Graduation Project II

Design of Northern Part of Nablus Ring Road

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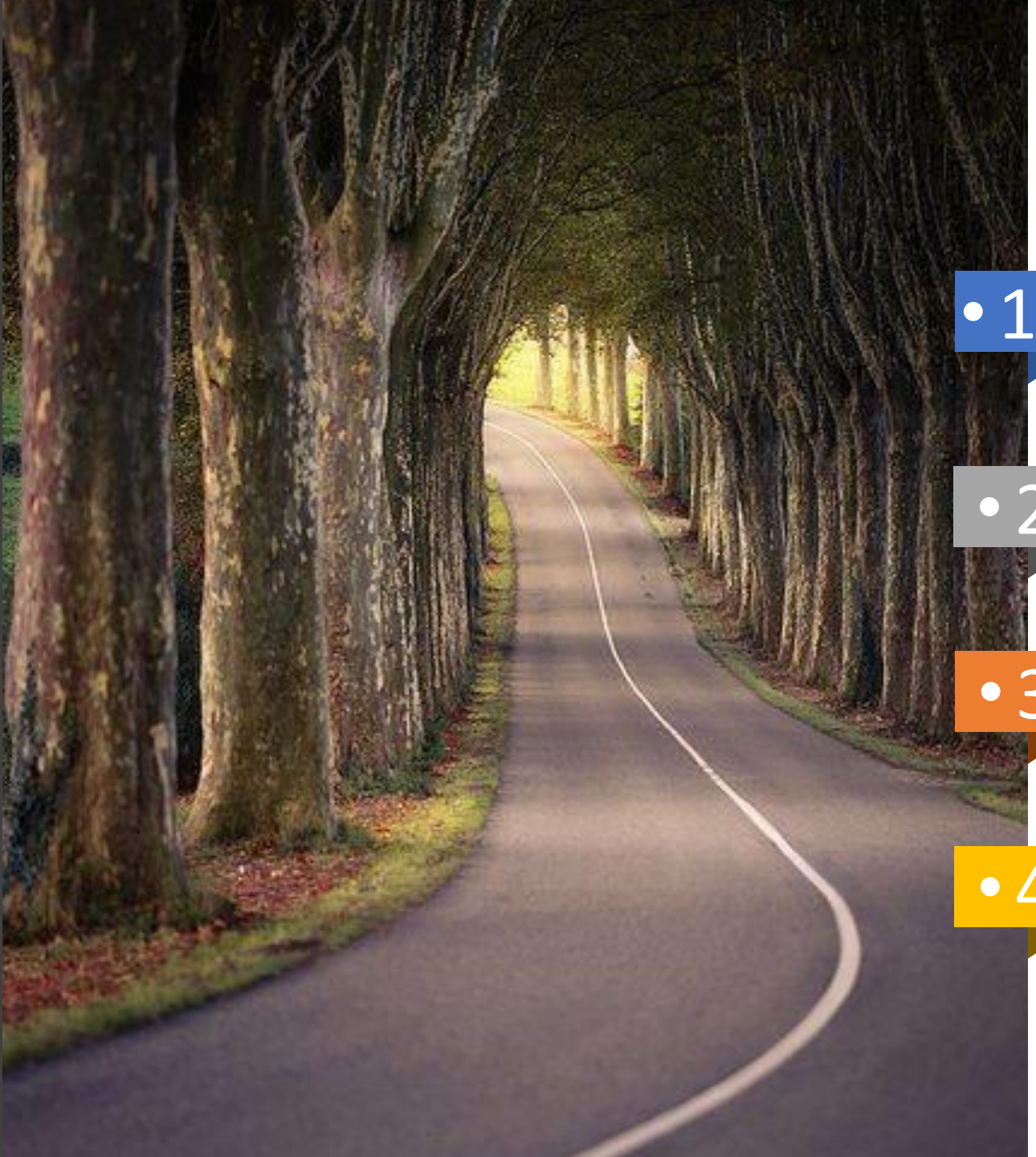
Dr. Amjad Issa

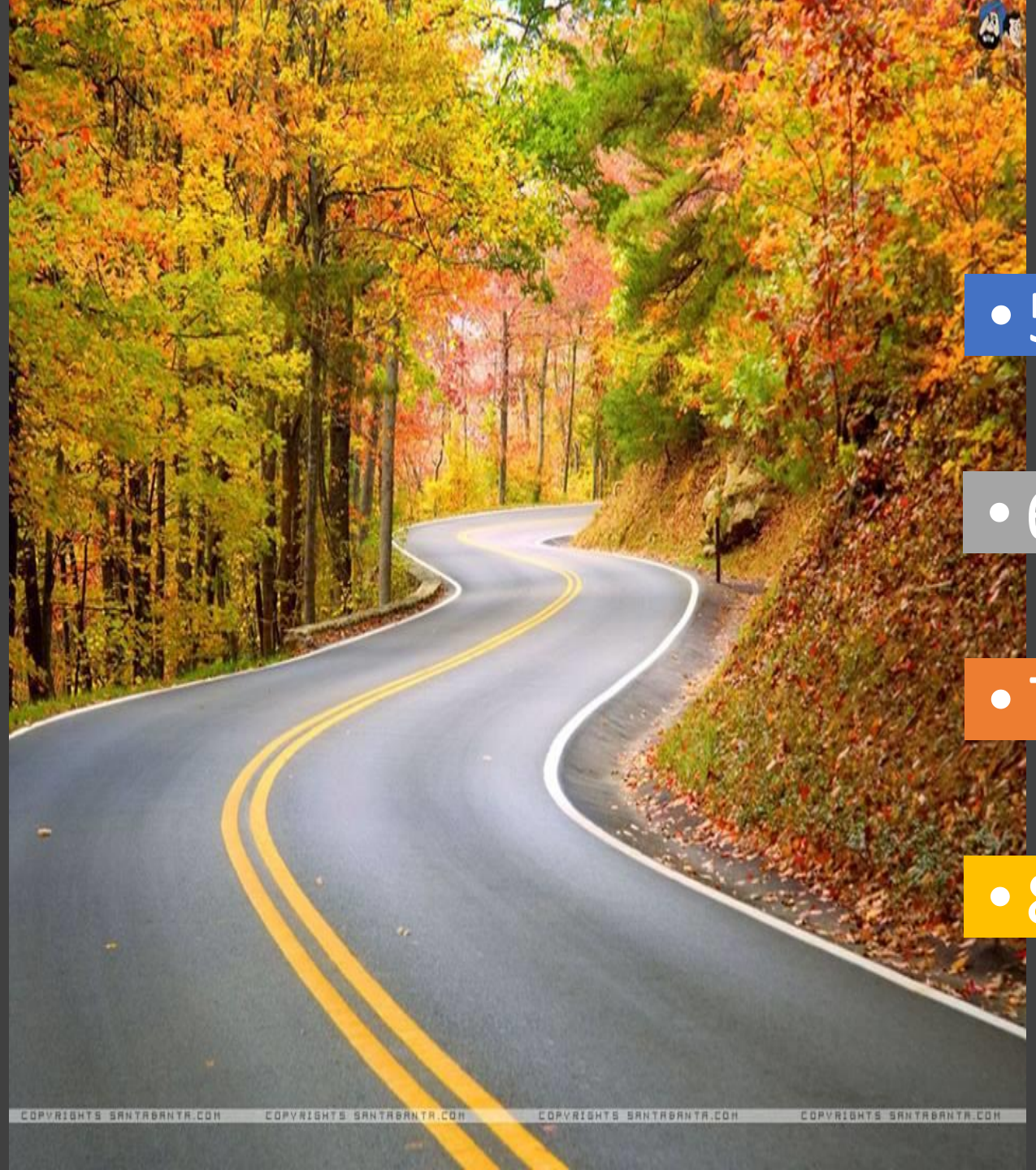
DESIGN OF NORTHERN PART OF NABLUS RING ROAD

DEYAA JARARAA & HADEEL TALAHMEH



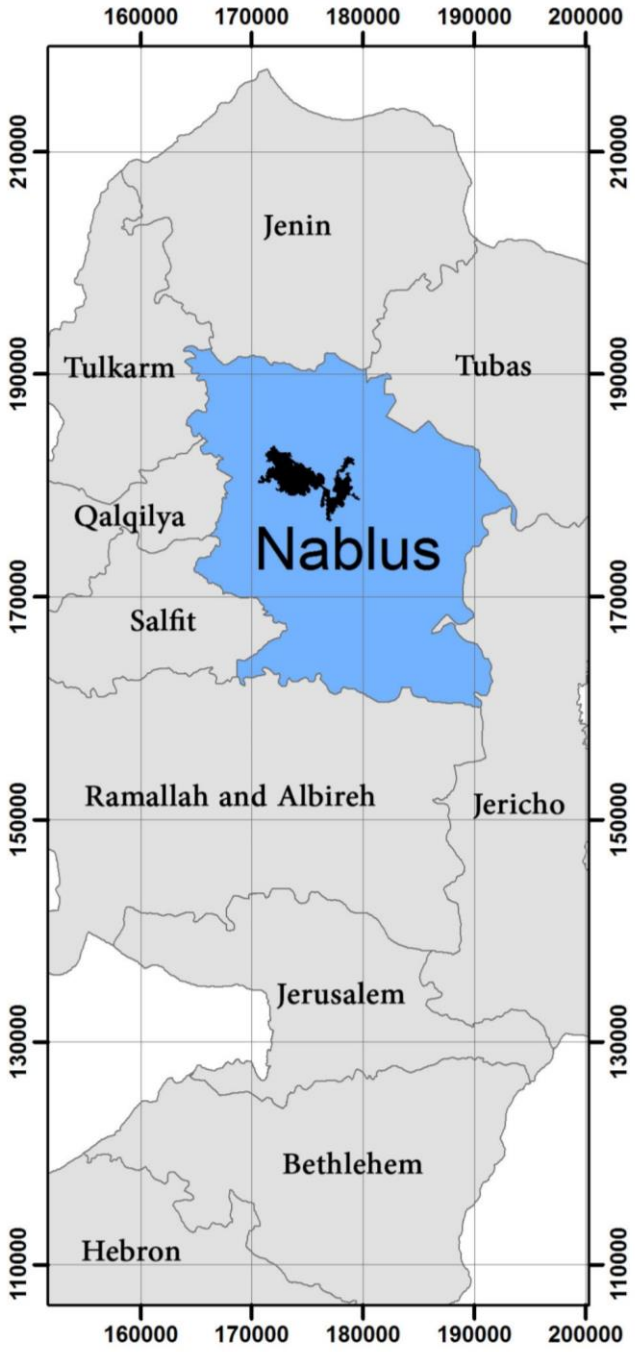
CONTENT

1. General Background
2. Objectives
3. Project Entrance
4. Methodology & Design Criteria



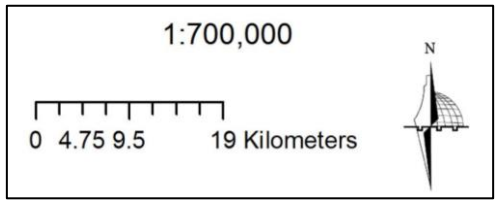
CONTENT

- 5 • Geometric Design
- 6 • Pavement Design
- 7 • BOQ & Cost Estimations
- 8 • Conclusions & Recommendations

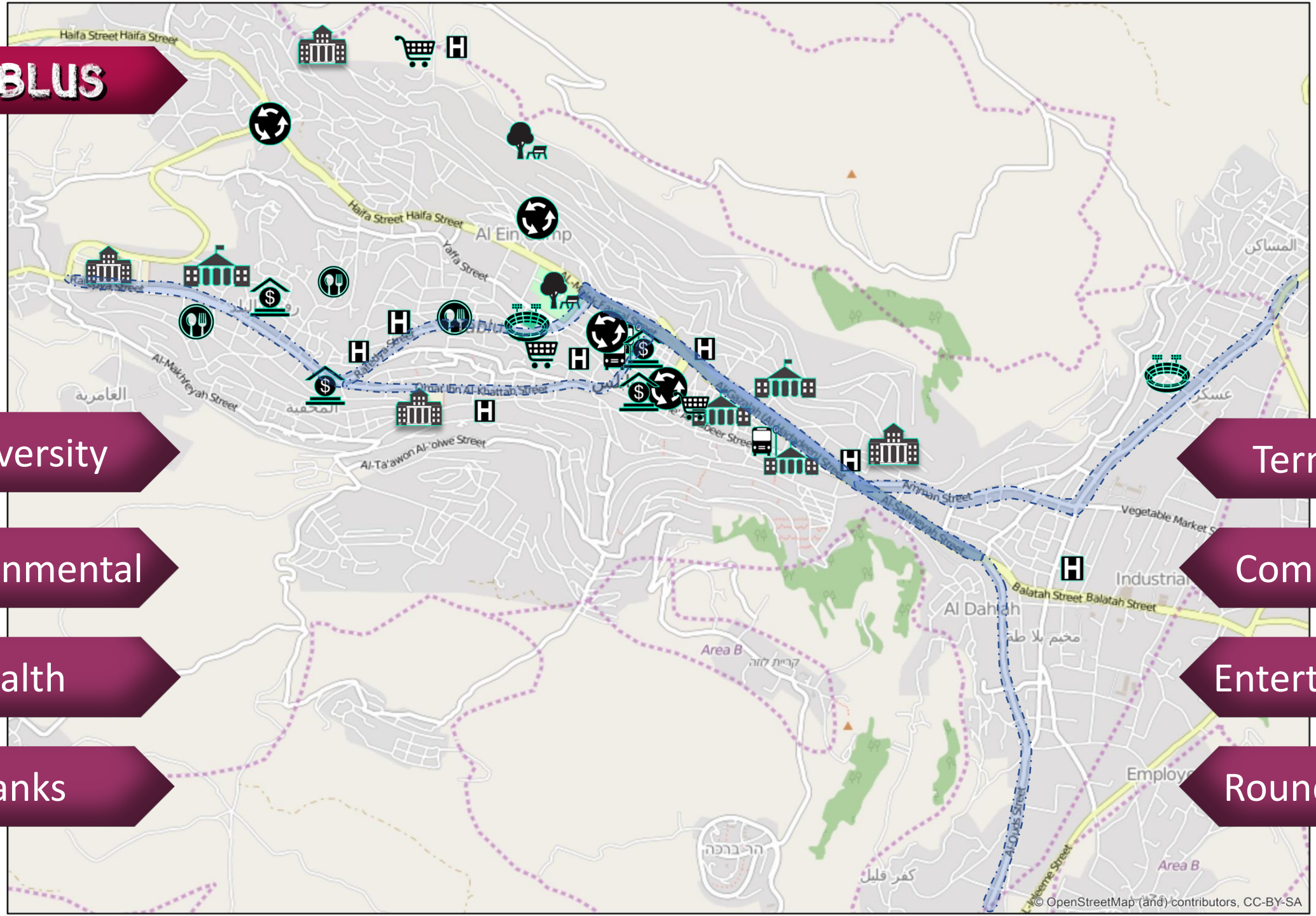


GENERAL BACKGROUND

Nablus city is one of the most important Palestinian cities to its existence in the middle of the West Bank as a link between other cities.



NABLUS



University

Governmental

Health

Banks

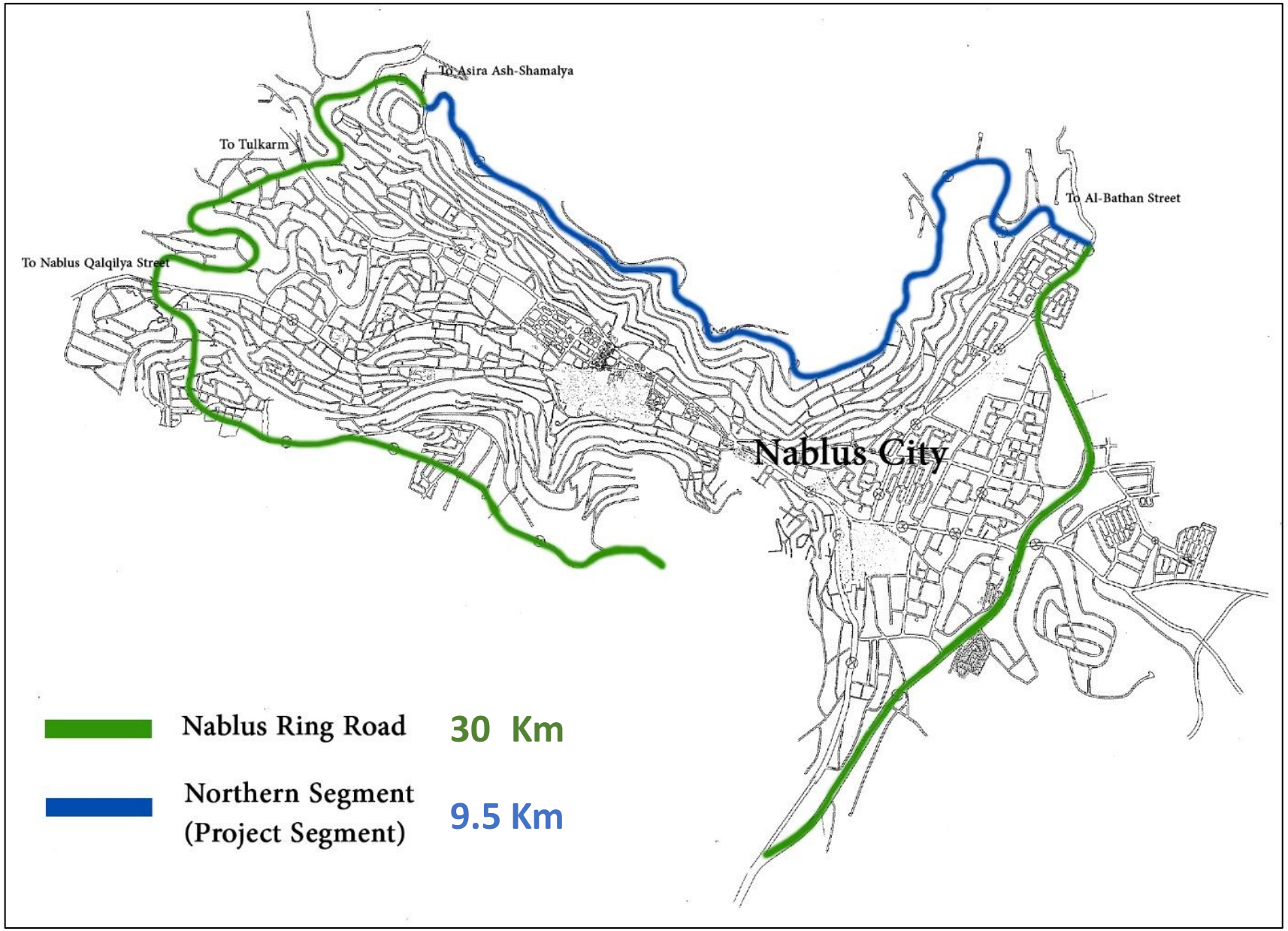
Terminals

Commercial

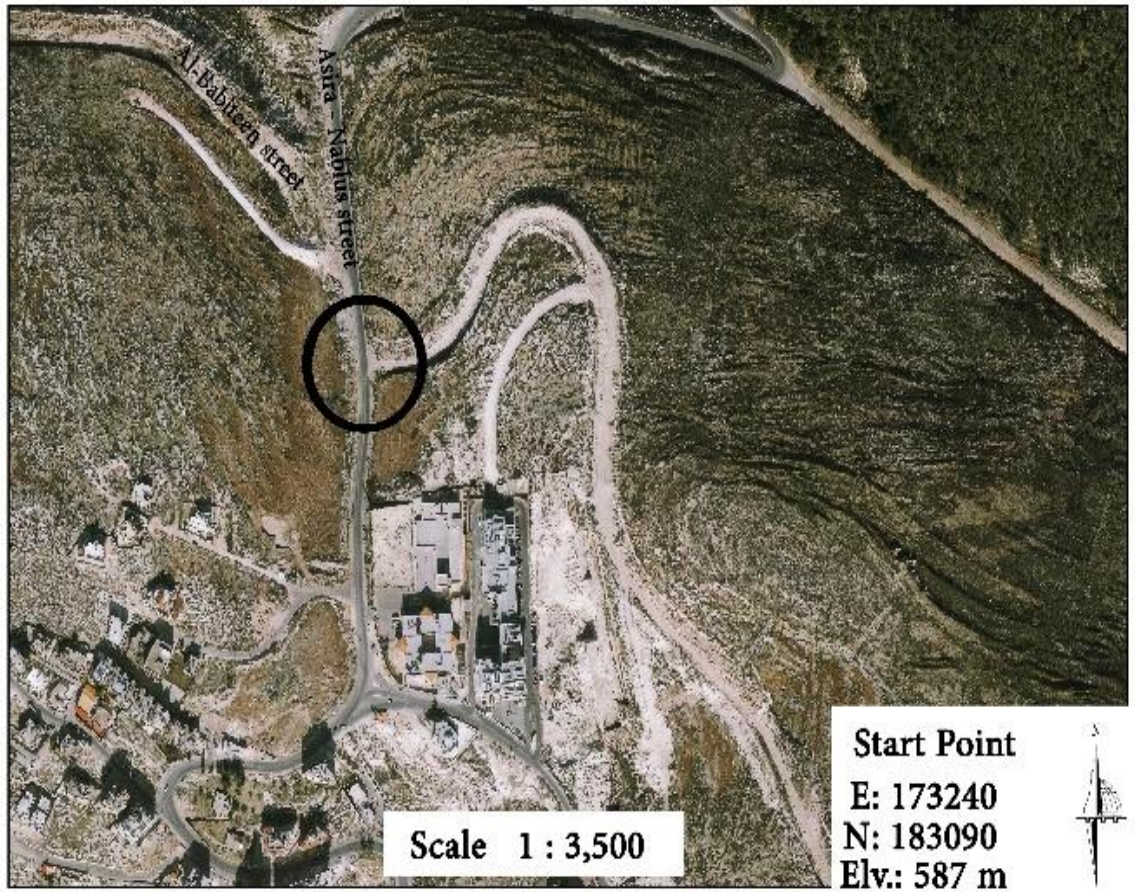
Entertainment

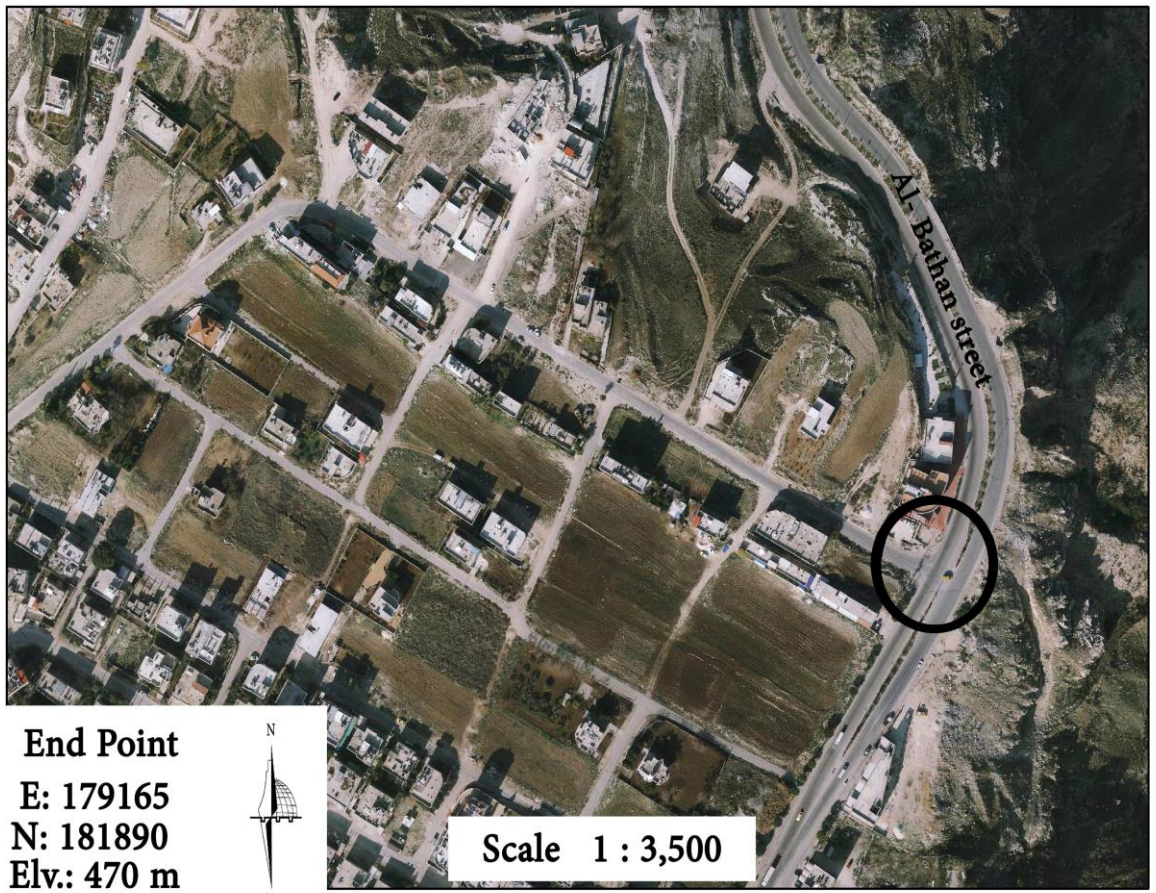
Roundabouts

Schematic Map of Nablus City and the location of Ring Road



Aerial Photos for the Entrance and Exit of the road.

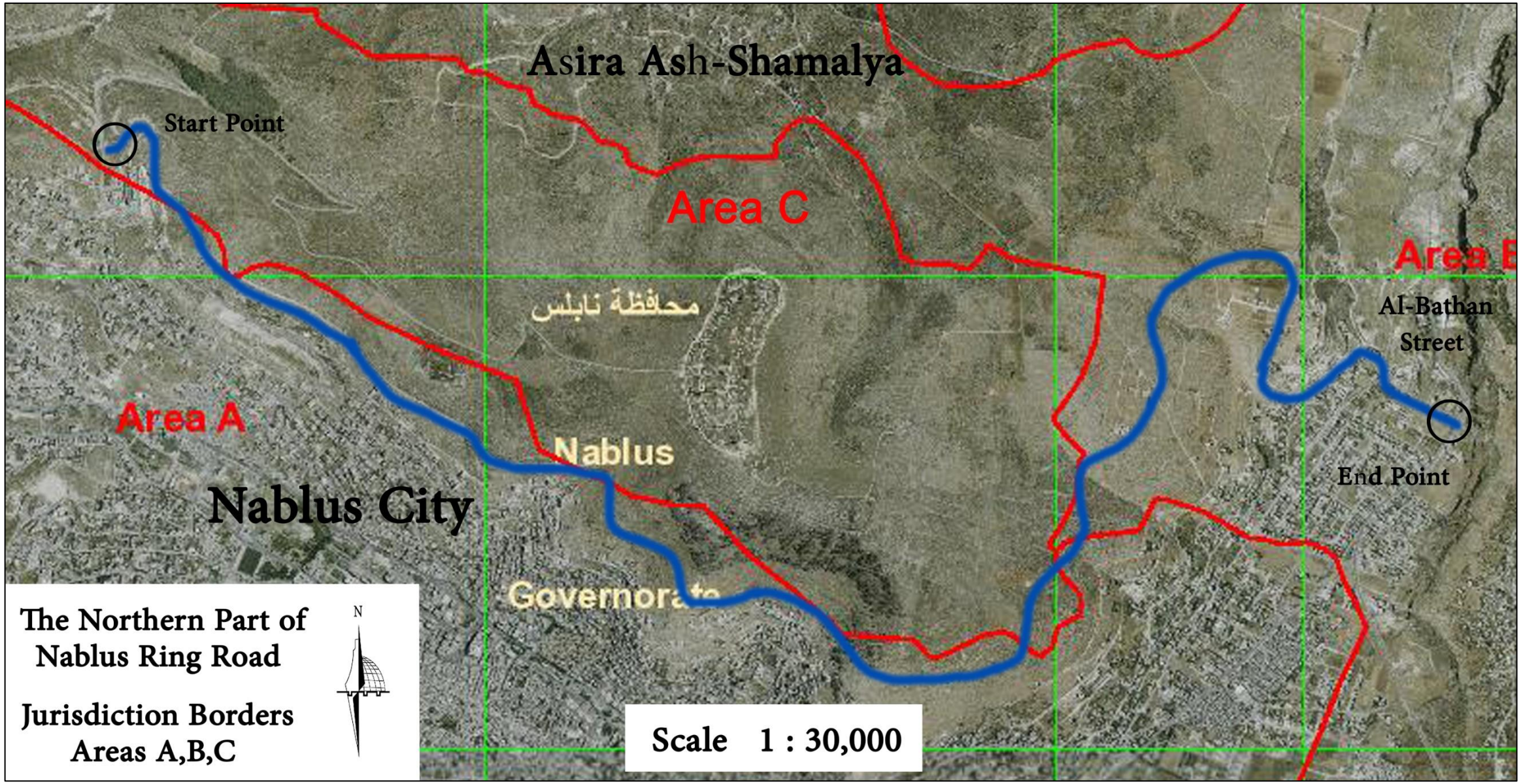




OBJECTIVE

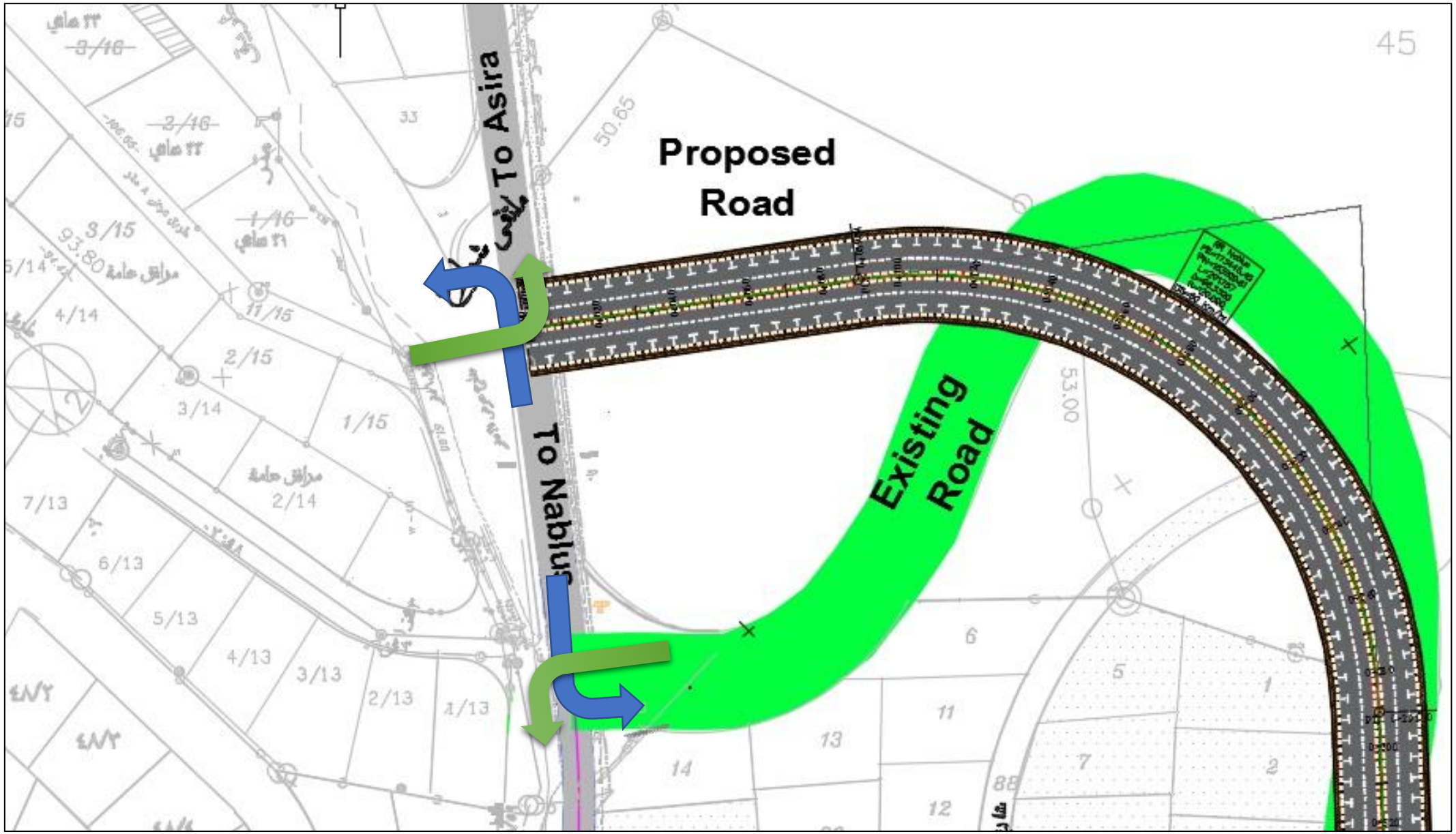
1. Evaluate Existing Road
2. Propose Road Design
3. Design of Road Facilities
4. Quantities & Costs Estimated

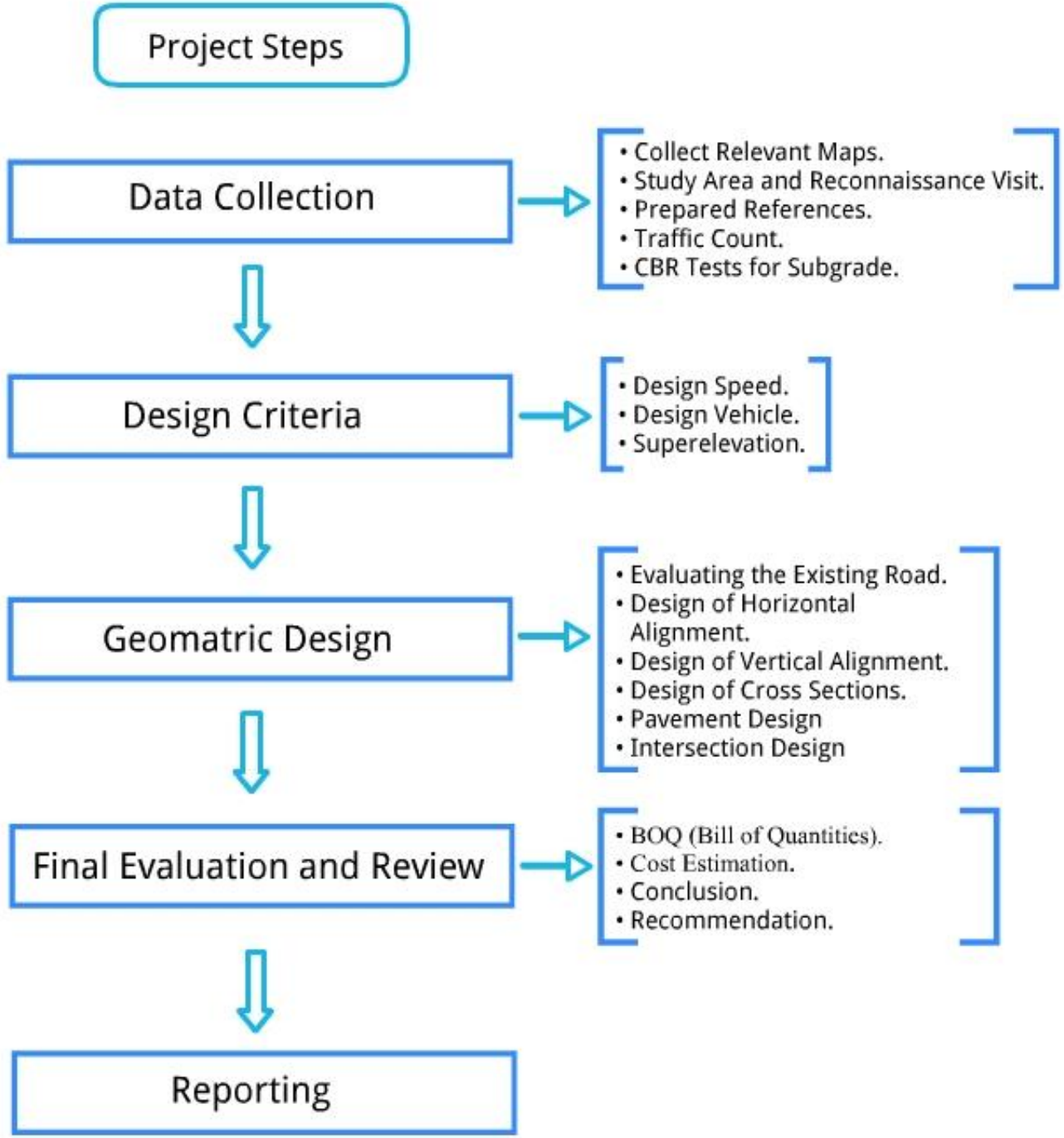
EVALUATING


Asira Ash-Shamalya
Start Point
Area C
Area B
محافظة نابلس
Al-Bathan
Street
Area A
Nablus
End Point
Nablus City
Governorate
The Northern Part of
Nablus Ring Road
Jurisdiction Borders
Areas A,B,C
N
Scale 1 : 30,000

ENTRANCE
Proposed Entrance
Existing Entrance
Al-Babitain Road

ENTRANCE




Project Steps
Data Collection
• Collect Relevant Maps.
• Study Area and Reconnaissance Visit.
• Prepared References.
• Traffic Count.
• CBR Tests for Subgrade.
Design Criteria
• Design Speed.
• Design Vehicle.
• Superelevation.
Geomatric Design
• Evaluating the Existing Road.
• Design of Horizontal Alignment.
• Design of Vertical Alignment.
• Design of Cross Sections.
• Pavement Design
• Intersection Design
Final Evaluation and Review
• BOQ (Bill of Quantities).
• Cost Estimation.
• Conclusion.
• Recommendation.
Reporting

DESIGN CRITERIA

DESIGN SPEED

Station	Design Speed (Km/hr)	Superelevation	Minimum Radius (m)
(0+000 – 0+370)	50	NON	116
(0+370 – 2+800)	70	6 %	184
(2+800 – 8+200)	50	NON	116
(8+200 – 9+120)	40	NON	70
(9+120 – 9+396)	50	NON	116

DESIGN CRITERIA

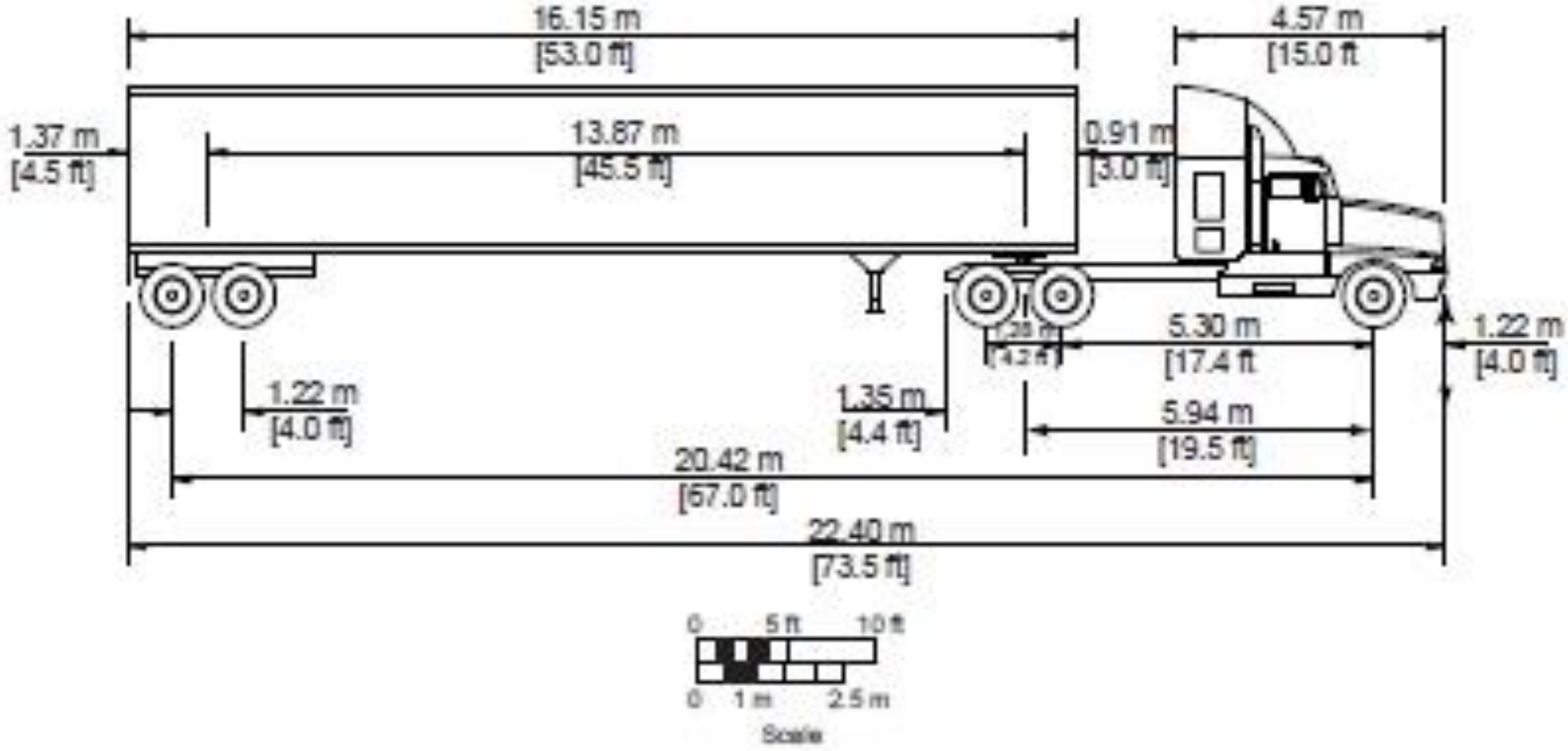
DESIGN VEHICLE

WB-20

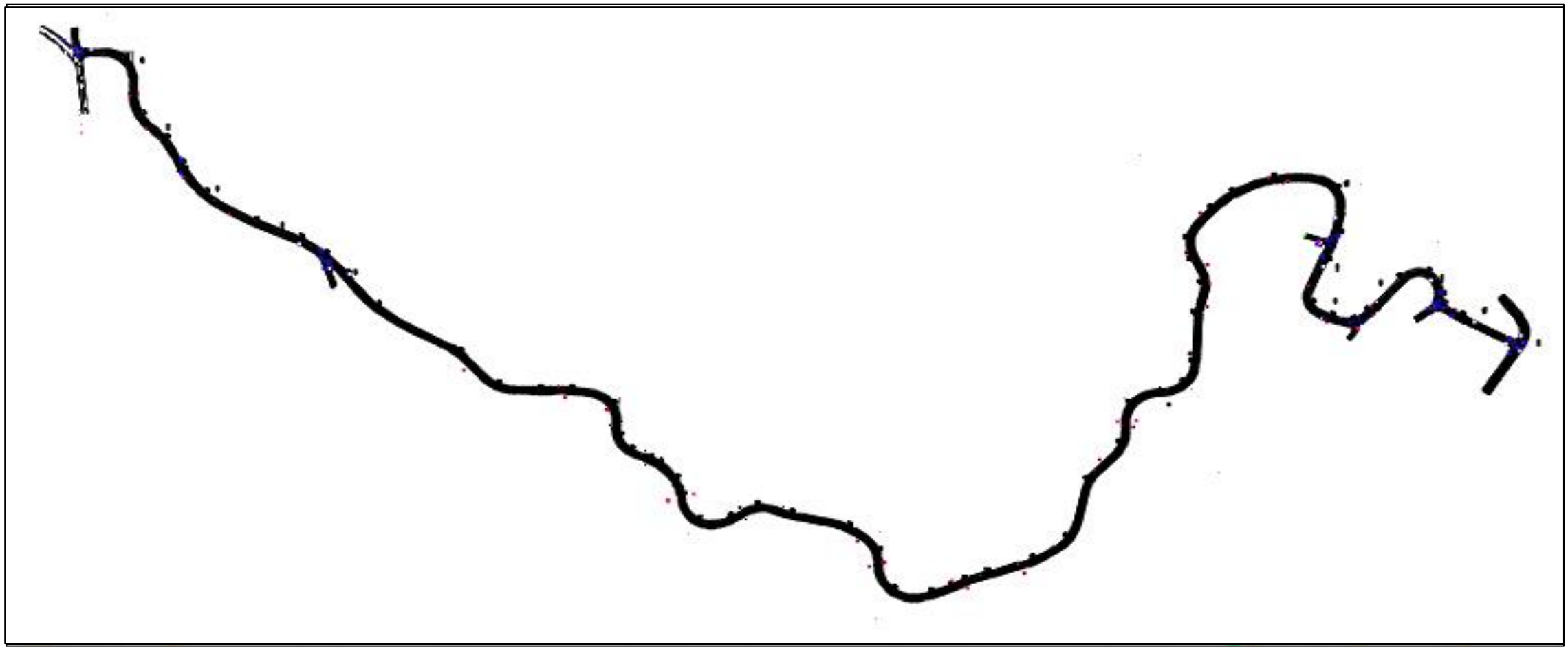
Height = 4.1 m

Width = 2.6 m

Length = 22.4 m



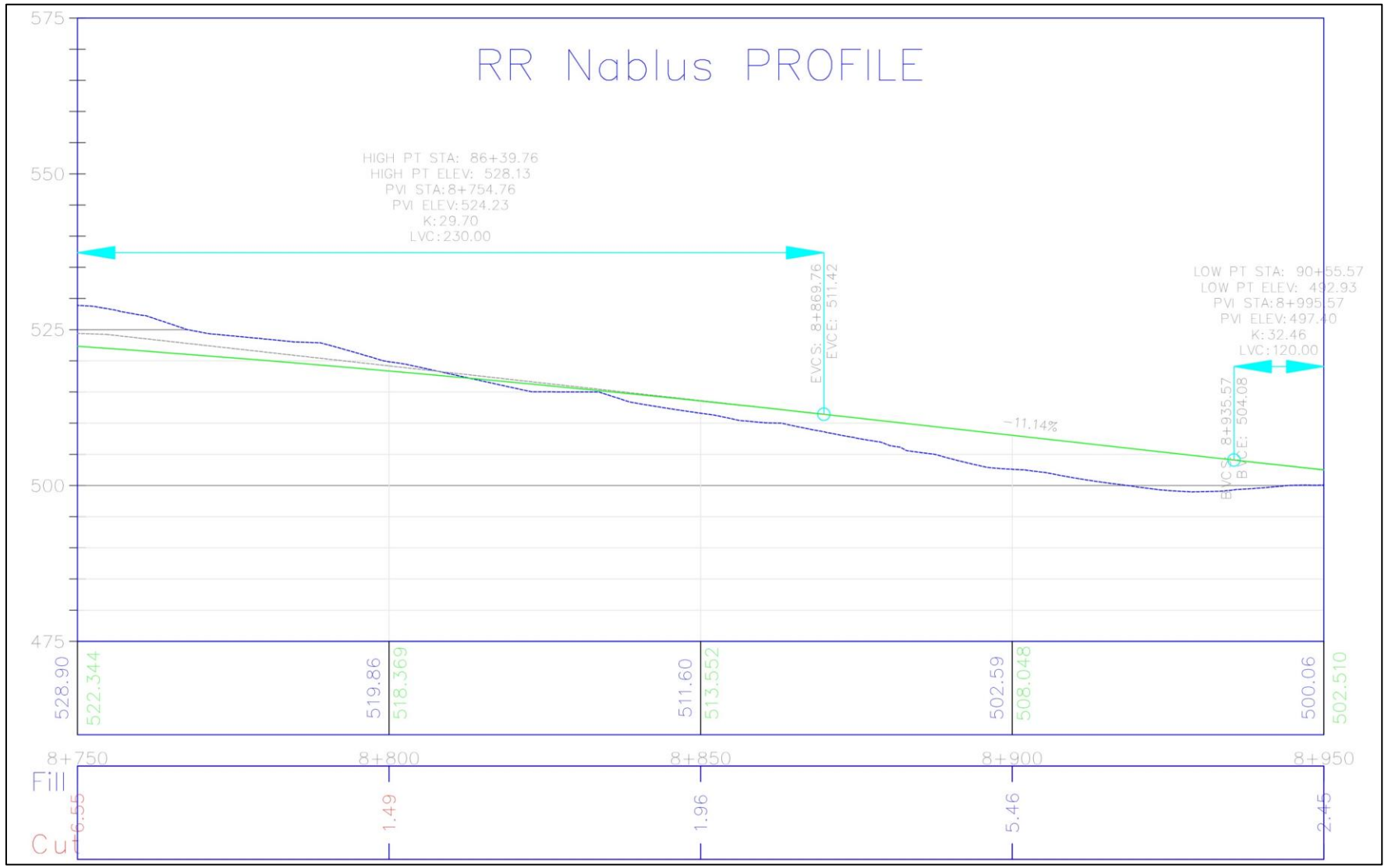
DESIGN OF HORIZONTAL ALIGNMENT



DESIGN OF HORIZONTAL ALIGNMENT

Type of the Curve	Number
Simple curves	26
Compound curves	12
Reversed curves	6

DESIGN OF VERTICAL ALIGNMENT



DESIGN OF VERTICAL ALIGNMENT

- Max. Grade ➔ **13 %**

  Note : All segments match the max grade except the following.

Station	Grade
(0+020 – 1+095)	15.12 %
(7+075 – 7+615)	13.97 %

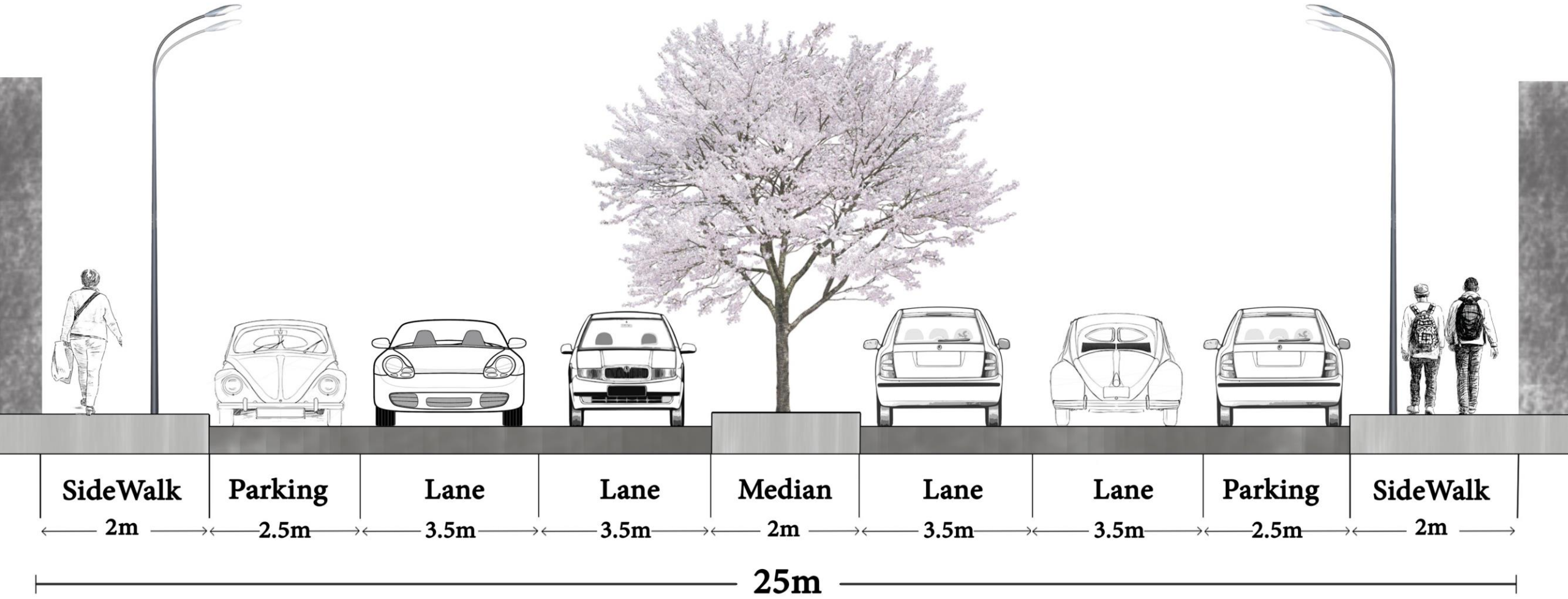
DESIGN OF VERTICAL ALIGNMENT

Type of Curve	Minimum K	Number
Crest Curve	**SSD** for V = 70 → k = 17 for V = 50 → k = 7 for V = 40 → k = 4	9
Sag Curve	**HSD** For V = 70 → k= 23 for V = 50 → k = 13 for V = 40 → k = 9	9

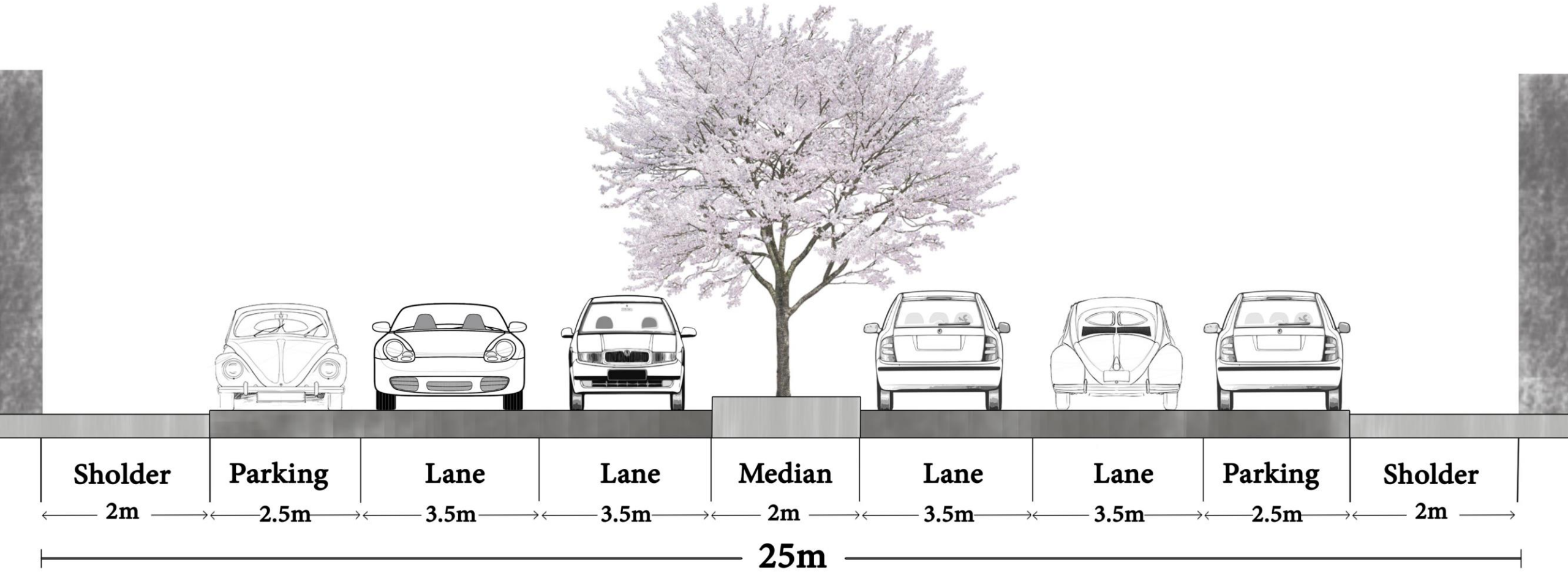
DESIGN OF CROSS SECTION

- We have two typical cross section scenarios:

Type of the Cross Section	Station
With Sidewalk (Typical 1)	(0+000 – 1+500)
	(7+500 – 9+396)
With Shoulder (Typical 2)	(1+500 – 7+500)



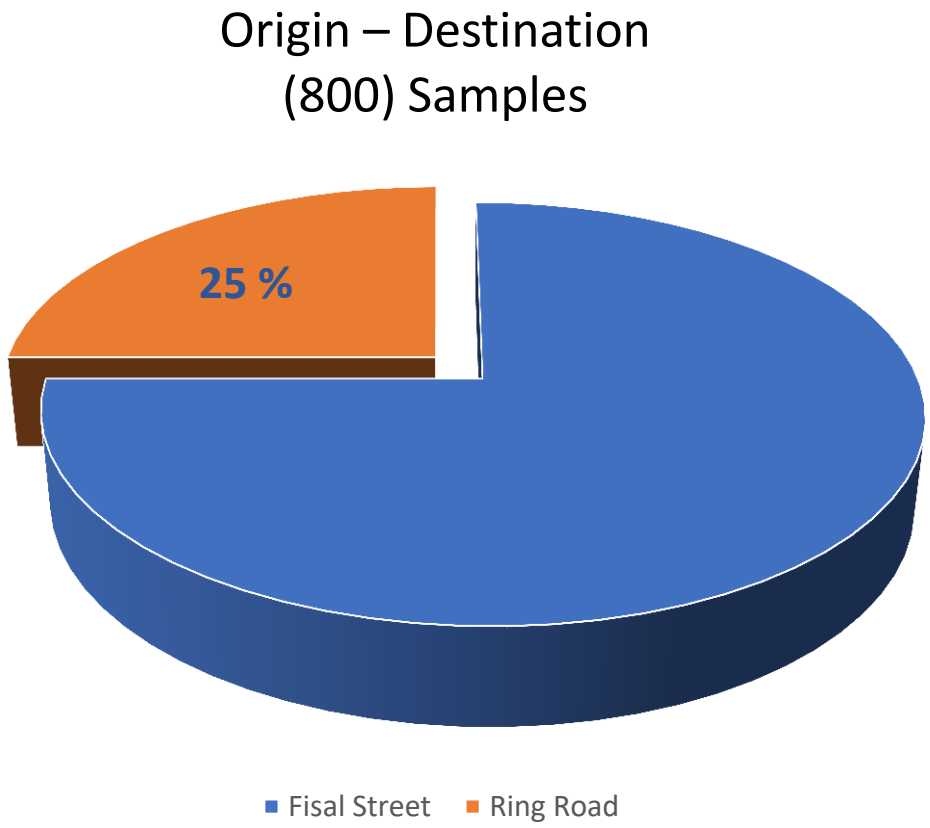
Typical Cross Section 1 (with Sidewalk)



Typical Cross Section 2 (with Shoulders)

TRAFFIC ANALYSIS

- Current **ADT**(Faisal Street)➔ **31080 veh/day**
- Percentage (NRR) = 23 % ➔ **Take 25 %**
- Estimation **ADT**(NRR)➔ **7770 veh/day**
- Design **ESAL** (20 years)➔ **2.9 Millions**



TRAFFIC ANALYSIS

HCS software check:

- Travel lanes number (**N = 2**) ➔ **Satisfied**

RESULTS		
Direction	1	2
Desired level of service	B	B
Flow rate, vp	1393 pc/h	783 pc/h
Free-flow speed, FFS	80.2 km/h	80.2 km/h
Maximum service flow rate allowed for desired LOS, MSF	882 pc/h/ln	882 pc/h/ln
Number of lanes required, N	1.6	0.9

Designers should perform an operational analysis on the possible choices for N.

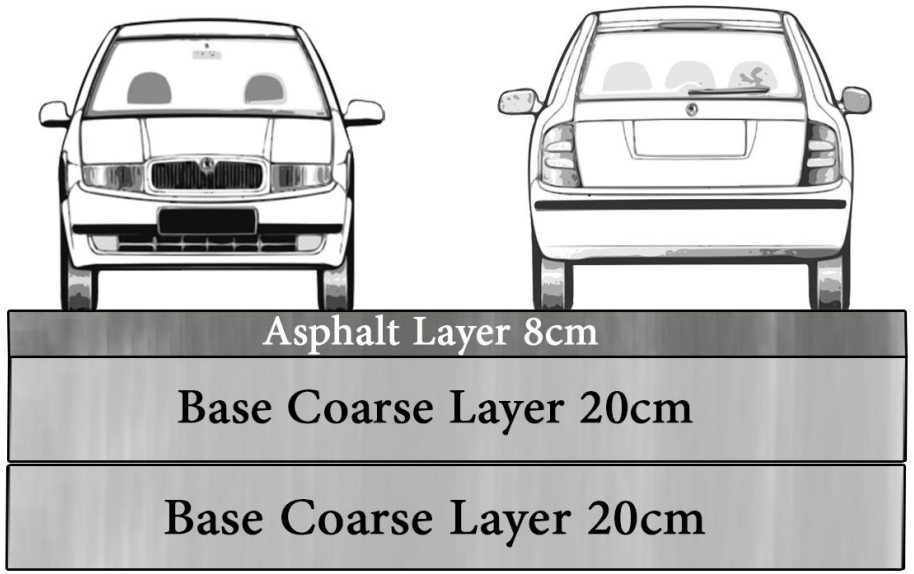
PAVEMENT DESIGN

CBR Test

PAVEMENT DESIGN

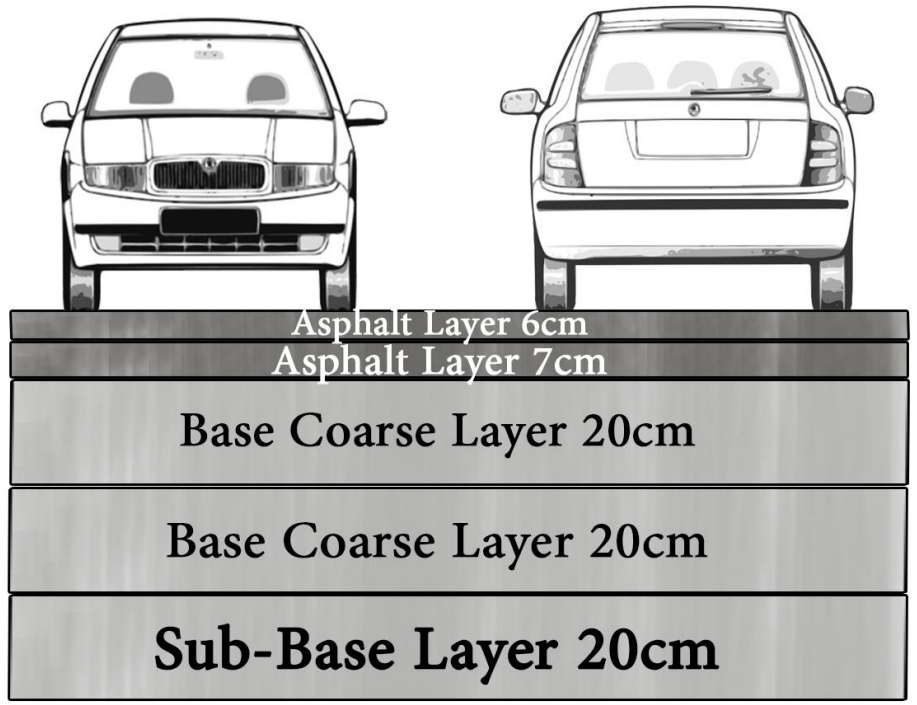
Sample	CBR Value	Stations Represented
Sample 1 (0+850)	27.4 %	(0+000 – 7+500)
Sample 2 (7+600)	3.8 %	(7+500 – 9+396)

PAVEMENT DESIGN



Pavment Layers

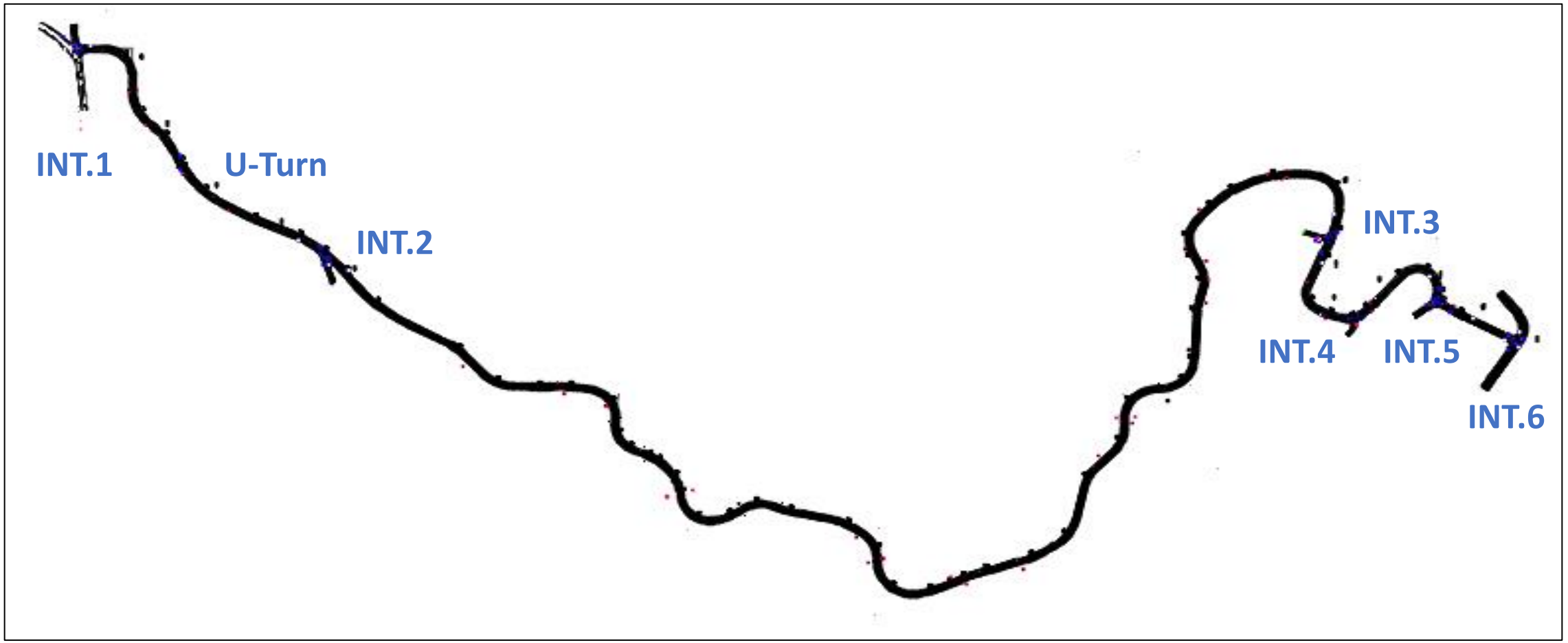
0+000 – 7+500



Pavment Layers

7+500 – 9+396

INTERSECTIONS



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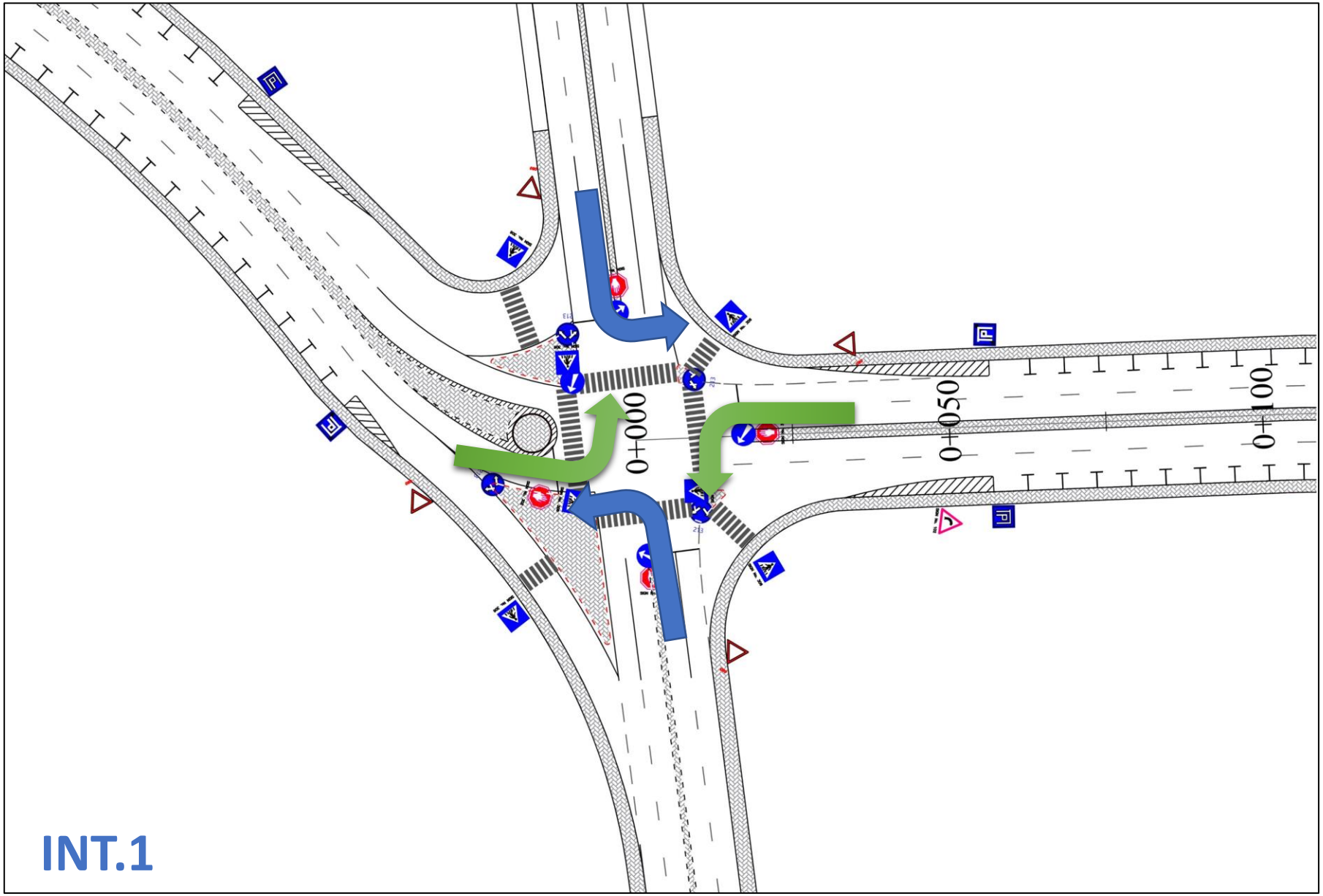
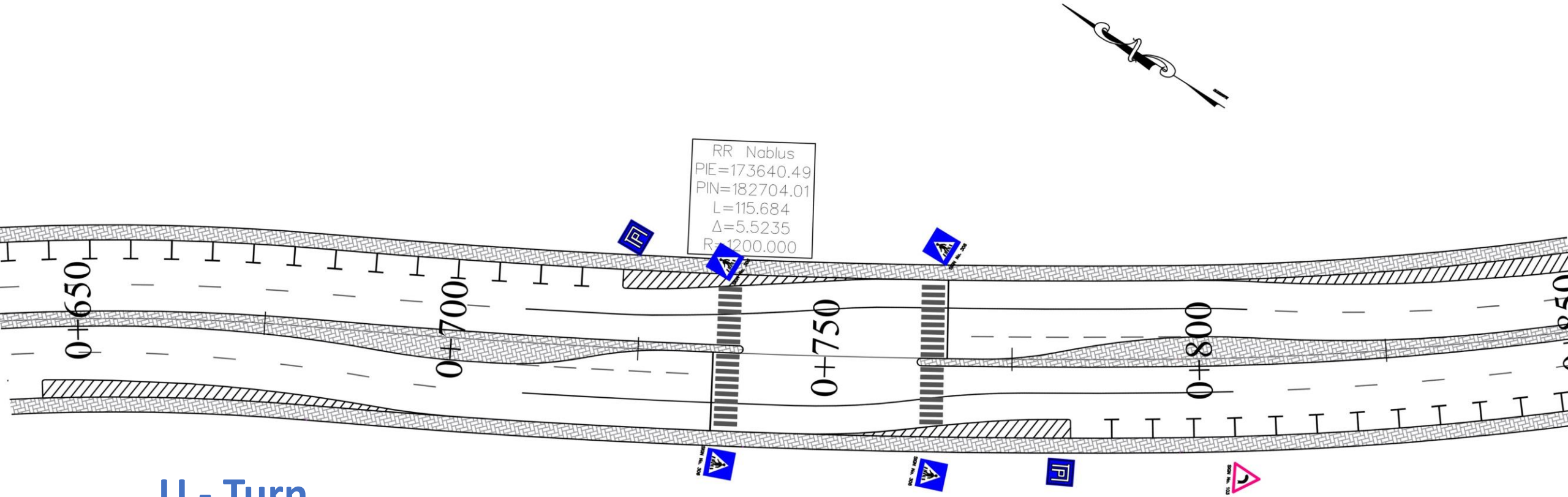


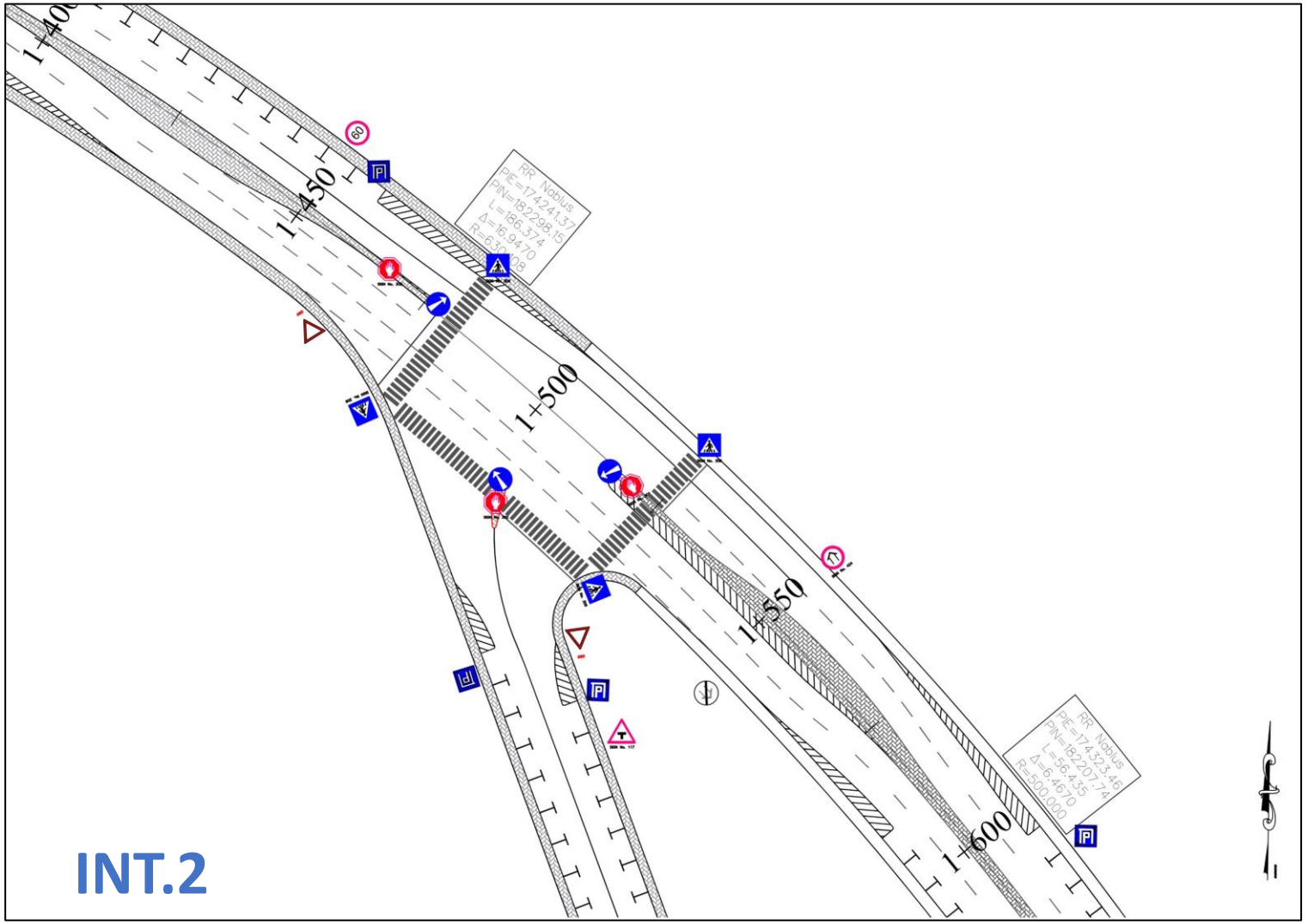
INT.1

INTERSECTIONS



U - Turn

INTERSECTIONS



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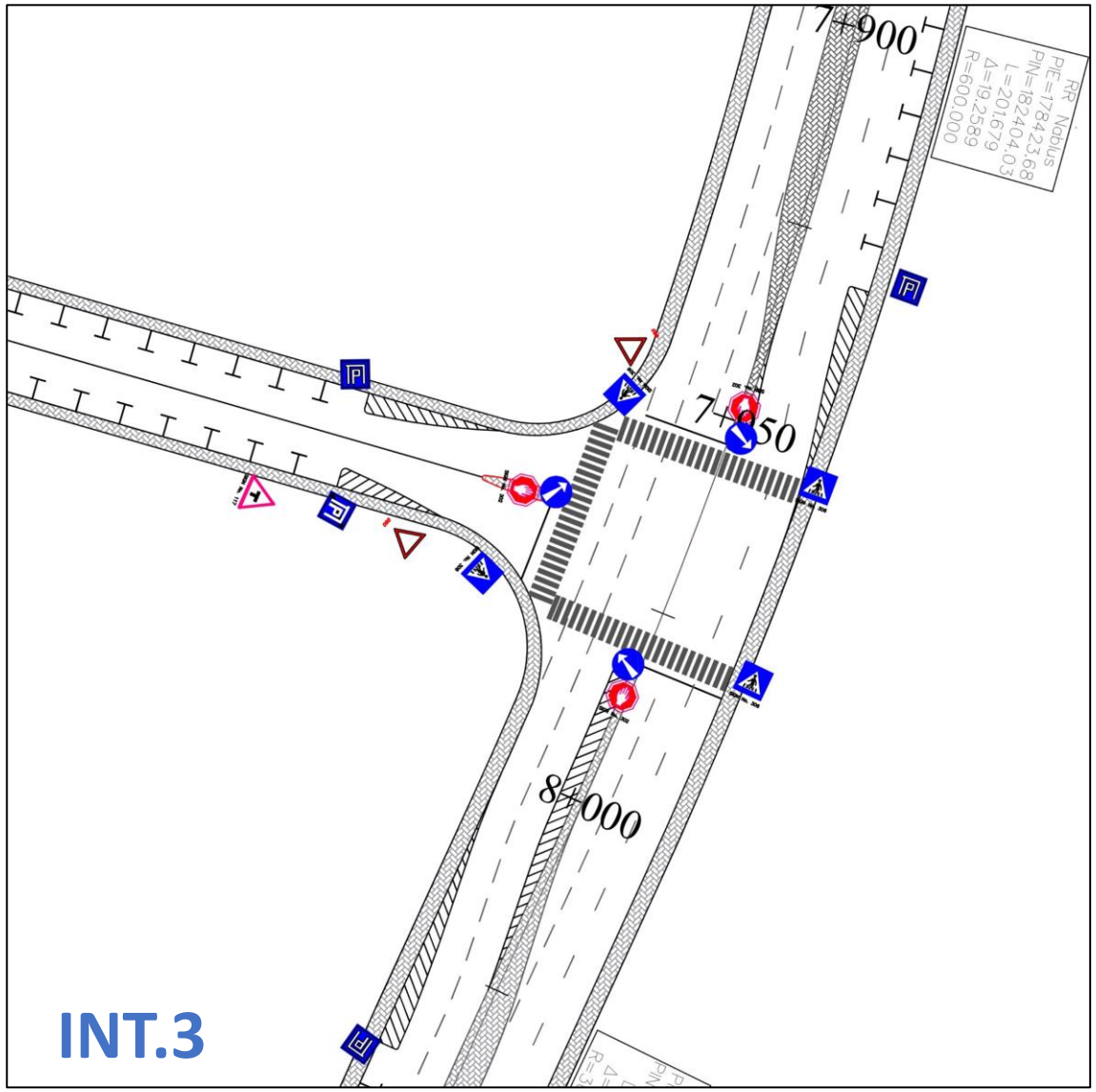
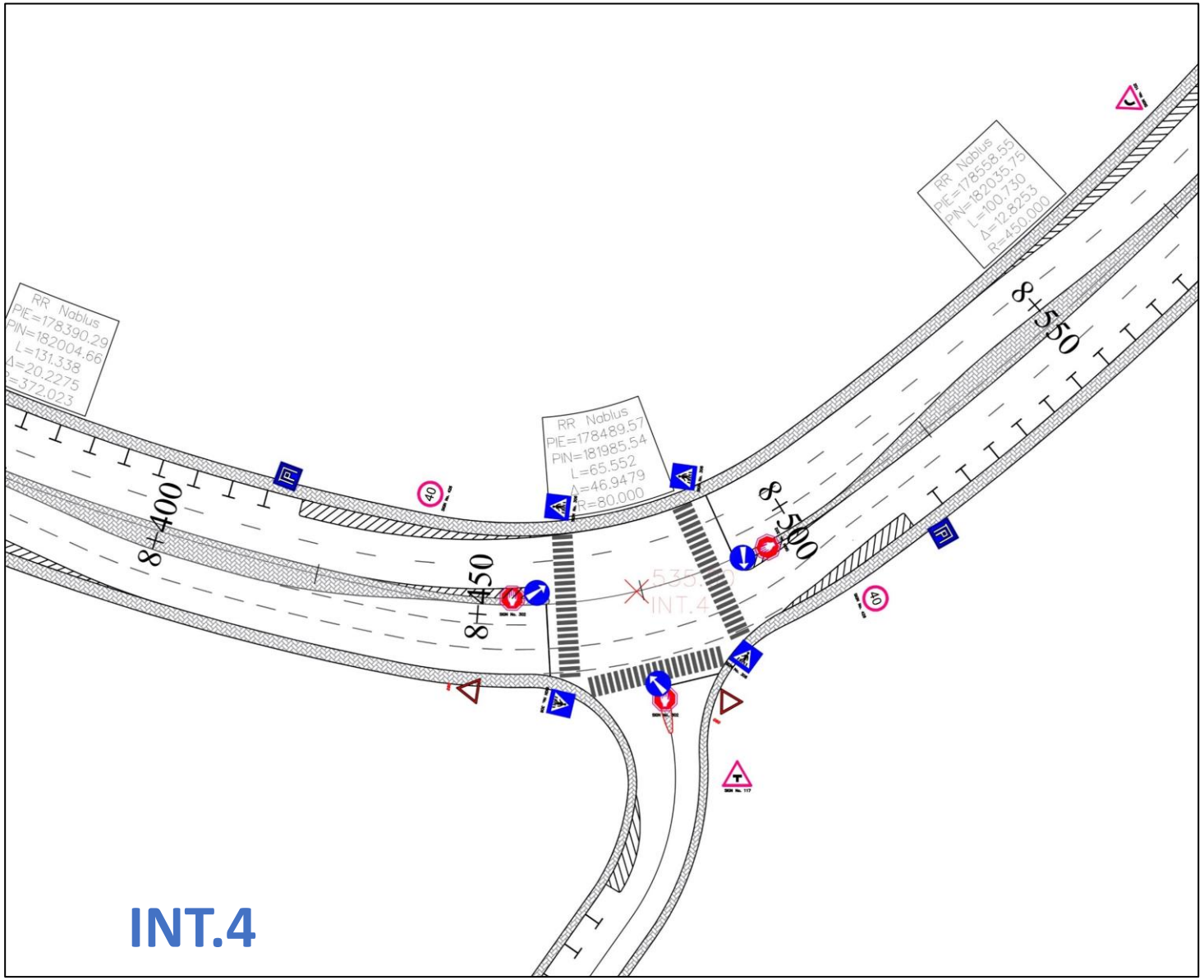
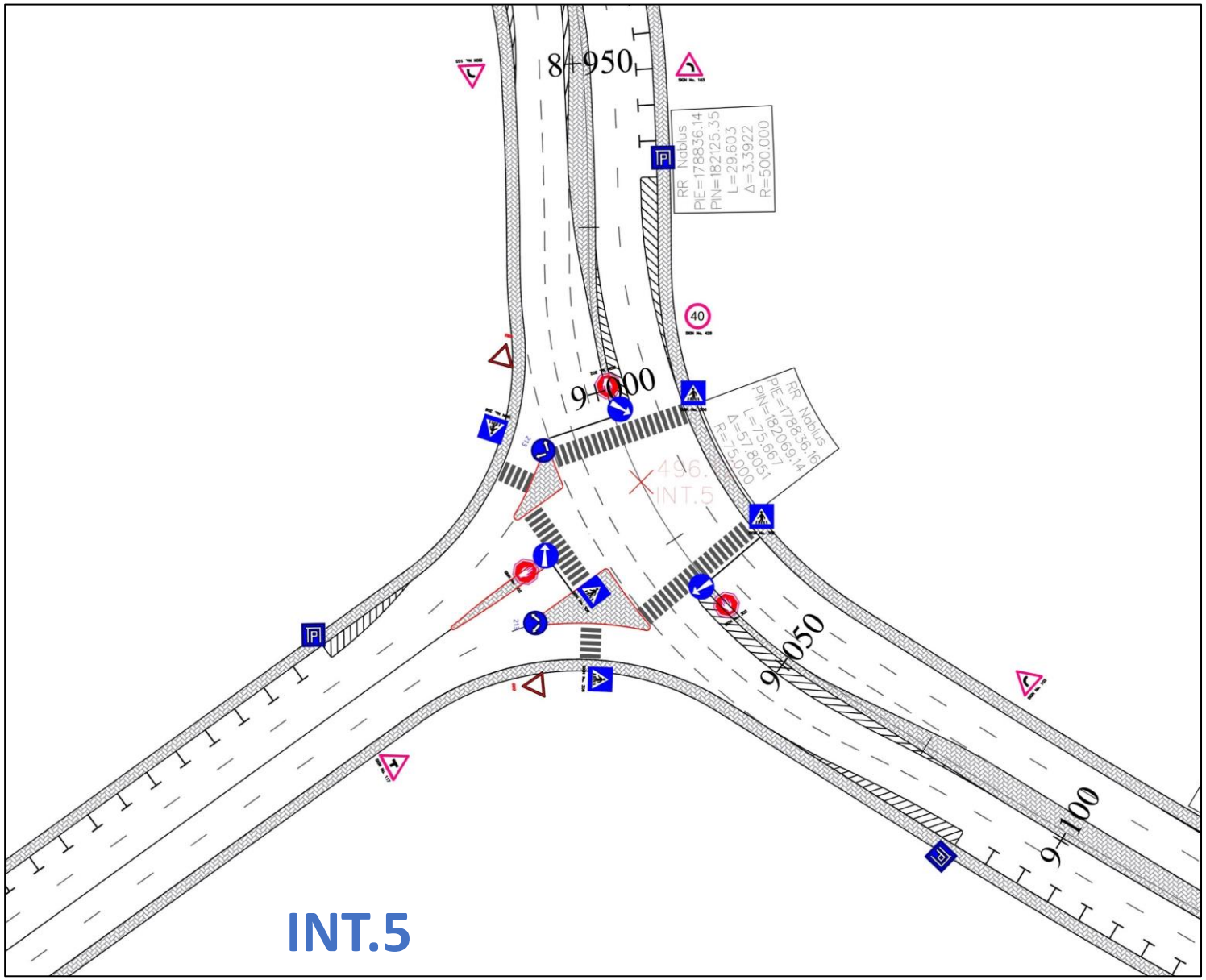


INTERSECTIONS

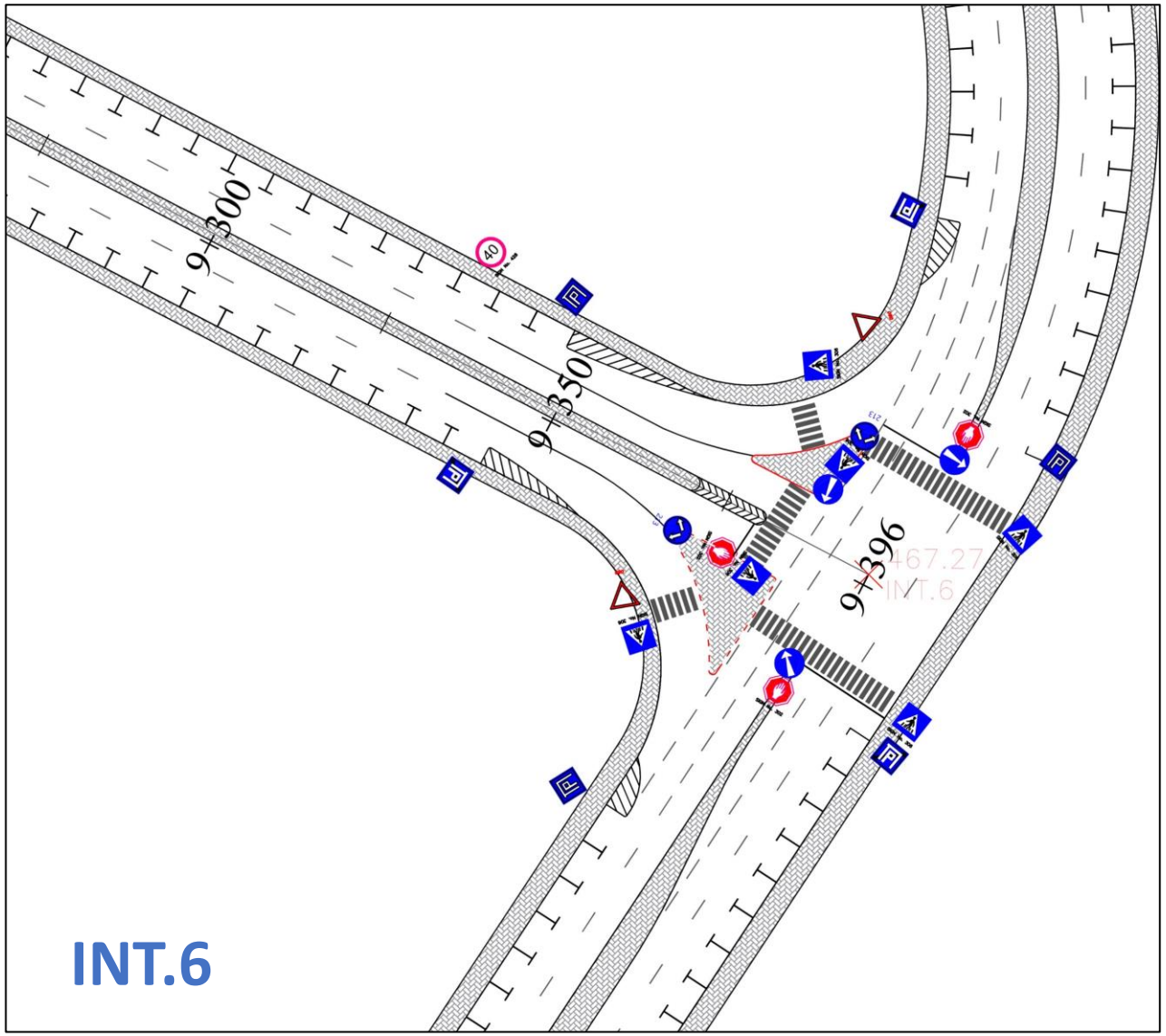


INT.4

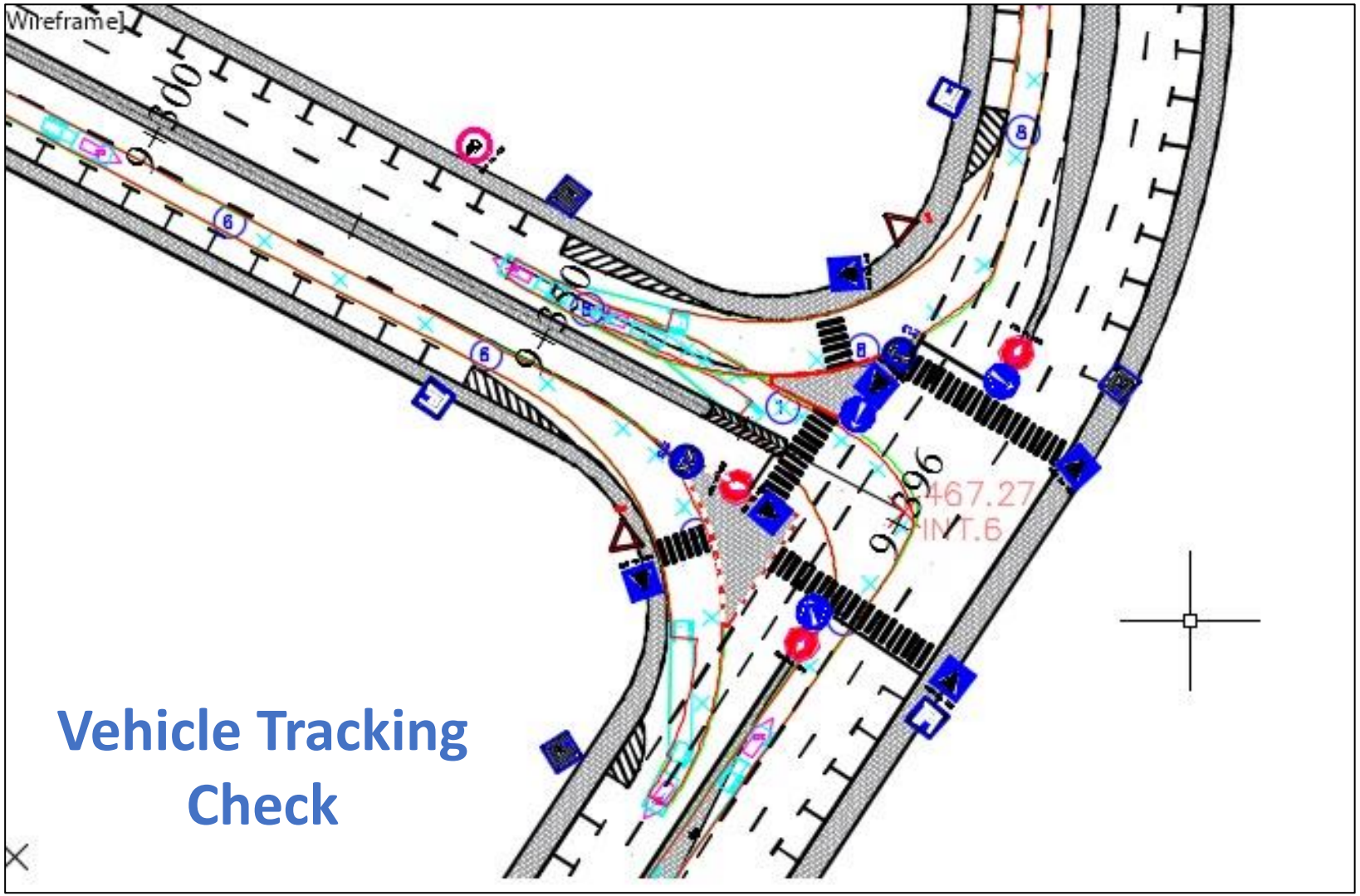
INTERSECTIONS



INTERSECTIONS

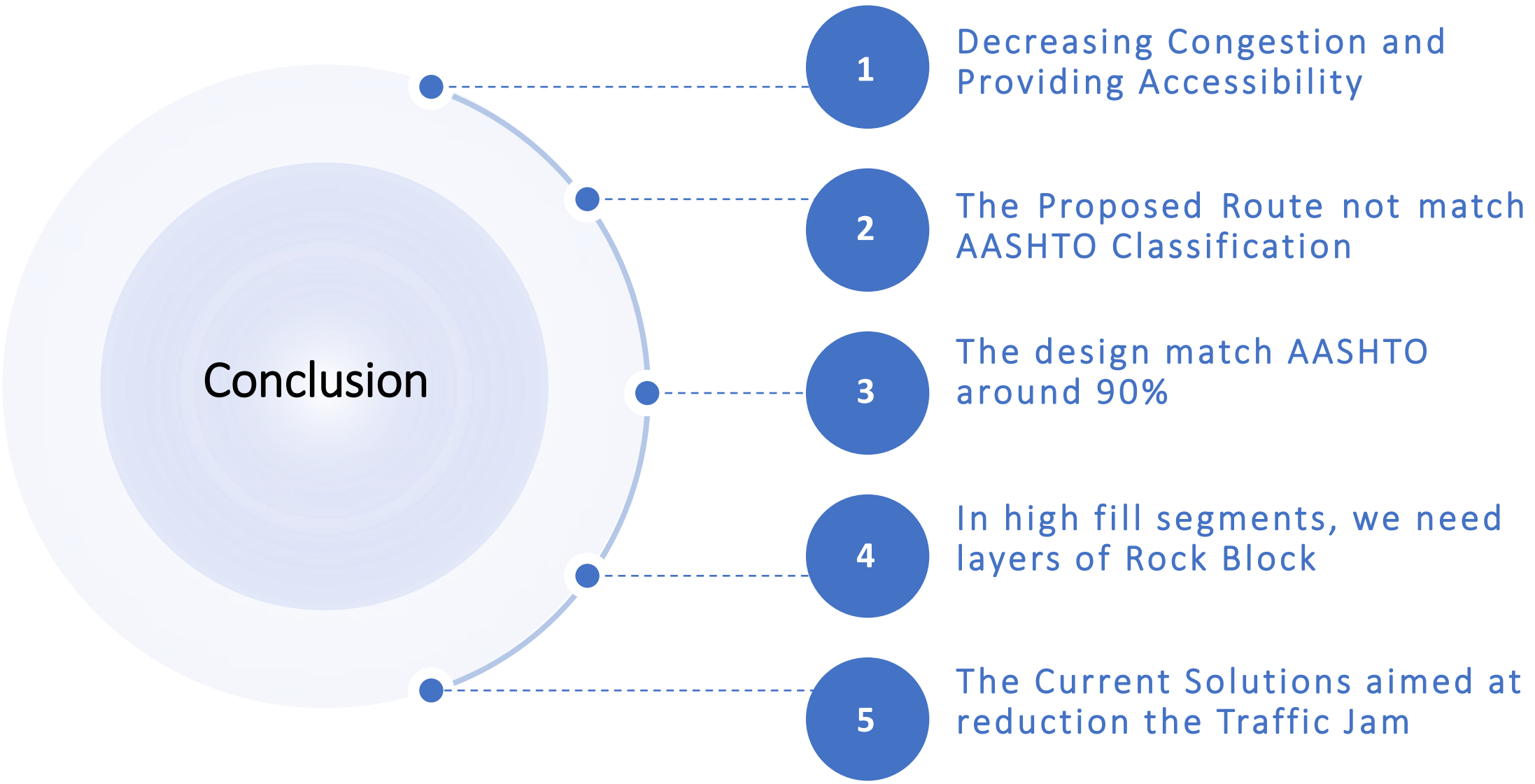


INTERSECTIONS



BOQ AND COST ESTIMATION

Items	Estimation Cost (Million)
Cut & Fill	4.79
Base Coarse	1.41
Sub Base	0.1
Pavement	4.28
Marking	0.22
Paving	1.04
Signing & Cuties	0.07
Walls & Guard Rail	1.2
TOTAL PROJECT COST	13.1 M


Conclusion
1
Decreasing Congestion and Providing Accessibility
2
The Proposed Route not match AASHTO Classification
3
The design match AASHTO around 90%
4
In high fill segments, we need layers of Rock Block
5
The Current Solutions aimed at reduction the Traffic Jam

RECOMMENDATIONS

- **It is recommended to consider the other alternative modified route for the entrance of the road in order to work 4-legs intersection.**
- **Nablus Municipality is encouraged to attain the needed funds to construct the whole Ring Road.**
- **Redesign intersections after street operating.**
- **Reorganizing the area around the Road especially at the End .**

RECOMMENDATIONS

- **Complete all parts of the project surround Nablus-City.**
- **Select the projects that are in the priory and short list according to the strategic plan.**
- **Design a proper drainage system in order to avoid acceptable future problems in the road layers.**
- **Design the thickness of the concrete walls.**

RECOMMENDATIONS

- **Prevent the placing of grafts in the street area.**

RECOMMENDATIONS

- **Check Current House Levels And Stabilize Street Levels.**

DISCUSSION

We Are Ready ..
you can Ask !!