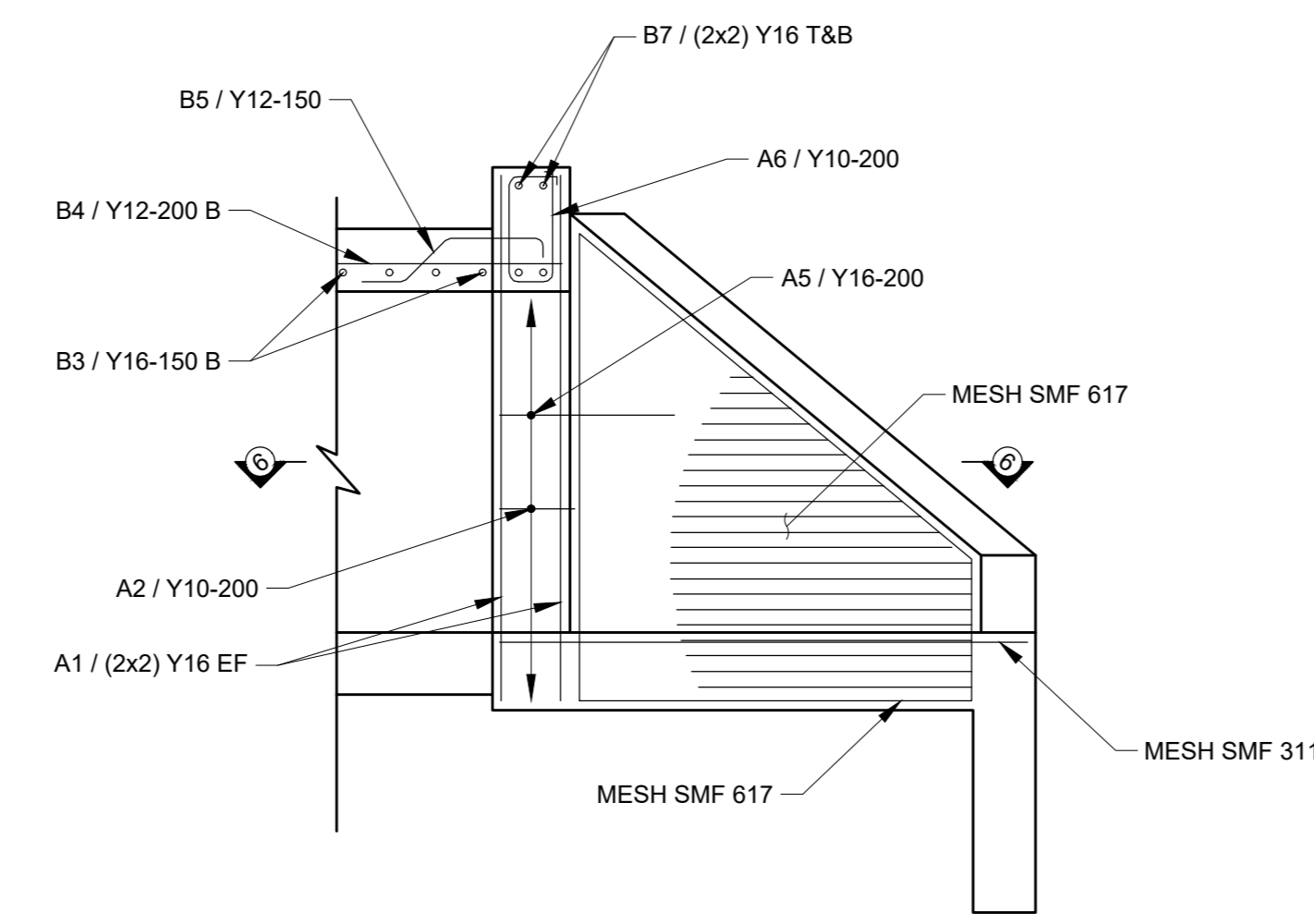
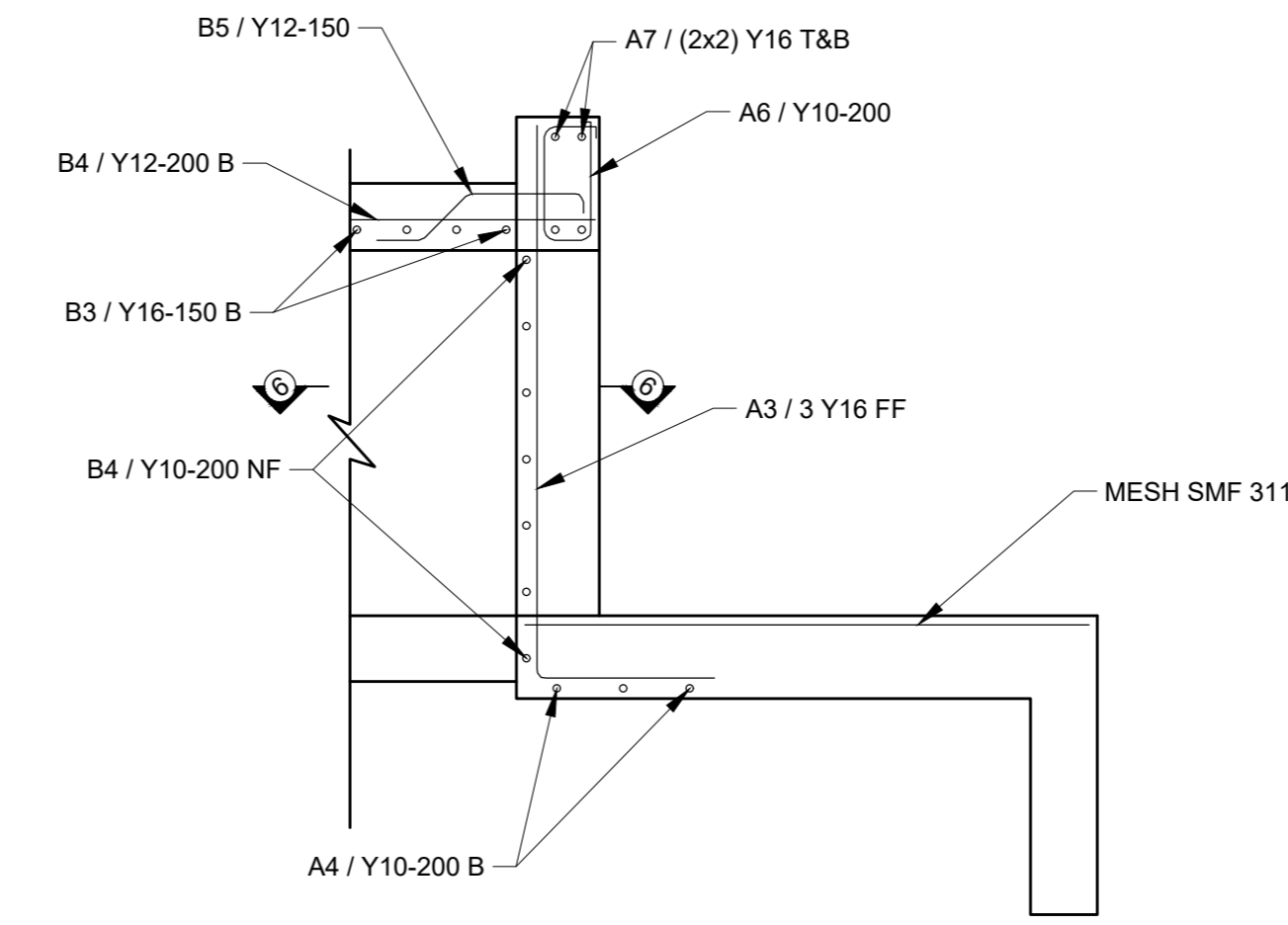


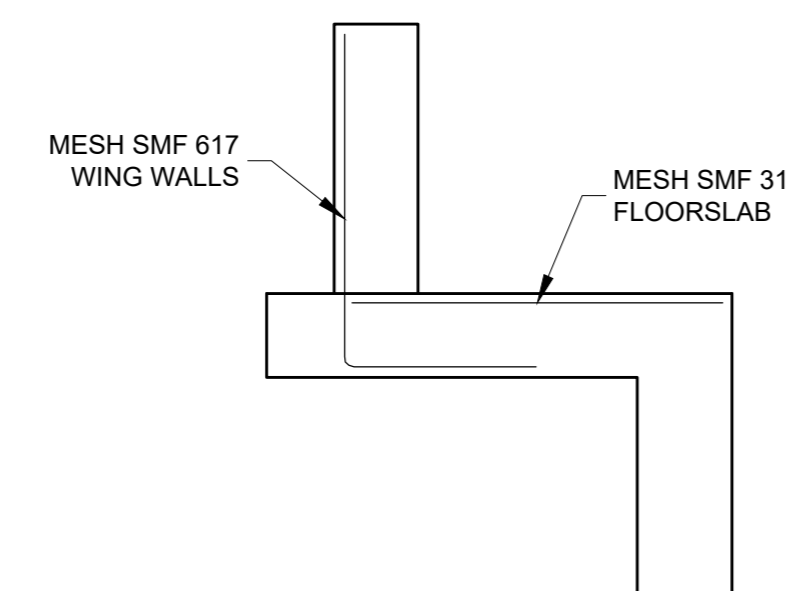
SECTION S1-S1 - INLET / OUTLET WING WALLS HEADWALL & COLUMNS - REINFORCEMENT
N.T.S



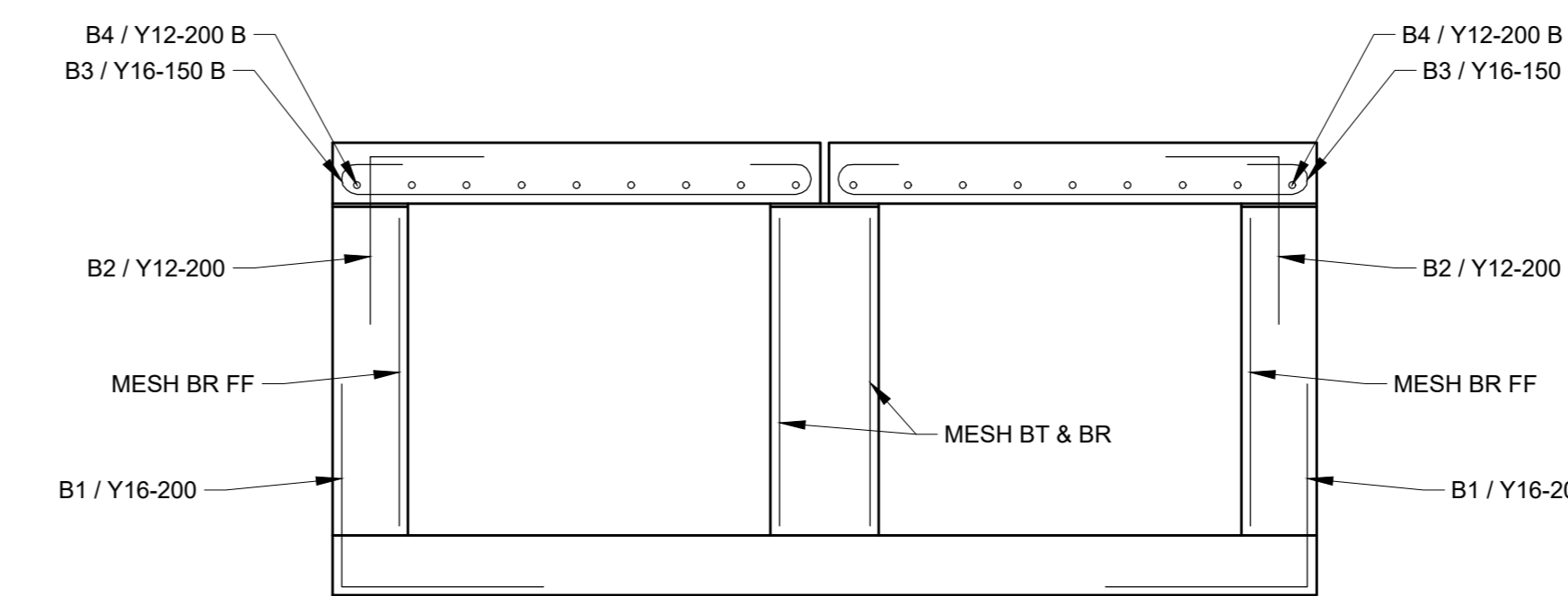
SECTION S2-S2 - INLET / OUTLET WING WALLS HEADWALL & WING WALLS - REINFORCEMENT
N.T.S



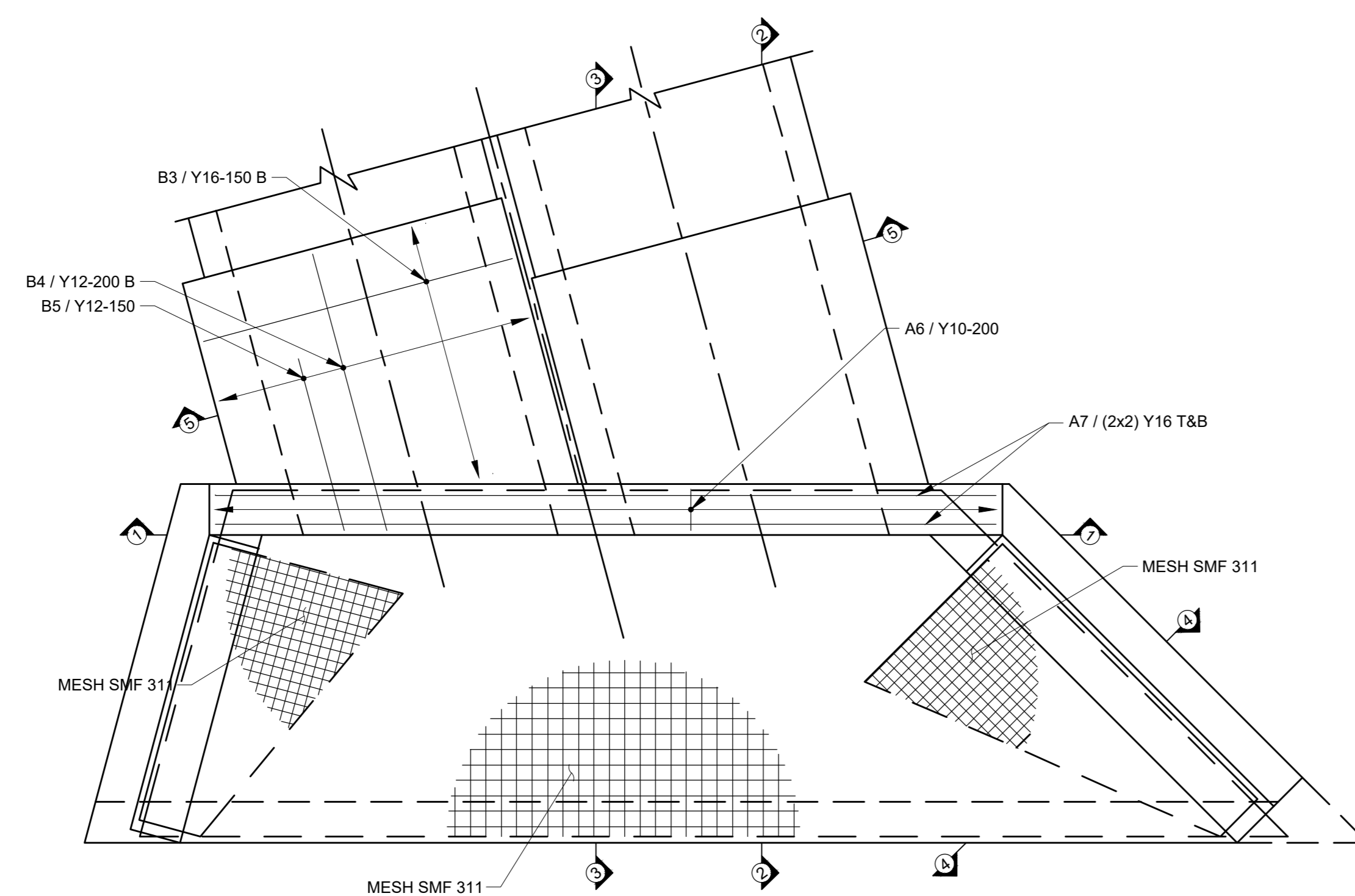
SECTION S3-S3 - INLET / OUTLET WING WALLS HEADWALL & COLUMNS - REINFORCEMENT
N.T.S



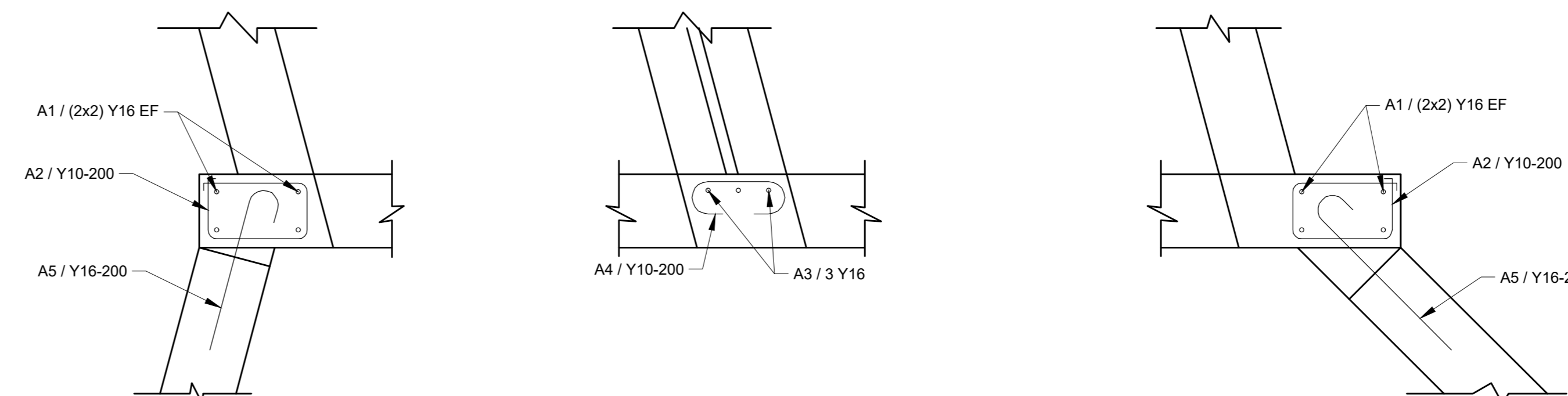
SECTION S4-S4 - INLET / OUTLET WING WALLS WING WALLS & FLOORSLAB - REINFORCEMENT
N.T.S



SECTION S5-S5 - INLET / OUTLET WING WALLS INSITU BARREL (BOX CULVERTS ONLY) - REINFORCEMENT
N.T.S



TYPICAL REINFORCEMENT PLAN OF INLET / OUTLET WING WALLS - MAX Ø = 30°
N.T.S



SECTION S6-S6 - INLET / OUTLET WING WALLS HEADWALL COLUMNS - REINFORCEMENT
N.T.S

DATA SHEET AND FORMULAS

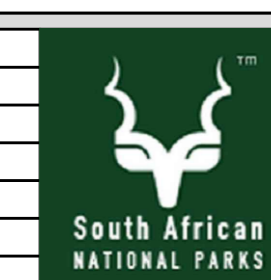
FORMULAE

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

Rev	Date	By	Description


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

HOD TECH SERVICES	DATE:
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SEN. MAN. CIVIL & BUILDING	DATE:
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SEN. MAN. ELECTRO & MECHANICAL	DATE:
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SEN. MAN. ROADS & MAINTENANCE	DATE:
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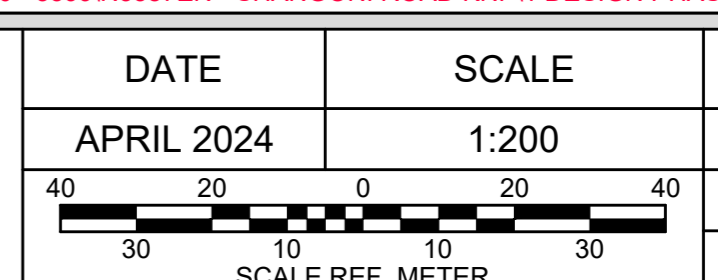
MAN. PLANNING & DESIGN	DATE:
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CLIENT	DATE:
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SERVICE: **STORMWATER**
 PROJECT: **SHANGONI ROAD PH 1**
 FOR TENDER PURPOSES

PROJECT: **SHANGONI ROAD PH 1**
 TITLE: **CULVERTS : HEADWALLS - TYPICAL REINFORCING DETAILS**

DATE	SCALE	CAD FILE NAME	CONSULTANT DWG. NO.
APRIL 2024	1:200	EN3587SW TYPICALS.dwg	EN/3587/SW/3/003
PAPER SIZE		CLIENT DWG. NO.	
A0		P09/SW/3/003	



(REF FOLDER: X:02 PROJECTS\3000\3500 - 3599\N3587EN - SHANGONI ROAD KNP\1 DESIGN PHASE\F DRAWINGS\TENDER\STORMWATER\EN3587SW TYPICALS.DWG)