

**GEO-LOGIKA Kft.**  
**Gioris Nikolaos**

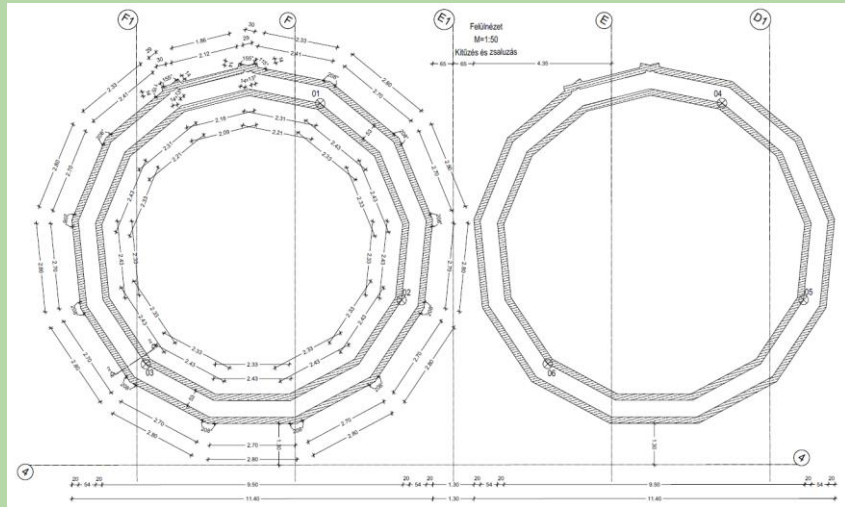
Mérnökgeodézia Konferencia,  
2023. november 11.

**28 m mély**  
zagymegtámasztású furat  
építésének geodéziai irányítása

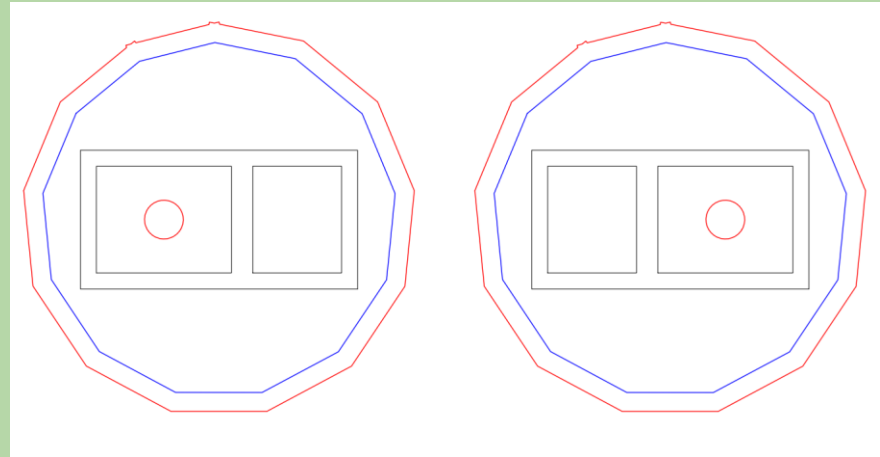
# Résfalazott munkatér elhatárolás

A munka a két cső és akna munkaterületének elhatárolásával kezdődött.  
Ez egy egyszerű a kört legjobban közelítő sokszögű résfal építésével valósult meg

## A résfal terve



## A műszerre feltöltött dxf

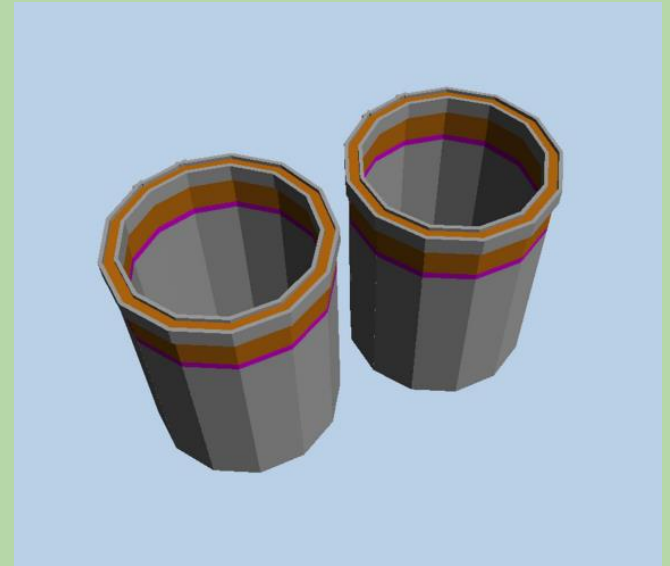


# Résfalazott munkatér elhatárolás:

A résvezető gerenda a valóságban



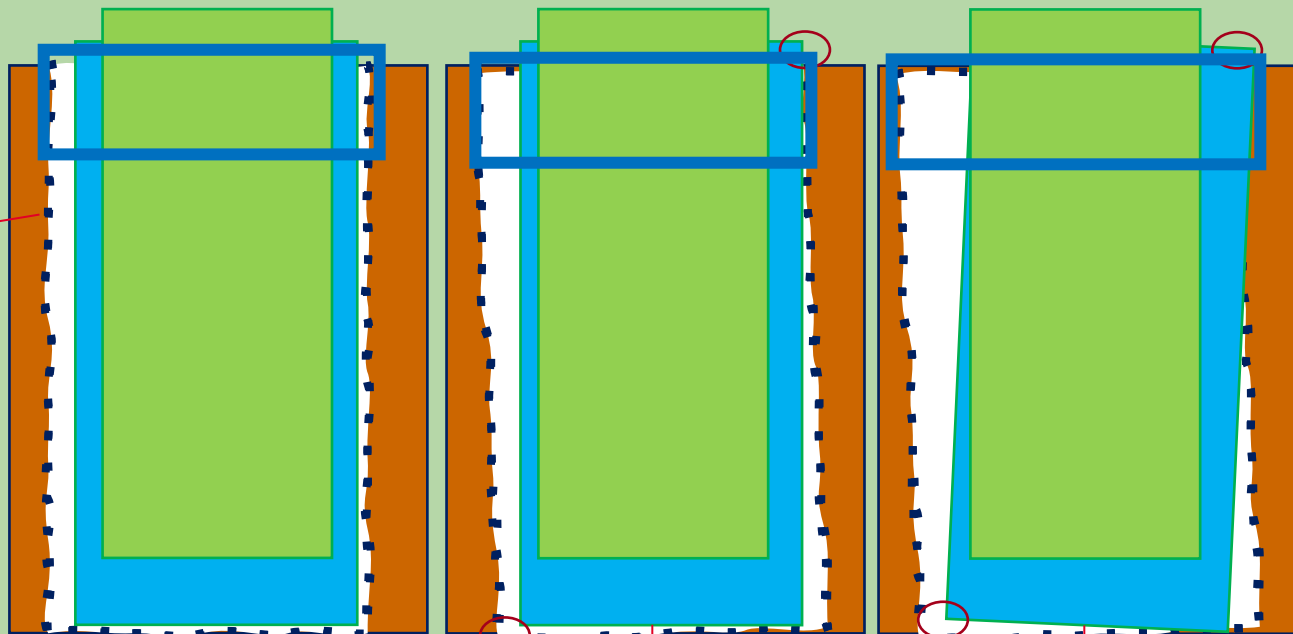
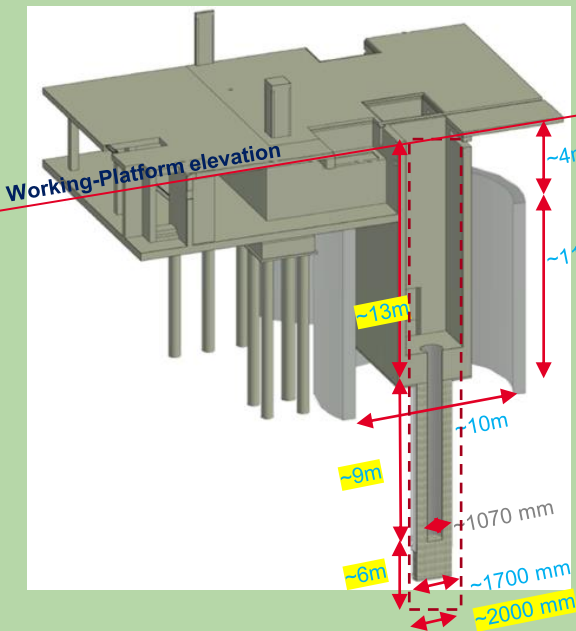
A résfalazott aknák modellje



## Nagy átmérőjű fúrás; Konceptió tervezés

Lehetséges hibák;

- Furat nem függőleges – 26m! 2m átmérő
- Védőcső;
  - nem függőlegesen kerül beépítésre,
  - nem egyenesre van gyártva
- Haszoncső;
  - nem függőlegesen kerül beépítésre,
  - nem egyenesre van gyártva



„Csupán” pontra-állási  
elfogadott hiba 10cm  
Tartalék 30cm,

Ha minden eleme elméleti szinten  
függőleges

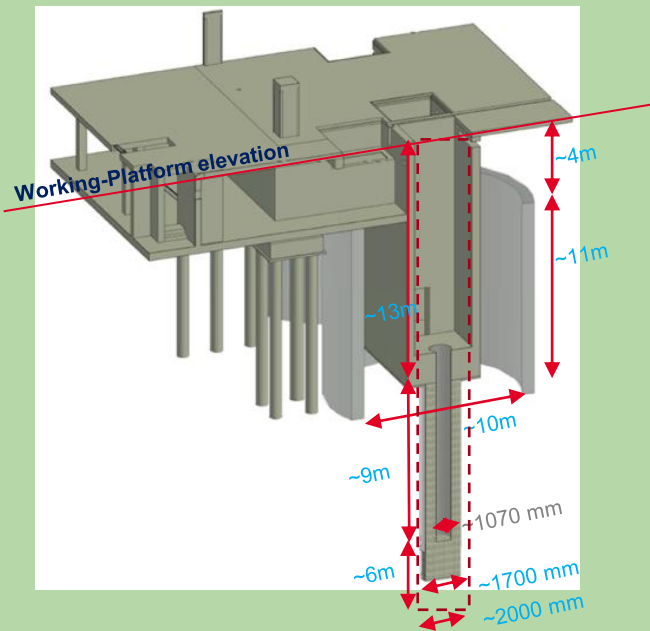
Furat 1% eltérése a függőlegestől  
20m-en 20cm!

Tartalék 2000/1700 □ 15-15cm

Védőcső elhelyezési  
pontatlansága vagy gyártási hibája  
szintén okozhat 10-20cm-t!

A fúró-dob 2m átmérőjű!

# Fúrófejek



Talaj fúró / kitermelő (dob-fúró);  
Magas „testű” - segíti a függőleges fúrást  
Íránycsőből indulva!



Kőzet-fúrófej;  
Felőrli a kemény réteget, de nem fejt  
ki! Így a két fejet ~1 méterenként  
cserélgetni kell..



14:31  
12/16

56%

9%

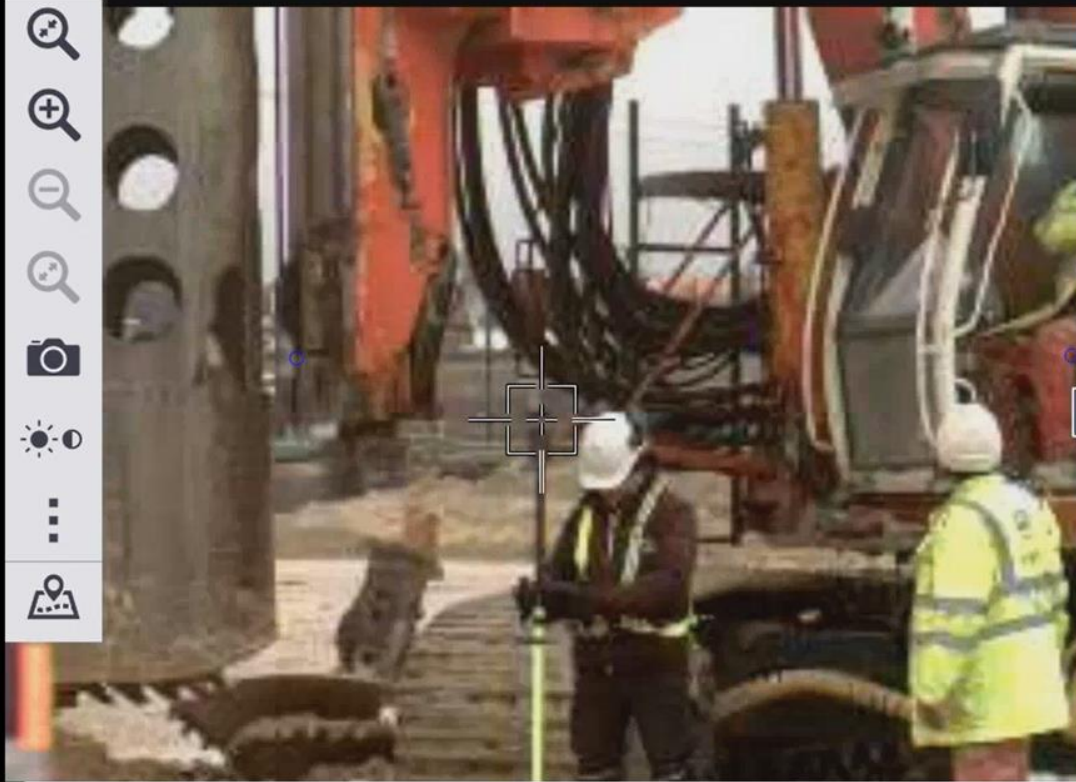


\*T  
0.000



+10  
1.720

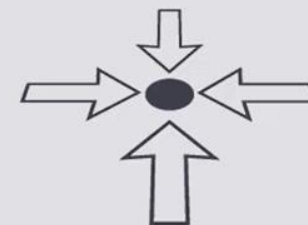
Target locked



Stake: CsoBelso 1943



Offset: 1.700m at 329°38'24"



Go In  
**0.000m**

Go Right  
**0.003m**

V Dist

H.Ang reqd.  
**23°04'31"**

Delta H.Ang  
**-0°00'46"**

0:07:20



0:33:02

20221216-2

Esc

Measure

Target

Turn



Options

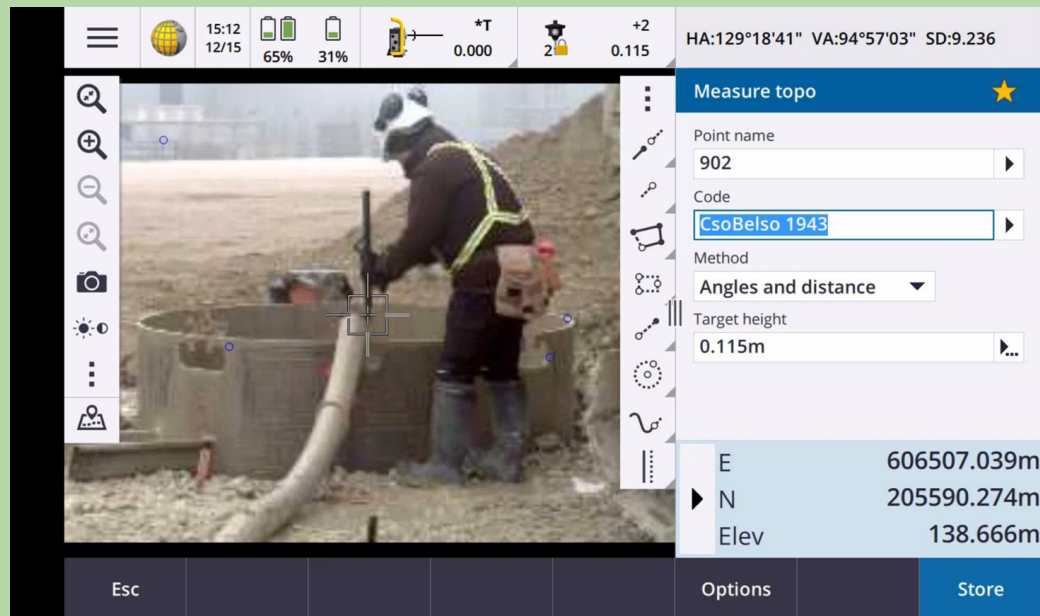
Offset

Accept

# A zagymegtámasztású furat

A sokszögű résfalak belsejébe egy zagyos furat lett elhelyezve. Ehhez középpontot tűztem ki és két irányban az iránycső palástjához egy egy őrponthot. Ez alapján helyezték el a furat vezetésére szolgáló külső iránycsövet. Ennek mérete ~2050 mm. Az iránycsövet az előkészített talajba befűrták.

Miután az iránycső befűrásával végeztek leellenőriztem a vezetőcső végleges helyét és függőlegességét, pontosabban a csővég vízszintességét





14:10  
12/15

83%

43%

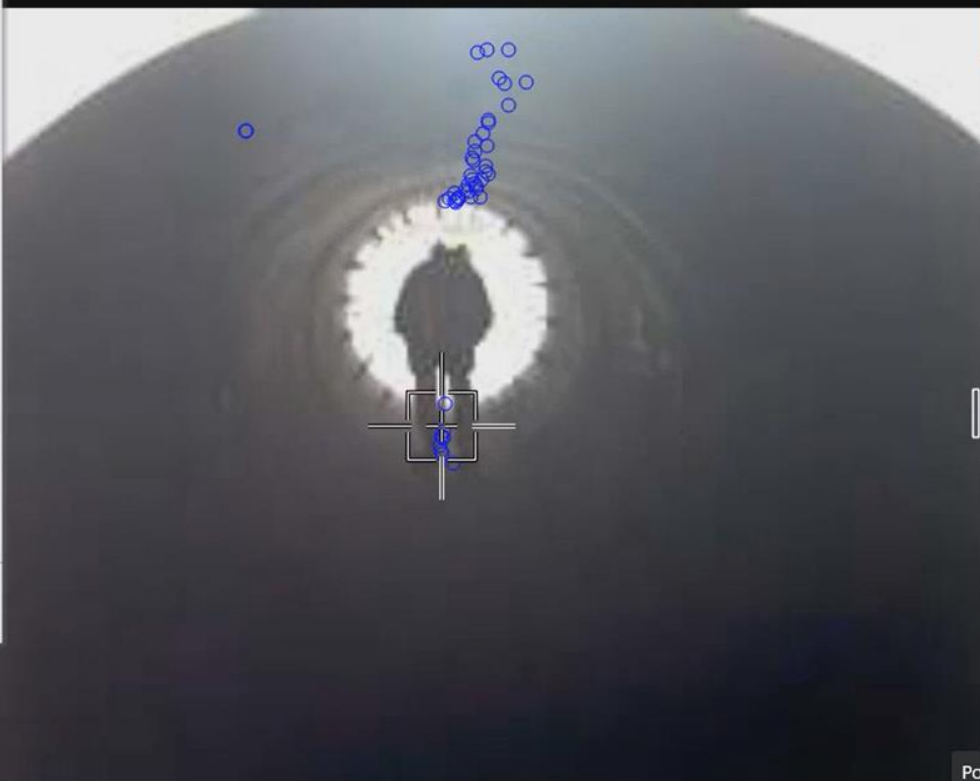


\*T  
0.000



-18  
0.000

HA:346°05'36" VA:92°52'23" SD:23.230



Stake: 1001-1002



0.00

2.00

4.00

Station  
**0+018.790m**  
H.Offset  
**-0.043m**

Grade to line  
**Cut 633.15%**

Cut 0.273m

Pozicionálás

0:01:09

0:51:28

20221215

Esc

Measure

Target

Turn

Options

Accept





14:31  
12/15



78%



39%



\*T  
0.000



5

-18  
0.000

HA:339°18'19" VA:94°06'33" SD:6.285



Stake: 1001-1002



0.00

2.00

4.00

1001

Station

**0+001.901m**

Grade to line

**Cut 124.04%**

H.Offset

**-0.802m**

V.Distance

**Cut 0.994m**

0:11:19

0:41:18

20221215

Esc

Measure

Target

Turn

Options

Accept



14:31  
12/15



78%



39%



\*T  
0.000



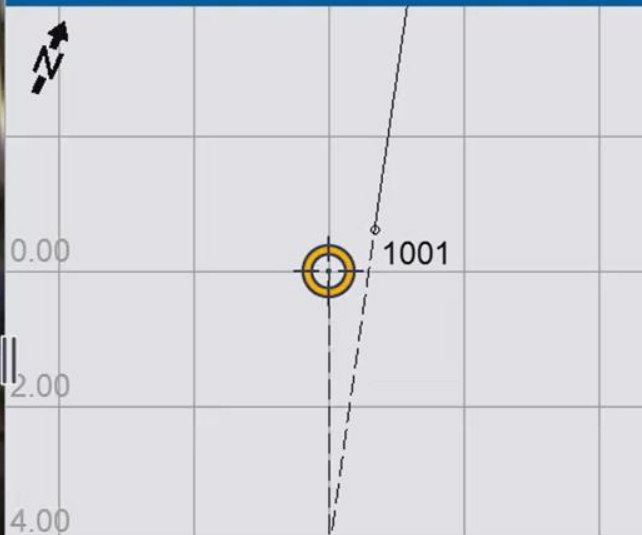
5

-18  
0.000

HA:337°45'45" VA:97°43'27" SD:3.681



Stake: 1001-1002



Station  
**-0+000.714m**

Grade to line  
**Cut 159.28%**

H.Offset  
**-0.594m**

V.Distance  
**Cut 0.946m**

0:11:31

0:41:06

20221215

Esc

Measure

Target



Turn



Options



Accept



14:36  
12/15

77%

38%



T  
0.000



-18  
0.000

HA:346°19'07" VA:90°38'36"



Stake: 1001-1002



0.00

2.00

4.00



Station  
**0+022.929m**

Grade to line  
**Cut 201.74%**

H.Offset  
**0.585m**

V.Distance  
**Cut 1.180m**

Esc

Measure

Target

Turn

Options

Accept

14:54 12/15 71% 34% 0.000 3! 0.000 HA:346°50'12" VA:87°37'59" SD:4.368

**Measure topo** ★

Point name: 2001

Code: 1001-1002

Method: Angles and distance

Target height: 0.000m

14:55 12/15 71% 34% 0.000 3! 0.000 HA:336°06'27" VA:95°26'39"

**Measure topo** ★

Point name: 2003

Code: 1001-1002

Method: Angles and distance

Target height: 0.000m

Esc Check Turn Dist Options Measure

14:54 12/15 71% 34% 0.000 3! 0.000 HA:347°46'08" VA:108°31'04"

**Measure topo** ★

Point name: 2002

Code: 1001-1002

Method: Angles and distance

Target height: 0.000m

20221215 Esc Check Turn Dist Options Measure

14:56 12/15 71% 34% 0.000 3! 0.000 HA:358°13'53" VA:97°36'20"

**Measure topo** ★

Point name: 2004

Code: 1001-1002

Method: Angles and distance

Target height: 0.000m

Esc Check Turn Dist Options Measure

Esc Check Turn Dist Options Measure

EntityType: Arc Entity Name:,-0m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.000m	-0.0044m	0.0289m	-0.0044m	0.0287m
2	0.000m	-0.0232m	0.0291m	-0.0233m	0.0288m
3	-0.001m	-0.8121m	0.9773m	-0.8115m	0.9772m
4	0.000m	-0.8071m	1.0053m	-0.8071m	1.0053m
5	0.000m	0.0109m	1.6664m	0.0109m	1.6662m
6	0.001m	0.0232m	1.6661m	0.0232m	1.6668m
7	0.000m	0.7903m	1.0484m	0.7901m	1.0484m
8	0.000m	0.8069m	0.9646m	0.8065m	0.9646m

EntityType: Arc Entity Name:,-3m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.002m	-0.7815m	1.1071m	-0.7837m	1.1079m
2	-0.003m	-0.0679m	1.6620m	-0.0676m	1.6592m
3	0.002m	0.8007m	0.9897m	0.8028m	0.9901m
4	-0.002m	0.0315m	0.0273m	0.0314m	0.0289m

EntityType: Arc Entity Name:,-6m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7660m	1.1459m	-0.7686m	1.1470m
2	0.003m	-0.7445m	1.1960m	-0.7470m	1.1971m
3	-0.003m	-0.0691m	1.6643m	-0.0689m	1.6613m
4	-0.004m	-0.0339m	1.6664m	-0.0338m	1.6625m
5	0.003m	0.7897m	1.0511m	0.7923m	1.0517m
6	0.002m	0.7903m	1.0490m	0.7924m	1.0496m
7	-0.002m	0.0037m	0.0297m	0.0037m	0.0315m
8	-0.002m	-0.0011m	0.0296m	-0.0011m	0.0313m

EntityType: Arc Entity Name:,-9m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.6861m	1.3005m	-0.6887m	1.3022m
2	-0.004m	-0.1026m	1.6606m	-0.1022m	1.6569m
3	0.002m	0.7941m	1.0277m	0.7962m	1.0282m
4	-0.002m	-0.0017m	0.0299m	-0.0017m	0.0315m

EntityType: Arc Entity Name:,-1m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.000m	0.0037m	0.0290m	0.0037m	0.0294m
2	0.001m	-0.8130m	0.9736m	-0.8137m	0.9737m
3	0.000m	-0.7993m	1.0420m	-0.7991m	1.0419m
4	-0.001m	-0.0297m	1.6646m	-0.0297m	1.6640m
5	-0.001m	-0.0008m	1.6650m	-0.0008m	1.6643m
6	0.001m	0.0114m	1.6648m	0.0115m	1.6655m
7	0.000m	0.7705m	1.1076m	0.7710m	1.1078m

EntityType: Arc Entity Name:,-4m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.004m	-0.7761m	1.1216m	-0.7794m	1.1227m
2	0.004m	-0.7731m	1.1288m	-0.7769m	1.1312m
3	-0.005m	-0.0444m	1.6625m	-0.0442m	1.6578m
4	-0.005m	-0.0405m	1.6628m	-0.0403m	1.6580m
5	0.004m	0.7931m	1.0225m	0.7966m	1.0233m
6	0.003m	0.7943m	1.0168m	0.7975m	1.0175m
7	-0.003m	0.0056m	0.0266m	0.0055m	0.0294m
8	-0.002m	0.0028m	0.0266m	0.0028m	0.0290m

EntityType: Arc Entity Name:,-7m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7626m	1.1565m	-0.7651m	1.1575m
2	-0.003m	-0.0444m	1.6658m	-0.0442m	1.6623m
3	0.003m	0.8019m	0.9918m	0.8044m	0.9923m
4	-0.002m	0.0407m	0.0301m	0.0406m	0.0320m

EntityType: Arc Entity Name:,-10m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7018m	1.2730m	-0.7042m	1.2745m
2	0.004m	-0.7001m	1.2758m	-0.7038m	1.2781m
3	-0.004m	-0.1289m	1.6561m	-0.1283m	1.6525m
4	-0.005m	-0.1128m	1.6584m	-0.1122m	1.6537m
5	0.002m	0.7930m	1.0360m	0.7949m	1.0365m
6	0.003m	0.7973m	1.0167m	0.8003m	1.0173m
7	-0.002m	0.0132m	0.0300m	0.0131m	0.0322m
8	-0.001m	0.0055m	0.0299m	0.0054m	0.0314m

EntityType: Arc Entity Name:,-2m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.002m	-0.7918m	1.0717m	-0.7938m	1.0723m
2	0.002m	-0.7844m	1.0961m	-0.7861m	1.0967m
3	-0.002m	-0.0770m	1.6615m	-0.0768m	1.6597m
4	-0.002m	-0.0437m	1.6638m	-0.0436m	1.6621m
5	-0.001m	-0.0317m	1.6643m	-0.0317m	1.6632m
6	0.002m	0.8000m	0.9942m	0.8017m	0.9945m
7	0.002m	0.8015m	0.9860m	0.8033m	0.9863m
8	-0.001m	0.0202m	0.0281m	0.0202m	0.0291m
9	-0.002m	0.0173m	0.0280m	0.0172m	0.0299m

EntityType: Arc Entity Name:,-5m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7508m	1.1839m	-0.7536m	1.1851m
2	-0.004m	-0.0437m	1.6649m	-0.0435m	1.6610m
3	0.003m	0.7751m	1.0970m	0.7778m	1.0979m
4	-0.002m	0.0054m	0.0284m	0.0054m	0.0303m

EntityType: Arc Entity Name:,-8m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7872m	1.0889m	-0.7905m	1.0899m
2	0.002m	-0.7723m	1.1328m	-0.7740m	1.1334m
3	-0.003m	-0.0509m	1.6652m	-0.0507m	1.6618m
4	-0.003m	-0.0464m	1.6654m	-0.0463m	1.6624m
5	0.003m	0.7953m	1.0189m	0.7978m	1.0194m
6	0.002m	0.7971m	1.0100m	0.7994m	1.0104m
7	-0.002m	0.0276m	0.0304m	0.0275m	0.0322m
8	-0.002m	0.0152m	0.0300m	0.0152m	0.0319m

EntityType: Arc Entity Name:,-22m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.002m	-0.8094m	1.0122m	-0.8110m	1.0125m
2	0.002m	-0.8087m	1.0159m	-0.8108m	1.0164m
3	-0.003m	-0.0563m	1.6692m	-0.0561m	1.6657m
4	-0.001m	0.0062m	1.6706m	0.0062m	1.6693m
5	0.001m	0.7821m	1.0728m	0.7833m	1.0731m
6	0.003m	0.7831m	1.0694m	0.7857m	1.0701m
7	-0.001m	0.0407m	0.0342m	0.0406m	0.0351m
8	-0.001m	0.0393m	0.0341m	0.0392m	0.0352m
9	-0.001m	0.0259m	0.0335m	0.0258m	0.0345m

Regresszió  
számítások  
(körszelvények  
méterenként)  
1. oldal

# Regresszió számítások (körszelvények méterenként)

## 2. oldal

EntityType: Arc Entity Name:,-11m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7155m	1.2531m	-0.7184m	1.2548m
2	-0.004m	-0.0669m	1.6649m	-0.0666m	1.6607m
3	0.003m	0.7918m	1.0413m	0.7944m	1.0419m
4	-0.002m	-0.0148m	0.0305m	-0.0148m	0.0324m

EntityType: Arc Entity Name:,-14m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.005m	-0.7323m	1.2208m	-0.7371m	1.2233m
2	0.003m	-0.7152m	1.2530m	-0.7175m	1.2543m
3	-0.004m	-0.1216m	1.6617m	-0.1210m	1.6577m
4	-0.005m	-0.0836m	1.6665m	-0.0830m	1.6610m
5	0.003m	0.7957m	1.0375m	0.7986m	1.0382m
6	0.003m	0.7989m	1.0235m	0.8018m	1.0241m
7	-0.002m	-0.0247m	0.0338m	-0.0246m	0.0354m
8	-0.003m	-0.0426m	0.0345m	-0.0424m	0.0374m

EntityType: Arc Entity Name:,-17m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.004m	-0.7312m	1.2207m	-0.7345m	1.2223m
2	-0.005m	-0.0336m	1.6666m	-0.0335m	1.6621m
3	0.003m	0.7990m	1.0666m	0.8021m	1.0072m
4	-0.002m	0.0004m	0.0330m	0.0004m	0.0352m
5	-0.002m	0.0002m	0.0330m	0.0002m	0.0353m

EntityType: Arc Entity Name:,-20m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7970m	1.0608m	-0.8002m	1.0616m
2	0.003m	-0.7902m	1.0849m	-0.7929m	1.0857m
3	-0.005m	-0.0713m	1.6661m	-0.0709m	1.6609m
4	-0.002m	-0.0114m	1.6687m	-0.0114m	1.6666m
5	0.002m	0.7971m	1.0018m	0.7995m	1.0022m
6	0.003m	0.7986m	0.9933m	0.8020m	0.9939m
7	-0.002m	0.0475m	0.0349m	0.0474m	0.0369m
8	-0.003m	0.0391m	0.0344m	0.0390m	0.0371m

EntityType: Arc Entity Name:,-12m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.005m	-0.7332m	1.2220m	-0.7375m	1.2242m
2	0.003m	-0.7178m	1.2507m	-0.7209m	1.2524m
3	-0.005m	-0.1243m	1.6603m	-0.1236m	1.6555m
4	-0.005m	-0.0857m	1.6651m	-0.0852m	1.6599m
5	0.004m	0.7950m	1.0294m	0.7988m	1.0302m
6	0.002m	0.8015m	0.9973m	0.8039m	0.9978m
7	-0.002m	-0.0005m	0.0322m	-0.0005m	0.0343m
8	-0.003m	-0.0183m	0.0323m	-0.0182m	0.0349m

EntityType: Arc Entity Name:,-15m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.004m	-0.7606m	1.1642m	-0.7646m	1.1659m
2	-0.005m	-0.1282m	1.6606m	-0.1274m	1.6555m
3	0.003m	0.7878m	1.0611m	0.7911m	1.0619m
4	-0.003m	0.0421m	0.0334m	0.0420m	0.0360m

EntityType: Arc Entity Name:,-18m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.005m	-0.7760m	1.1174m	-0.7807m	1.1190m
2	0.003m	-0.7631m	1.1523m	-0.7660m	1.1535m
3	-0.004m	-0.1823m	1.6485m	-0.1814m	1.6447m
4	-0.005m	-0.1319m	1.6582m	-0.1311m	1.6531m
5	0.003m	0.7972m	1.0147m	0.8003m	1.0154m
6	0.003m	0.8001m	0.9999m	0.8029m	1.0004m
7	-0.002m	0.0008m	0.0341m	0.0008m	0.0361m
8	-0.003m	-0.0053m	0.0341m	-0.0053m	0.0371m

EntityType: Arc Entity Name:,-21m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7998m	1.0534m	-0.8027m	1.0541m
2	-0.004m	-0.0712m	1.6664m	-0.0709m	1.6628m
3	0.003m	0.7970m	1.0059m	0.7998m	1.0065m
4	-0.002m	0.0586m	0.0341m	0.0584m	0.0364m

EntityType: Arc Entity Name:,-13m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.005m	-0.7035m	1.2722m	-0.7078m	1.2748m
2	-0.006m	-0.1068m	1.6625m	-0.1060m	1.6565m
3	0.004m	0.7967m	1.0267m	0.8003m	1.0275m
4	-0.003m	0.0411m	0.0346m	0.0410m	0.0373m

EntityType: Arc Entity Name:,-16m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.003m	-0.7207m	1.2401m	-0.7234m	1.2416m
2	0.005m	-0.7141m	1.2521m	-0.7182m	1.2544m
3	-0.006m	-0.0987m	1.6614m	-0.0980m	1.6556m
4	-0.003m	-0.0834m	1.6631m	-0.0831m	1.6598m
5	0.002m	0.8014m	0.9992m	0.8036m	0.9996m
6	0.004m	0.8034m	0.9880m	0.8069m	0.9886m
7	-0.001m	0.0172m	0.0320m	0.0172m	0.0332m
8	-0.003m	0.0142m	0.0320m	0.0141m	0.0352m

EntityType: Arc Entity Name:,-19m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.004m	-0.7855m	1.0955m	-0.7894m	1.0968m
2	-0.005m	-0.0654m	1.6657m	-0.0650m	1.6600m
3	0.004m	0.7923m	1.0279m	0.7958m	1.0287m
4	-0.003m	-0.0287m	0.0333m	-0.0286m	0.0361m

EntityType: Arc Entity Name:,-22m					
Pt No.	Offset_to_Entity	Coordinates on Entity		Point Coordinates	
		Northing	Easting	Northing	Easting
1	0.002m	-0.8094m	1.0122m	-0.8110m	1.0125m
2	0.002m	-0.8087m	1.0159m	-0.8108m	1.0164m
3	-0.003m	-0.0563m	1.6692m	-0.0561m	1.6657m
4	-0.001m	0.0062m	1.6706m	0.0062m	1.6693m
5	0.001m	0.7821m	1.0728m	0.7833m	1.0731m
6	0.003m	0.7831m	1.0694m	0.7857m	1.0701m
7	-0.001m	0.0407m	0.0342m	0.0406m	0.0351m
8	-0.001m	0.0393m	0.0341m	0.0392m	0.0352m
9	-0.001m	0.0259m	0.0335m	0.0258m	0.0345m

# Miután meg lett a csőpalást minden metszete méterenként

Most következett a munka lényegi része.

Kigyűjtöttem az egyes metszetek körközéppontját.

Itt azzal szembesültem, hogy a világelső CAD fejlesztő regressziós egyenes számító modulja, csak vízszintes egyenest tud számolni.

Azonban ahol nagy a baj, ott közel a segítség:

# A csőtengely számítása GeoEasy segítségével

Regressziós egyenes számítása GeoEasy-vel

$$\begin{aligned}
 Y &= 0.849 - 0.0002581 * t \\
 X &= -0.004 + 0.00001887 * t \\
 Z &= -11 + 0.99999998 * t
 \end{aligned}$$

Regressziós egyenes számítása GeoEasy-vel

$$\begin{aligned}
 Y &= 0.849 + 0.00012796 * t \\
 X &= -0.004 - 0.00048449 * t \\
 Z &= -11 + 1.000000016 * t
 \end{aligned}$$

Mindezekből a mérésekből és számításokból megállapítottam, hogy a cső egyenessége megfelelő és a behelyezés elkezdhető.

Pontszám	y	x	z	dy	dx	dz	dt
3000	0.848	-0.004	0.000	-0.002	0.000	0.000	0.002
3001	0.847	-0.005	-1.000	-0.001	0.001	0.000	0.001
3002	0.846	-0.005	-2.000	0.000	0.001	0.000	0.001
3003	0.845	-0.005	-3.000	0.002	0.001	0.000	0.002
3004	0.845	-0.006	-4.000	0.002	0.002	0.000	0.003
3005	0.847	-0.004	-5.000	0.000	0.000	0.000	0.000
3006	0.848	-0.003	-6.000	-0.001	-0.001	0.000	0.001
3007	0.848	-0.004	-7.000	0.000	0.000	0.000	0.000
3008	0.848	-0.005	-8.000	0.000	0.001	0.000	0.001
3009	0.848	-0.004	-9.000	0.000	0.000	0.000	0.000
3010	0.848	-0.003	-10.000	0.001	-0.001	0.000	0.002
3011	0.849	-0.004	-11.000	0.000	0.000	0.000	0.000
3012	0.851	-0.004	-12.000	-0.001	-0.001	0.000	0.002
3013	0.851	-0.002	-13.000	-0.002	-0.002	0.000	0.003
3014	0.852	-0.002	-14.000	-0.002	-0.003	0.000	0.004
3015	0.851	-0.004	-15.000	-0.001	-0.001	0.000	0.001
3016	0.849	-0.003	-16.000	0.001	-0.002	0.000	0.002
3017	0.850	-0.003	-17.000	0.000	-0.001	0.000	0.001
3018	0.851	-0.003	-18.000	0.000	-0.001	0.000	0.001
3019	0.850	-0.006	-19.000	0.001	0.001	0.000	0.001
3020	0.851	-0.007	-20.000	0.000	0.002	0.000	0.002
3021	0.850	-0.007	-21.000	0.001	0.002	0.000	0.003
3022	0.852	-0.006	-22.000	0.000	0.002	0.000	0.002

RMS 0.002

Pontszám	y	x	z	dy	dx	dz	dt
4000	0.846	0.006	0.000	0.004	-0.007	0.000	0.008
4001	0.848	-0.012	-1.000	0.002	0.012	0.000	0.012
4002	0.849	-0.009	-2.000	0.001	0.009	0.000	0.009
4003	0.849	-0.007	-3.000	0.001	0.007	0.000	0.008
4004	0.850	-0.004	-4.000	-0.001	0.005	0.000	0.005
4005	0.853	-0.002	-5.000	-0.003	0.003	0.000	0.005
4006	0.854	0.002	-6.000	-0.005	-0.001	0.000	0.005
4007	0.852	0.005	-7.000	-0.003	-0.002	0.000	0.003
4008	0.851	0.008	-8.000	-0.002	-0.005	0.000	0.005
4009	0.848	0.009	-9.000	0.001	-0.006	0.000	0.006
4010	0.848	0.010	-10.000	0.000	-0.006	0.000	0.006
4011	0.848	0.009	-11.000	0.001	-0.005	0.000	0.005
4012	0.847	0.009	-12.000	0.001	-0.004	0.000	0.004
4013	0.847	0.010	-13.000	0.001	-0.005	0.000	0.005
4014	0.848	0.013	-14.000	0.000	-0.007	0.000	0.007
4015	0.848	0.012	-15.000	0.000	-0.006	0.000	0.006
4016	0.847	0.011	-16.000	0.001	-0.004	0.000	0.004
4017	0.847	0.011	-17.000	0.001	-0.003	0.000	0.003
4018	0.849	0.008	-18.000	-0.001	-0.001	0.000	0.001
4019	0.848	0.008	-19.000	-0.001	0.000	0.000	0.001
4020	0.847	0.008	-20.000	0.001	0.000	0.000	0.001
4021	0.845	0.008	-21.000	0.003	0.001	0.000	0.003
4022	0.849	-0.015	-22.000	-0.002	0.025	0.000	0.025

RMS 0.008



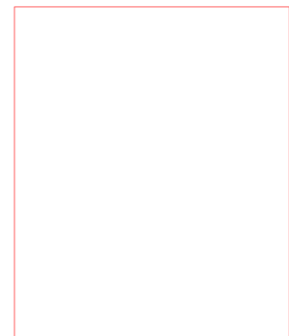
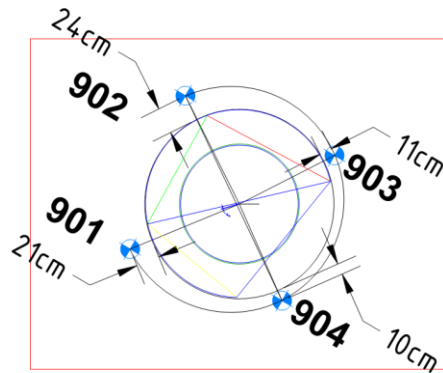


Védő-cső pozicionálása;

Az elvégzett geodéziai felmérés segítségével, a pozicionálás „fa-ék” egyszerű feladat ☺



09:40 12/16 95% 28% S 0.000 31 +0 0.000 HA:233°18'31" VA:88°17'15"

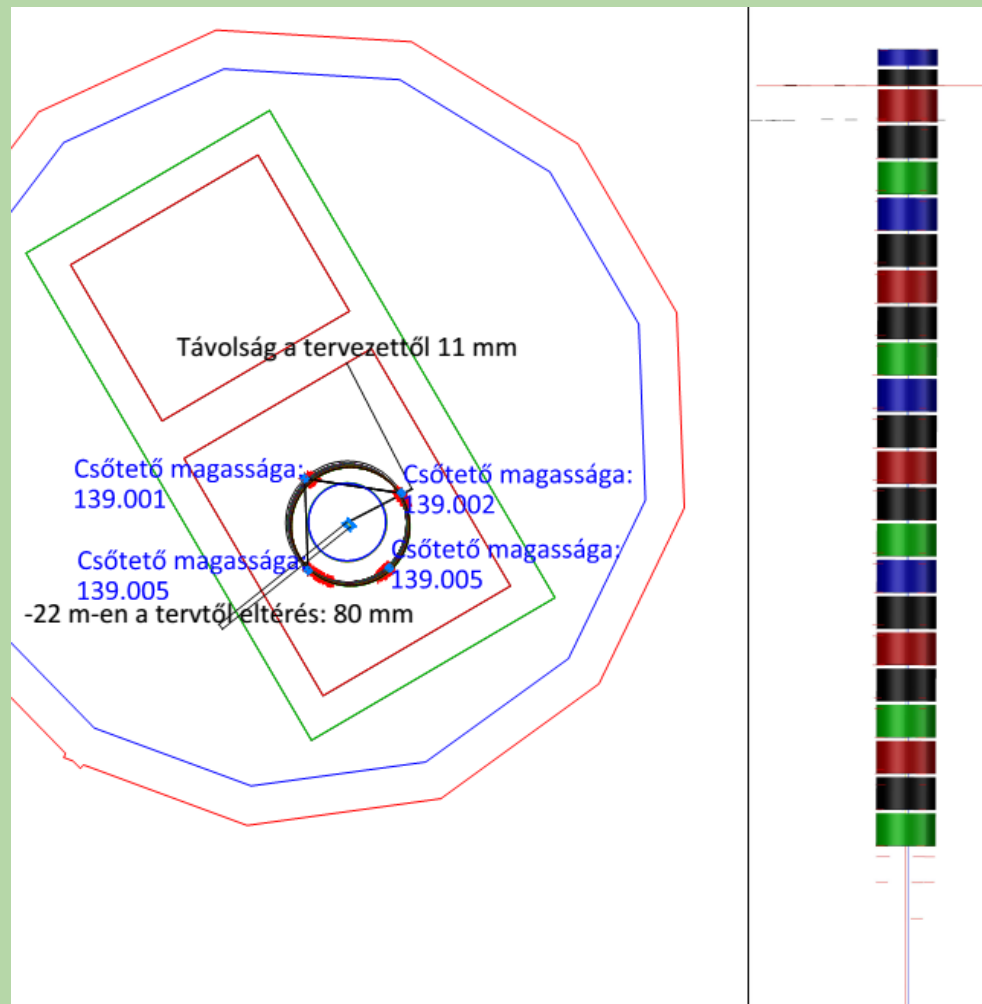


# Az eredmény:

A védőcsövet 11 mm-es pontossággal kiviteleztük, a csőtetőn mérve

A ferdeség és a cső gyártási geometriájából ehhez hozzájött 69 mm - 22 méteren

Ami összesen 80 mm-es eredményt adott



Köszönöm, hogy meghallgattatok

