MODELLERING OG ANVENDELSE AF DRAINAGE & UTILITIES

RAMBØLL Bright ideas. Sustainable change.

AGENDA

- Presentation
- What is 3D / BIM
- Level of Development (LOD)
- DanDasGraf vs. D&U
- Examples of 3D projects
- What is Drainage & Utilities?
- Collaboration with road/rail
- Hydraulic calculation
- The future – next step
- Questions?

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PRESENTATION

- Andreas Bangsø Stokholm
- Rambøll since 2009 (RHO and Vejle) – teacher
- Department: Utility & Climate Adaptation
- Disciplin Lead, 3D CAD/BIM Rambøll Water DK
- SUE Sub SIG Bentleyuser.dk

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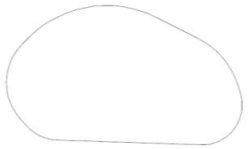
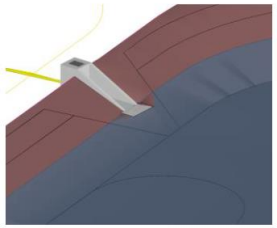
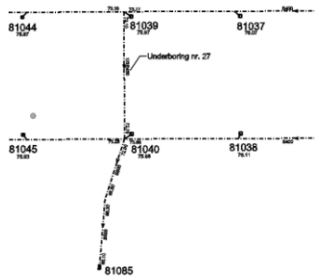
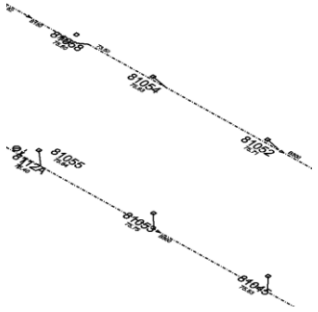
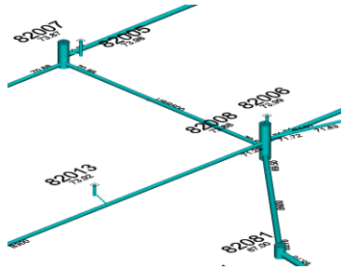
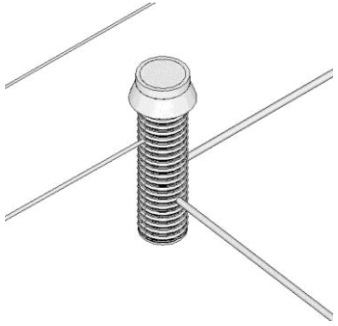
LEVEL OF DEVELOPMENT

LOD 100	LOD 200	LOD 300	LOD 325	LOD 400
LOG 100	LOG 200	LOG 300	LOG 325	LOG 400
 Basins appear as 2D shapes.	Basins appear as 3D lines indicating the top and bottum of the basin, permanent water level and maximum stowing level.	 Basins appear as 3D with correct outer geometry including slopes and surfaces. The basins must follow the requirements for stowing capacity. All 3D lines necessary to construct the basins, permanent water level and maximum stowing level is included.	 Basins appear as 3D with correct shape including slopes, surfaces and drain constructions. The basins must follow the requirements for stowing capacity. All 3D lines necessary to construct the basins, permanent water level and maximum stowing level is included.	Pending

[BDK CAD manual]

VD Modelstardard

LOD 100	LOD 200	LOD 300	LOD 325	LOD 400
LOG 100	LOG 200	LOG 300	LOG 325	LOG 400
 Drainage appears as 2D lines. Manholes appear as 2D signatures.	 Drainage appears as 3D reference lines accordring to DS 475. Manholes is indicated by a point and appears as 3D signatures for top of manhole.	 Drainage appears as 3D solids including 3D reference lines accordring to DS 475. Manholes appear as 3D solids and points indicating the center.	 Drainage appears as 3D solid pipes and manholes with gradients, dimension and the reference lines and points according to DS 475.The model includes joints.	Pending

DANDASGRAF VS D&U (2021)

Description	Dandasgraf/Multigraf	D&U (ORD)
2D	+	+
TV-inspection	+	-
Quantity Extraction	+	+
Annotation	Good	Work in progres
3D	(+) LOD300	+ LOD325
Hydraulic calculation	(+)	+
Flow calculation	-	+

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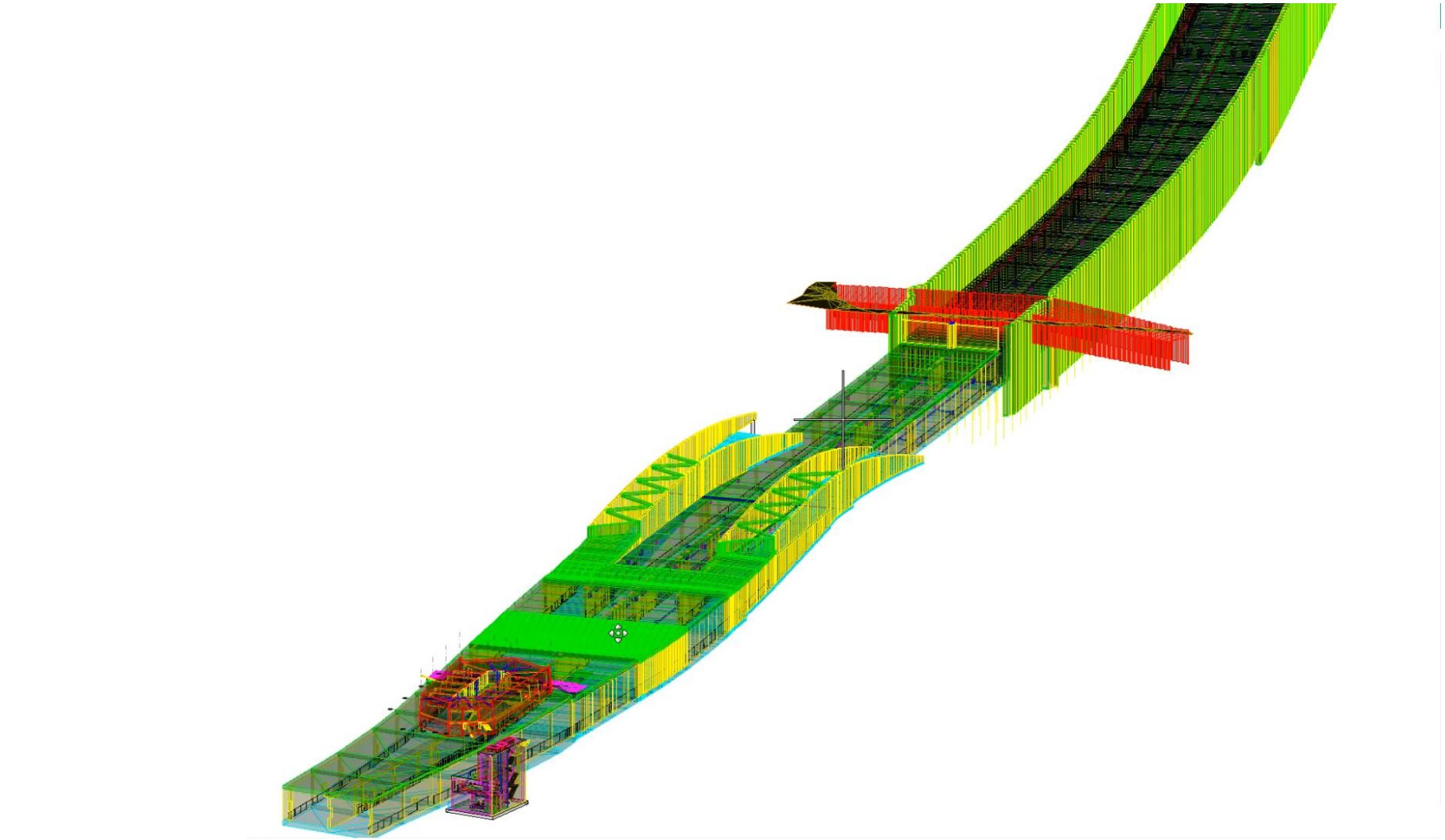
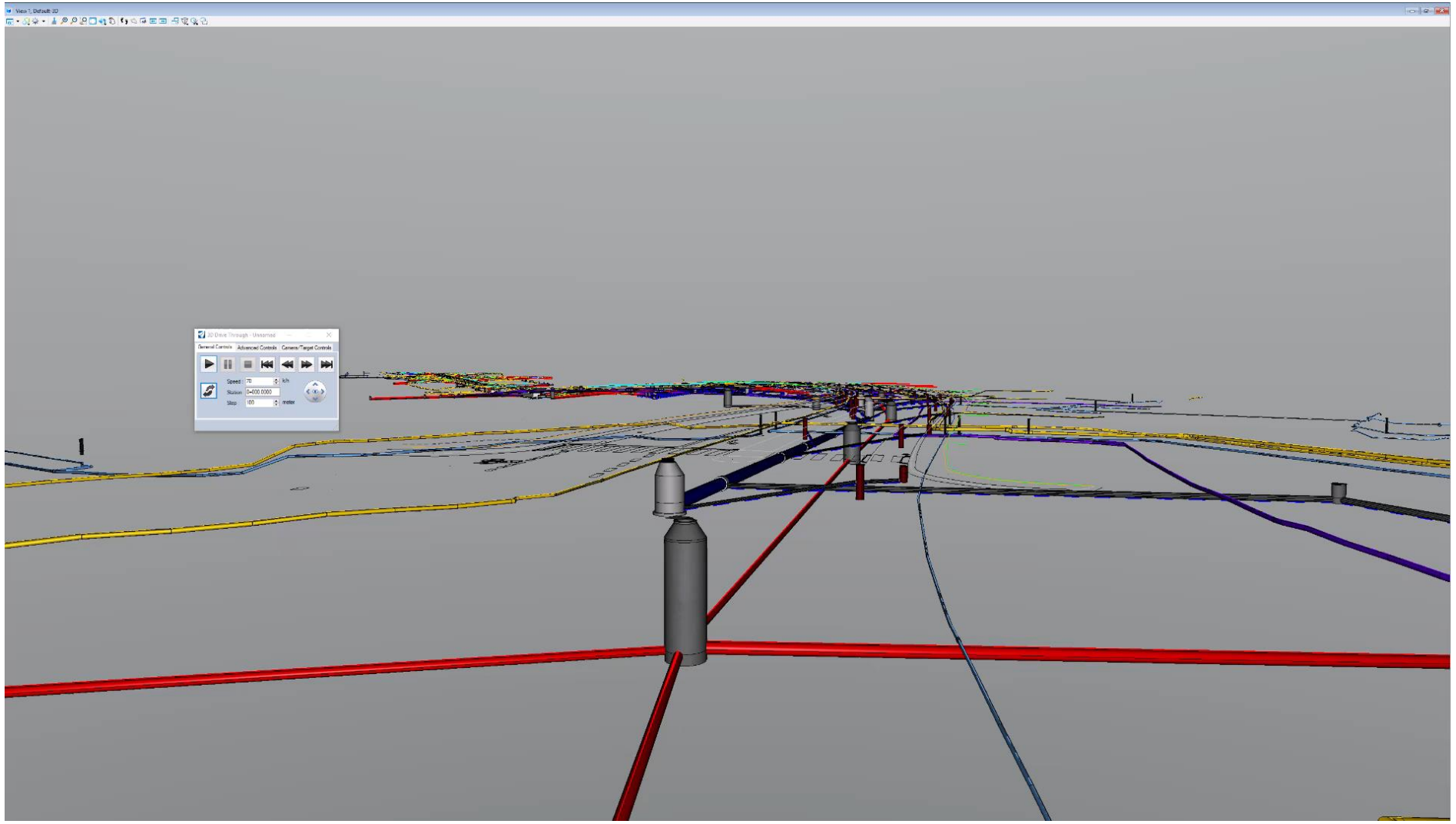
DANDASGRAF/MULTIGRAF – NORDHAVNSTUNNEL



DRAINAGE & UTILITES (CE) - SMAKKEGÅRDSVEJ



WHAT IS DRAINAGE & UTILITIES

- Dynamic 3D design tool
- Utilities (Communication, Heat, Water, Storm Water, Electricity, etc.)
- LOD - no boundaries (3D details, item types, UDX)
- Uses terrain models existing and designed
- Hydraulic calculations

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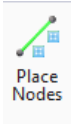
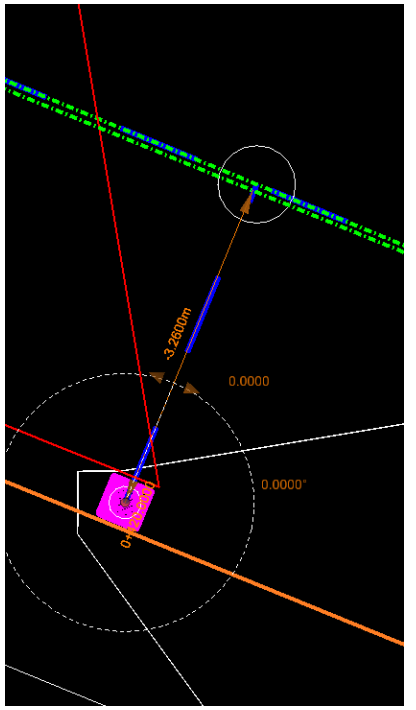
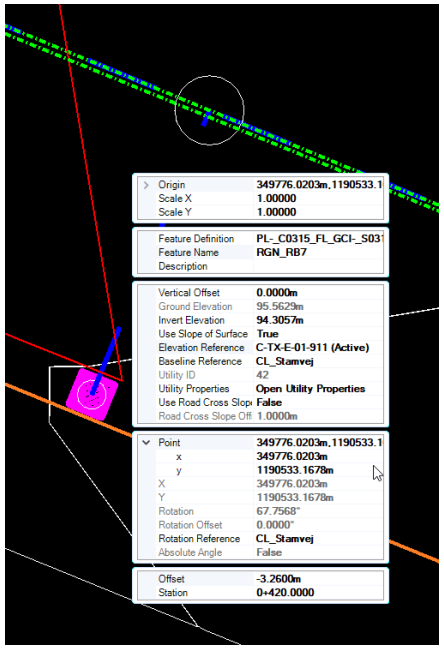
COLLABORATION WITH ROAD/RAIL

- Snap to terrain model
- Placement of node along alignment



- Placement of gully in relation to alignment (rotation, distance, station)
- Use of road surface to calculate catchment area
- Dymamic when changes occur





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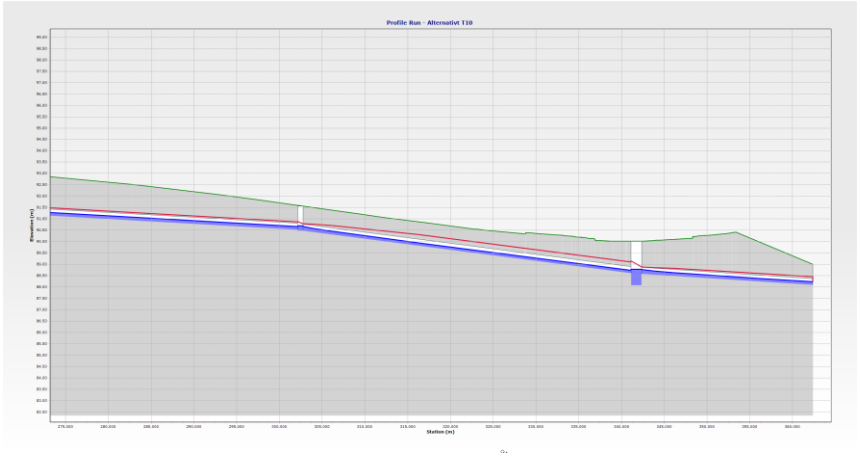
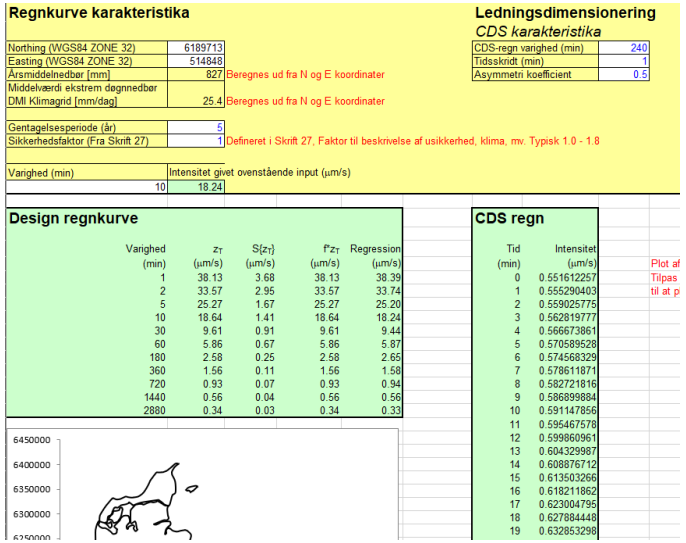
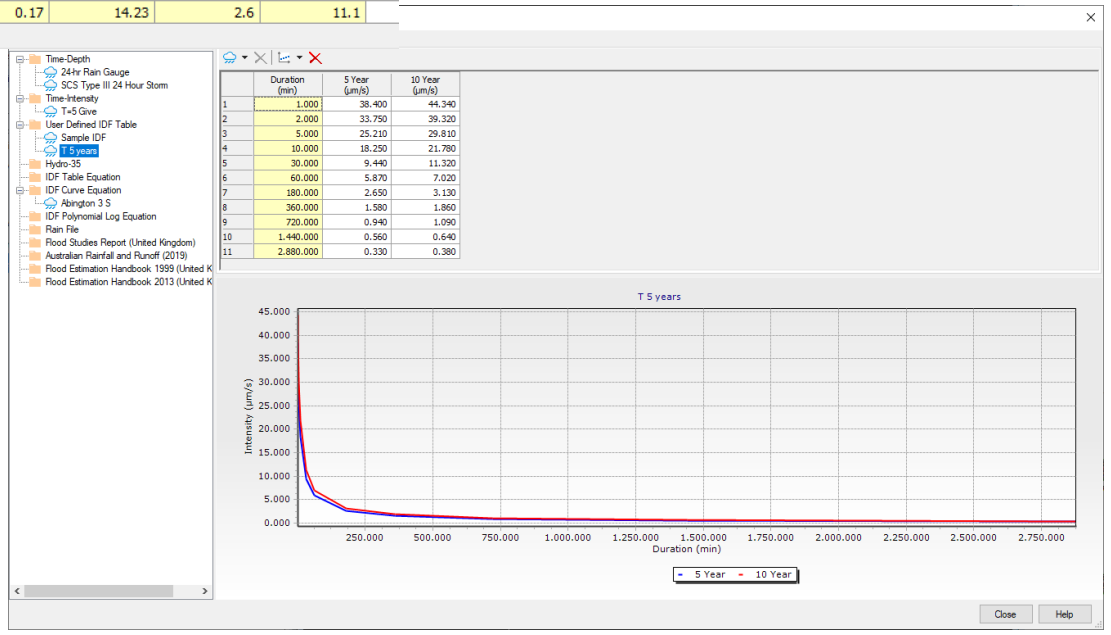
HYDRAULIC CALCULATION

- Use of regionalregnrækker 4.1.xls
- Defining catchment areas and runoff coef.
- Analyse or design the drainage system

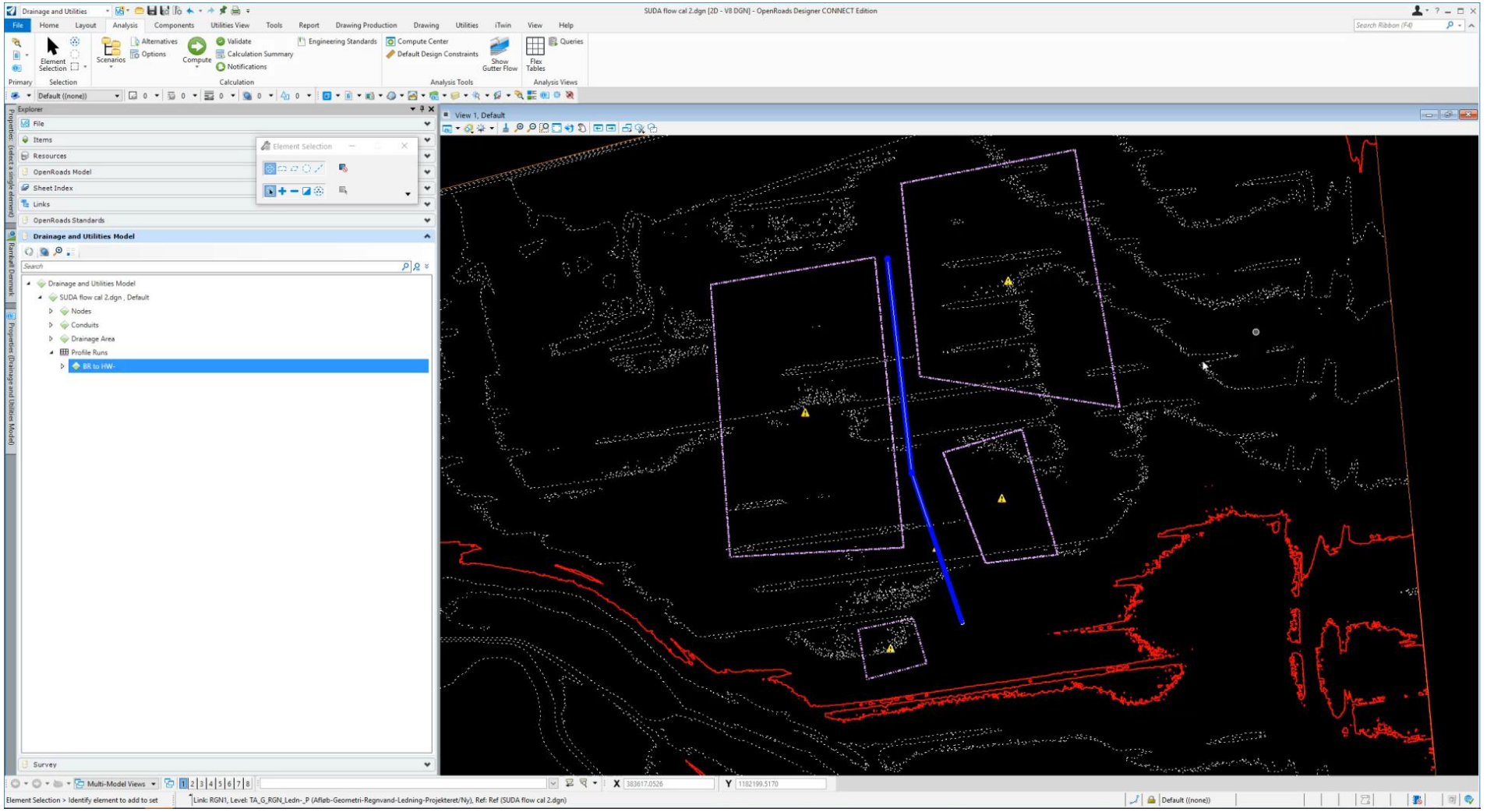


Flow (L/s)	Velocity (m/s)	Depth (Out) (m)	Capacity (Full Flow) (L/s)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)
0.00	0.00	0.05	1.231.99	0.0	0.0
0.00	0.00	0.17	3.83	0.0	(N/A)
71.05	2.00	0.15	130.67	54.4	52.6
71.05	2.70	0.12	195.68	36.3	41.7
71.05	2.08	0.15	137.90	51.5	50.9
67.45	2.30	0.15	87.33	77.2	66.0
70.68	2.16	0.17	80.40	87.9	72.7
0.37	0.75	0.17	14.23	2.6	11.1





HYDRAULIC CALCULATION



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FUTURE

- More demand for 3D models
- 3D models as design tool
- Higher LOD demand
- Multidiciplinary collaboration/ Clash detection
- 3D models at meetings
- 3D models to contractor (currently primarily basins and 3D bottom line)
- Collaboration with DanDasGraf import/export
- Hydraulic calculation (regional + CDS)

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QUESTIONS

- ???

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