Bending check - assumed pure flexure			named cell	AS 5100.5 -2017
M*	kNm	400	mdesign0	
V*	kNm	275	vdesign0	
bv	mm	300	bv	
d	mm2	538	d	
h	mm	600	h	
ast_provided	mm2	2250	astf	
fsy	N/mm2	500	fsy	
fsyf	N/mm2	500	fsyf	
fcprime	N/mm2	50	fcprime	
es	N/mm2	200000	es	
phiv		0.7	phiv	
alpha2		0.850	alpha2	=MIN(MAX(1-0.003*fcprime,0.67),0.85), Eqn 8.1.3(1)
gamma		0.700	gamma	=MIN(MAX(1.05-0.007*fcprime,0.67),0.85), Eqn 8.1.3(2)
d_n	mm	126.05	dn	=fsy*ast_provided/(alpha2*fcprime*bv*gamma)
ku		0.234	ku	=dn/d, to be less than 0.36
ku0		0.234	ku0	=ku
phif		0.8	phif	=MIN(0.8,MAX(1.19-13/12*ku0,0.6)), table 2.30.2 (b)
mu	kNm	555.62	mu	=fsy*astf*d*(1-gamma*ku/2)*0.000001
phimu	kNm	444.49	phimu	=phif*mu
phiMu/M*	kNm	1.11	phimu/mdesign0	=phimu/mdesign0
dv	mm	484.2	dv	=MAX(0.72*h,0.9*d), Clause 8.2.1.9

		Doug's values										
Case		1		2		3		4		5		
M*	kNm	400	Doug's	400	M* changed	400	M* changed	400	M* changed	400	M* changed	m_design
V*	kN	275	values	275		275		275		275		v_design
ast_provided	mm2	2250		2250		2250		2250		2250		ast_provided
epsx		1.2234E-03		1.2234E-03		1.2234E-03		1.2234E-03		1.2234E-03		epsx =(ABS(m_design)/dv*1000000 + ABS(v_design)*1000)/ (2*es*ast_provided), Eqn 8.2.4.3(1)
is epsx < 0.3e-3 ?		Yes		Yes		Yes		Yes		Yes		IF(epsx<0.003,"Yes","No")
theta_v	deg	37.56		37.56		37.56		37.56		37.56		thetav = 29+7000*epsx, Eqn 8.2.4.2(5)
cot(theta_v)		1.3002		1.3002		1.3002		1.3002		1.3002		cotthetav =1/TAN(thetav*PI()/180)
k_v		0.1411		0.1411		0.1411		0.1411		0.1411		kv =0.4/(1+1500*epsx), Eqn 8.2.4.2(4)
square root f;c		7.0711		7.0711		7.0711		7.0711		7.0711		sqfc = MIN(8,SQRT(fcprime)) ,Cl 8.2.4.1
v_uc	kN	144.91		144.91		144.91		144.91		144.91		vuc = kv*bv*dv*sqfc/1000, Eqn 8.2.4.1
a_sv	mm2	160.00	2 legs N10	160.00	2 legs N10	220.00	2 legs N12	400.00	2 legs N16	620.00	2 legs N20	asv
s	mm	200.00		200.00		200.00		200.00		200.00		s
asv/s		0.8000		0.8000		1.1000		2.0000		3.1000		asvdivs=asv/s
v_us	kN	251.82		251.82		346.26		629.56		975.82		vus = asvdivs*dv*fsyf*cotthetav/1000 , Eqn 8.2.5.2(1)
phivuc	kN	101.440		101.440		101.440		101.440		101.440		phivuc = phiv * vuc
phivus	kN	176.277		176.277		242.381		440.693		683.074		phivus = phiv * vus
phi v_u	kN	277.72		277.72		343.82		542.13		784.51		phivu=phiv*(vuc+vus)
v_u.max	kN	1737.38		1737.38		1737.38		1737.38		1737.38		vumax=0.55*(0.9*fcprime*bv*dv*cotthetav)/ (1+cotthetav*cotthetav)/1000, Eqn 8.2.3.3(1)
phi V_umax	kN	1216.16		1216.16		1216.16		1216.16		1216.16		phivumax
Is V* < phi_v V_u.max ?		Yes, okay		Yes, okay		Yes, okay		Yes, okay		Yes, okay		IF(v_design<phivumax, "Yes, okay", "No, not okay")
Del F_td	kN	242.96		242.96		199.98		71.06		0.00		delftd =MAX(cotthetav*(v_design-0.5*phiv*vus),0) Eqn 8.2.7(2), AS 5100.5
z = d_v/1000.0	mm	484.20		484.20		484.20		484.20		484.20		zvalue = dv
Ast_required	mm2	2759		2759		2637		2268		2065		ast_required =abs(m_design*1e6/(zvalue*phif*fsy) + delftd*1e3/(phiv*fsy), To satisfy clause 8.2.7
is Ast_prov >= Ast_req (okay) ?		not okay		not okay		not okay		not okay		okay		IF(ast_provided>=ast_required, "okay","not okay")
stress	MPa	613.21		613.21		585.92		504.07		458.95		stress =abs(m_design*1e6)/(z*phi_f*ast_provided) + deltaF_td*1e3/(phi_v*ast_provided)
phi_v V_u/V*		1.01		1.01		1.25		1.97		2.85		=phivu/v_design
Ast_provided/ Ast_required		0.815		0.815		0.853		0.992		1.089		=ast_provided/ast_required