Magnetic field shielding for SIDIS target

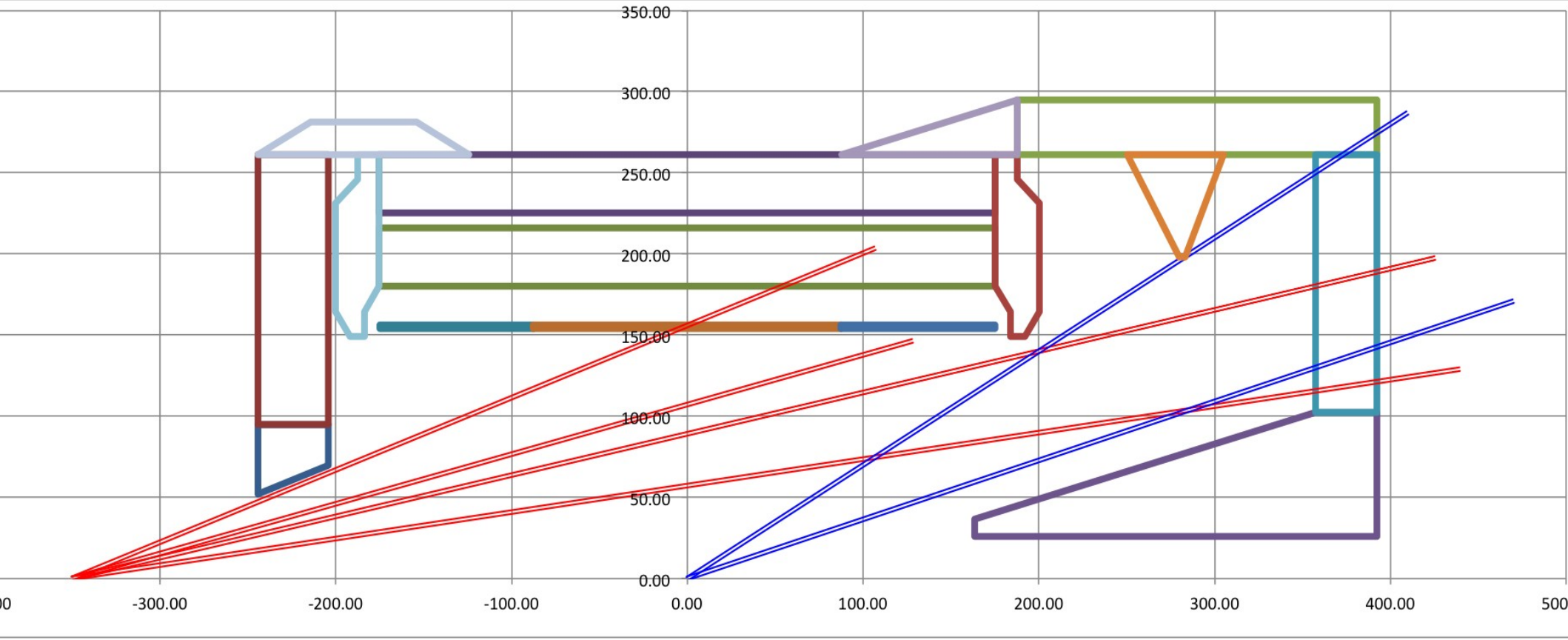
(e-mail) from Paul E. Reimer

•There were several questions about the magnetic field in the SIDIS target region at the phone conference yesterday afternoon (Wednesday 21 September). I have modeled several designs for the SIDIS target region as shown in the pictures below.

• The entire difference resides in the construction of the flux return between z=-350 and z=-240. These estimates do not include any additional coils to negate available fields.

•In separate e-mails (hopefully today or tomorrow) I will answer questions about the downstream end cap and differences for SIDIS and PVDIS.

NO ADDITIONAL SHIELDING



Upstream pole 8

Yoke end peices 7

Return Yoke 6

return yoke region 5

Upstream coil 2

Central coil 3

Downstream coil 4

Downstream front 10

downstream top 11

nosecone 9

calo 12

sidis high 1

sidis hi 2

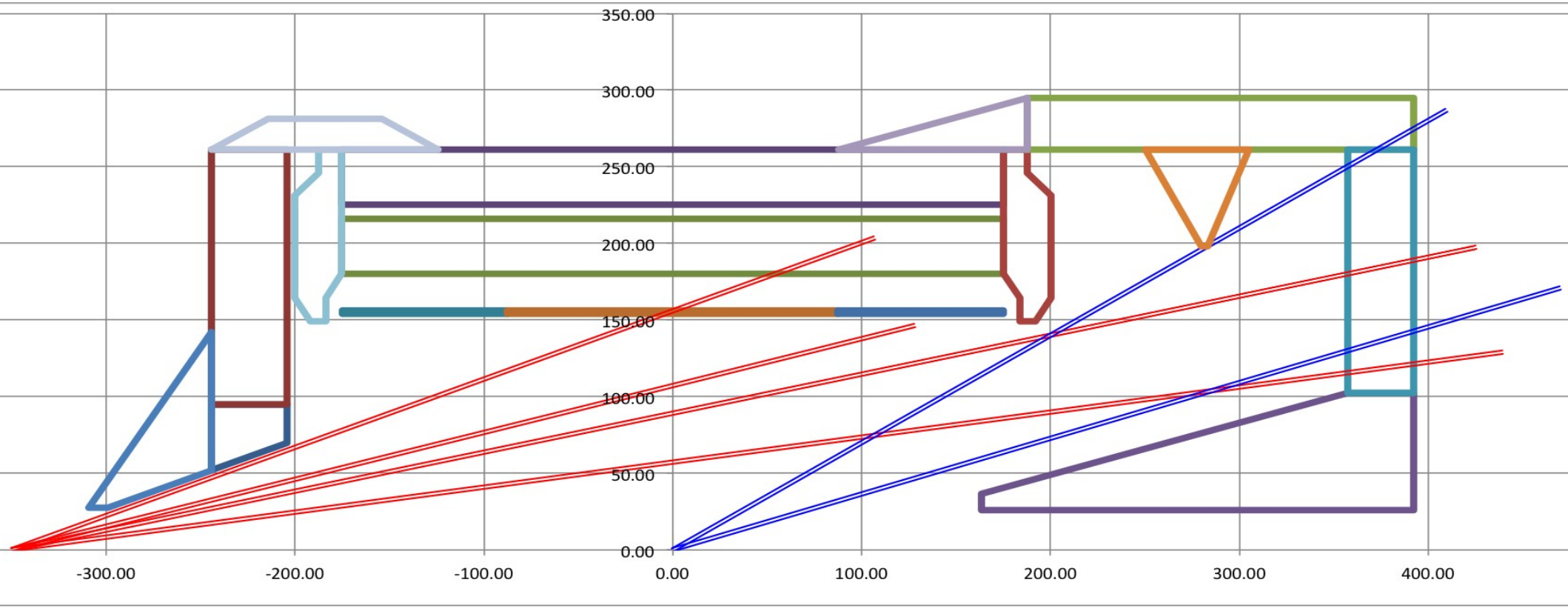
sidis low 1

sidis low 2

NO ADDITIONAL SHIELDING

R	Z	Br	Bz	|B|	A	dBz/dr	dBr/dz	Field
(cm)	(cm)	(G)	(G)	(G)	(G-cm)	(G/cm)	(G/cm)	Index
0	-350	0.00E+00	5.11E+01	5.11E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	-350	-7.98E-01	5.11E+01	5.11E+01	2.55E+01	-1.68E-02	-1.68E-02	-3.30E-04
2	-350	-1.60E+00	5.11E+01	5.11E+01	5.11E+01	-3.25E-02	-3.25E-02	-1.27E-03
3	-350	-2.39E+00	5.10E+01	5.11E+01	7.66E+01	-4.58E-02	-4.58E-02	-2.69E-03
4	-350	-3.18E+00	5.10E+01	5.11E+01	1.02E+02	-5.59E-02	-5.59E-02	-4.39E-03
5	-350	-3.85E+00	5.09E+01	5.11E+01	1.27E+02	-3.58E-02	-3.58E-02	-3.52E-03

WITH “SHIELDING FIN”



Upstream pole 8

Yoke end peices 7

Return Yoke 6

return yoke region 5

Upstream coil 2

Central coil 3

Downstream coil 4

Downstream front 10

downstream top 11

nosecone 9

calo 12

sidis high 1

sidis hi 2

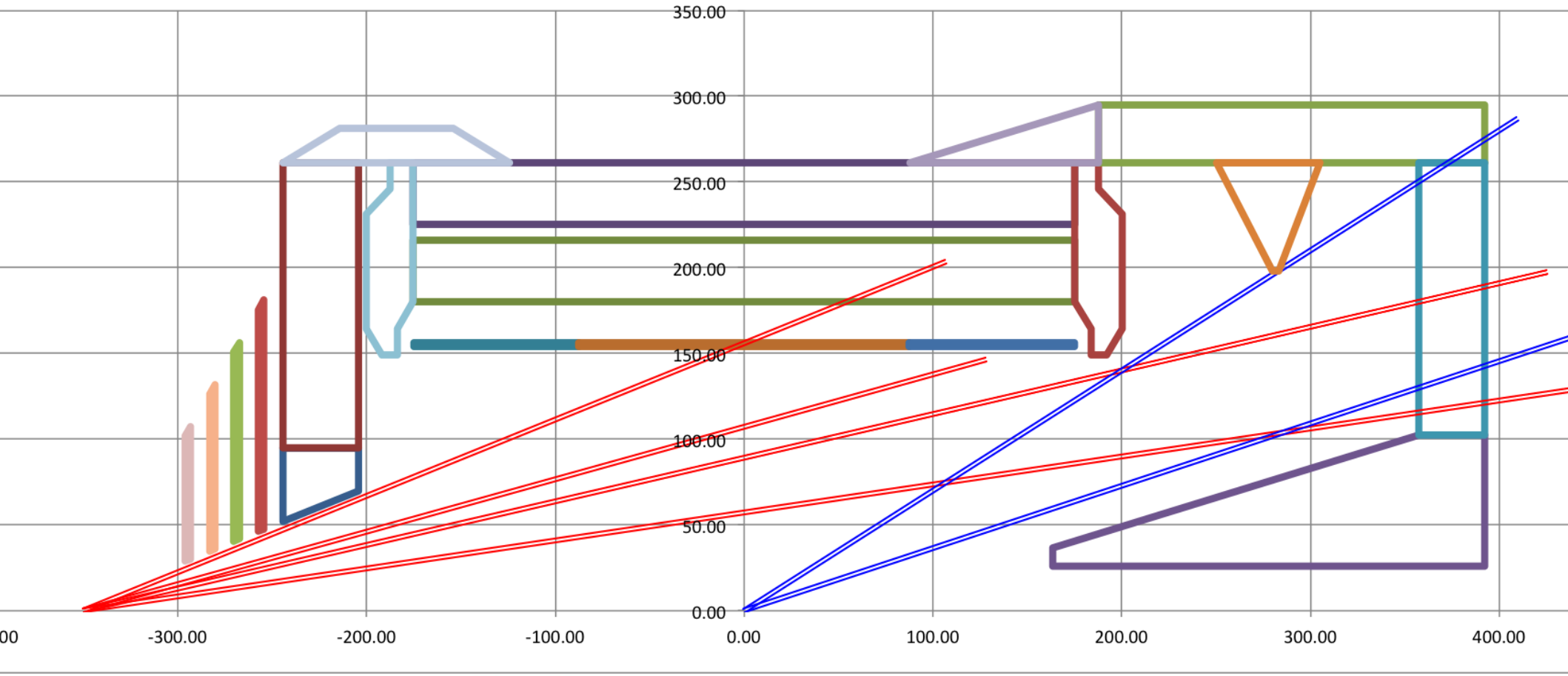
sidis low 1

sidis low 2

WITH “SHIELDING FIN”

	R	Z	Br	Bz	|B|	A	dBz/dr	dBr/dz	Field
	(cm)	(cm)	(G)	(G)	(G)	(G-cm)	(G/cm)	(G/cm)	Index
15 cm shield fin	0	-350	0.00E+00	3.58E+01	3.58E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	1	-350	-5.92E-01	3.58E+01	3.58E+01	1.79E+01	-1.42E-02	-1.42E-02	-3.96E-04
	2	-350	-1.18E+00	3.57E+01	3.58E+01	3.58E+01	-2.73E-02	-2.73E-02	-1.53E-03
	3	-350	-1.77E+00	3.57E+01	3.58E+01	5.36E+01	-3.85E-02	-3.85E-02	-3.24E-03
	4	-350	-2.36E+00	3.57E+01	3.58E+01	7.14E+01	-4.71E-02	-4.71E-02	-5.28E-03
	5	-350	-2.84E+00	3.57E+01	3.58E+01	8.93E+01	-3.02E-02	-3.02E-02	-4.24E-03
30 cm shield fin	0	-350	0.00E+00	2.23E+01	2.23E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	1	-350	-3.95E-01	2.23E+01	2.23E+01	1.12E+01	-1.09E-02	-1.09E-02	-4.86E-04
	2	-350	-7.89E-01	2.23E+01	2.23E+01	2.23E+01	-2.09E-02	-2.09E-02	-1.88E-03
	3	-350	-1.18E+00	2.23E+01	2.23E+01	3.35E+01	-2.95E-02	-2.95E-02	-3.97E-03
	4	-350	-1.57E+00	2.23E+01	2.23E+01	4.46E+01	-3.61E-02	-3.61E-02	-6.49E-03
	5	-350	-1.88E+00	2.23E+01	2.23E+01	5.57E+01	-2.32E-02	-2.32E-02	-5.22E-03
45 cm shielding fin	0	-350	0.00E+00	1.40E+01	1.40E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	1	-350	-2.60E-01	1.40E+01	1.40E+01	7.00E+00	-8.03E-03	-8.03E-03	-5.74E-04
	2	-350	-5.19E-01	1.40E+01	1.40E+01	1.40E+01	-1.55E-02	-1.55E-02	-2.21E-03
	3	-350	-7.77E-01	1.40E+01	1.40E+01	2.10E+01	-2.19E-02	-2.19E-02	-4.69E-03
	4	-350	-1.03E+00	1.40E+01	1.40E+01	2.80E+01	-2.67E-02	-2.67E-02	-7.67E-03
	5	-350	-1.23E+00	1.39E+01	1.40E+01	3.49E+01	-1.73E-02	-1.73E-02	-6.20E-03
65 cm shielding fin	0	-350	0.00E+00	8.57E+00	8.57E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	1	-350	-1.53E-01	8.57E+00	8.57E+00	4.28E+00	-4.93E-03	-4.93E-03	-5.75E-04
	2	-350	-3.05E-01	8.56E+00	8.57E+00	8.57E+00	-9.50E-03	-9.50E-03	-2.22E-03
	3	-350	-4.56E-01	8.55E+00	8.56E+00	1.28E+01	-1.34E-02	-1.34E-02	-4.71E-03
	4	-350	-6.07E-01	8.53E+00	8.56E+00	1.71E+01	-1.64E-02	-1.64E-02	-7.71E-03
	5	-350	-7.21E-01	8.53E+00	8.56E+00	2.14E+01	-1.07E-02	-1.07E-02	-6.28E-03

WITH SHIELDING PLATES



Upstream pole 8

Yoke end peices 7

Return Yoke 6

return yoke region 5

Upstream coil 2

Central coil 3

Downstream coil 4

Downstream front 10

downstream top 11

nosecone 9

calo 12

sidis high 1

sidis hi 2

sidis low 1

sidis low 2

WITH SHIELDING PLATES

R	Z	Br	Bz	|B|	A	dBz/dr	dBr/dz	Field
(cm)	(cm)	(G)	(G)	(G)	(G-cm)	(G/cm)	(G/cm)	Index
0	-350	0.00E+00	1.16E+01	1.16E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	-350	-2.00E-01	1.16E+01	1.16E+01	5.80E+00	-6.20E-03	-6.20E-03	-5.34E-04
2	-350	-4.01E-01	1.16E+01	1.16E+01	1.16E+01	-1.20E-02	-1.20E-02	-2.06E-03
3	-350	-6.00E-01	1.16E+01	1.16E+01	1.74E+01	-1.69E-02	-1.69E-02	-4.37E-03
4	-350	-7.97E-01	1.16E+01	1.16E+01	2.31E+01	-2.07E-02	-2.07E-02	-7.15E-03
5	-350	-9.49E-01	1.15E+01	1.16E+01	2.89E+01	-1.34E-02	-1.34E-02	-5.82E-03