Appendix 4

Topographic Survey

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4.1 Technical Specifications

4.1.1 Purpose

The work called for Topographic Survey under this Contract (hereinafter referred to as the Work) will be conducted as a part of the JICA Study on The Development Plan for Sewerage System and Sewage Treatment Plant for Greater Tirana in the Republic of Albania. The survey results will be used by the JICA Study Team (hereinafter referred to as "the Engineer" for the preparation of a feasibility study of the priority project identified in the Sewerage Master Plan in the Study, and will serve as the basis for the preparation of preliminary designs of major sewage facilities such as trunk sewers, a pumping station and a sewage treatment plant.

4.1.2 General Requirements

The Contractor shall comply with the following requirements in undertaking the Work.

(1) All measurements and results of the survey shall be in SI units.

(2) Locations of bench marks in the vicinity of the sites for the Work shall be confirmed by the Contractor and shall be approved by the Engineer before the commencement of the survey works in field.

(3) The Contractor shall provide temporary bench mark at the convenient location of project site.

(4) Prior to the commencement of the Work, the Contractor shall submit an Initiation Report prepared in English describing:

- List of survey and investigation equipment to be used by the Contractor
- Methods of survey and investigation to be used by the Contractor
- Work Schedule
- Staff Assignment Schedule

(5) The Contractor shall provide, and therefore shall include the associated costs in his proposal, all survey equipment, personnel, transportation and others required to complete the Work.

(6) The Contractor shall not commence the Work in field without receiving a written Notice to Proceed from the Engineer.

(7) Drawings shall be prepared using AUTOCAD latest release. Drawings and reports to be submitted by the Contractor shall, unless otherwise specifically directed by the Engineer, be sized as follows:

- All drawings; One (1) sets of A 1 size and two (2) sets of A3 size, including one set of files with compact disks.
- All reports; Two (2) sets of A4

(8) The progress of the Work shall be described in the form of a weekly report and submitted to the designated address of the Engineer by a facsimile at the end of each week throughout the tenure of this Contract.

(9) Accuracy of the survey and investigation shall be as directed by the Engineer.

4.1.3 Scope of Works

The Work comprises the following schedules:

Schedule (1): Plan Table Survey

Schedule (2): Leveling Survey

Schedule (3): Reporting

(1) Plane Table Survey

Plane table survey, with a scale of 1/10,000 with one meter contour line, shall be conducted at the following sites covering total area of 65 hectare, at the proposed sewage pumping station and the sewage treatment plant. Their locations are shown in the attached survey area location map of *Figure 4.1.1*.

- Sewage Pumping Station (PS), about two (2) hectare, including surrounding area
- Sewage Treatment Plant (STP), about 63 hectare, including surrounding area

(2) Leveling Survey

Leveling survey shall be conducted as follows:

1) Longitudinal profile
- about 21 km for trunk sewers routes
- about 2 km for access roads for the proposed sewage treatment plant

2) Cross Section
- about 10 points along the trunk sewer routes
- about 7 points near the sites for STP and PS

3) Spot Level
- about 35 points in the proposed sites for STP and PS

Approximate survey routes along the trunk sewers are shown in the attached survey area location map of *Figure 4.1.1*. The detailed location will be instructed by the Engineer using 1: 2,500 scale maps.

The longitudinal profile survey is to measure ground level at every station markers and the specified Trunk-line points directed by the Engineer, distance at every station markers and angle at each turning point along the pipeline alignment. The cross section at the specified point is to measure 30 m wide. Along the pipeline alignment at every 100 meters in principle, the width of road or street shall be measured and features of land such as houses, buildings, sidewalks, electric poles, signboards, traffic lights, ditches etc., shall be investigated and marked with their limit.

The cross section survey shall be conducted at the specified 17 points to measure the width and depth of rivers, streams and channel structures.

The spot level is to measure the levels at specified points in the sites for STP and PS, the points set every

150 to 200 m interval.

The Contractor shall provide a temporary bench mark at the convenient location(s) under the direction of the Engineer. The temporary bench mark shall be fixed into the ground with durable materials as approved to avoid any movement and loss.

(3) Reporting

The Contractor shall prepare and submit the drawings with the following scales upon the completion of field survey.

1) Plane Table Survey

- Plan ; 1 / 1,000
  with one meter contour line

2) Leveling Survey

- Longitudinal profile and Spot level :
  Horizontal ; 1 / 2,500
  Vertical ; 1 / 100
- Cross Section ;
  Horizontal ; 1 / 500
  Vertical ; 1 / 100

As mentioned, the drawings of the plans shall present range of road or street, houses, rivers/streams/watercourses, factories, concrete shelters, buildings, and any features of land use at the proposed sites for PS and STP and along the routes of trunk sewers.

The drawings shall be printed out and digital files of drawings with format of AUTOCAD latest release shall be submitted. Font size of information and notes in the drawings shall be readable when the drawings are printed out in A4 size.

In addition to the above drawings, the Contractor shall submit all survey data including field notes, photographs of site survey, others obtained during field surveys.

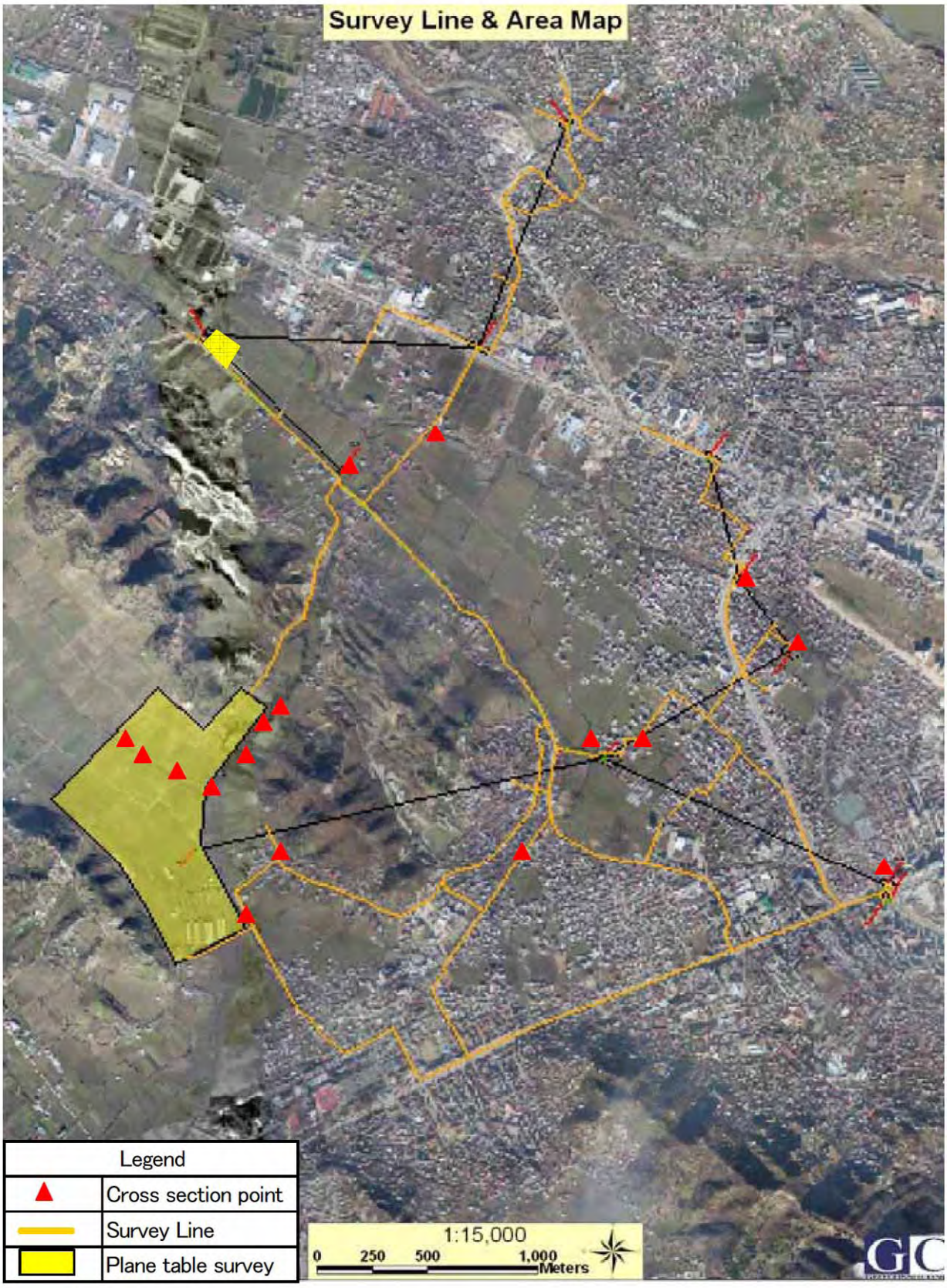


Figure 4.1.1 Locations of Topographic Survey

4.2 Result of Topographic Survey

Report

About the Implementation of Work according to the contract:

„THE STUDY
ON THE DEVELOPMENT PLAN FOR SEWERAGE SYSTEM AND SEWAGE TREATMENT PLANT FOR GREATER TIRANA IN THE REPUBLIC OF ALBANIA "

A- The work on the site

After signing the contract on march, 6th, 2006 started the work to execute it. For this is worked as following:

Firstly, in the presence of the engineer it is done the recognition of the area where we were informed about the volume of the work and positively with:

1. The sector where the pumping station is projected to be build
2. The sector where the sewage treatment plant is projected to be build
3. The section where the sewerage system is going to be placed
4. Some of the places where the Spot Level is going to be placed
5. Some of the places where the cross section is going to be placed

The Recognition is done based on the maps which are built at the scale 1:25 000.

Secondly, waiting for the improvement of the weather the work on the site started on March, 16th, 2006. At the plan it was predicted the definition of coordinates of three fix points using GPS. But because of the bad weather the clouds blocked the sight of the four satellites which are necessary to determinate the coordinates of the points.

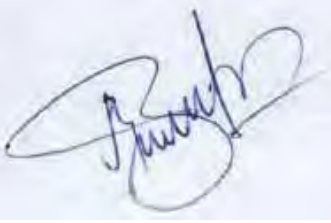
Under these conditions because we wonted to have no delay to start with work we have determinate these points' using the plane coordinates of five bunkers which are known from the digital model that we had.

We have determined three fix points in this way, because we are convinced that this is right and we might start with work. In this way we have determinate the coordinate Z of one bench mark too.

Thirdly, we have worked in two groups. The first one has made the measurements for the determinate all fix points in the whole area and all coordinates (X,Y,Z) for the points in the longitudinal profiles (approx. 23 km long). This group has worked with total station Leica TCR 407 because with it we might realize the necessary Accuracy.

The second group has made the measurements for the survey on:

a) the pumping station area
b) the sewerage treatment plant area



c) the places where the Cross sections is going to be build

This group had at one disposal total station from Nikon 310. Using this Instrument it is ensured the necessary Accuracy during the measurements in accordance with the scale of graphics.

The first group has used the stake out-mode at the building of the longitude Profiles using the coordinates derived from digital ground model that we had. The distance between the points is derived from the situation of the terrain. It is to notice that it is lesser as 100 m, which is specified in the contract, because there were a lot of feature on the terrain that are considered.

The second group has used the survey- mode to take all points, which covered for all the feature of the terrains both on the areas and the cross sections.

The work on the site has taken a long time from 4 weeks. There were also interruptions because the weather was a bed one.
Before the measurements is began with the building of the graphics. For that are used all sketches and notices, which are done on the site.

B- Graphics

Graphics have taken a long time from 2 weeks. Based on the technical specifications of the contract it is selected the CAD-program Land Development 2004 to build all graphics. All the measurements are transferred to the program as text file. After this it is processing as fellow:

1. All points are grouped with reference to relief and situation
2. It is transferred to the layers
3. It is procedure with interpolation
4. It is annotated with text as name and scale
5. It is omitted with legend

After the build of graphics it is started with Plotter of products, based on the requirements of the contract for the scale.

C- The Problems, which are resulted at the implementation of the contract :

A- By the measurements for build of the plan for the pumping station and sewerage treatment plant.

1. Where the terrain was uniform aren't surveyed profusely points for the relief.
2. Where were situation which as buildings or things like that are surveyed all necessary points to give a representative and fullness picture of this situation.

B- By the measurements for build of longitudinal profiles

1. Profile 5 (reference to graphics)

   1.1 Bench marks no. 38/45,48/52 and 48/55 are surveyed at the foot of an enclosure because the line was inside of the enclosure.

   1.2 The distance between bench marks 6/9 and 6/7 is c.155 m because the survey of in between points was impossible.

2. Profile 8

   1.1 The survey Point No3 is surveyed thereon a dump.

   1.2 Based on the photo for investigation are surveyed the points 1 and 2 respectively a manhole and the mouth of e channel in the river of Lana.

3. Profile 10

   1.1 Bench marks no. 88/02,80/01,88/05 and 88/09 are surveyed at the foot of an enclosure because the line was inside of the enclosure.

4. Profile 11

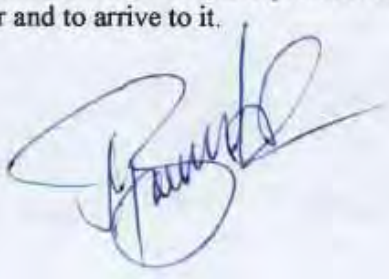
   1.1 Idem for bench marks 8/01 and No. 5-3

5. Profile 16

   1.1 Bench marks No.9, 3/15,3/16,3/17,3,18 are surveyed on the pavement because they are placed inside of a private area

6. Profili 19

   1.1 The bench mark no. 3/70 is definite using the interpolation because it was impossible to pass the river and to arrive to it.



1.2 The bench mark 3/81 ist surveyed at the foundation of a bridge.

7. Profili 22

1.1 Bench mark No8 is not placed because was inside of a building area. That is the reason of the change of the location for the profile.

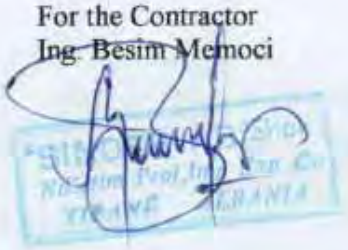
D. By the building of the Cross Section

a. At the C- 4-cross section is not surveyed its projected location because it was placed on a building area. Its real location is charted on the graphics.

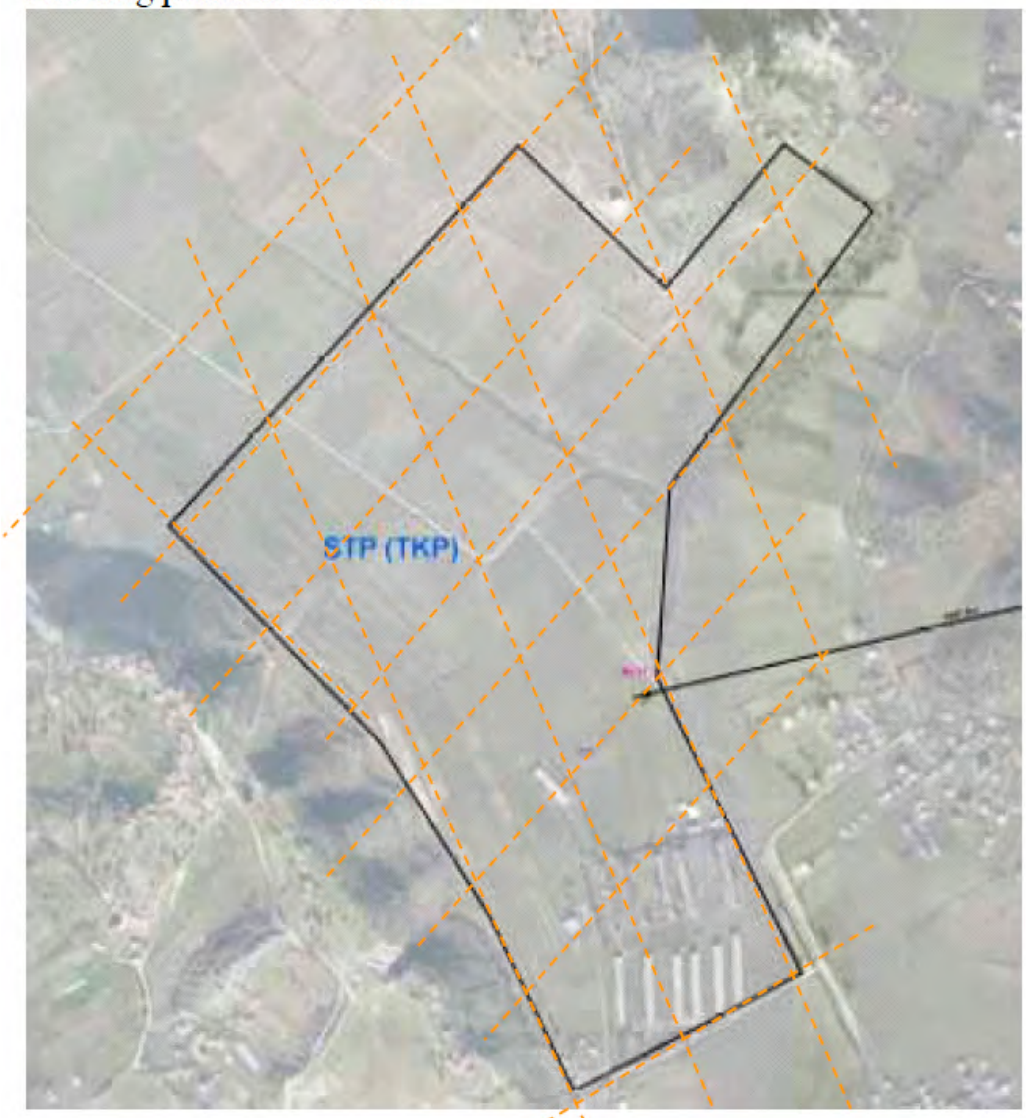
Inventory:

1.Report
2.The plan of pumping station Size A3. Scale 1:1000 Piece 1
3.The plan of sewerage treatment plant. Size A1.
Scale 1:1000 Piece 4
4.Longitudinal profile Scale
H 1:2500
V 1:100
Size A1
Piece 9
5.Cross Section, Scale
H 1:500
V 1:100
Size A3
Piece 4
6.The plan of longitudinal Profiles , Scale 1:2500
Size A1
Piece 6

For the Contractor
Ing. Besim Memoci



Leveling points at STP site



Leveling points in PS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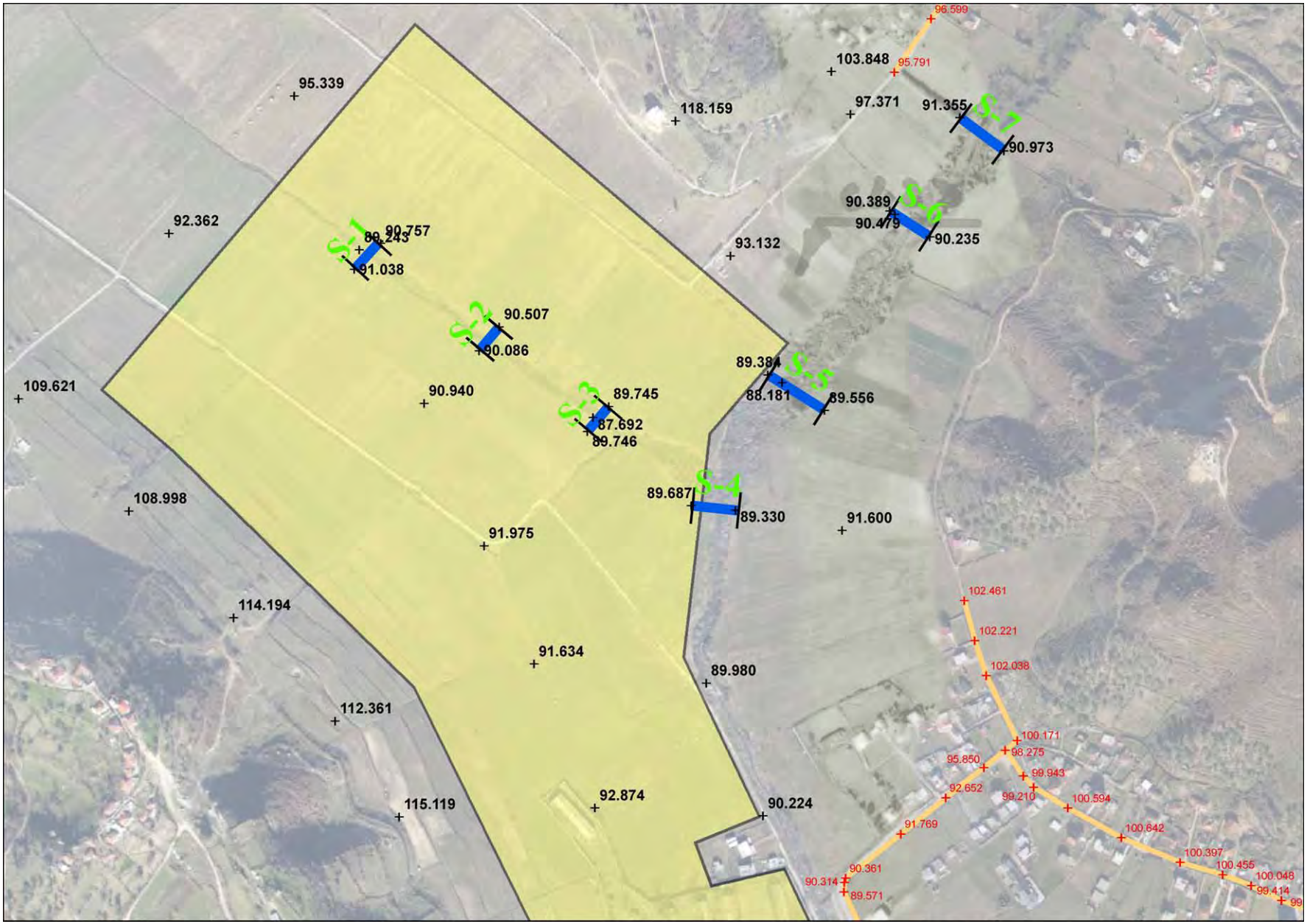
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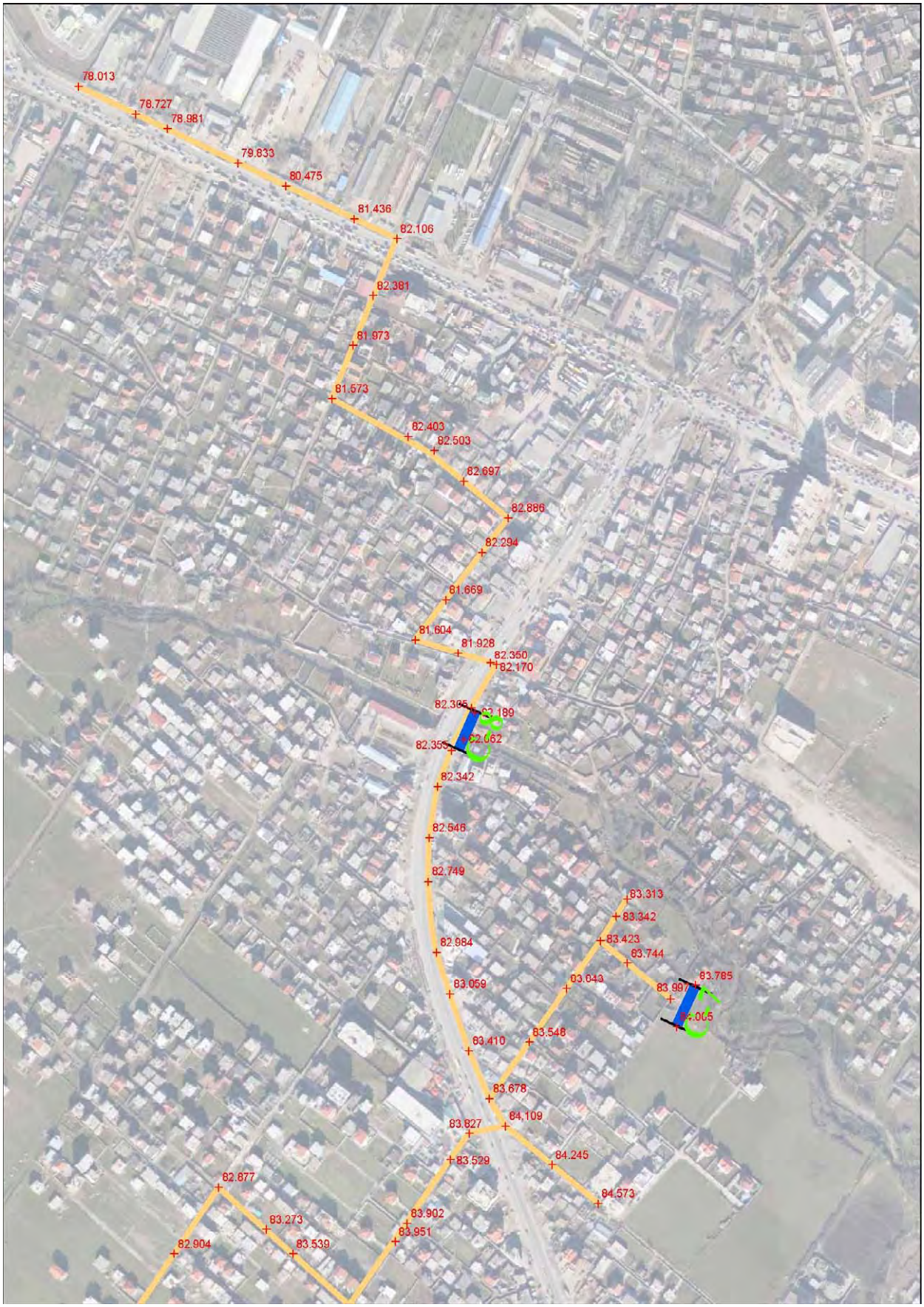
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