

بسم الله الرحمن الرحيم



**An-Najah National University  
Faculty Of Engineering  
Civil Engineering Department**

**“Design of Wastewater Collection System for Sabastia Town”**

**Prepared By:  
Mohammad J. Ghazal  
Waleed Q. Ghazal  
Ghaith N. Sultan**

**Supervisor: Dr. Hafez Shaheen**

**2012 – 2013**

# Out Line

---

- ◉ Objectives
- ◉ Study Area
- ◉ Problem Definition
- ◉ Available Data
- ◉ WWCS Design
- ◉ Results
- ◉ Quantity Surveying and Project Cost

# 1. Objectives

---

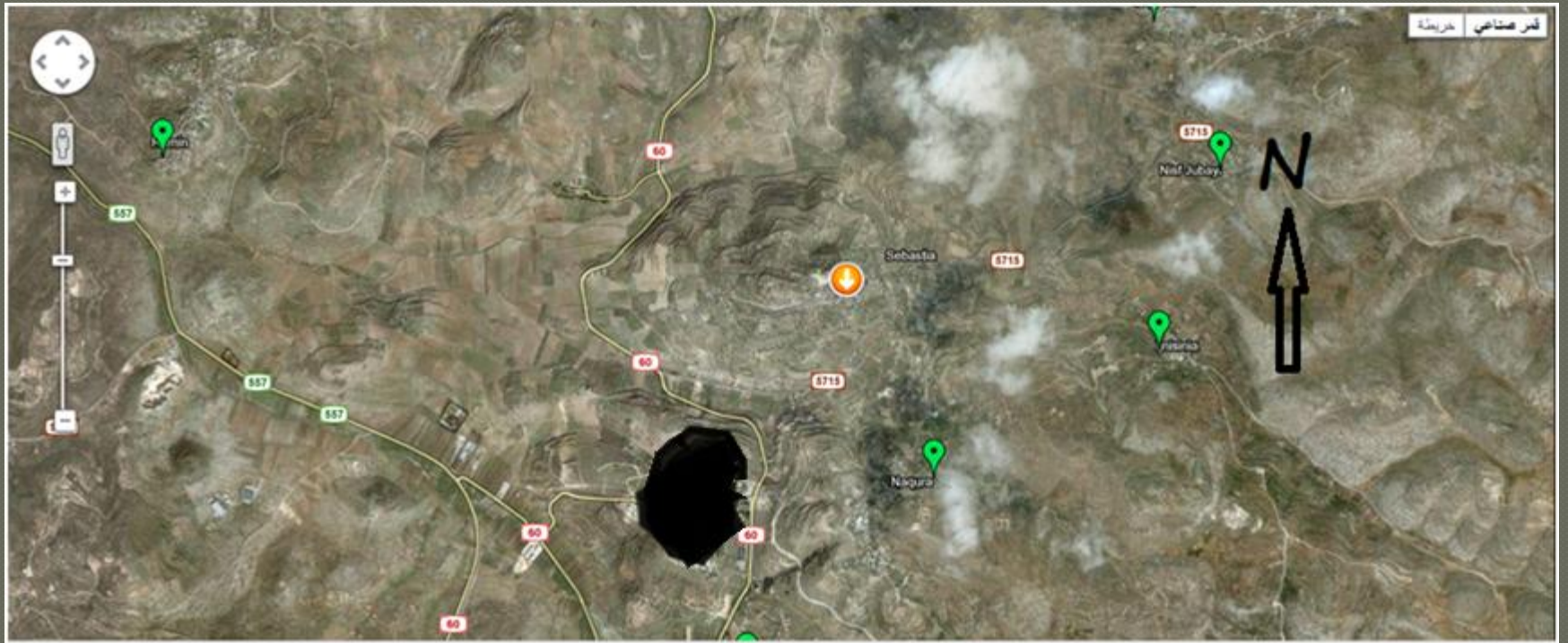
The main objectives of this project are:

- i. Design a wastewater collection system; to serve Sabastia Town.
- ii. Design a main trunk line; to transport the wastewater to Wadi Zemar “Wadi Al-Tofah” conveyance system.

## 2. Study Area

---

- Sabastia is a small town located 12 Km north – west of Nablus city.
- The maximum elevation about 463 meter above mean sea level.
- Population was about 3,000 capita in 2012 and growth rate is 3%.
- Total area is 6,000 donums, populated area is about 2,000 donums.
- The WWTP is located 4.3Km to the west of Sabastia.



# 3. Problem Definition

---

There is no wastewater collection system in Sabastia.

The cesspits is the main way to dispose wastewater.

The wastewater collection system is necessary; to protect the environment and complete the Western Nablus WWTP project.





# 4. Available Data

---

- ⦿ Growth rate is 3%.
- ⦿ Design period is 35 years.
- ⦿ Population in 2012 was 3,000, and about 8,440 in 2047.
- ⦿ Return flow percent is 80%.
- ⦿ Infiltration is 20%.
- ⦿ Peak hourly factor is 3.

# 5. WWCS Design

## 5.1 Criteria

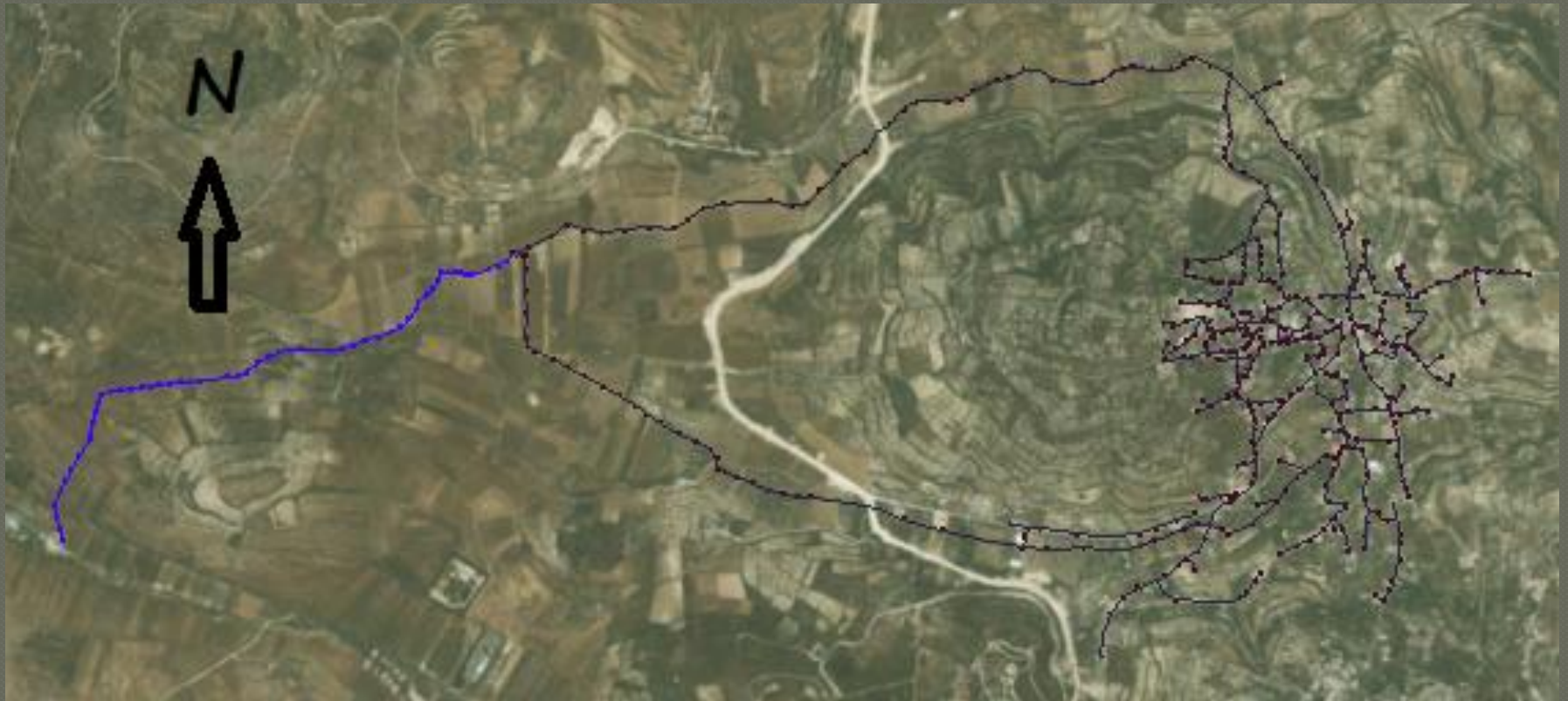
---

<b>Criterion</b>	<b>Unit</b>	<b>Value</b>
Velocity	m/s	0.6 – 3.0
Max. Length	m	60
Slope	%	0.5 – 14
Cover	m	0.5 – 5.0
Pipe's Material	-	PVC (n=0.01)
Full Flow Percentage	%	50

# 5.2 Design Steps

---

- Network layout



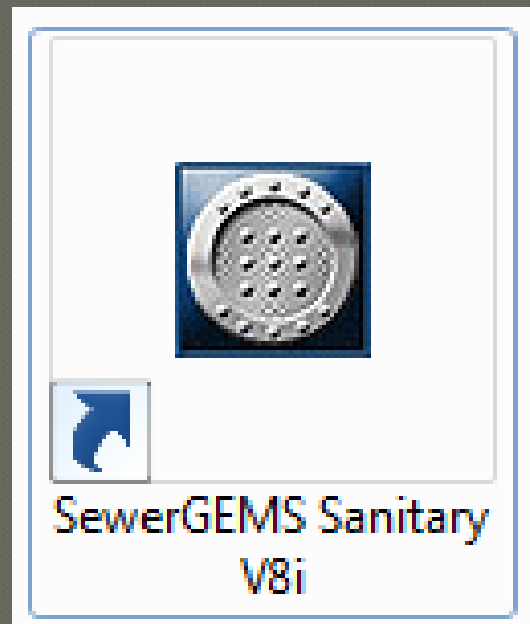
## ○ Manholes loads

MH	Houses	Person	Total Pop.	Futer Pop.	Design Flow
#	#	Per/H	Capita	Capita	CMH
MH-1	3	6	18	59	0.75
MH-2	1	6	6	20	0.25

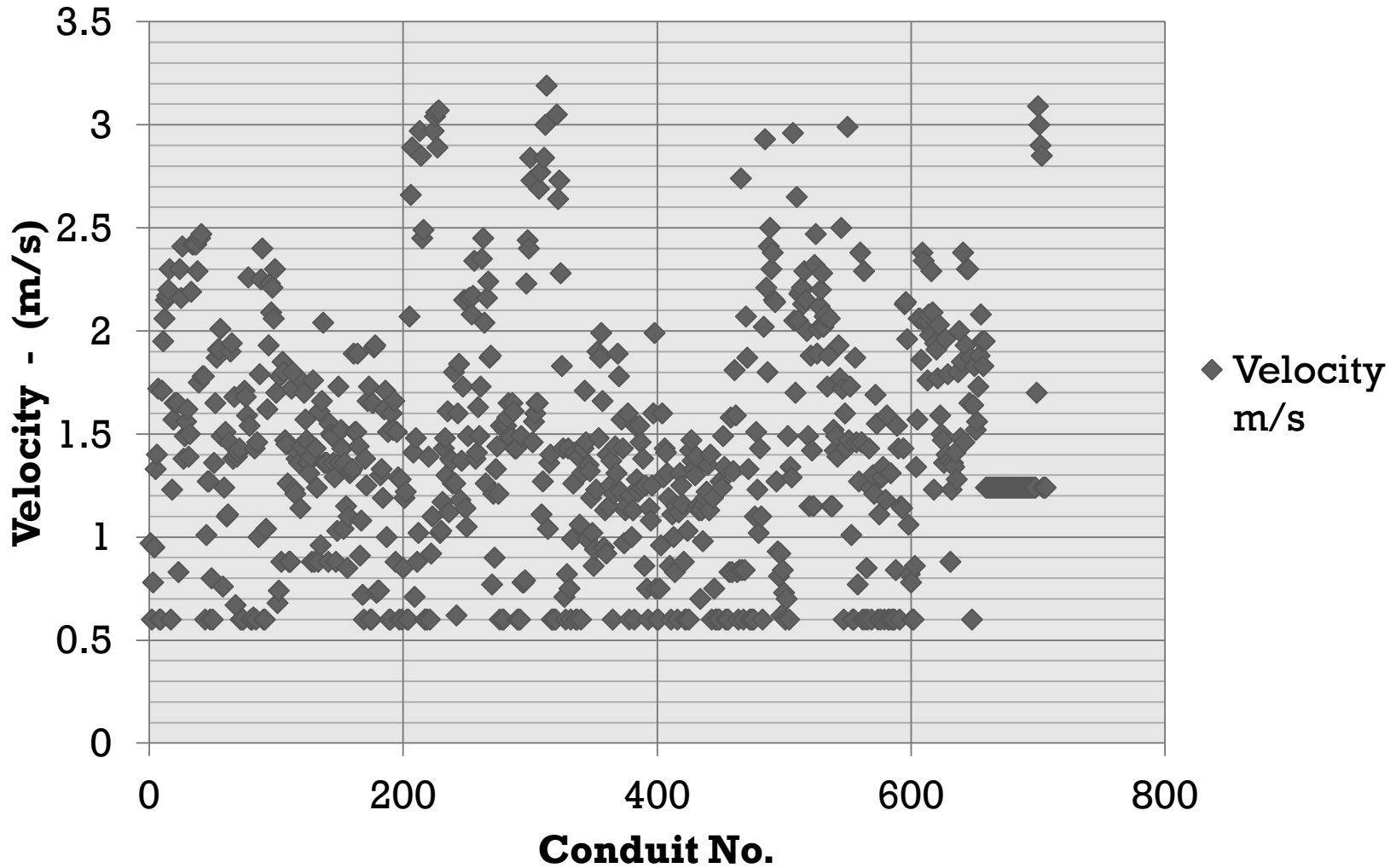
Unit sanitary load per capita is 307 L/D.

---

- Design using SewerCAD.

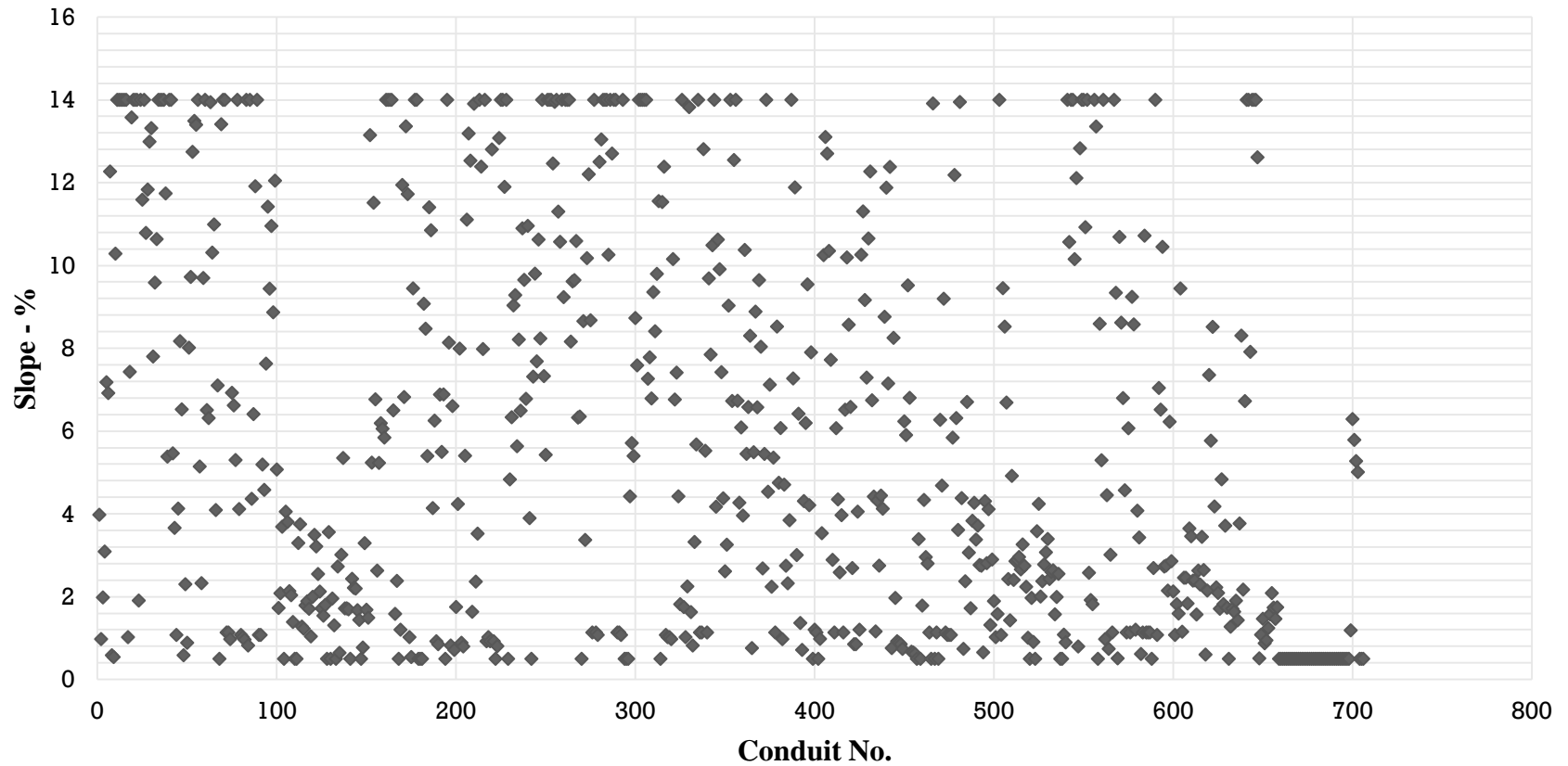


# 5.3 Results (Velocity)

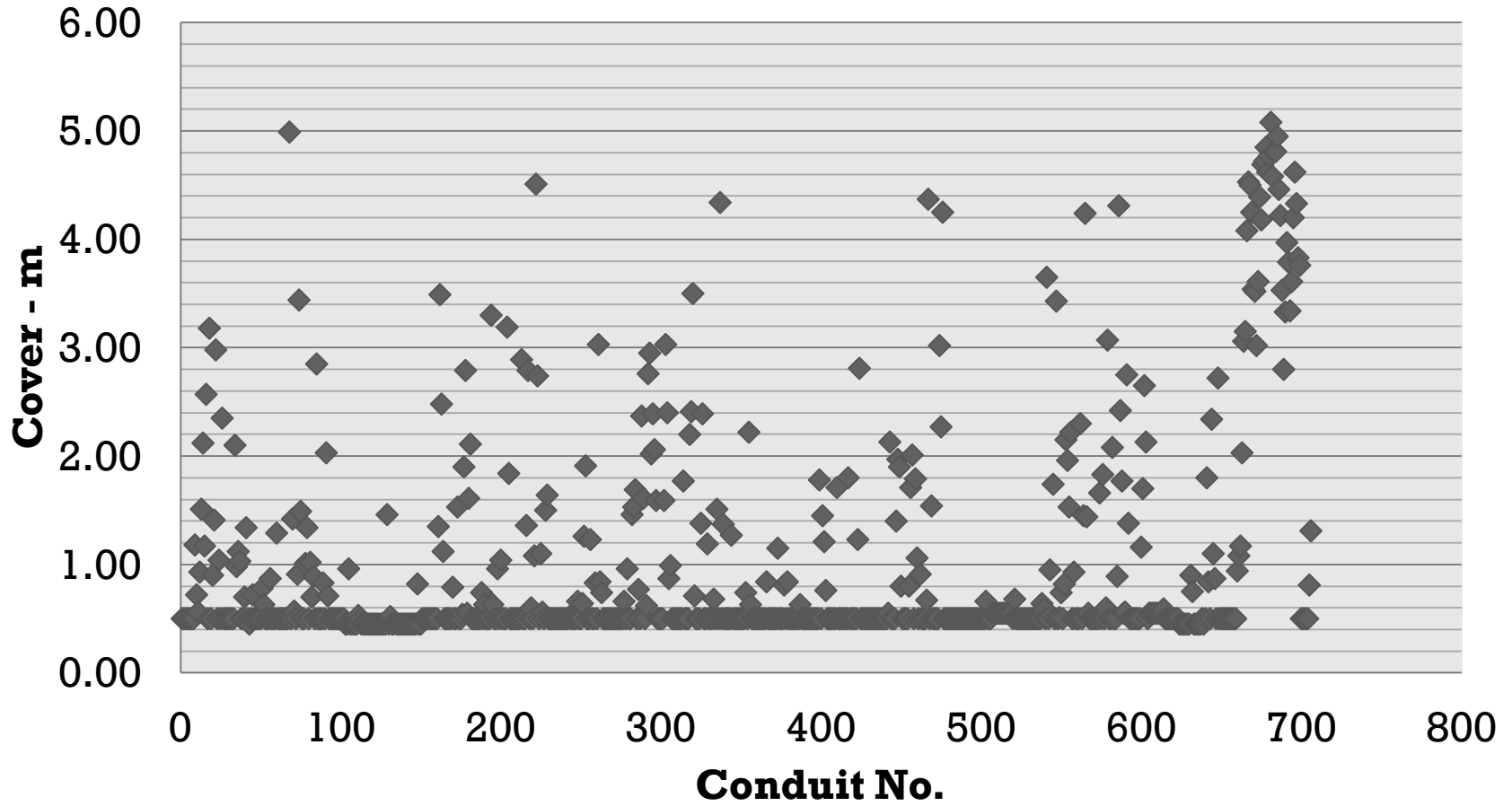


# 5.4 Results (Slope)

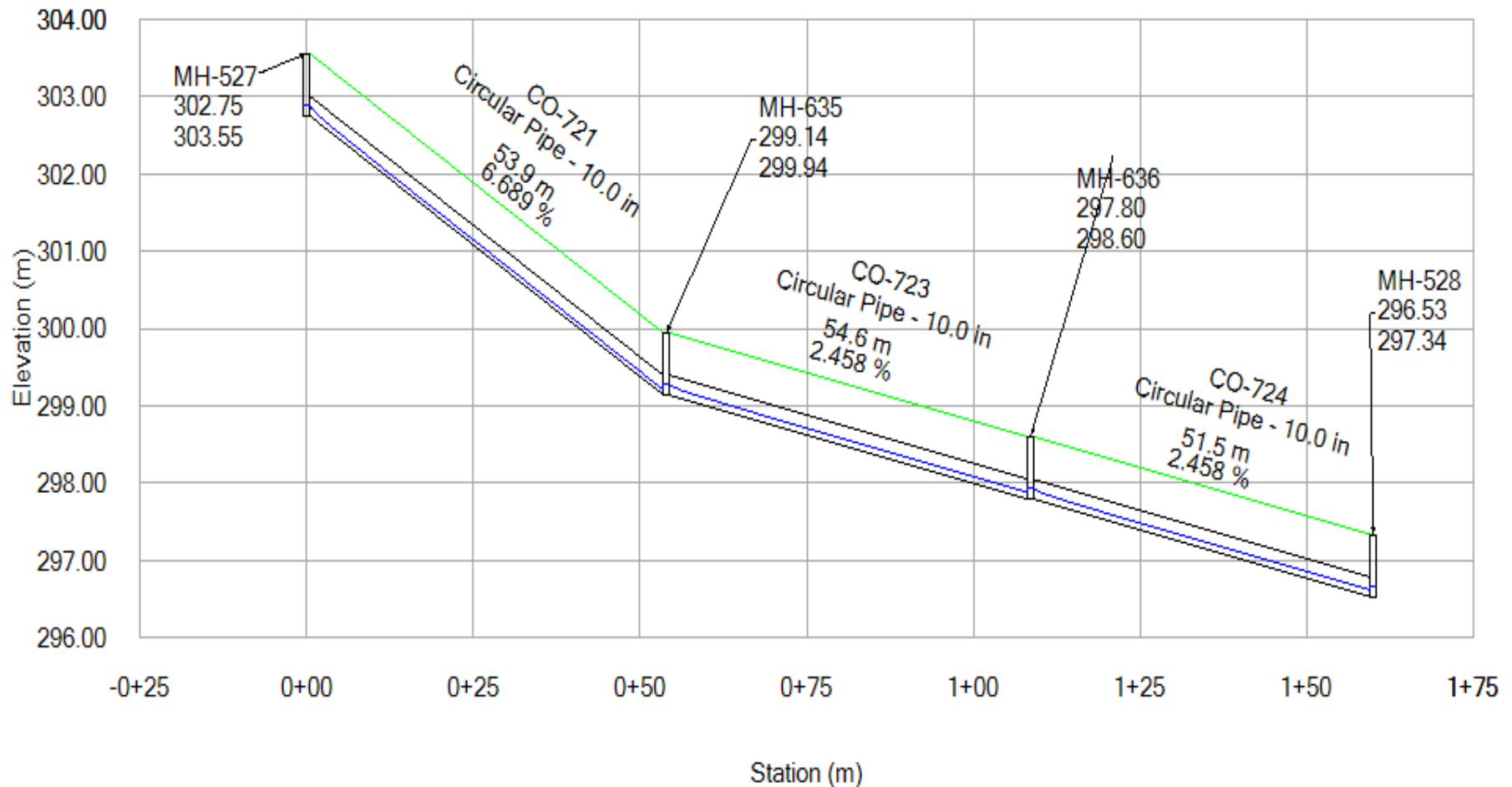
**Slope %**



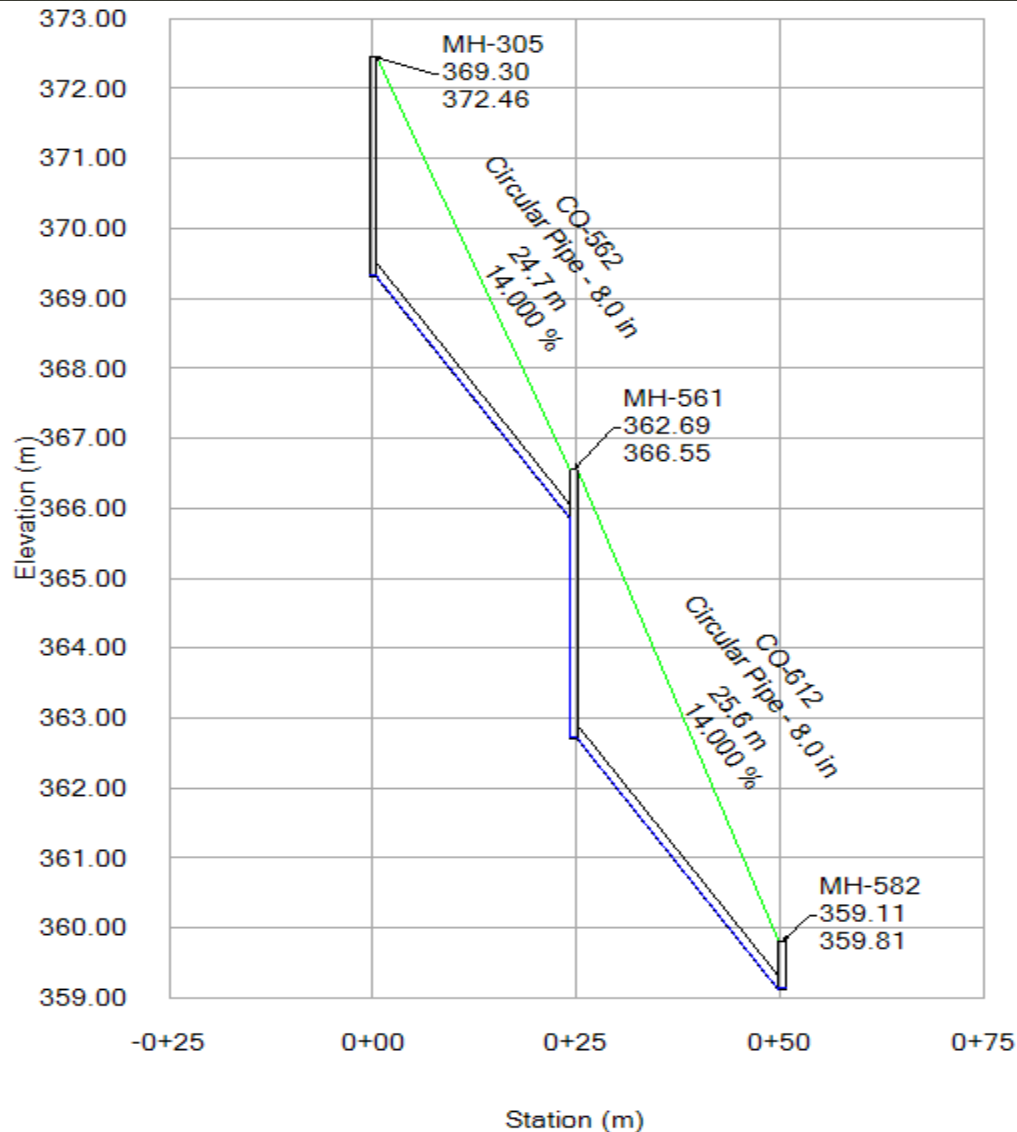
# 5.5 Results (Cover)



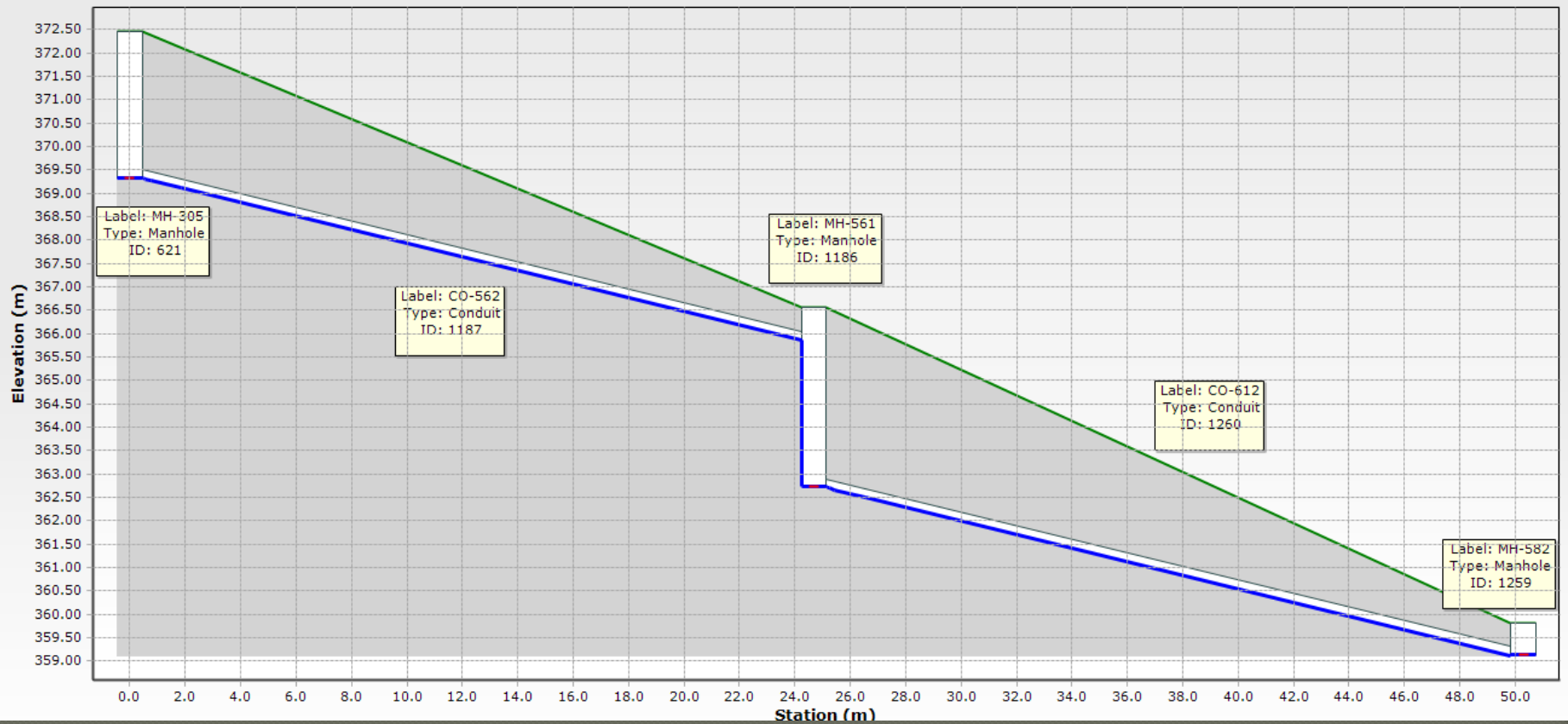
# 5.6 Results (Profiles)



# 5.6 Results (Profile – Drop Manhole)



# 5.6 Results (Profile – Drop Manhole)



# 6. Quantity Surveying

---

<b>Material</b>	<b>Unit</b>	<b>Quantity</b>
Excavation	Cubic Meter	28,521
Back Filling	Cubic Meter	13,653
Manholes	Unit	706
Conduits	Meter Run	21,309
Sand	Cubic Meter	12,183

# Bill of Quantities and Costs

Material Type	Unit	Quantity	Material Unit Cost	Total Cost
			Euro	Euro
Excavation	CM	28,521	10	285,210
Back Filling	CM	13,653	6	81,918
Manholes - 1.5m	No.	537	500	268,500
Manholes - 3m	No.	101	600	60,600
Manholes - 4m	No.	30	700	21,000
Manholes - 5m	No.	23	800	18,400
Manholes - 6m	No.	5	900	4,500
Conduit - 8in	MR	13,538	32	433,216
Conduit - 10in	MR	4,718	44	207,592
Conduit - 12in	MR	3,053	68	207,604
Total Cost - (Euro)				1,588,540
Total Cost After Waste Factor - (Euro)				1,636,196

# Cost Analysis

---

The total project cost is 1,636,000 Euro.

Unit	Total	Cost Per Unit
Cost Per KM	21.309 KM	77,000 Euro
Cost Per Capita	3,000 Capita	545 Euro
Trunk Line sewer	7.5 KM	610,000 Euro



Thank You  
For Your  
Attention