

Methodology



Wastewater collection network



Description of the study area



Outline

Project objectives:
Description of the study area.
Water distribution network.
Wastewater collection network.
BODQ for the wastewater collection network.

Analysis and Design of the water distribution network, design of wastewater collection network for Dir Alghuson .

Prepared by:
Ahmed Saadoun
Hassan Khader
Submitted to:
Dr. Mohammed B. Alsaad

Design criteria

• Slope of the sewer is lower than the minimum value.
• If the minimum value of 1% should be at least.
• If the minimum value of 1% should be at least.
• If the minimum value of 1% should be at least.

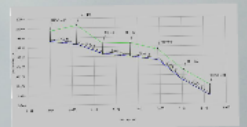
Cover depth

• Cover: the distance between the bottom of the sewer and the top of the cover.
• The minimum cover depth is 0.75 m.
• The maximum cover depth is 1.5 m.
• The maximum cover depth is 1.5 m.

Bill of quantity



sample profile



WDN



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• The minimum cover depth is 0.75 m.
• The maximum cover depth is 1.5 m.
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Total number of manholes and pipes

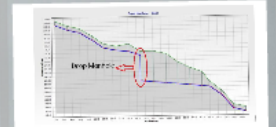


Cost

Item	Unit	Quantity	Rate	Amount
Manhole	Each	10	1000	10000
Pipe	m	1000	10	10000
Labour	hr	1000	10	10000
Material	m³	1000	10	10000
Transport	km	1000	10	10000
Electricity	kWh	1000	10	10000
Water	m³	1000	10	10000
Other				
Total				60000

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Material	m³	1000	10	10000
Transport	km	1000	10	10000
Electricity	kWh	1000	10	10000
Water	m³	1000	10	10000
Other				
Total				60000

Profile for the Drop Manhole



Profiles



Results



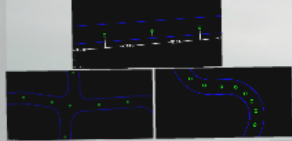
Running the model



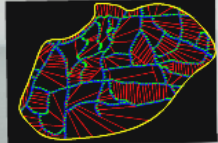
ArchHydro Drainage lines



Locating the manholes



Dividing the area



Calculating the cost

Cost = (Manhole + Pipe + Labour + Material + Transport + Electricity + Water + Other) * Quantity

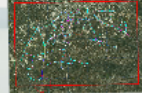
Ground surface elevation

Point	Elevation (m)
1	100.00
2	100.00
3	100.00
4	100.00
5	100.00
6	100.00
7	100.00
8	100.00
9	100.00
10	100.00

Connecting the pipes



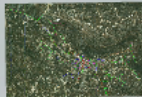
The network and Outfall



Methodology



WDN



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Wastewater collection network
BOQ for the wastewater collection network

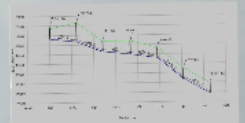
Analysis and Design of the water distribution network, design of wastewater collection network for Div Alghuson

Project of Dr.
Ahmed Alghuson
Ahmed Alghuson
Ahmed Alghuson
Submitted to
Dr. Mohammed B. Alghuson

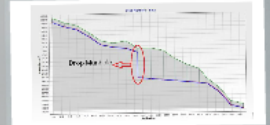
Bill of quantity



sample profile



Profile for the Drop Manhole



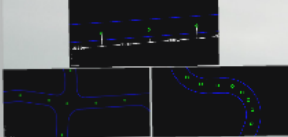
Profiles



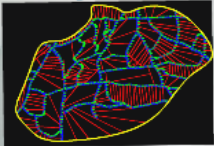
ArchHydro Drainage lines



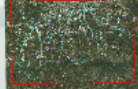
Locating the manholes



Dividing the area



The network and Outfall



Design criteria

Design criteria
- Slope: difference in elevation between consecutive manholes
- A minimum slope of 0.2% should be achieved
- A maximum slope of 0.5% should not be exceeded

Cover depth

Cover depth
- Cover: this should be between 1.0m and 1.5m
- The manhole cover should be 1.0m
- The manhole cover should be 1.5m

Cost

Multiple Input/Output Data Analysis (for 2023-2024)				
Item	Unit	Quantity	Rate	Amount
1.0m x 0.75m manhole cover	each	10	1000	10000
1.5m x 1.0m manhole cover	each	5	1500	7500
2.0m x 1.5m manhole cover	each	2	2000	4000
2.5m x 2.0m manhole cover	each	1	2500	2500
3.0m x 2.5m manhole cover	each	1	3000	3000
3.5m x 3.0m manhole cover	each	1	3500	3500
4.0m x 3.5m manhole cover	each	1	4000	4000
4.5m x 4.0m manhole cover	each	1	4500	4500
5.0m x 4.5m manhole cover	each	1	5000	5000
5.5m x 5.0m manhole cover	each	1	5500	5500
6.0m x 5.5m manhole cover	each	1	6000	6000
6.5m x 6.0m manhole cover	each	1	6500	6500
7.0m x 6.5m manhole cover	each	1	7000	7000
7.5m x 7.0m manhole cover	each	1	7500	7500
8.0m x 7.5m manhole cover	each	1	8000	8000
8.5m x 8.0m manhole cover	each	1	8500	8500
9.0m x 8.5m manhole cover	each	1	9000	9000
9.5m x 9.0m manhole cover	each	1	9500	9500
10.0m x 9.5m manhole cover	each	1	10000	10000
10.5m x 10.0m manhole cover	each	1	10500	10500
11.0m x 10.5m manhole cover	each	1	11000	11000
11.5m x 11.0m manhole cover	each	1	11500	11500
12.0m x 11.5m manhole cover	each	1	12000	12000
12.5m x 12.0m manhole cover	each	1	12500	12500
13.0m x 12.5m manhole cover	each	1	13000	13000
13.5m x 13.0m manhole cover	each	1	13500	13500
14.0m x 13.5m manhole cover	each	1	14000	14000
14.5m x 14.0m manhole cover	each	1	14500	14500
15.0m x 14.5m manhole cover	each	1	15000	15000
15.5m x 15.0m manhole cover	each	1	15500	15500
16.0m x 15.5m manhole cover	each	1	16000	16000
16.5m x 16.0m manhole cover	each	1	16500	16500
17.0m x 16.5m manhole cover	each	1	17000	17000
17.5m x 17.0m manhole cover	each	1	17500	17500
18.0m x 17.5m manhole cover	each	1	18000	18000
18.5m x 18.0m manhole cover	each	1	18500	18500
19.0m x 18.5m manhole cover	each	1	19000	19000
19.5m x 19.0m manhole cover	each	1	19500	19500
20.0m x 19.5m manhole cover	each	1	20000	20000
20.5m x 20.0m manhole cover	each	1	20500	20500
21.0m x 20.5m manhole cover	each	1	21000	21000
21.5m x 21.0m manhole cover	each	1	21500	21500
22.0m x 21.5m manhole cover	each	1	22000	22000
22.5m x 22.0m manhole cover	each	1	22500	22500
23.0m x 22.5m manhole cover	each	1	23000	23000
23.5m x 23.0m manhole cover	each	1	23500	23500
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24.5m x 24.0m manhole cover	each	1	24500	24500
25.0m x 24.5m manhole cover	each	1	25000	25000
25.5m x 25.0m manhole cover	each	1	25500	25500
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26.5m x 26.0m manhole cover	each	1	26500	26500
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30.0m x 29.5m manhole cover	each	1	30000	30000
30.5m x 30.0m manhole cover	each	1	30500	30500
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31.5m x 31.0m manhole cover	each	1	31500	31500
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32.5m x 32.0m manhole cover	each	1	32500	32500
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33.5m x 33.0m manhole cover	each	1	33500	33500
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40.5m x 40.0m manhole cover	each	1	40500	40500
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42.0m x 41.5m manhole cover	each	1	42000	42000
42.5m x 42.0m manhole cover	each	1	42500	42500
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44.5m x 44.0m manhole cover	each	1	44500	44500
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56.0m x 55.5m manhole cover	each	1	56000	56000
56.5m x 56.0m manhole cover	each	1	56500	56500
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62.5m x 62.0m manhole cover	each	1	62500	62500
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63.5m x 63.0m manhole cover	each	1	63500	63500
64.0m x 63.5m manhole cover	each	1	64000	64000
64.5m x 64.0m manhole cover	each	1	64500	64500
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108.5m x 108.0m manhole cover	each	1	108500	108500
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109.5m x 109.0m manhole cover	each	1	109500	109500
110.0m x 109.5m manhole cover	each	1	110000	110000
110.5m x 110.0m manhole cover	each	1	110	

Analysis and Design of the water distribution network , design of wastewater collection network for Dir Alghuson .

Prepared by :

**Ahmad Sweileh
Momen Khader**

**Yassir Abu Ashwareb
Ribhi Abu Snaineh**

**Submitted to
Dr. Mohammad N. Almasri**

Outline

- Project objectives.
- Description of the study area.
- Water distribution network.
- Wastewater collection network.
- BOQ for the wastewater collection network.

Project objectives

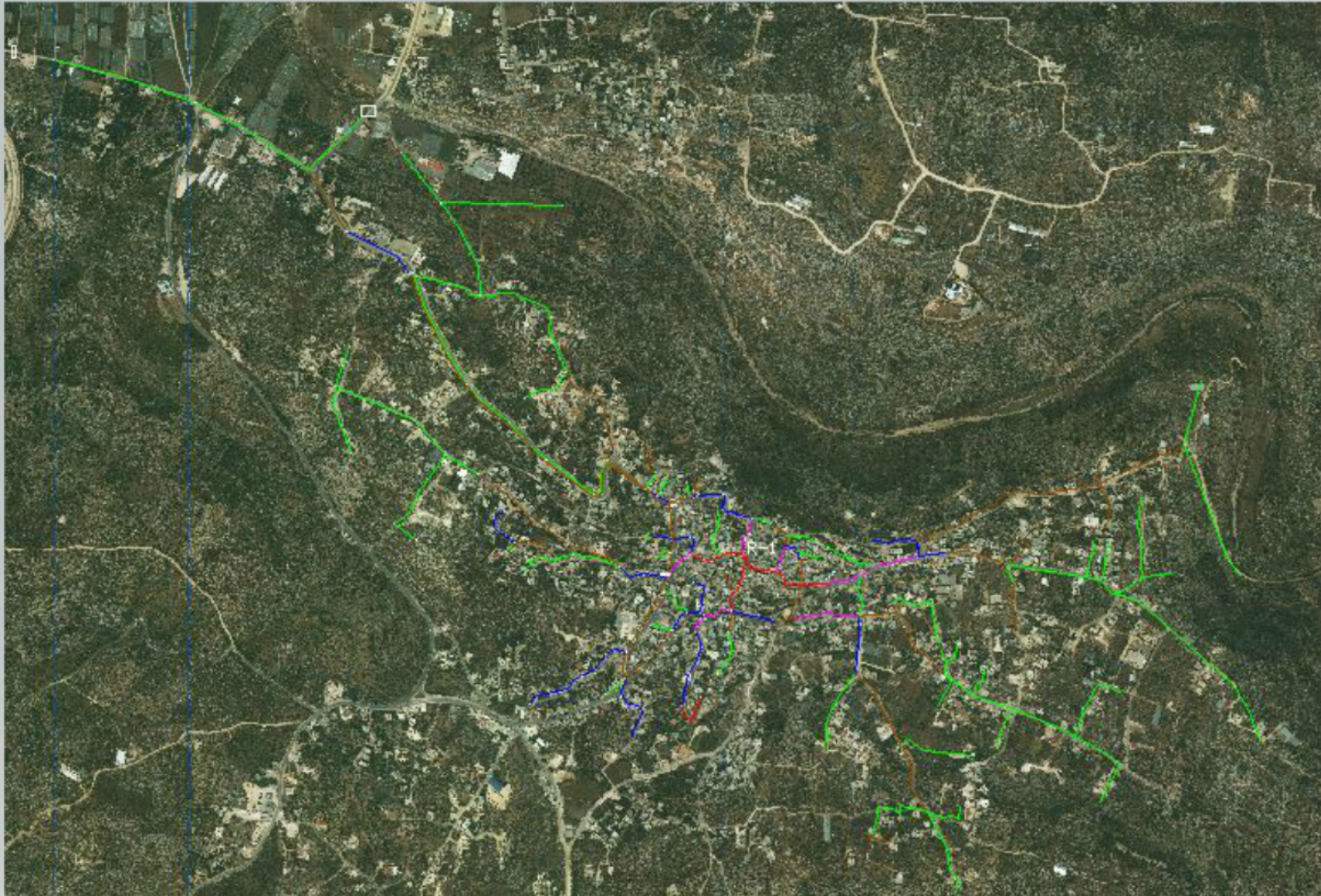
- 1-Water distribution network using WaterCAD.
- 2-Waste water network collection using SewerCAD.

Description of the study area

Dir-Alghson is a village located in the north of West Bank , The population size in Dir-Alghson is increasing rapidly .

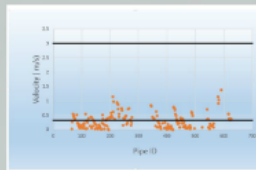


WDN

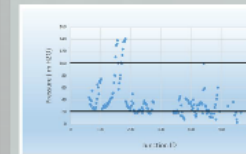


Results Analysis

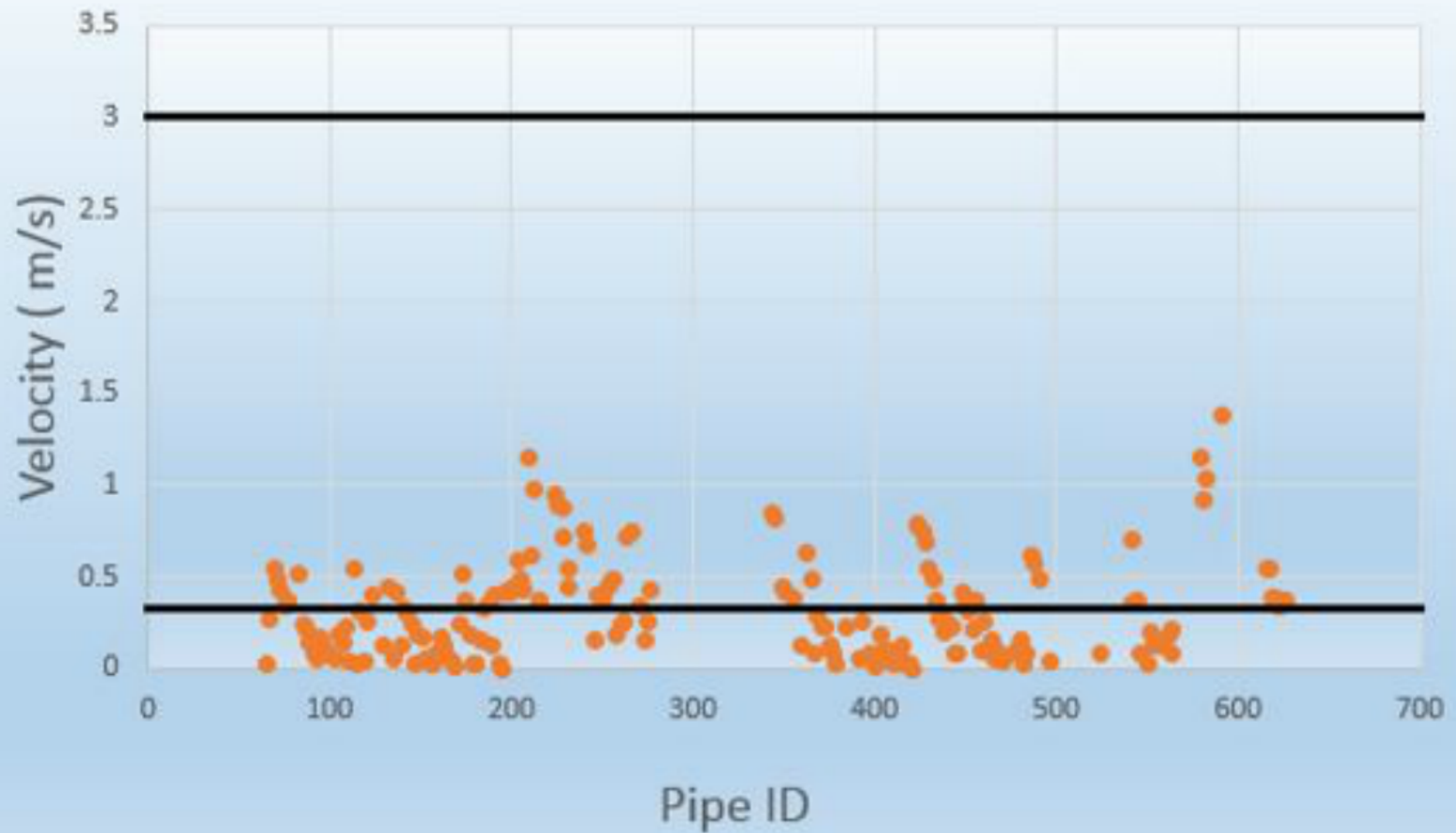
Velocity



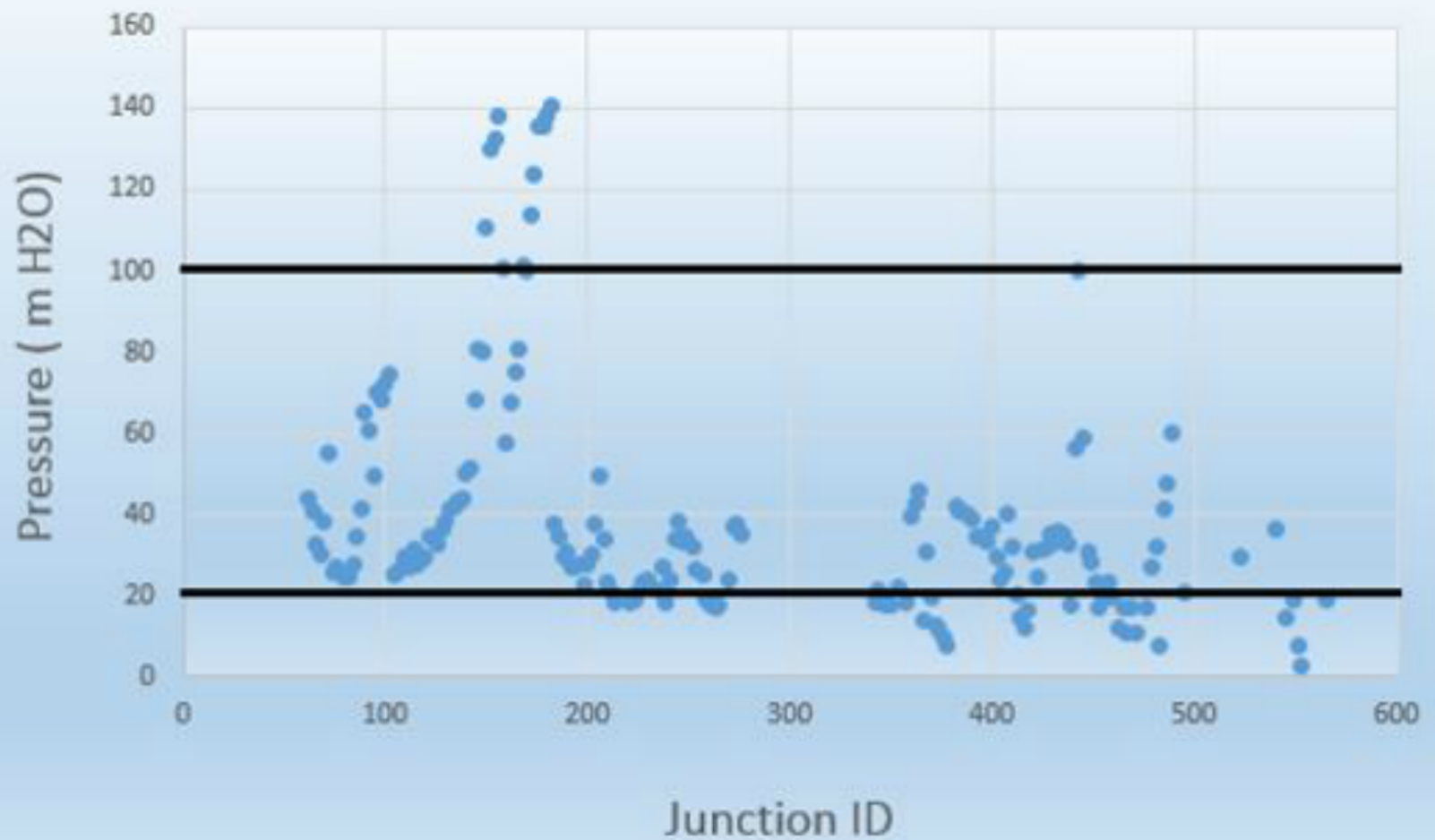
Pressure



Velocity

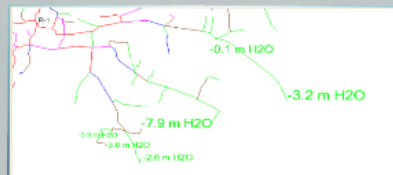


Pressure

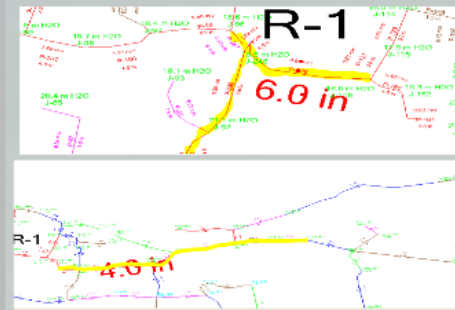


Results design

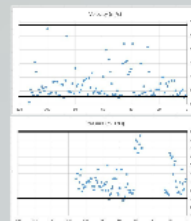
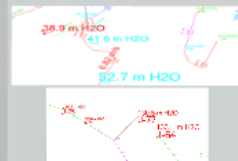
After entering the demand for 25 years

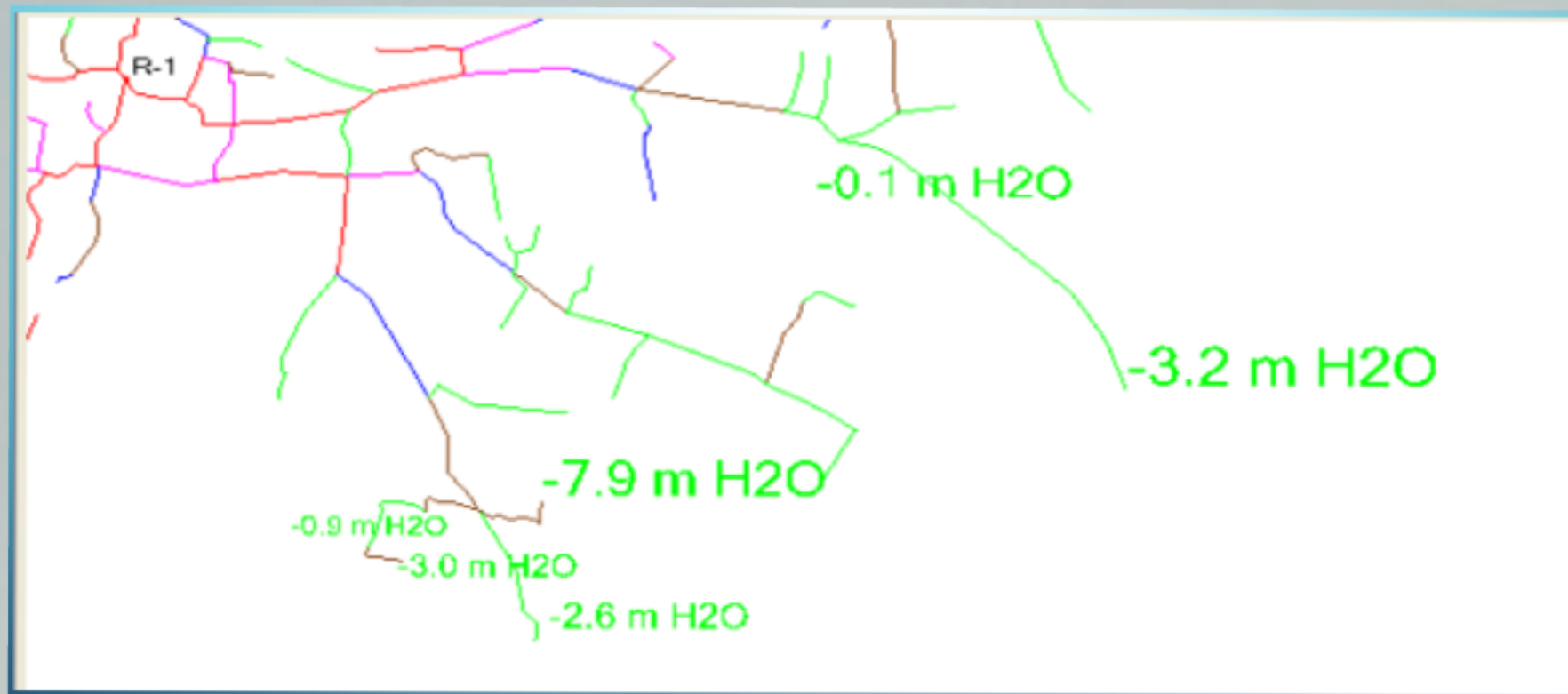


Replacing the diameter of pipes

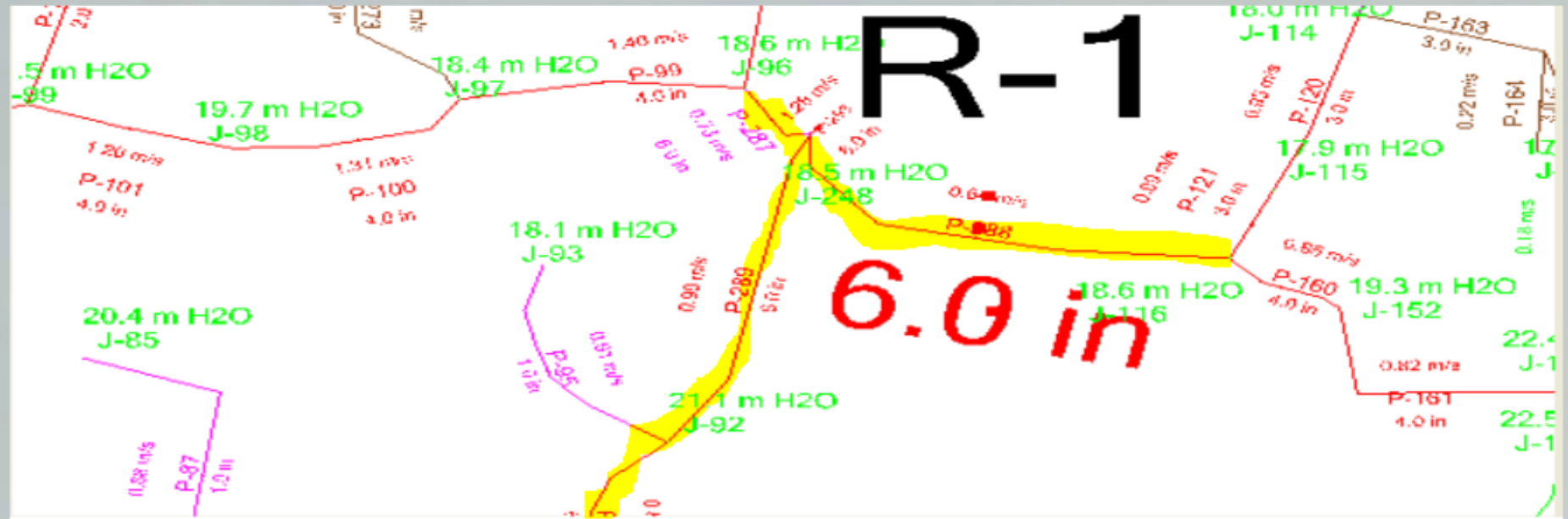


After replacing diameter of pipes

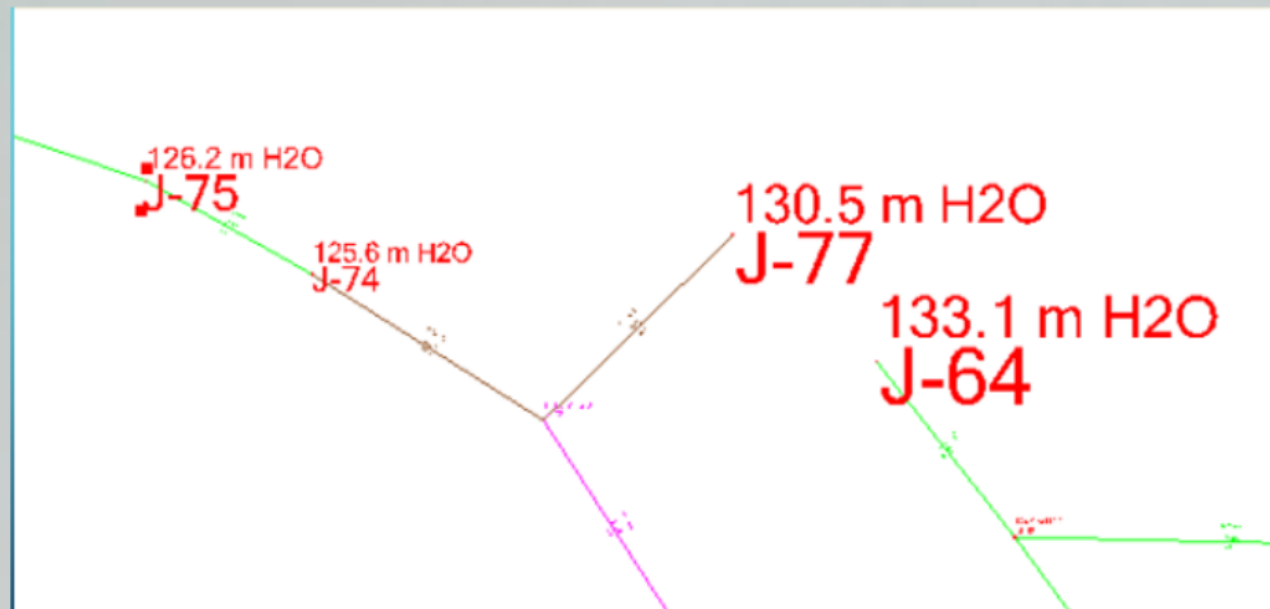
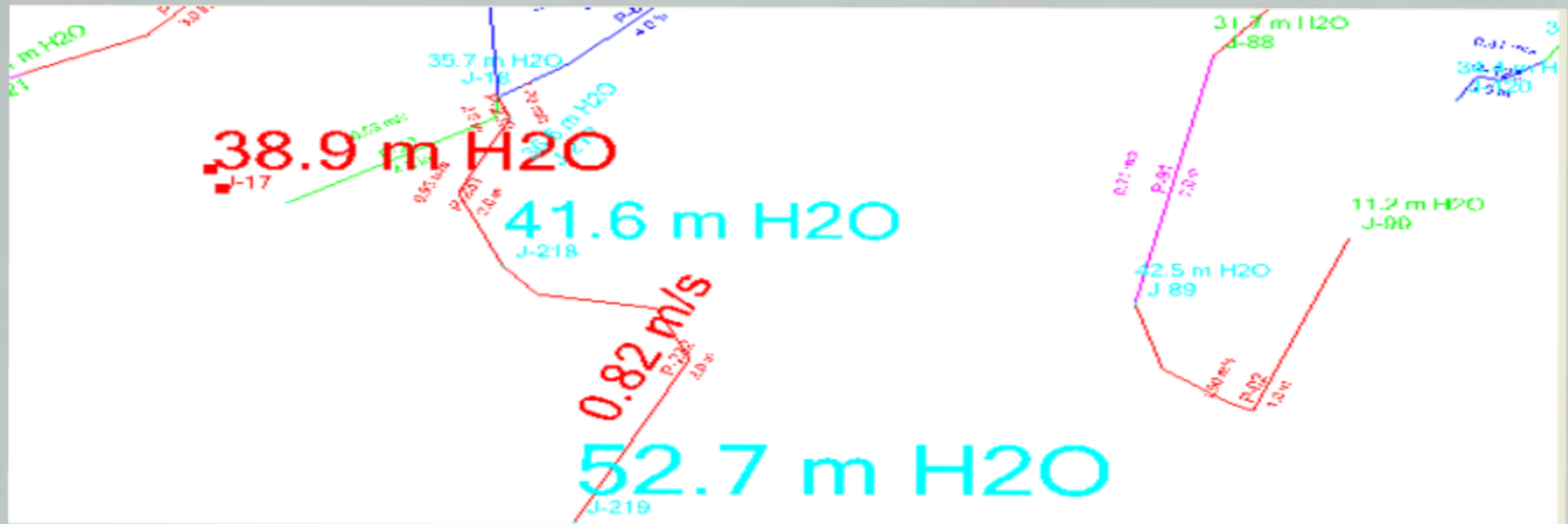


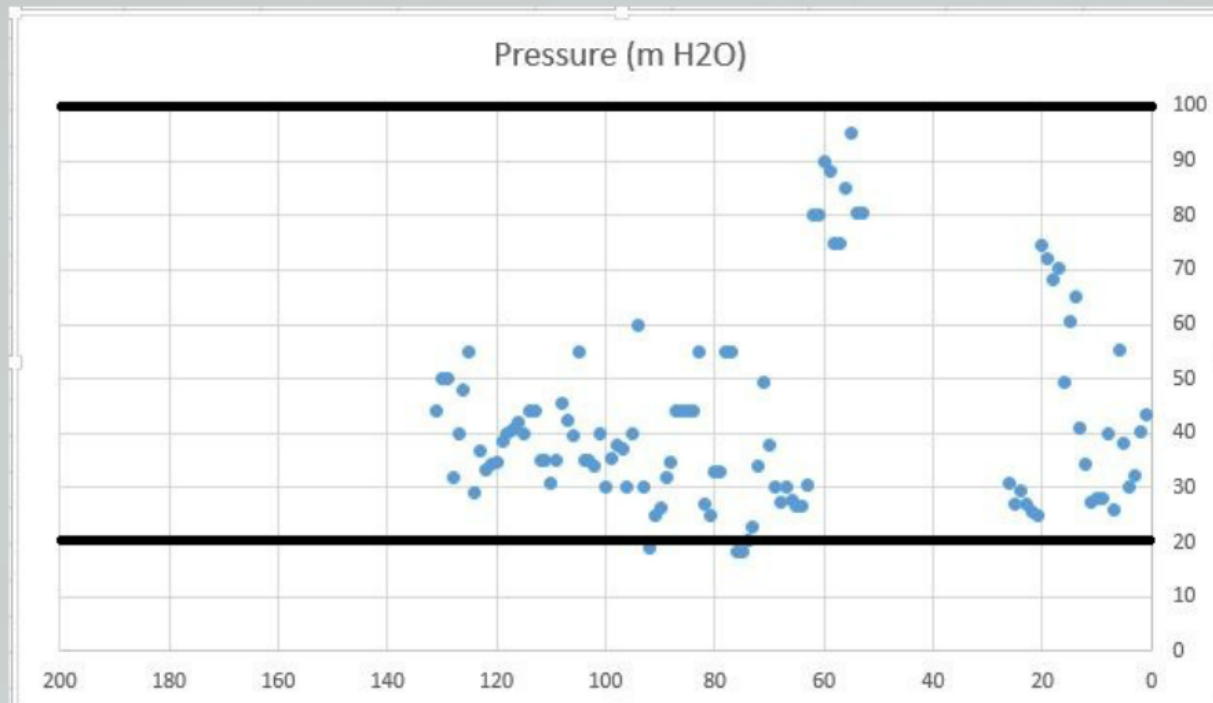
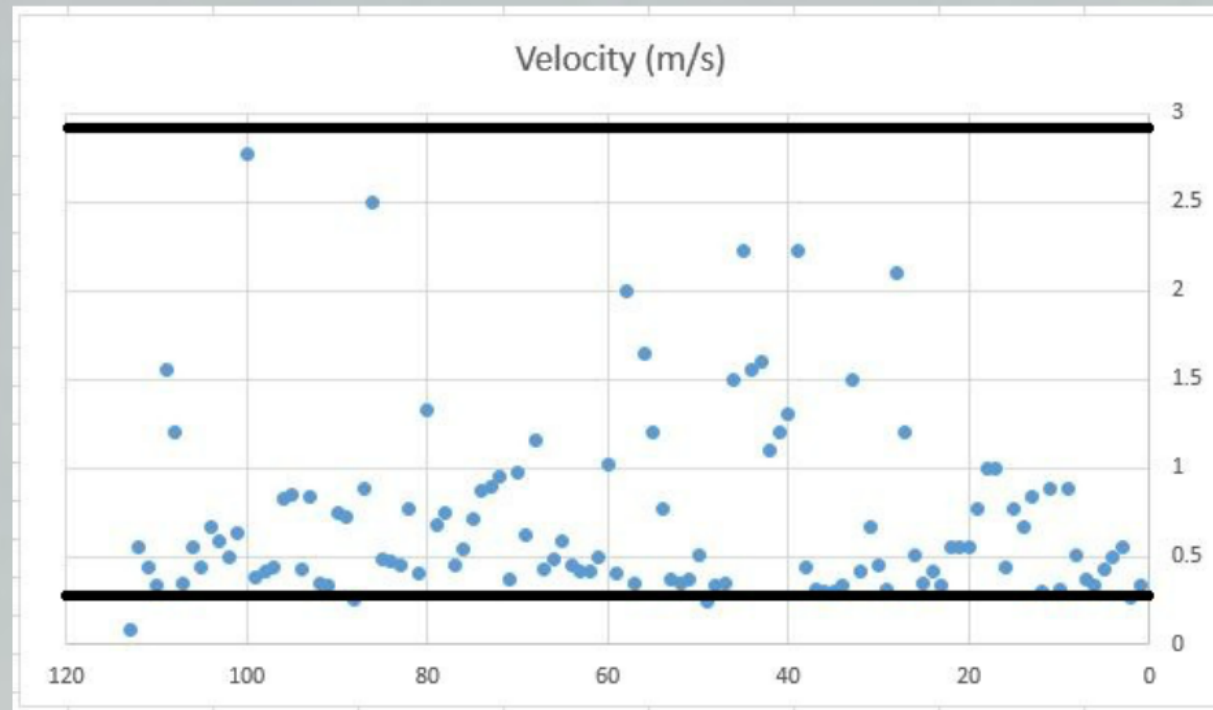


Replacing the diameter of pipes



After replacing diameter of pipes

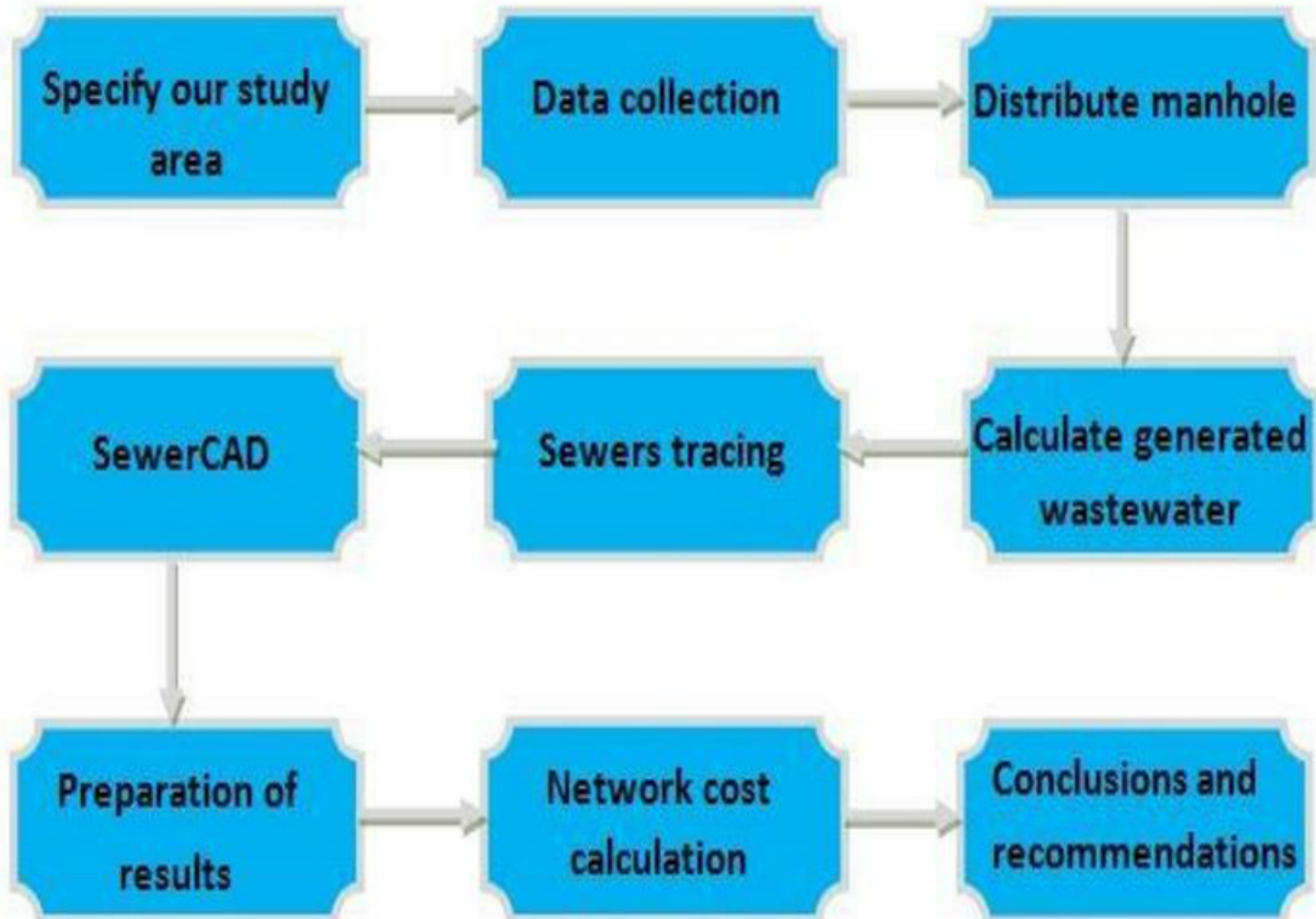




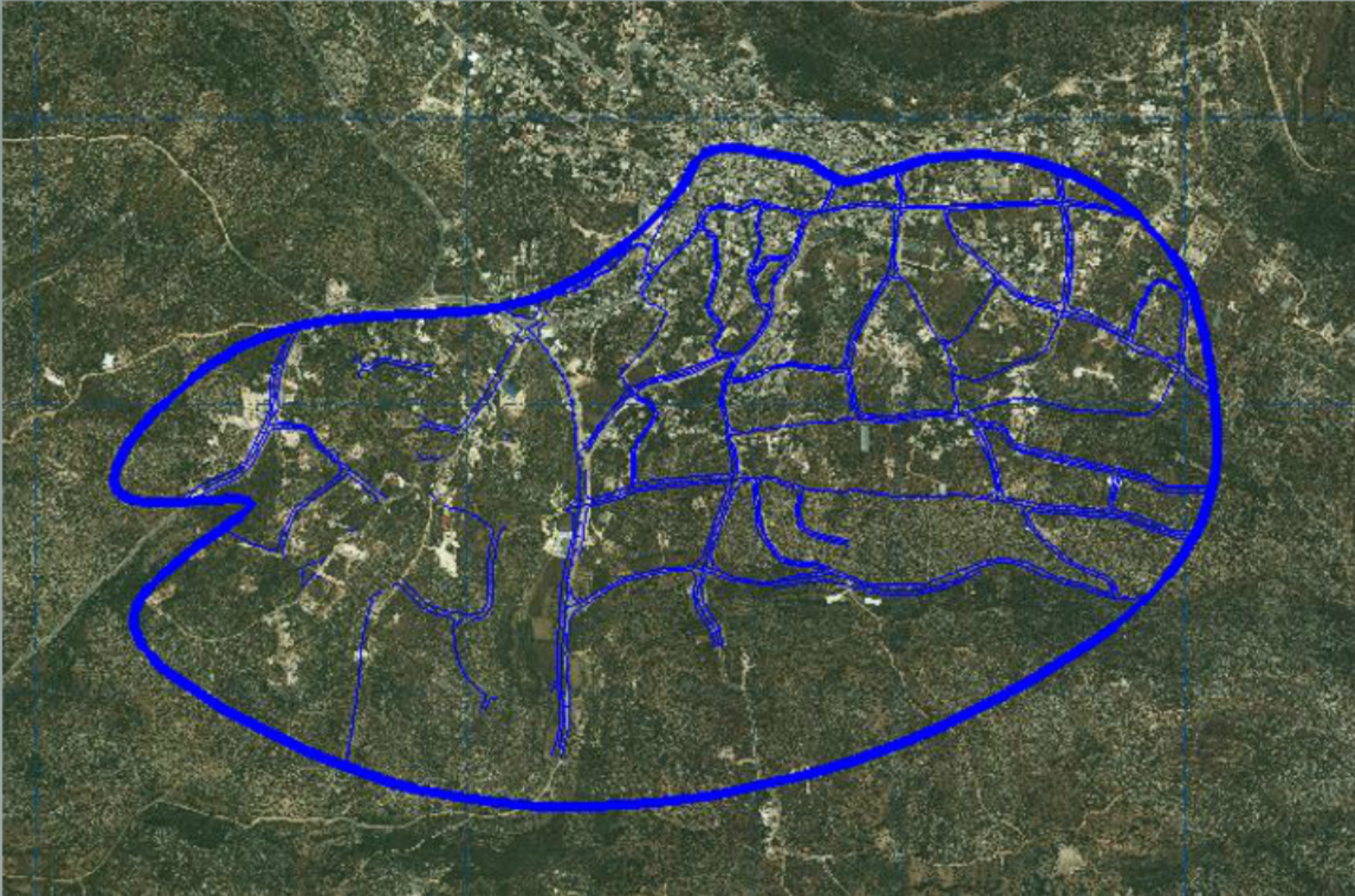
Wastewater collection network



Methodology



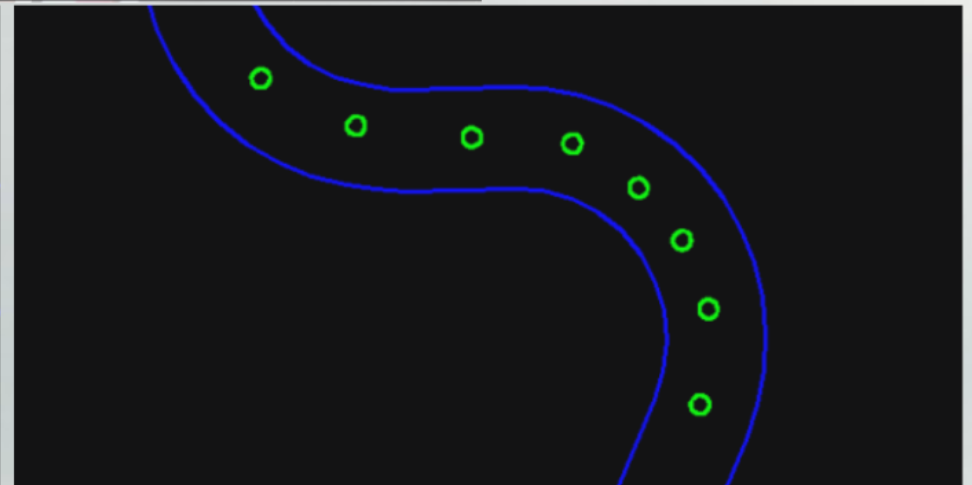
Selecting the catchment



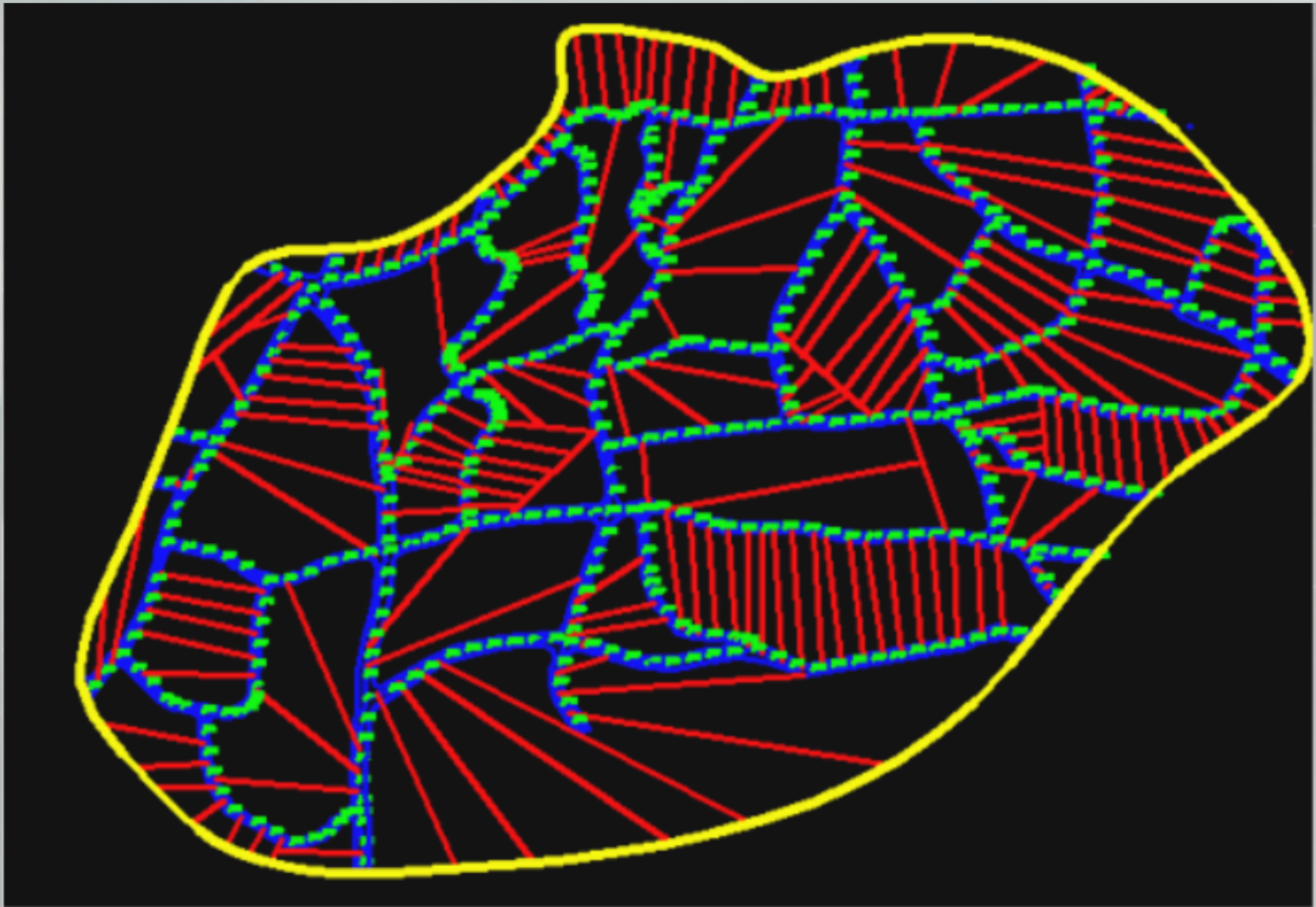
ArcHydro Drainage lines



Locating the manholes



Dividing the area



Calculating the load

**load = area covered by each manhole X
population density X per capita water
consumption X 80% X factor**

**Population density = $13953/3322300 = 0.0042$
capita/m²**

Per capita water consumption = 120 l/c.d

Peak factor = 3

We neglected infiltration

Ground surface elevation

 **Trex Wizard** X

File Selection

Select an elevation dataset and the applicable nodes to operate on.

Select Data Source Type

Data Source Type: Esri Shapefile

Elevation Dataset

File: project\vb.sn\elevation\elevation6.shp

Spatial Reference: Unknown

Select Elevation Field: ELEVATION

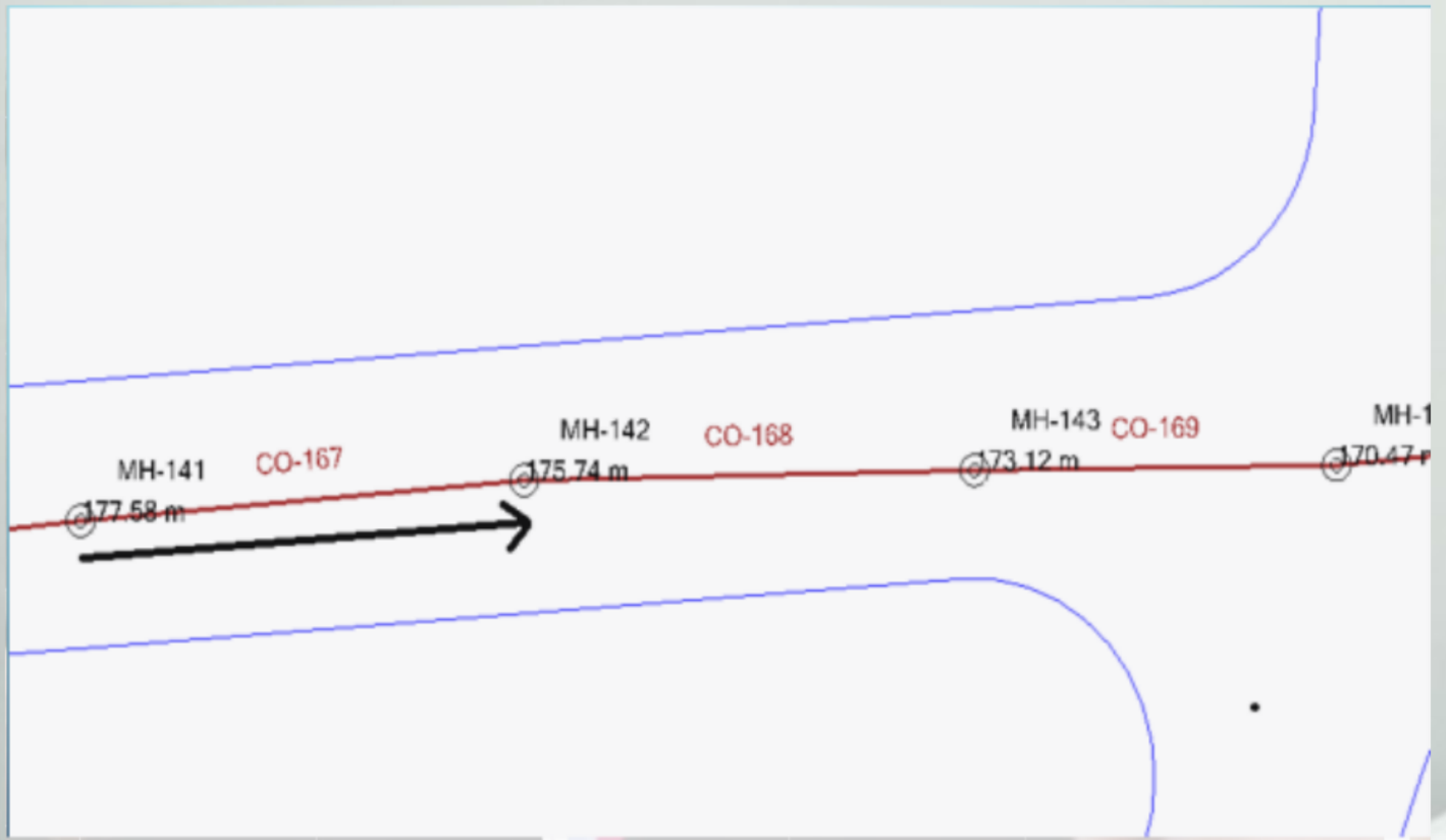
X-Y Units: m

Z Units: m

Clip Dataset to Model: ☐

Buffering Percentage: 50.0 %

Connecting the pipes



The network and Outfall



Design criteria

- Slope : difference in sewer invert elevations per sewer length
- A minimum slope of 1% should be at least maintained
- A maximum slope of 12% should not be exceeded

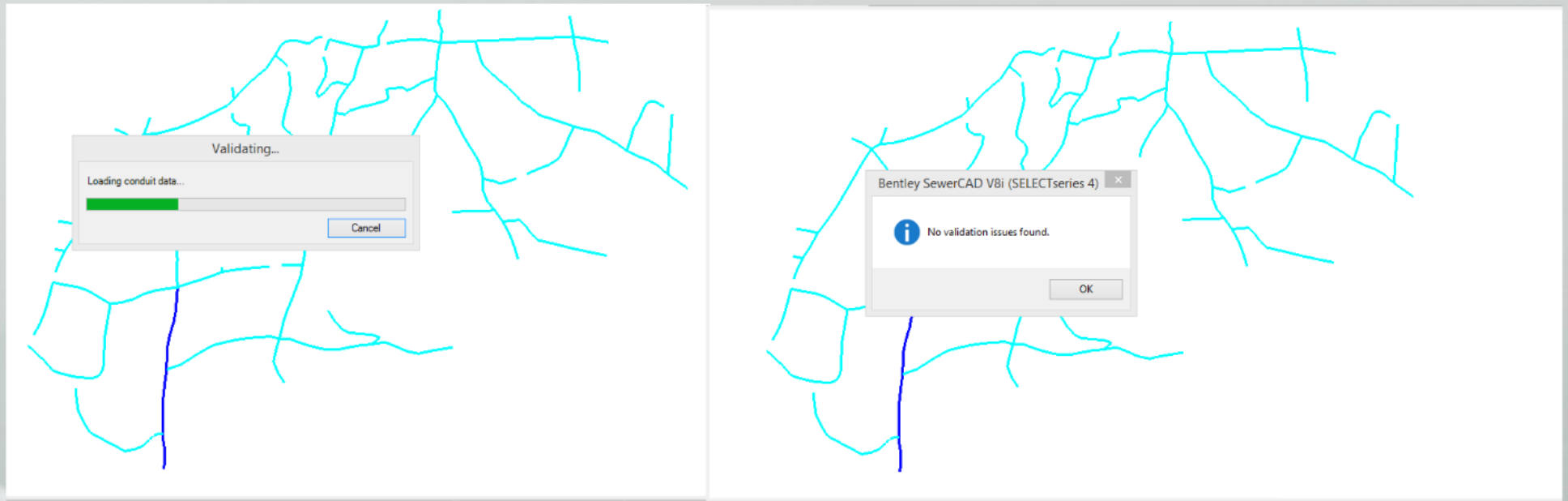
Cover depth

- Cover : the distance between the street elevation and that of the sewer crown
- The minimum cover should be
- at least 1 m
- The maximum cover should not
- exceed 3.5 m

Velocity

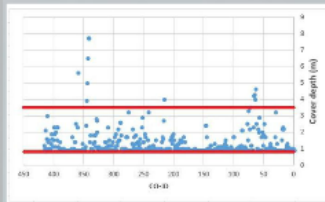
- maximum velocity = 3 m/s
- (10 ft/s)
- minimum velocity = 0.6 m/s
- (2 ft/s)

Running the model

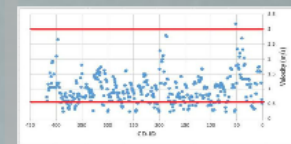


Results

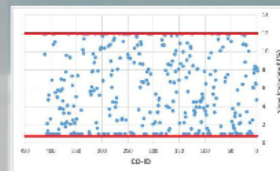
Cover depths



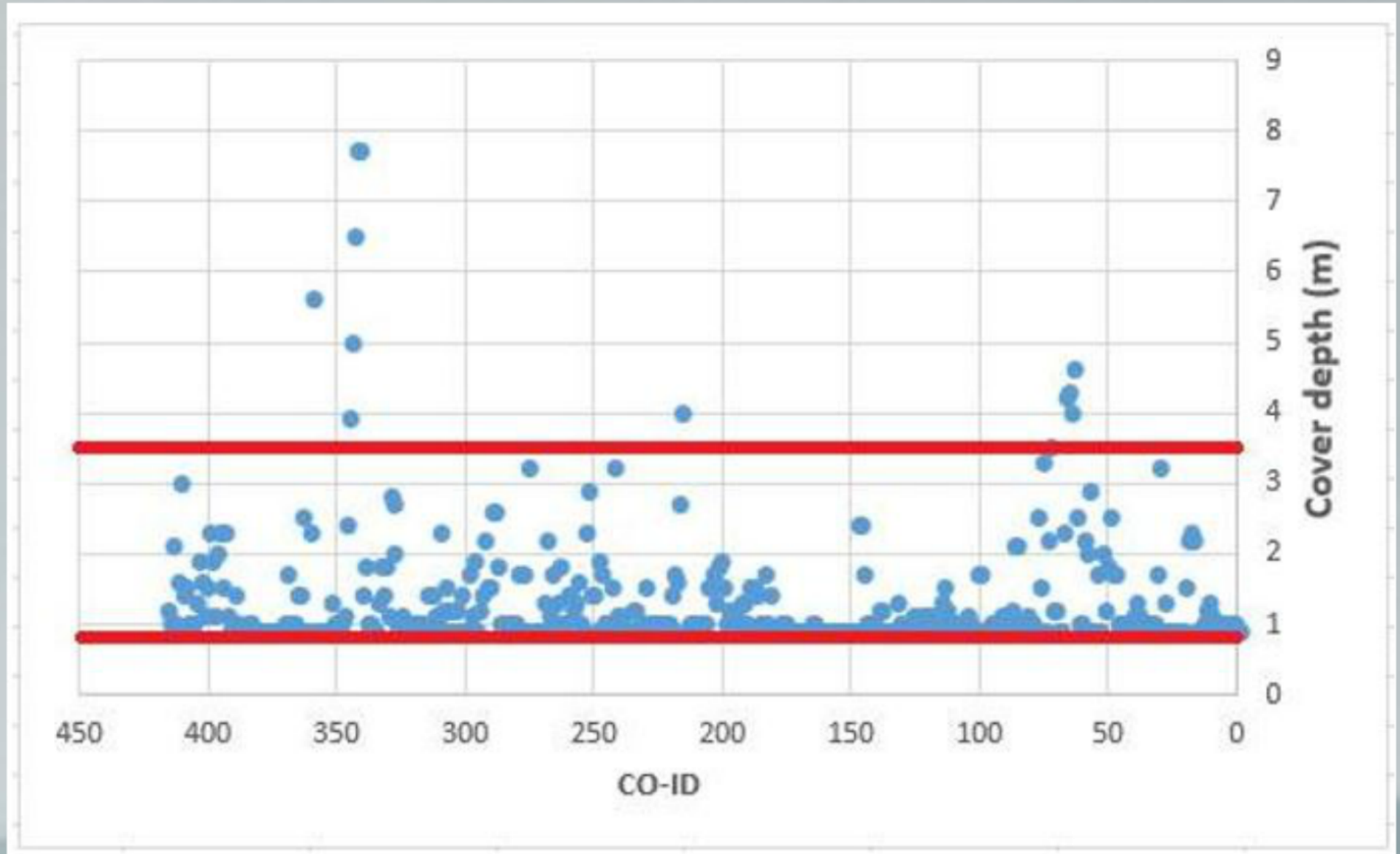
Velocity



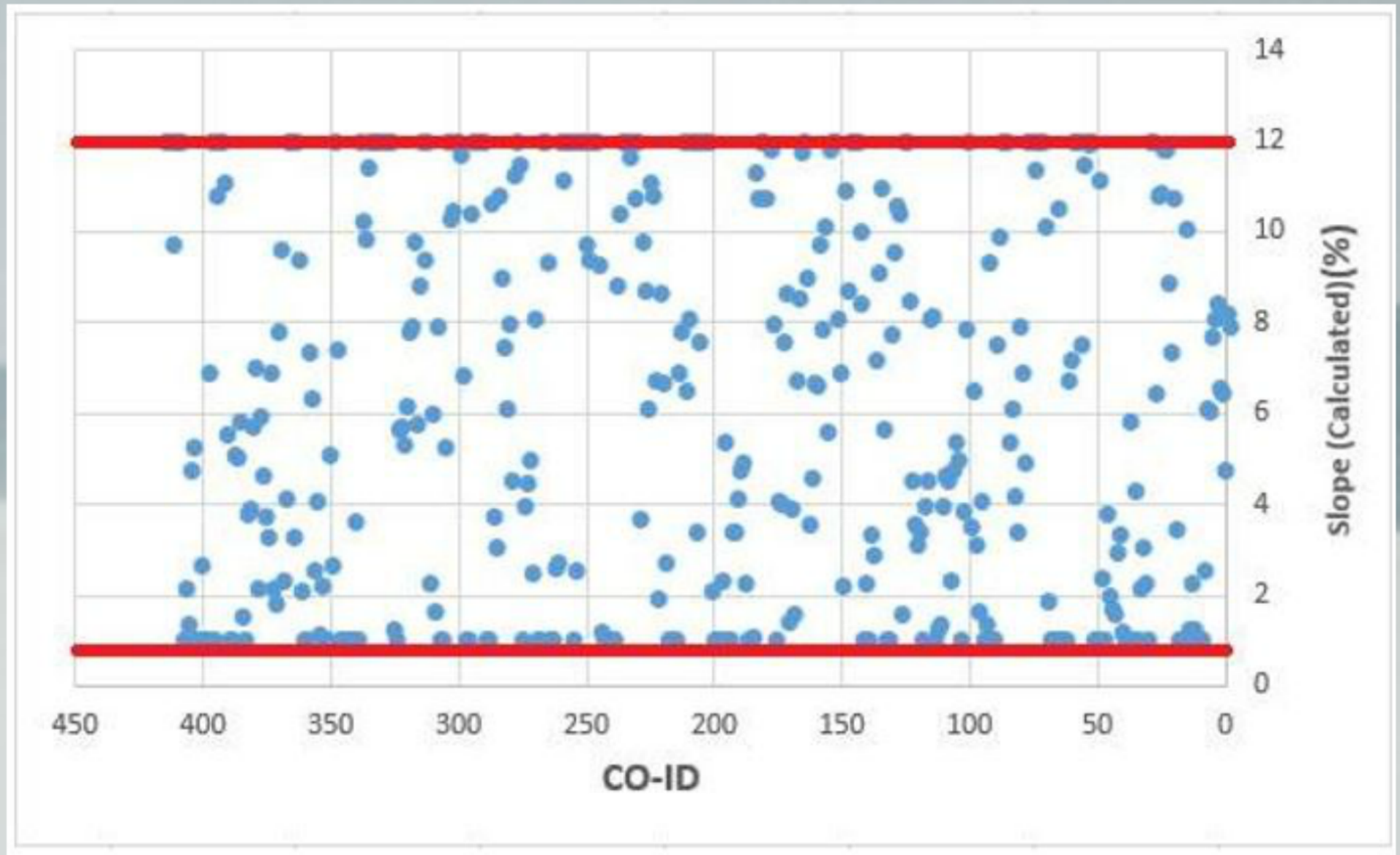
Slope



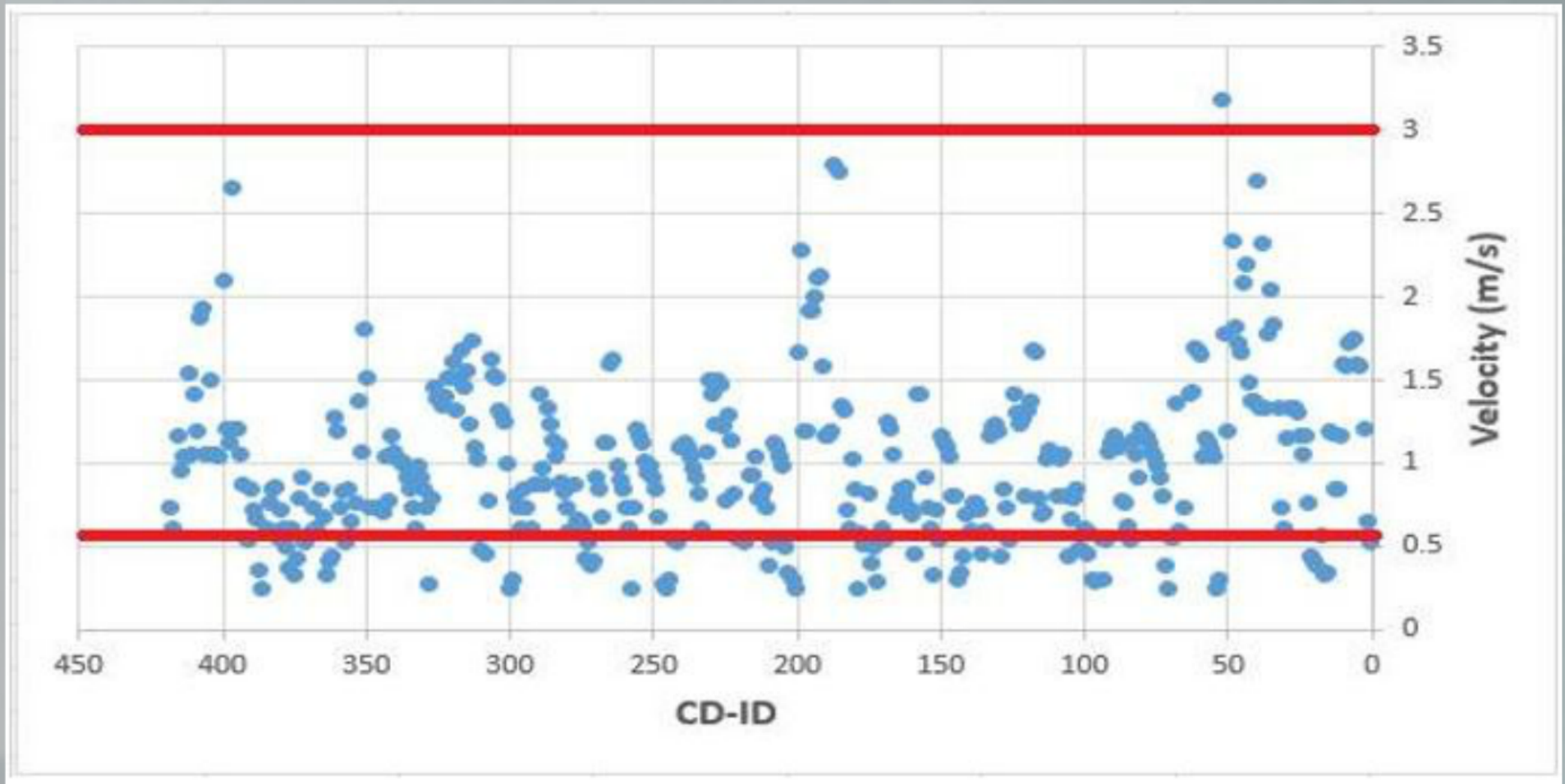
Cover depths



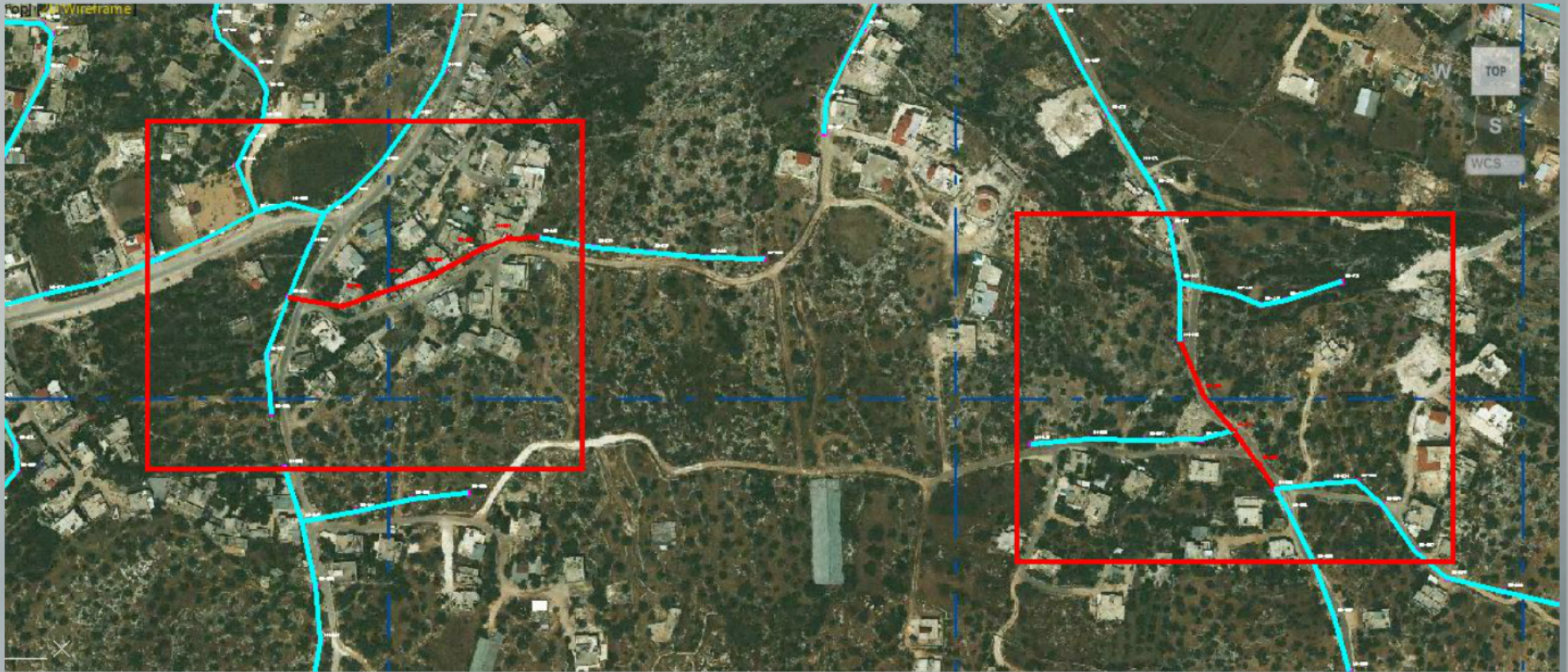
Slope



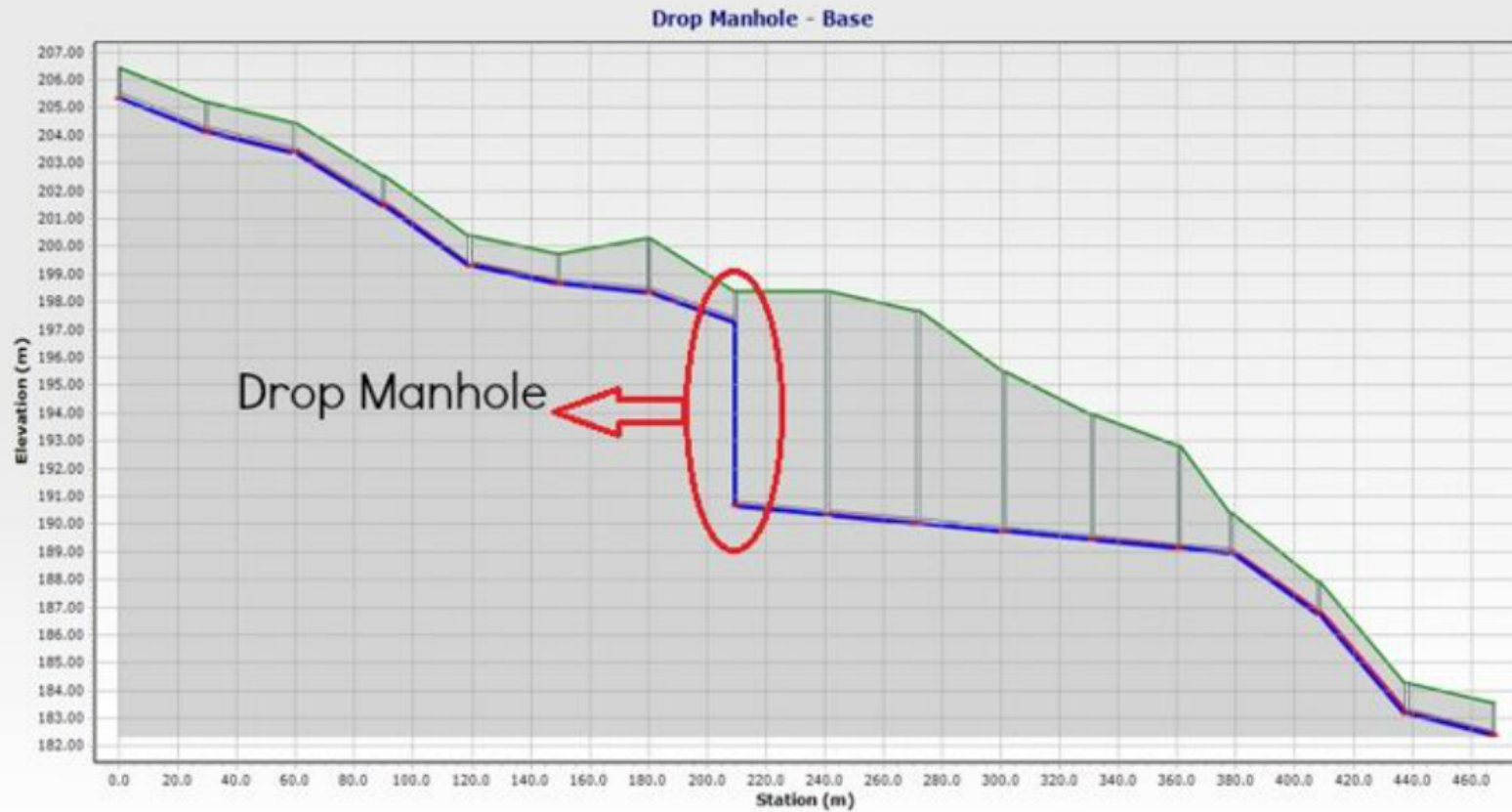
Velocity



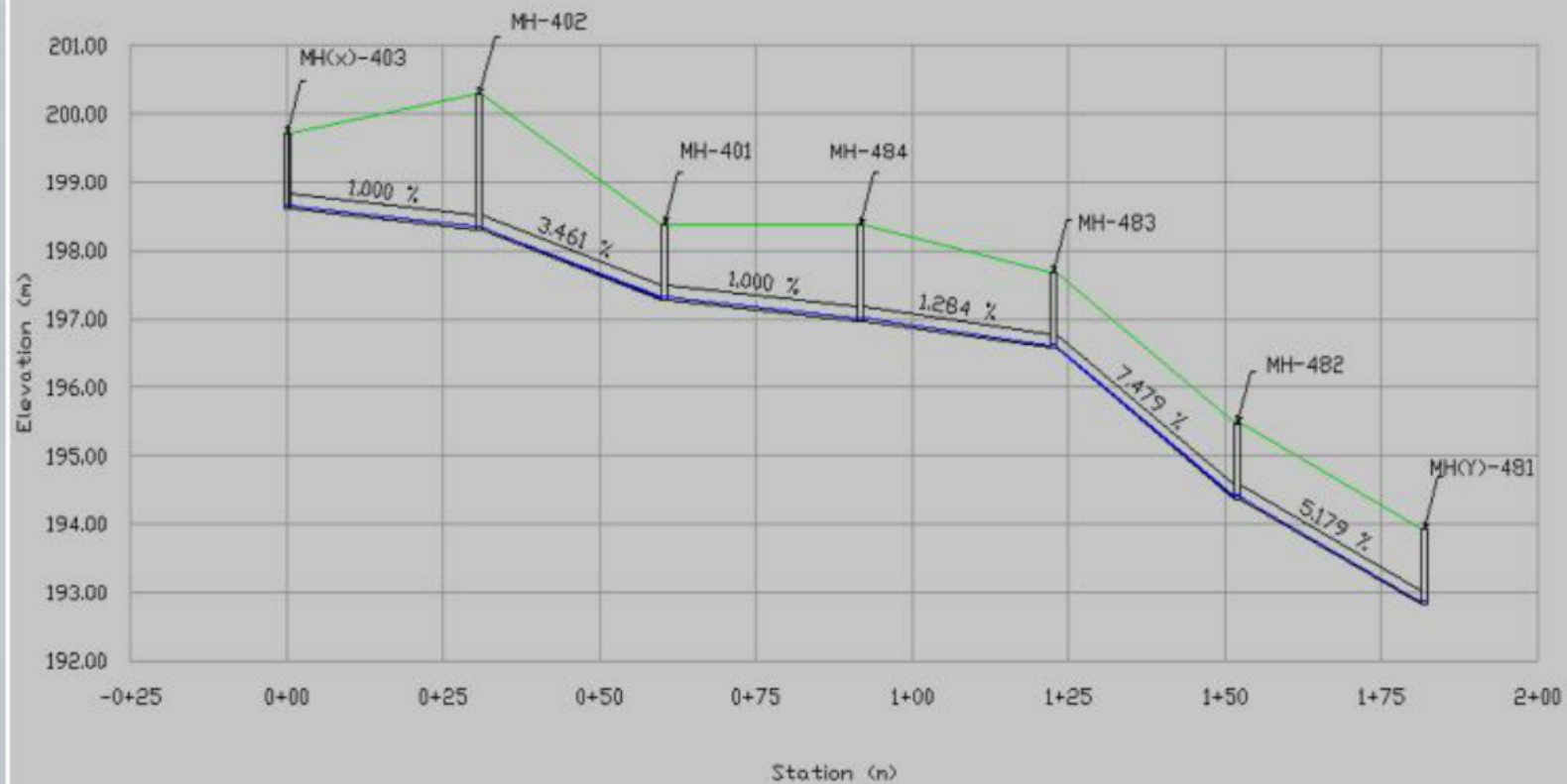
Profiles



Profile for the Drop Manhole



sample profile



Bill of quantity

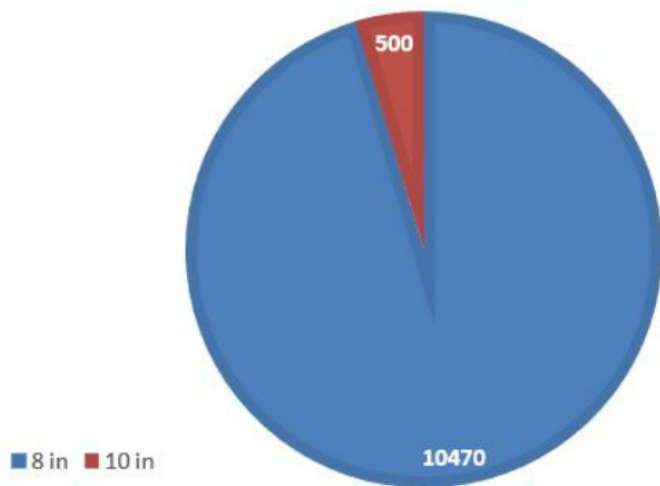


Total amount of excavation = 18848 m3

manholes label	Elevation (Ground) (m)	Elevation (Invert) (m)	Depth of manhole (m)	Depth of excavation (m)	1	2	Diameter (m)	Width of excavation (m)	Area 1 (m2)	Area 2 (m2)	Amount (m3)
MH-1	166.41	165.31	1.1	1.35	MH-101	MH-100	0.203	0.7032	0.949	0.9493	28.48
MH-2	165.74	164.64	1.1	1.35	MH-100	MH-99	0.203	0.7032	0.949	0.9845	29.007
MH-3	165.43	164.28	1.15	1.4	MH-99	MH-3	0.203	0.7032	0.984	0.9845	29.534
MH-4	166.92	165.82	1.1	1.35	MH-3	MH-98	0.203	0.7032	0.949	0.9845	29.007
MH-5	169.73	168.63	1.1	1.35	MH-98	MH-97	0.203	0.7032	0.984	0.9915	29.64
MH-6	172.97	171.87	1.1	1.35	MH-97	MH-96	0.203	0.7032	0.992	0.9845	29.64
MH-7	176.45	175.35	1.1	1.35	MH-96	MH-95	0.203	0.7032	0.984	0.9845	29.534
MH-8	180	178.9	1.1	1.35	MH-95	MH-94	0.203	0.7032	0.984	0.9915	29.64
MH-9	182.68	181.57	1.11	1.36	MH-94	MH-93	0.203	0.7032	0.992	1.0267	30.273

Total number of manhole and pipes

THE CONDUIT CHART BELOW SHOWS THE
REQUIRED CONDUIT NEEDED IN (M)



Manhole depth (m)	#NO. Manhole
1 from 2	331
2 from 3	48
3 from 4	19
4 from 5	10

Cost

Manhole depth (m)	#NO. Manhole	cost of one manhole (\$)	Total cost (\$)
0 from 2	331	271	89701
2 from 3	48	328	15744
3 from 4	19	385	7315
4 from 5	10	556	5560
			118320
PVC	length (m)	cost (\$)	Total cost (\$)
8 in	10470	10	104700
10 in	500	15	7500
			112200
Excavation	amount (m3)	unit cost (\$)	Total cost (\$)
-----	20961	11	230571

Labor	amount (m)	unit cost/40(m) (\$)	Total cost (\$)
-----	11000	60	16500
Asphalt	amount (m)	unit cost (\$)	Total cost (\$)
-----	11000	20	220000
Sand	amount (m3)	unit cost (\$)	Total cost (\$)
-----	5806	15	87090
Base course	amount (m3)	unit cost (\$)	Total cost (\$)
-----	15508	20	310160

Total cost

Total Cost (\$)	1094841
Cost per km(\$)	99531

Total cost

Total Cost (\$)	1094841
Cost per km(\$)	99531

Conclusions and Recommendations



