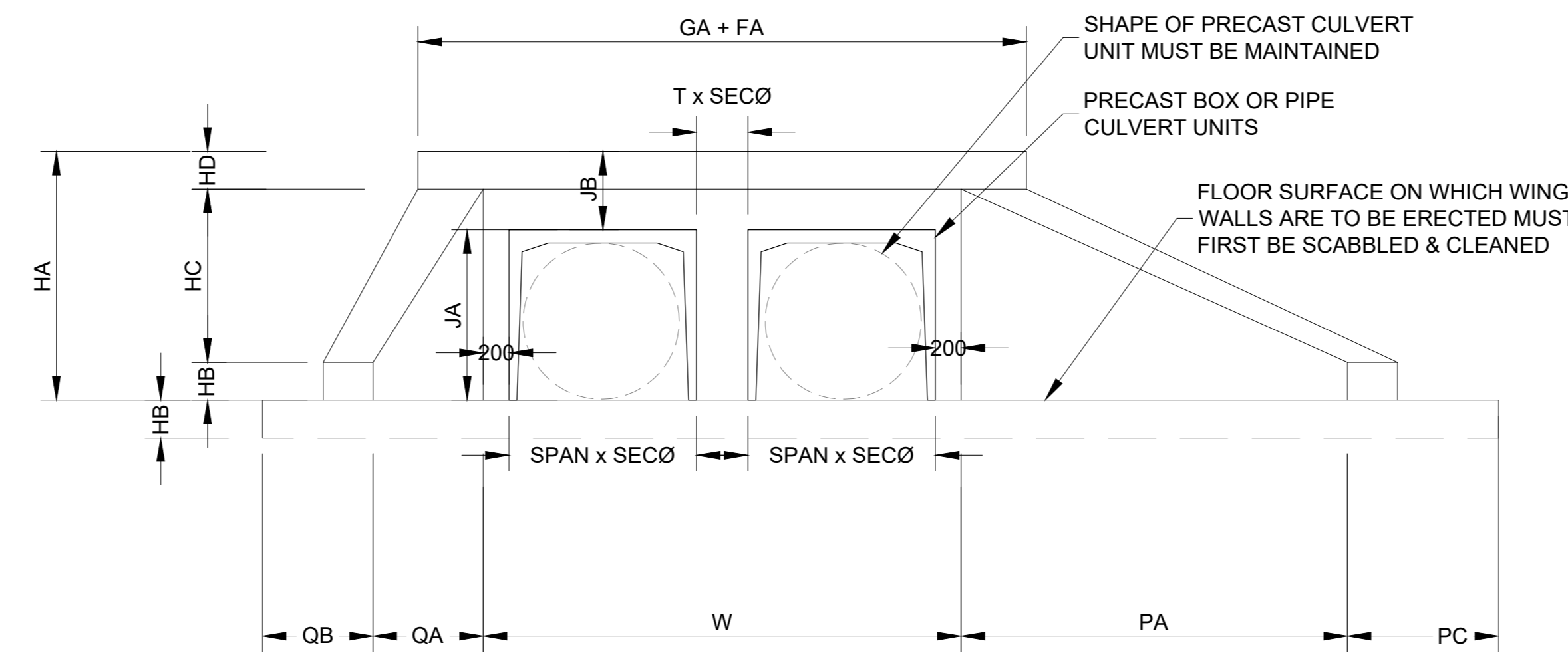
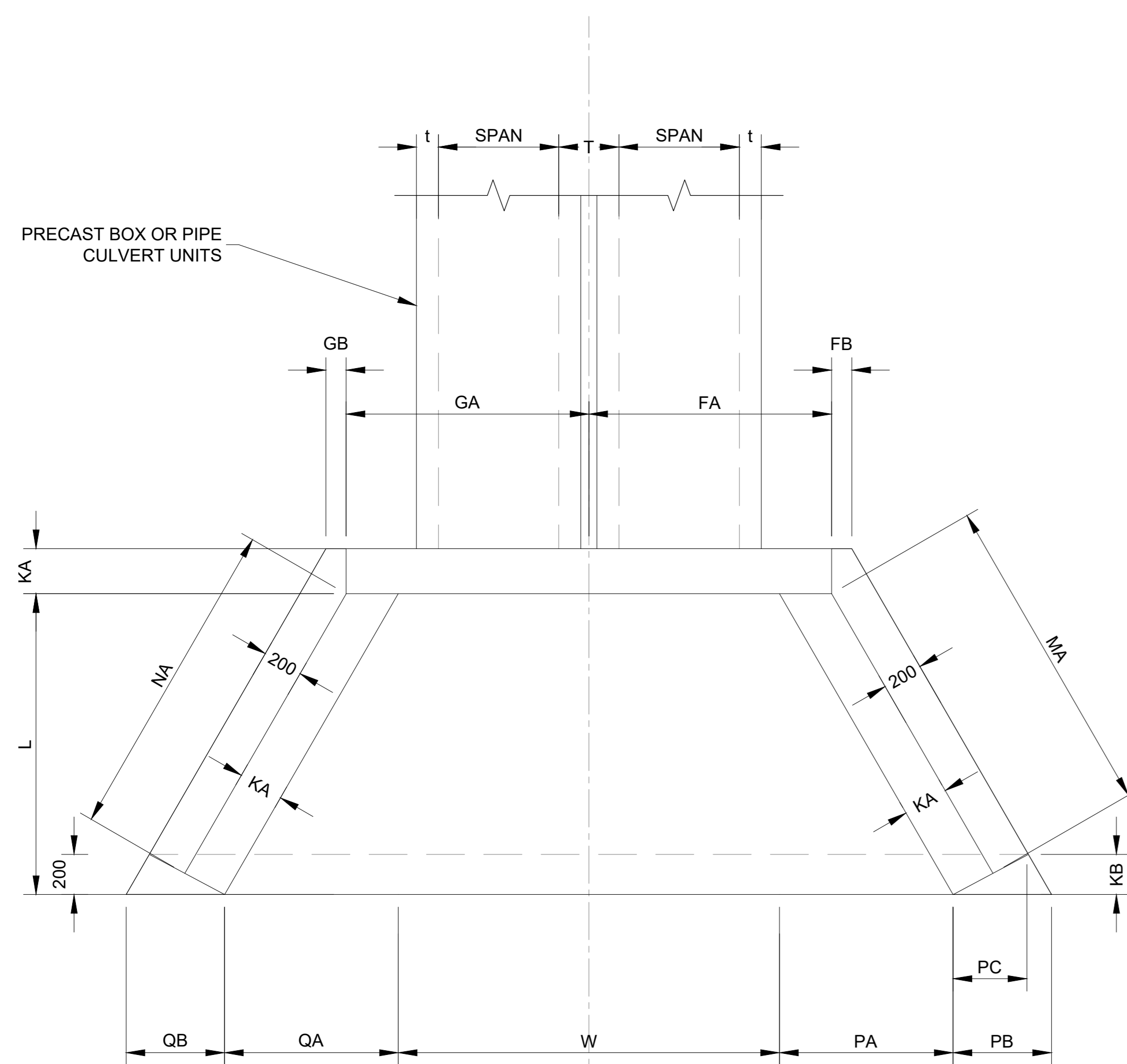


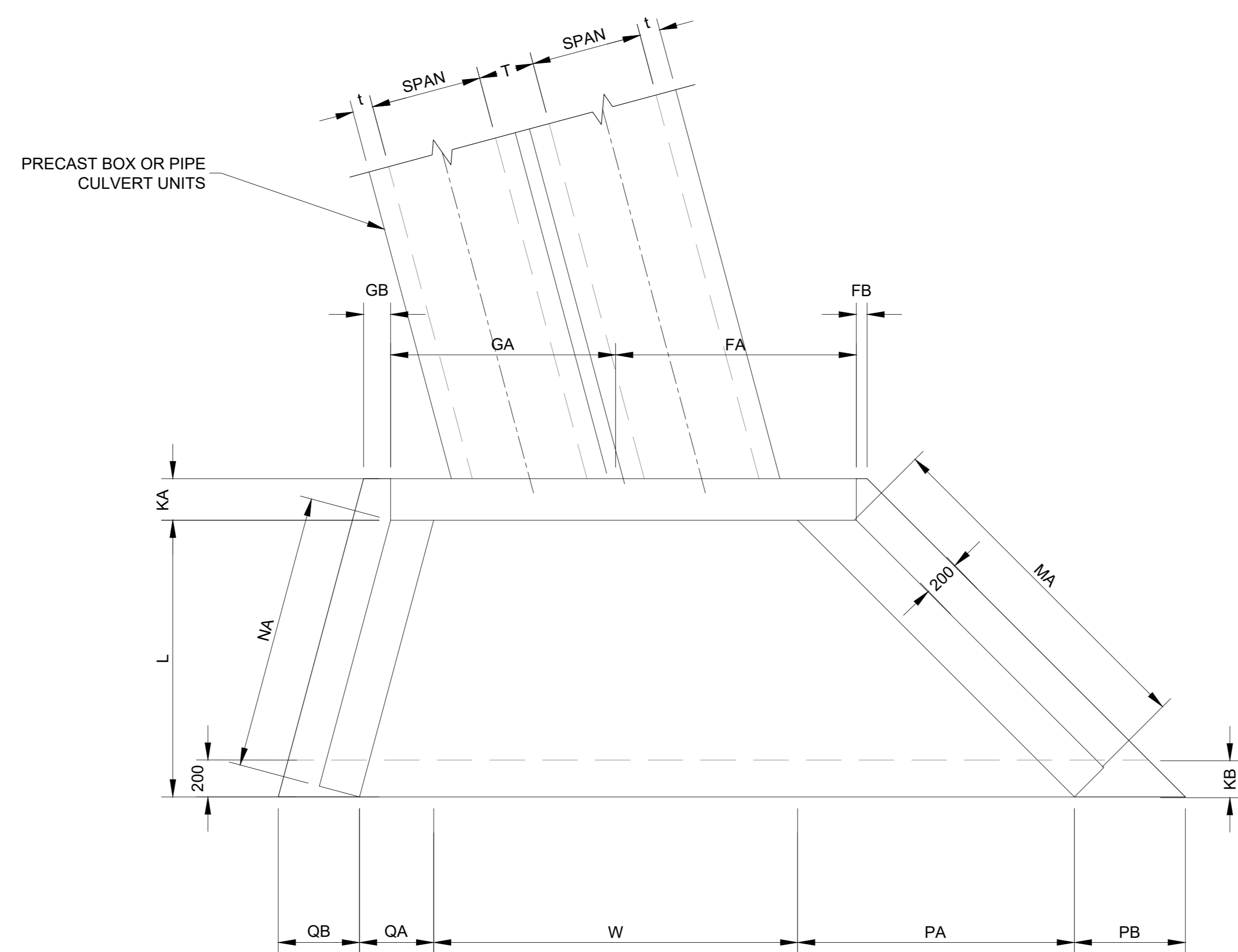
TYPICAL PLAN OF INLET / OUTLET WINGWALLS - (TYPE 1 CULVERT)
N.T.S



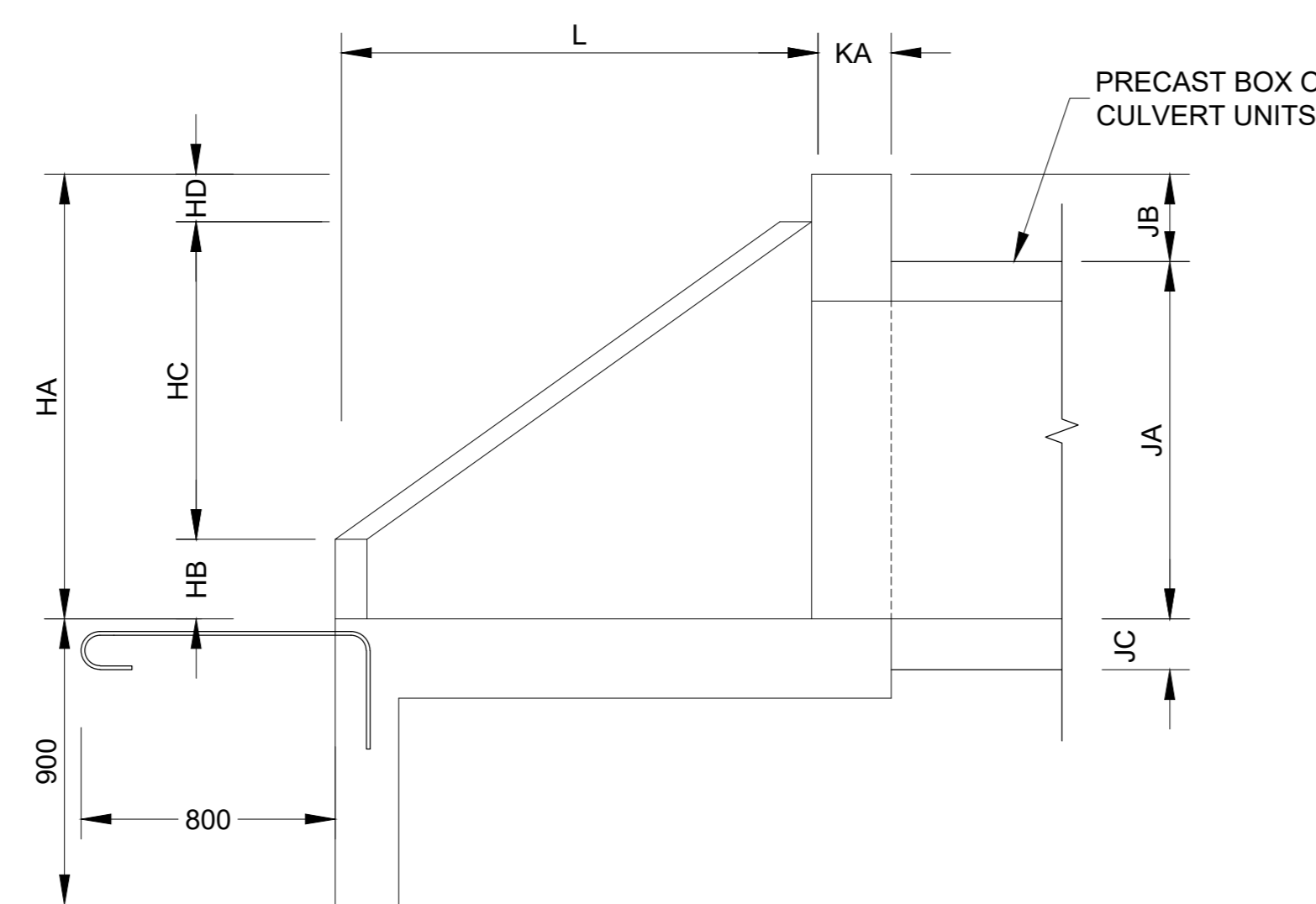
TYPICAL PLAN OF INLET / OUTLET WINGWALLS - (TYPE 2 & 3 CULVERTS)
N.T.S



TYPICAL PLAN OF INLET / OUTLET WINGWALLS - (TYPE 1 CULVERT)
N.T.S



TYPICAL PLAN OF INLET / OUTLET WINGWALLS - (TYPE 2 & 3 CULVERTS)
N.T.S



TYPICAL END ELEVATION OF INLET/OUTLET WINGWALLS
N.T.S

NOTES FOR INLET / OUTLET WING WALLS:

1. DESIGN CRITERIA
 - 1.01 THE WING WALLS ARE DESIGNED AS CANTILEVERS FIXED TO THE BASE AND SUPPORTED BY THE HEADWALL.
 - 1.02 THE WING WALLS ARE DESIGNED FOR A SURCHARGE OF 750mm AND A MAXIMUM SLOPE OF 1:1.5 FOR ANY FILL HEIGHT.
 - 1.03 THE DENSITY OF SOIL = 20kN/m³
 - 1.04 SOIL PRESSURES DETERMINED USING RANKINE'S THEORY.
 - 1.05 CONCRETE: WING WALL 30 INSITU BARREL CHARACTERISTIC STRENGTH (MPa) 30 / 19 CLASS CONCRETE
 - 1.06 REINFORCEMENT ACCORDING TO SABS 920 - LATEST REVISION
 - 1.07 A LINEAR SOIL PRESSURE DISTRIBUTION IS ASSUMED
 - 1.08 THE INSITU BARREL IS DESIGNED FOR SNABC TRAFFIC LOADING IN ACCORDANCE WITH TMH 7 PARTS 1, 2&3 (AS AMENDED 1988) "CODE OF PRACTICE FOR THE DESIGN OF HIGHWAY BRIDGES AND CULVERTS IN SOUTH AFRICA".
2. GENERAL
 - 2.01 THE REQUIRED CLASS OF SURFACE FINISH IS F2 FOR ALL VISIBLE SURFACES.
 - 2.02 ALL VISIBLE CORNERS MUST HAVE A 25 x 25 mm CHAMFER.
 - 2.03 TWO 150mm LAYERS OF APPROVED MATERIAL, COMPACTED TO 93% MODIFIED A.A.S.I.T.C. DENSITY, ARE REQUIRED UNDER THE INLETS AND OUTLETS.
 - 2.04 MINIMUM CONCRETE COVER TO REINFORCEMENT IS 40mm.
 - 2.05 FURTHER INFORMATION REGARDING SPECIFIC CULVERTS APPEAR ON THE DRAINAGE SCHEDULES, OF THE ROAD.
 - 2.06 THE INLET AND OUTLET UNITS ARE DESIGNED TO ACT AS INDEPENDENT UNITS WHEN USED TOGETHER WITH PIPES, PRECAST BARRELS, AS WELL AS INSITU BARREL DETAILS.
 - 2.07 REINFORCEMENT DETAILS OF THE FLOOR SLAB SUPPORTING THE CULVERT BARRELS APPEAR ON THE TYPICAL PLAN FOR PRECAST PORTAL CULVERTS BASE SLABS.
 - 2.08 THE HEADWALLS MUST BE ALIGNED PARALLEL TO THE ROAD SHOULDER.

DATA SHEET AND FORMULAE

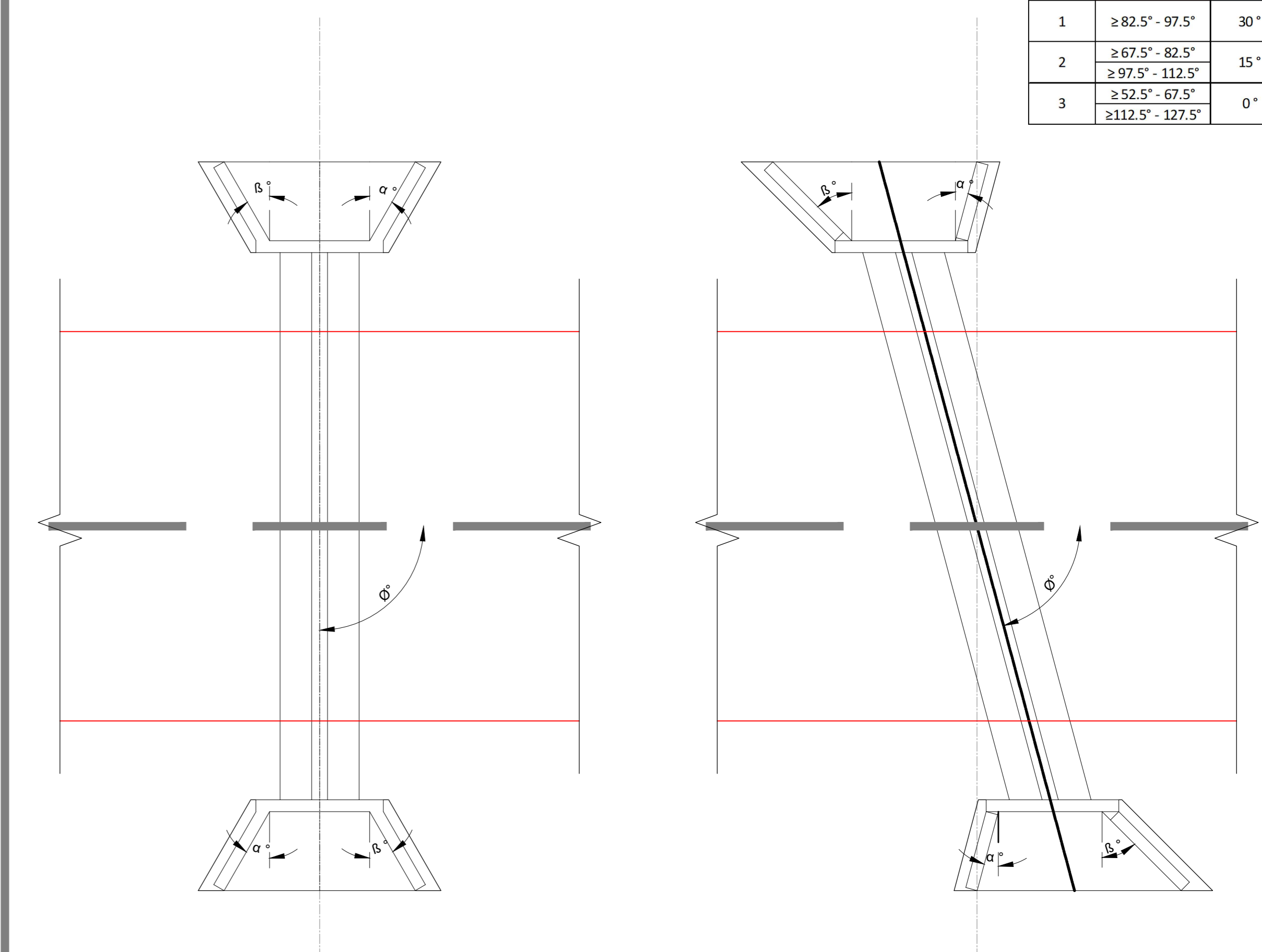
FORMULAE				
ϕ = CULVERT SKEW ANGLE				
$L = HC \times S$ (MIN 1500)				
$S = (\text{BATTER SLOPE})$				
$QA = L \times \tan(\phi - 30)$				
$PA = L \times \tan(\phi - 30)$				
$t = \text{PRECAST WALL THICKNESS}$				
$NA = L \times \sec(\phi - 30) - KA \times \tan(\phi - 30)$				
$MA = L \times \sec(\phi + 30) - KA \times \tan(\phi + 30)$				
$T = t \times 2 + 80$				
$QB = (KA + 200) \times \sec(\phi - 30)$				
$PB = (KA + 200) \times \sec(\phi + 30)$				
$KB = (KA + 200) \times \sin(\phi + 30)$				
$PC = (KA + 200) \times \cos(\phi + 30)$				
$GA = W/2 + KA \times \sec(\phi - 30)$				
$FA = W/2 + KA \times \sec(\phi + 30)$				
$GB = ((200 \times \text{COSEC}(\phi - 30)) - KA) \times \tan(\phi - 30)$				
$FB = ((200 \times \text{COSEC}(\phi + 30)) - KA) \times \tan(\phi + 30)$				
$R = t + 100$ (INSITU BARREL SLAB THICKNESS)				

VERTICAL HEIGHT OF CULVERTS	HB	HD	KA	JB
JA ≤ 900	150	150	225	300
JA ≥ 900	250	150	250	400

SPAN	JC (mm)	t (mm)
900 mm SPAN	150	110
1200 mm SPAN	160	125
1500 mm SPAN	175	145
1800 mm SPAN	190	150
2100 mm SPAN	220	155
2400 mm SPAN	260	170

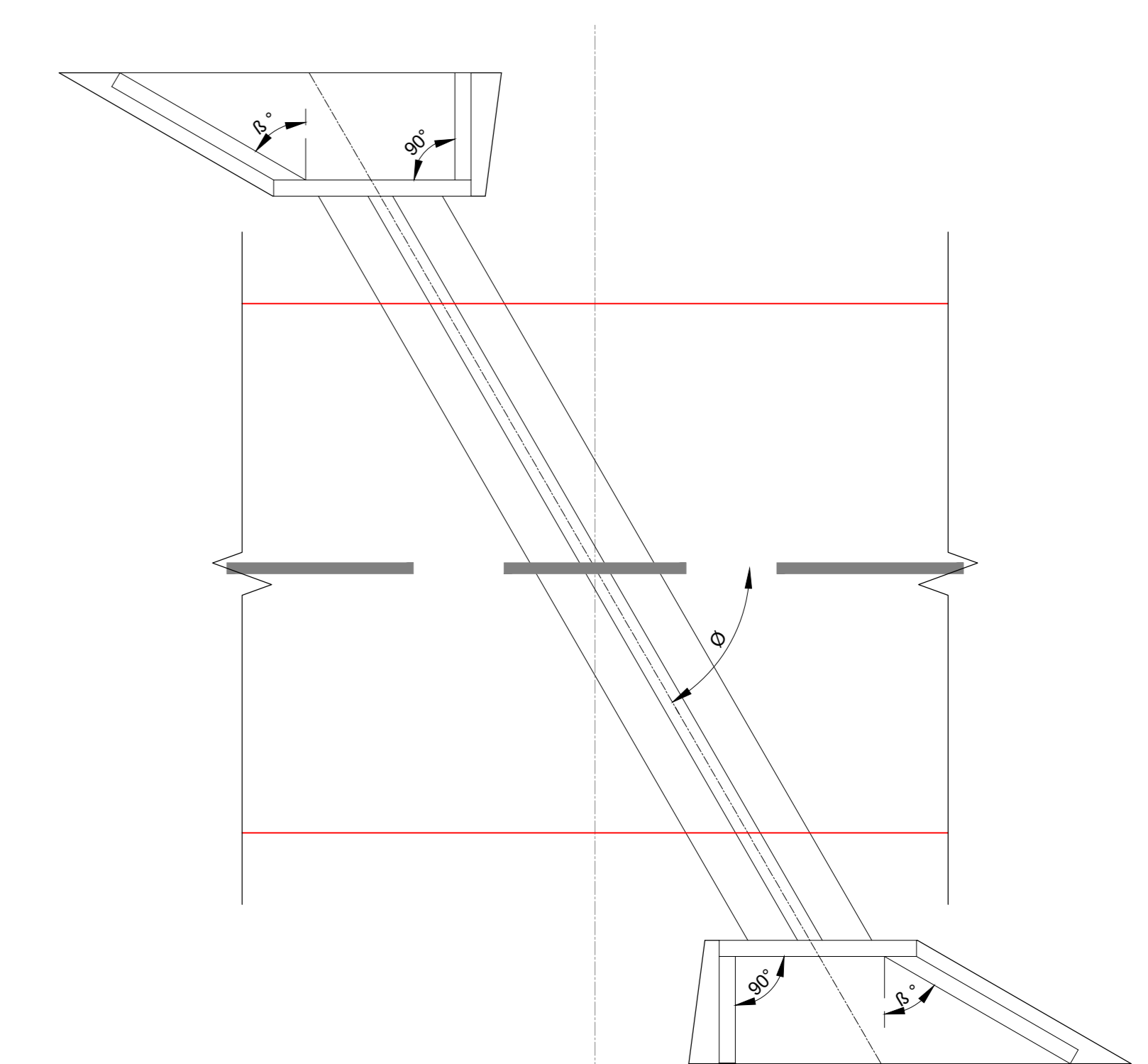
CULVERT CONFIGURATION TYPES

TABLE A CULVERT CONFIGURATION TYPES			
TYPE	ϕ °	α °	β °
1	≥ 82.5° - 97.5°	30°	30°
2	≥ 67.5° - 82.5°	15°	45°
3	≥ 52.5° - 67.5°	0°	60°



CULVERT LAYOUT (TYPE 1)

CULVERT LAYOUT (TYPE 2)



CULVERT LAYOUT (TYPE 3)

(REF FOLDER: X:02 PROJECTS\3000\3500 - 3599\N3587EN - SHANGONI ROAD KMP1 DESIGN PHASE I DRAWINGS\TENDER\STORMWATER\EN3587SW TYPICALS.DWG)

		TECHNICAL SERVICES DEPARTMENT KRUGER NATIONAL PARK DRAWING OFFICE (KNP) Tel: (013) 735 3448		DESIGNED BY: M. ELS CHECKED BY: C.J. SMIT DRAWN BY: J. VAN DYK CHECKED BY: C.J. SMIT	APPROVED BY: <table border="1"> <tr> <td>SEN. MAN. CIVIL & BUILDING</td> <td>SEN. MAN. ELECTRO & MECHANICAL</td> <td>SEN. MAN. ROADS & MAINTENANCE</td> <td>MAN. PLANNING & DESIGN</td> <td>CLIENT</td> </tr> <tr> <td>DATE:</td> <td>DATE:</td> <td>DATE:</td> <td>DATE:</td> <td>DATE:</td> </tr> </table>	SEN. MAN. CIVIL & BUILDING	SEN. MAN. ELECTRO & MECHANICAL	SEN. MAN. ROADS & MAINTENANCE	MAN. PLANNING & DESIGN	CLIENT	DATE:	DATE:	DATE:	DATE:	DATE:	SERVICE: STORMWATER FOR TENDER PURPOSES	PROJECT: SHANGONI ROAD PH 1	TITLE: CULVERTS : HEADWALLS - DIMENSIONING AND CONFIGURATIONS	DATE: APRIL 2024 SCALE: 1:1000 	CAD FILE NAME: EN3587SW TYPICALS.dwg PAPER SIZE: A0	CONSULTANT DWG NO: EN/3587/SW/3/001 CLIENT DWG. NO: P09/SW/3/001
SEN. MAN. CIVIL & BUILDING	SEN. MAN. ELECTRO & MECHANICAL	SEN. MAN. ROADS & MAINTENANCE	MAN. PLANNING & DESIGN	CLIENT																	
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