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LAND IMPROVEMENT PROJECT DESIGN IN 3D

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REAALPROJEKT OÜ fields of activity:

- DESIGN WORK
  - Designing streets and roads
  - Railway design
  - Designing bridges and tunnels
  - Designing water and sewerage utility lines
  - Hydraulic engineering
  - Other utility works
- EXPERT ASSESSMENTS AND SUPERVISION
- GEODETIC WORKS
  - Topographic works and construction site geodesy
  - Land readjustment work
- GEOTECHNICAL INVESTIGATIONS
- 3D SURVEYS
  - Laser scanning
  - Aerial surveys using drones
  - Underwater inspections

- ***INFRASTRUCTURE OBJECT 3D DESIGN (three-dimensional design)***
  - *Have been used in Estonia about 15 years*
  - *Changed mainly in detail and working practices*
  - *Significantly increased interactivity and automated information exchange*
  - *Areas of use:*
    - *Roads*
    - *Land improvement (amelioration)*
    - *Facilities (culverts, bridges, viaducts)*
    - *Water and sewerage utility pipelines*
  - *Due to inefficiency and lack of real need, today there is no use for cable lines designing.*

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- ***THEORETICAL BASE IS SAME, CHANGED IS TECHNICAL WORKING TECHNIQUES (USE OF COMPUTER)***

- ***BASIC COMPONENTS***
  - ***Plan solution (alignments)***
  - ***Solution with elevations (longitudinal profile)***
  - ***Typical cross-sections***

- ***COMBINING BASE COMPONENTS HELPS TO PROVIDE MODELS FOR DIFFERENT PROJECT ELEMENTS***

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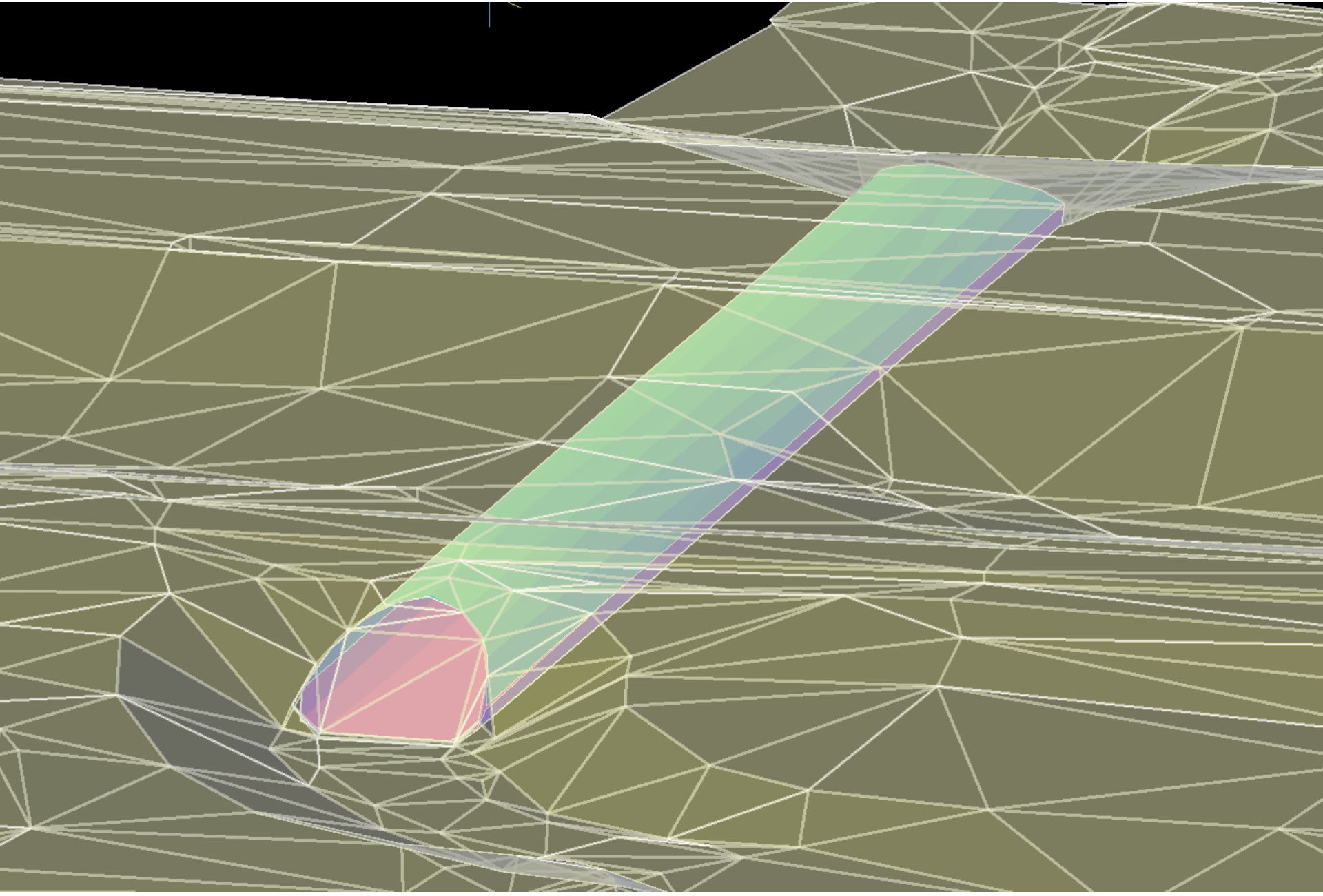
Example: DTM model in topographic plan and culvert



- ***NB! INPUT FOR 3D DESIGN***
  - ***CORRECT and DETAILED topographic plan from existing situation***
  - ***Topographic plan does not automatically mean correct DTM***
  - ***80-90% of the topographic plans today is not suitable for compilation of the DTM model and design***
  - ***The Financial savings from basic research will be leverage easily later in construction cost***
  - ***NB! 99% of Clients has no skills and ability to check DTM quality***

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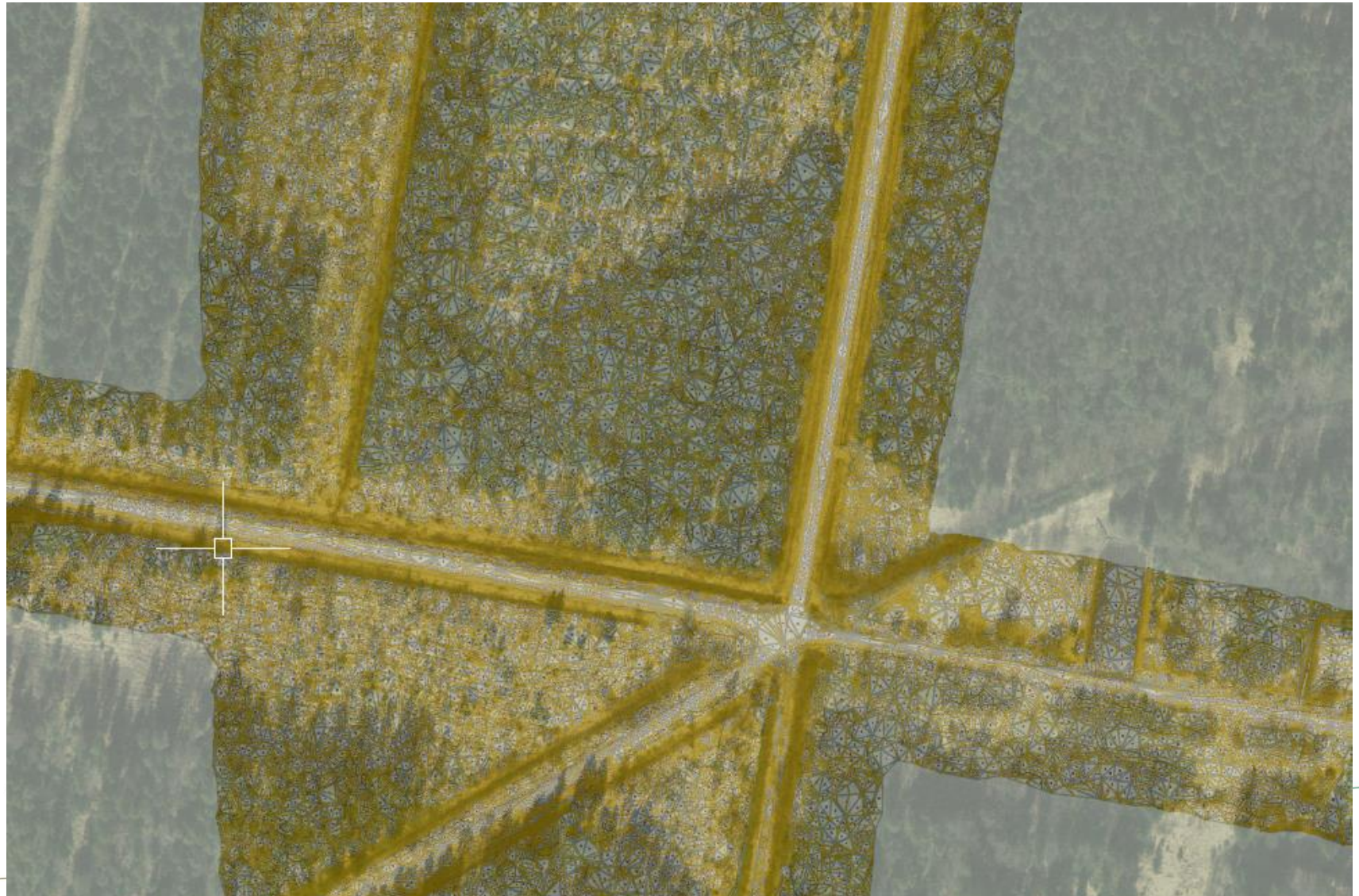
Topographic work process for the project:

- ***Aerial surveys using drones – a surface model is achieved by photogrammetry. Enables to survey large areas quickly and with low costs.***
- ***An alternative to drone is aerial survey data provided by the Land Board.***



Aerial surveys using drones

- Drone, UAV (Unmanned Aerial Vehicle), UAS (Unmanned Aerial System):
  - Multirotor complex
  - Airplane (fixed wing)
- Advantages:
  - Low costs
  - Flexibility
  - Effective
- Survey method:
  - Producing high resolution orthophotos
  - Laserscan (Lidar)

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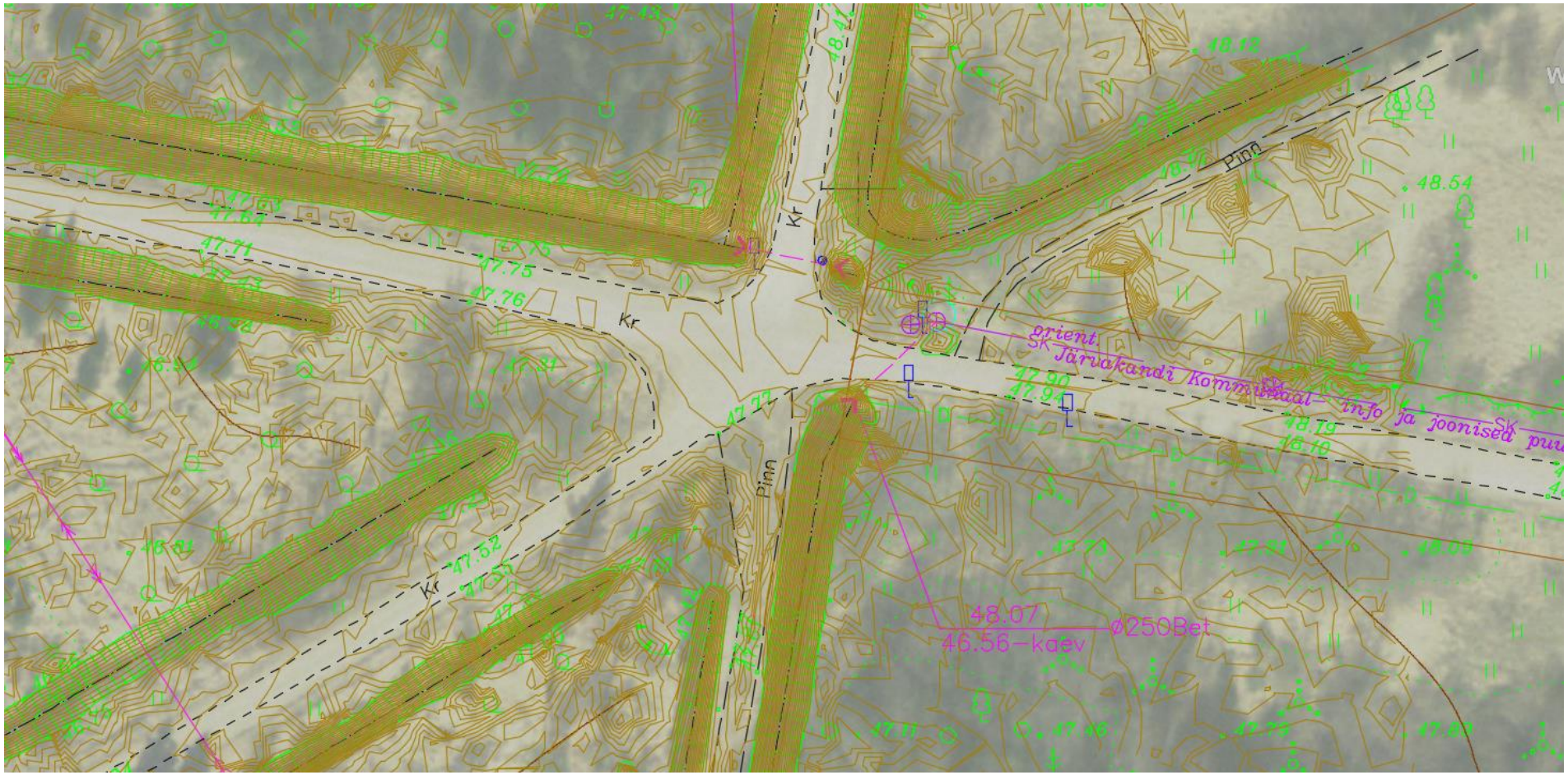
3D surface model from orthophotos

Topographic work process for the project:

- ***3D surface model.***



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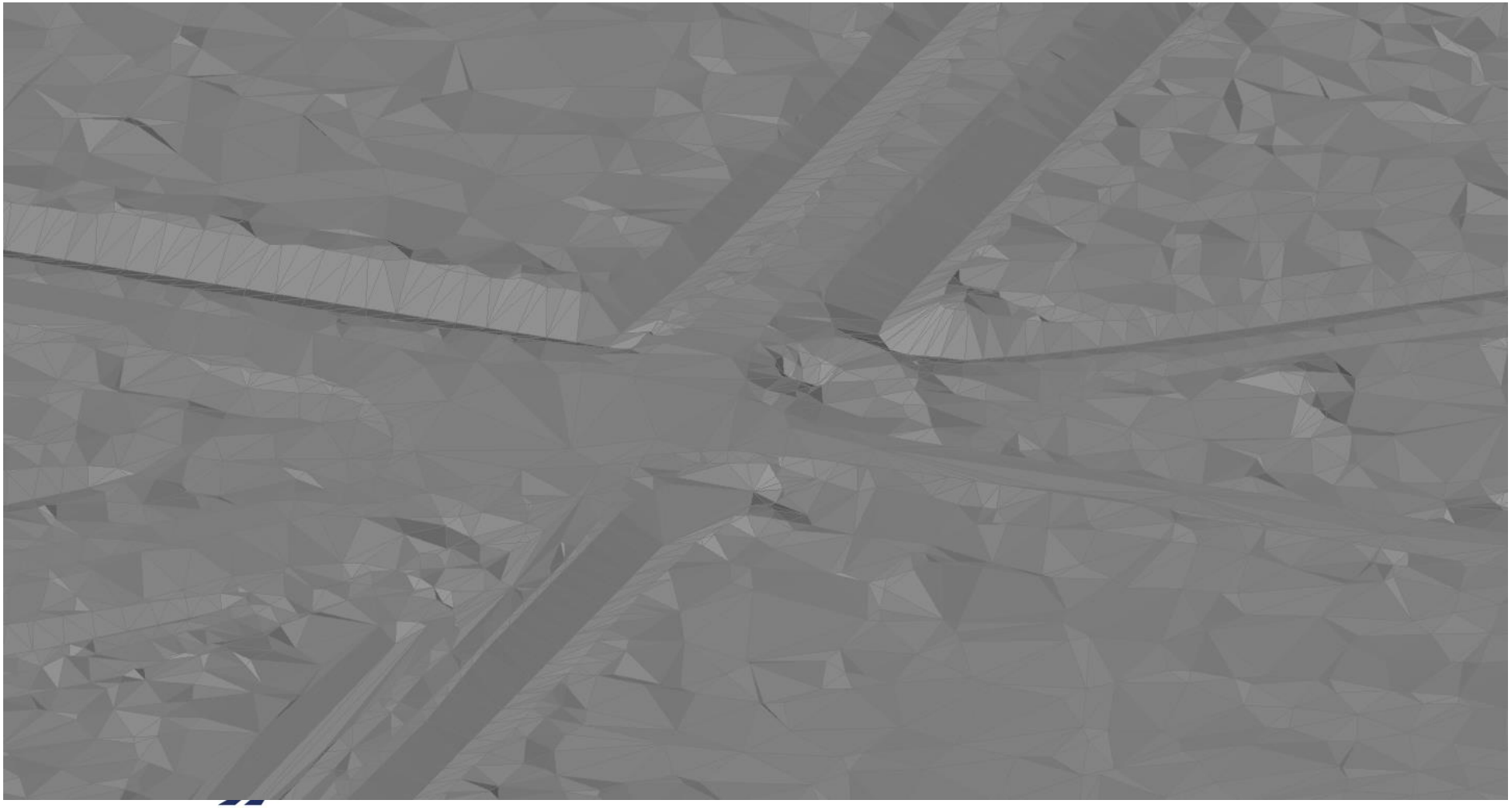
Topographic work process for the project:

- *3D view of the surface model.*



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Topographic work process for the project:

- ***Specified measurements on the site – utility networks (underground, terrestrial) and ditches, culverts, roads.***

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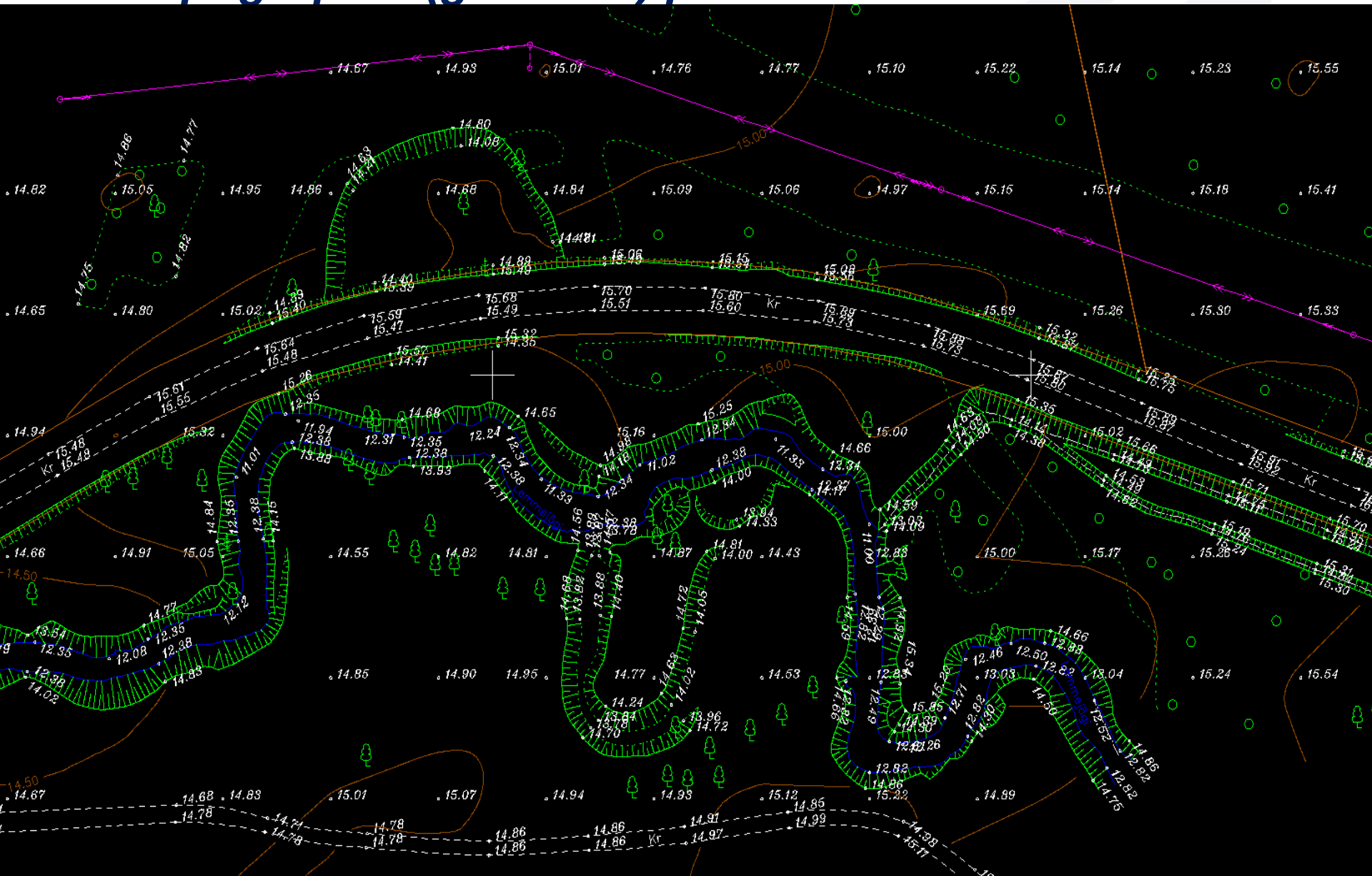
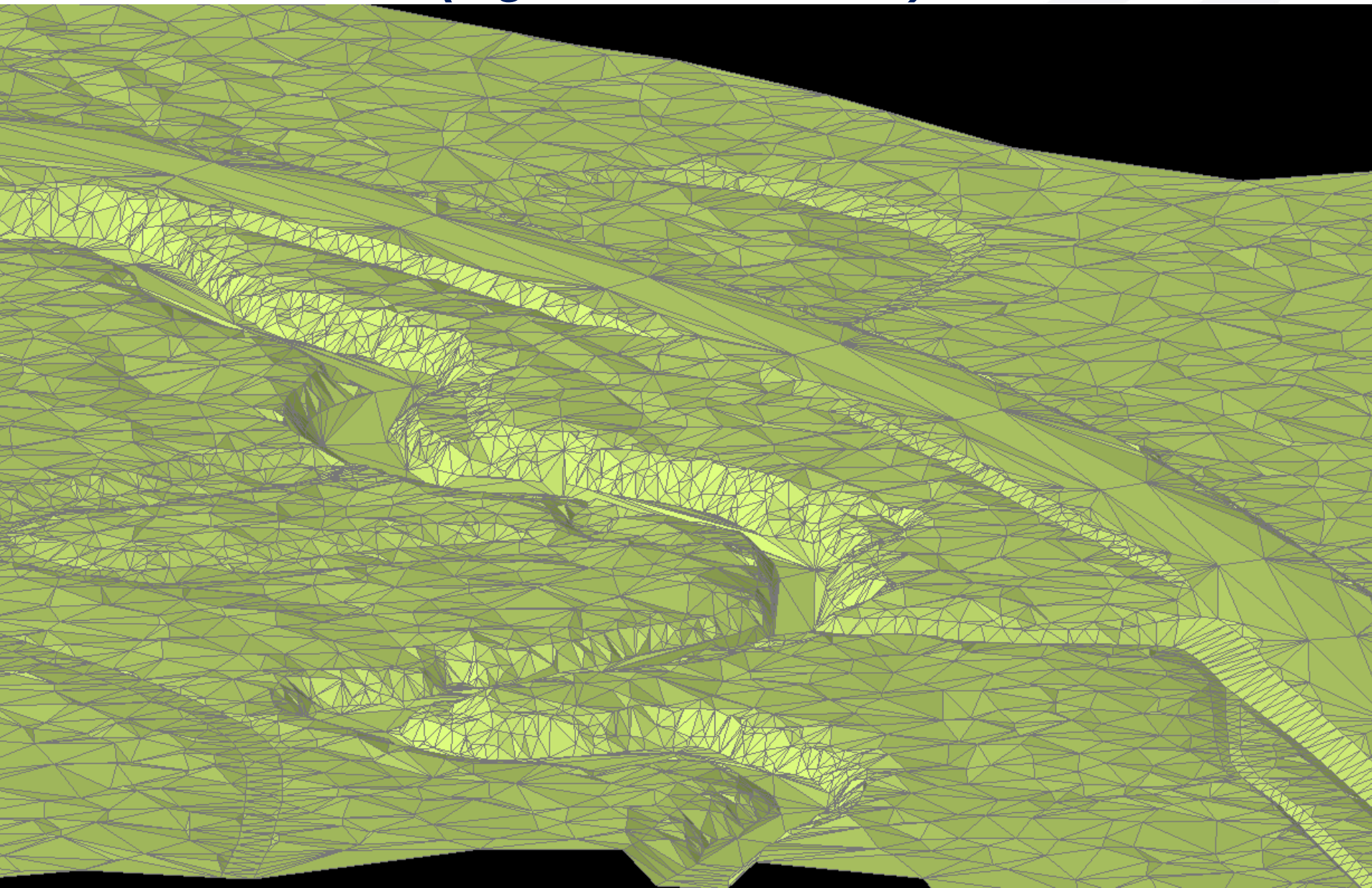
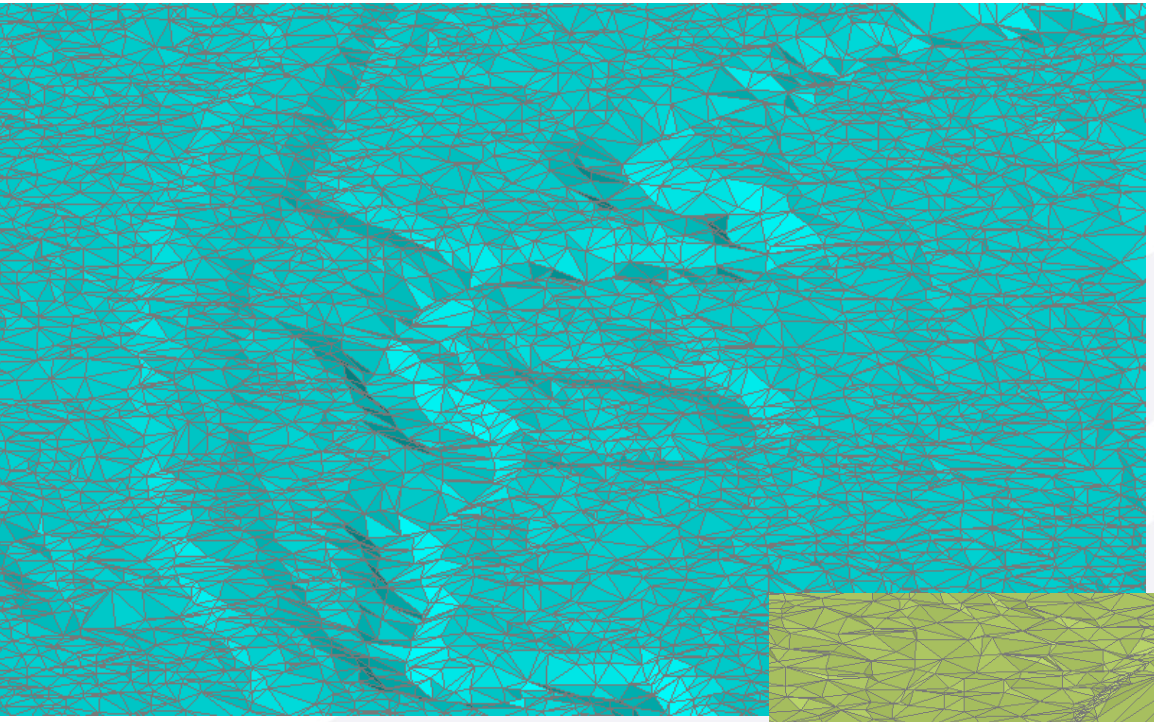
- ***THE FINAL RESULT***
  - ***– Topographic (geodetic) plan***

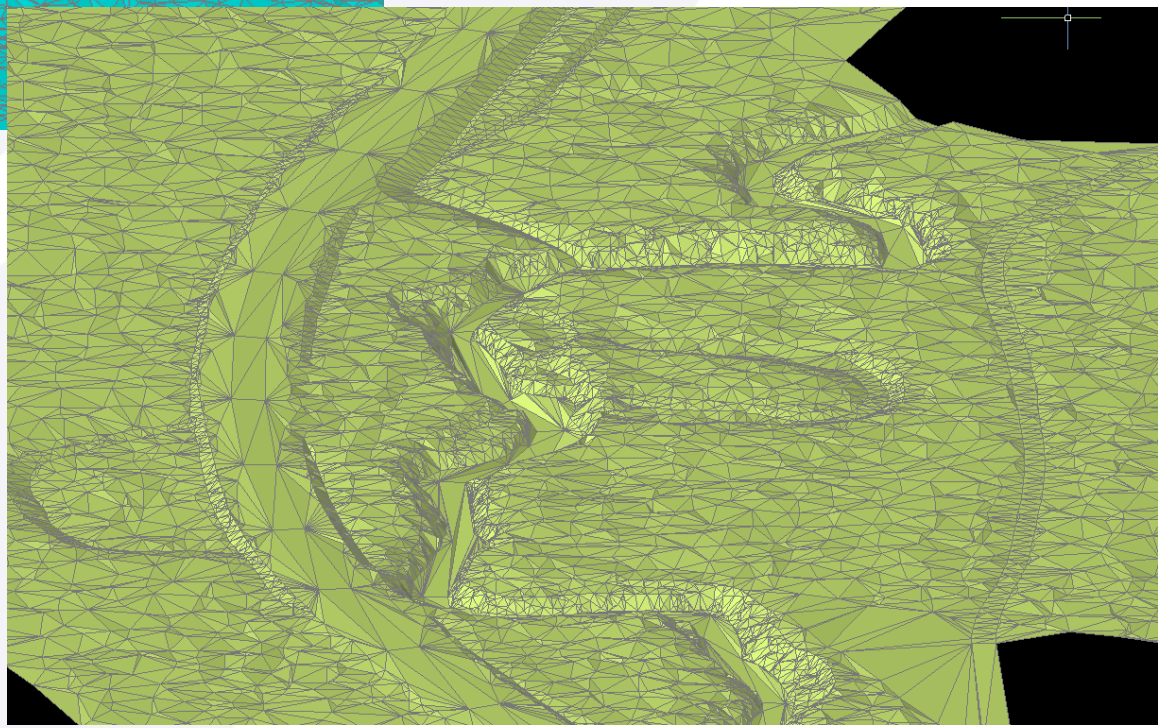


- ***THE FINAL RESULT***
  - ***Detailed DTM (digital terrain model)***

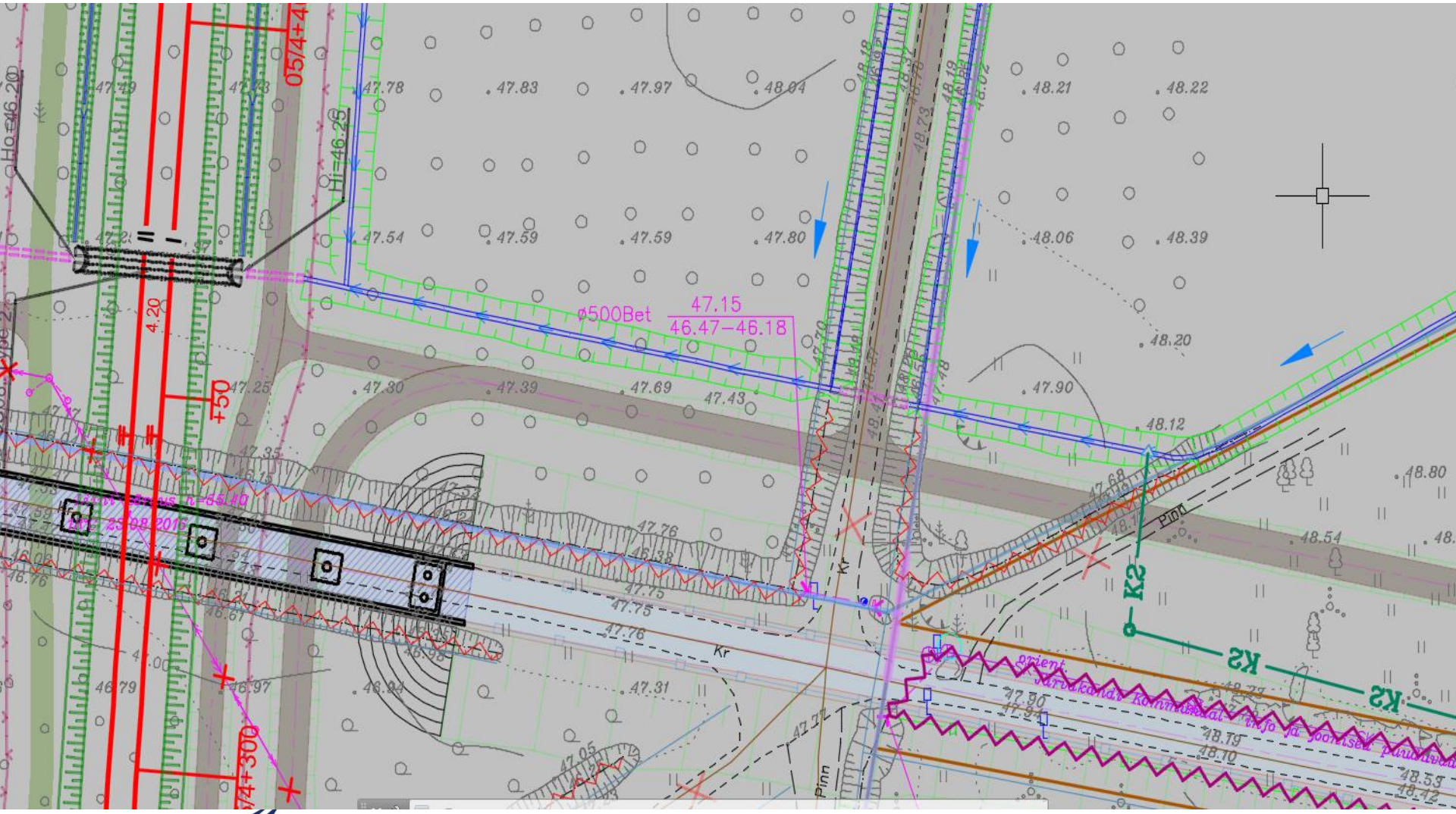


- ***MA LIDAR DTM vs FINAL TOPO DTM***





Example: PLAN (2D view)



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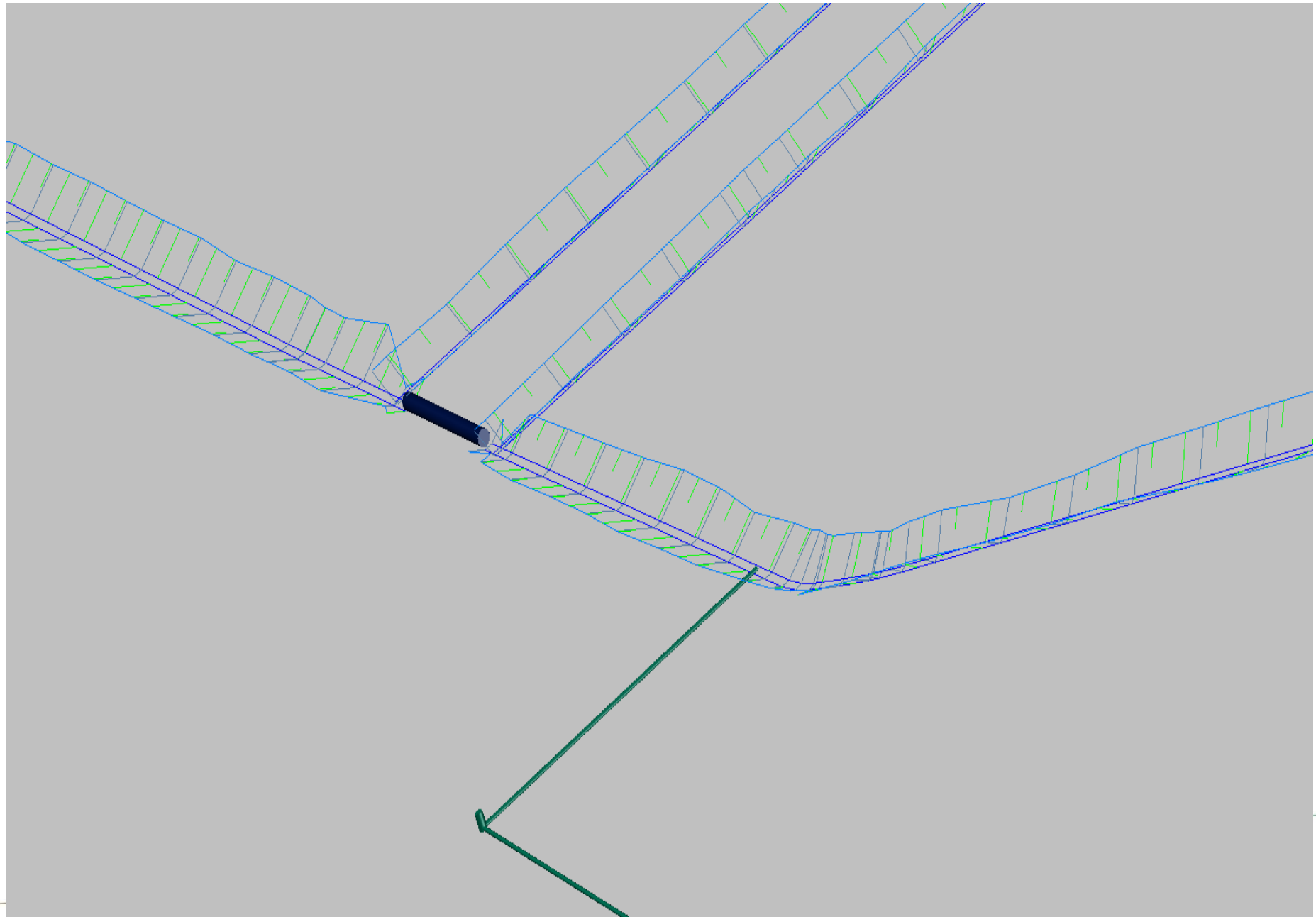
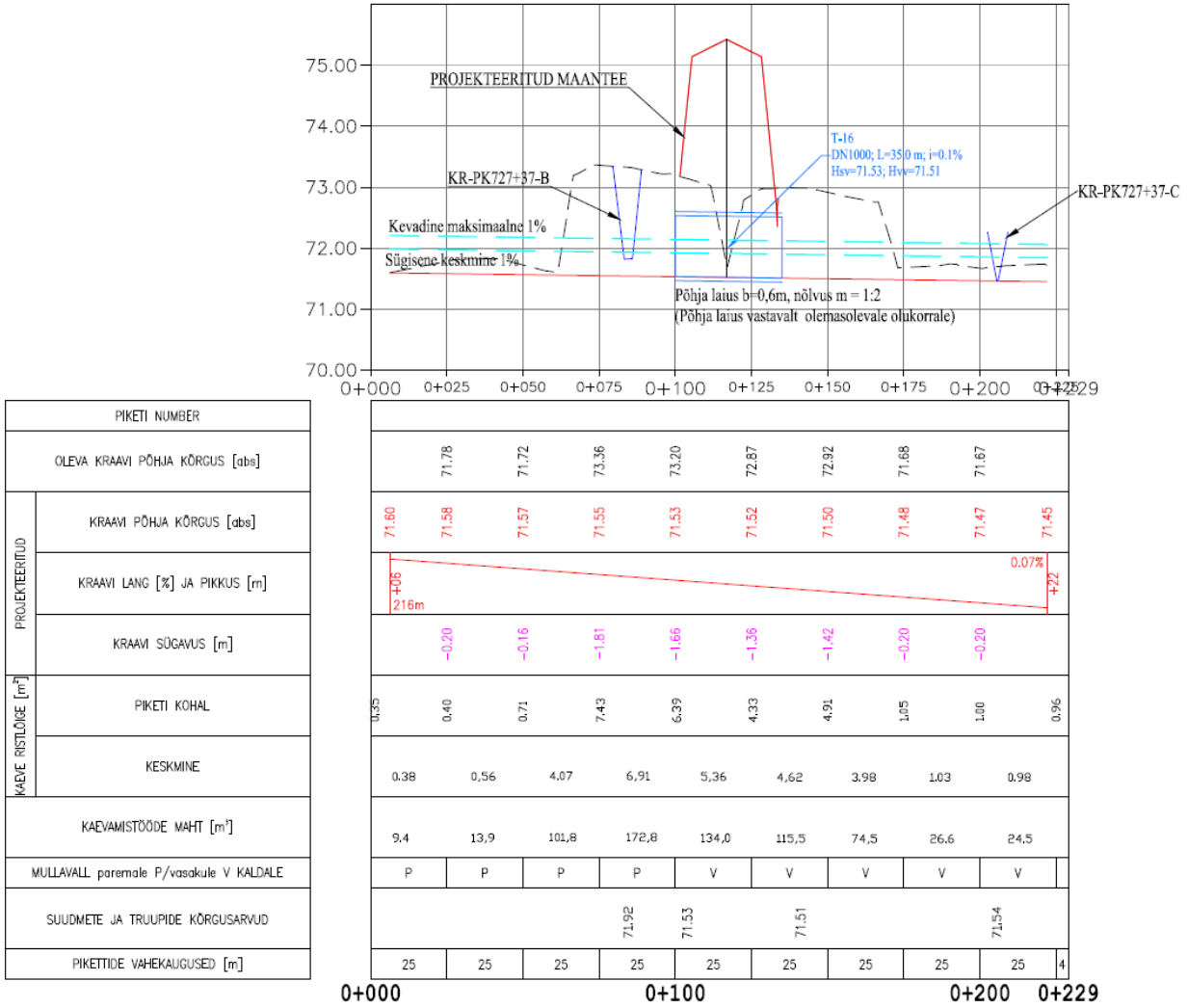
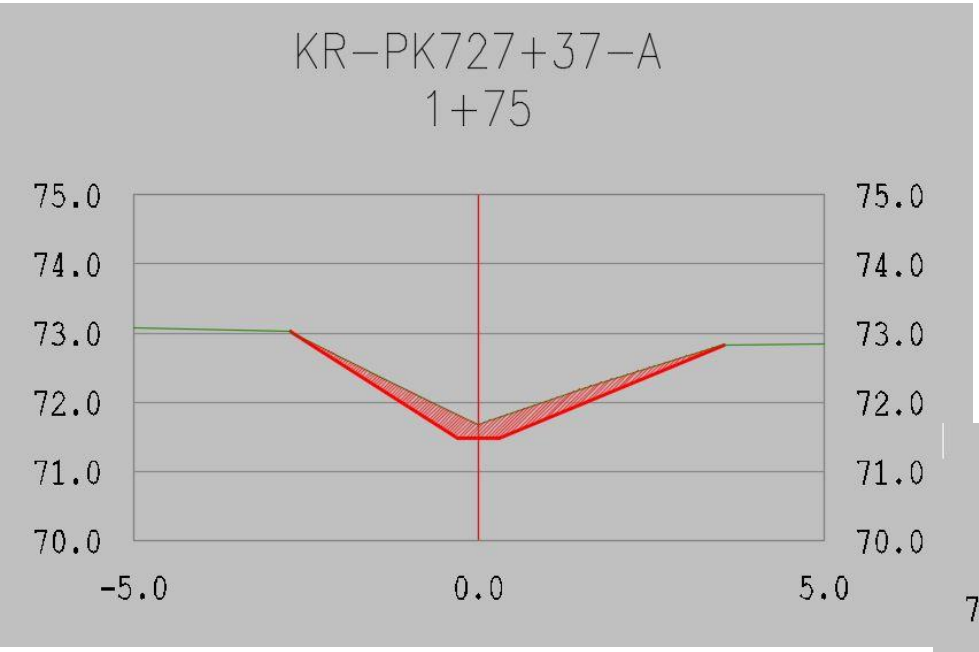
Example: DITCH AND CULVERT IN 3D MODEL



Example: LONGITUDINAL PROFILE

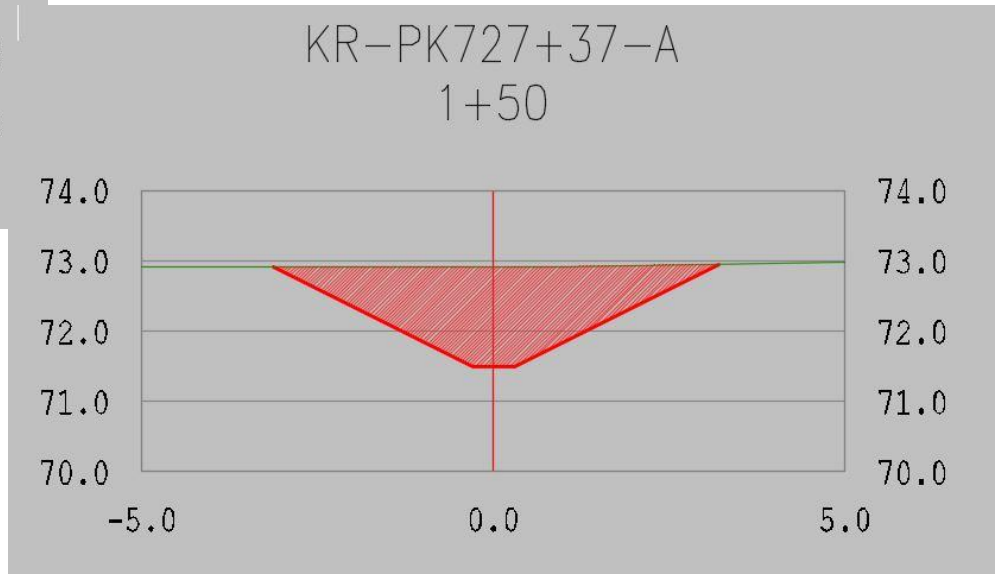


Example: VOLUME CALCULATIONS (3D model)



<= Section for existing ditch (cleaning or deepening)

Section for new ditch =>



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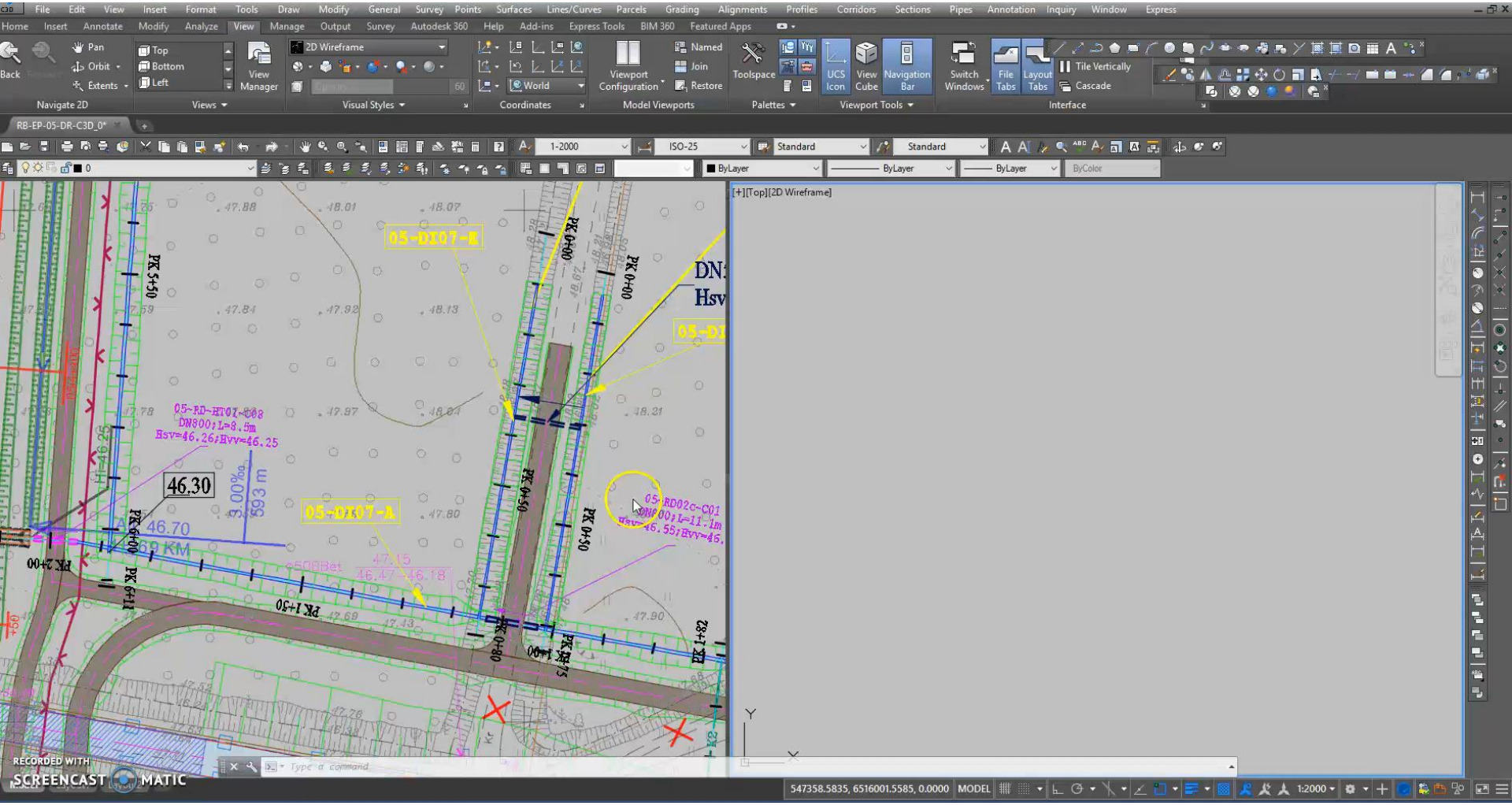

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Täname!

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