

Model design and exchange in Norway Toady



Heidi Berg, Vianova Systems as

Gjønnen Subway Station, Photo: Emma Tøndel Nypan

 **VIANOVA**

New Road Department Manual: No.138 Modellgrunnlag

Requirement for basic data, models and data exchange

No.138 Modellgrunnlag

- Requirement for ordering, designing and delivering models with correct quality
- Formalize the 3D model deliverance and exchange
- Easier and better quality control and geometry check between domains
- Better quality on the calculation base material, for the contractors calculation process
- Requirements for the as-built data (model quality)
- High quality as-built information models delivered to Road data Bank for maintenance



Work group :

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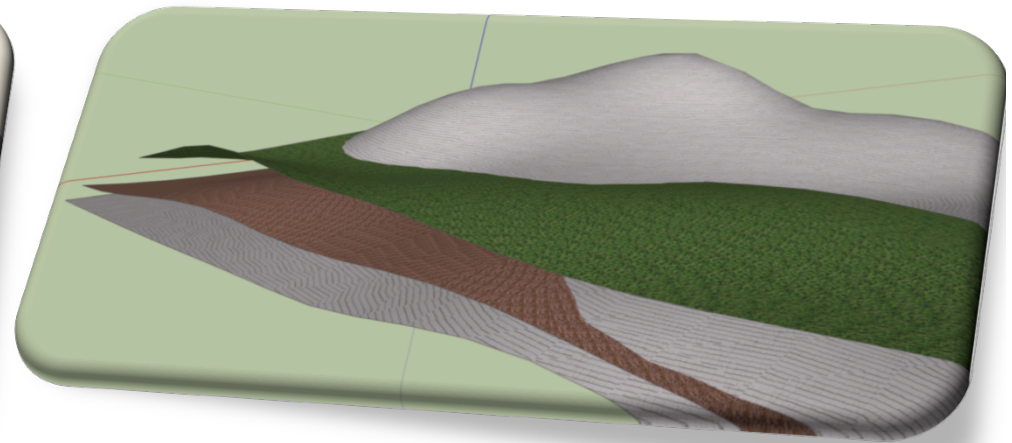
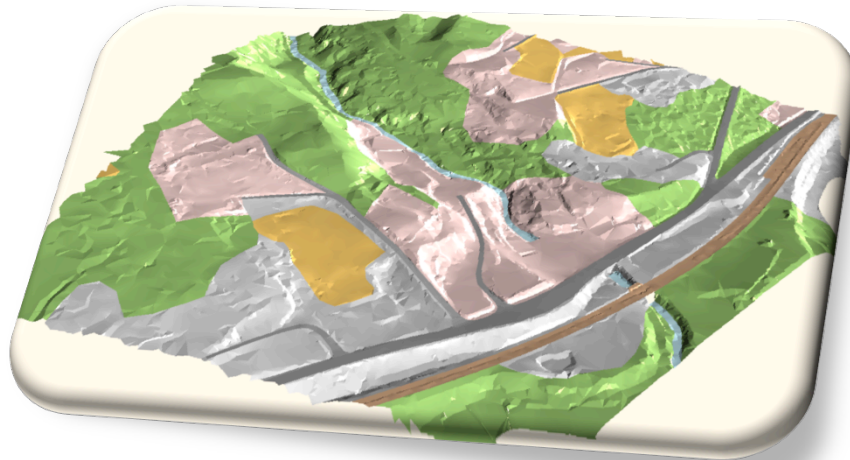
Programvareutviklere

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HB 138 – Digital Terrain Model and model of Sub-surface layers

Describes existing terrain situation for the top surface and sub/surface layers. This forms the calculation basis for all design and construction. HB 138 set higher quality requirements to the input data needed to create the DTM

Format: LandXML TIN model



HB 138 – Domain models (Road, Rail, Water & Sewer, cables etc)

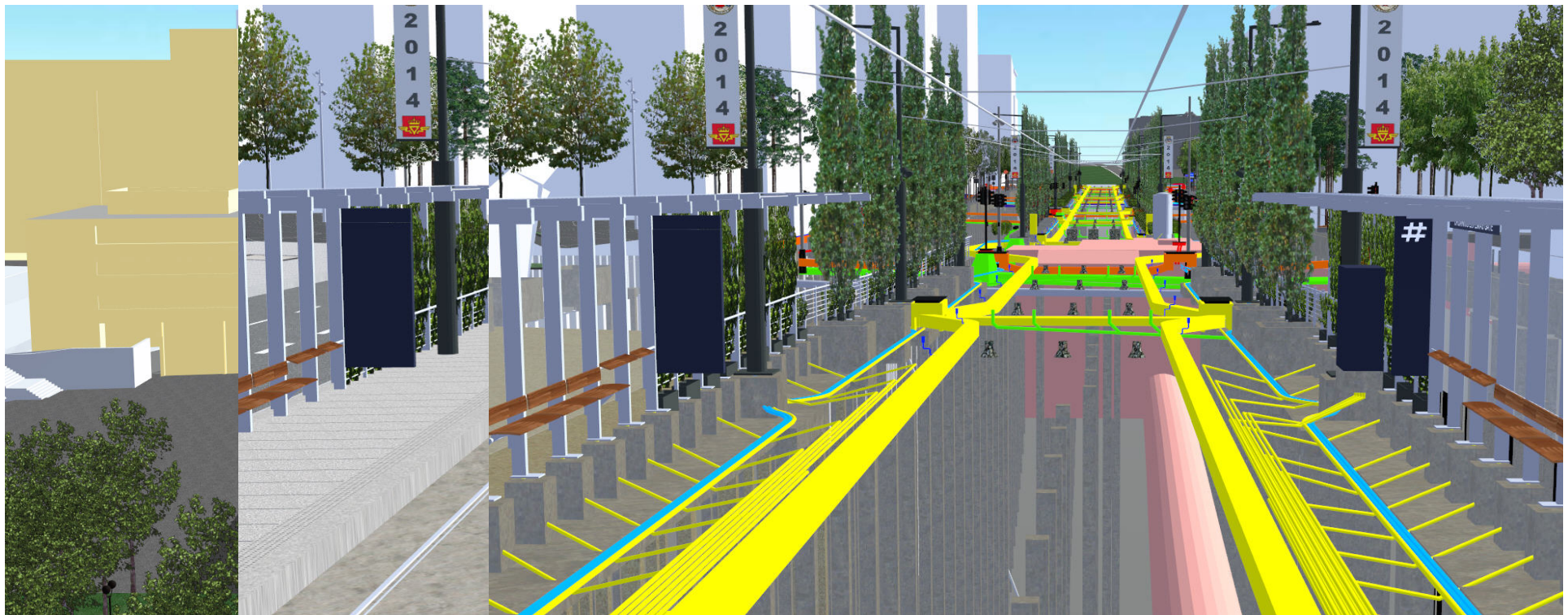
Domain models

All the different disciplines should create the 3D domain model(s) for their domain.

Ex. Road, Tunnel, Constructions etc.

The domain models should contain all 3D objects for that given domain.

Format: LandXML and in addition deliver original model format, to assure that no data get lost in conversion

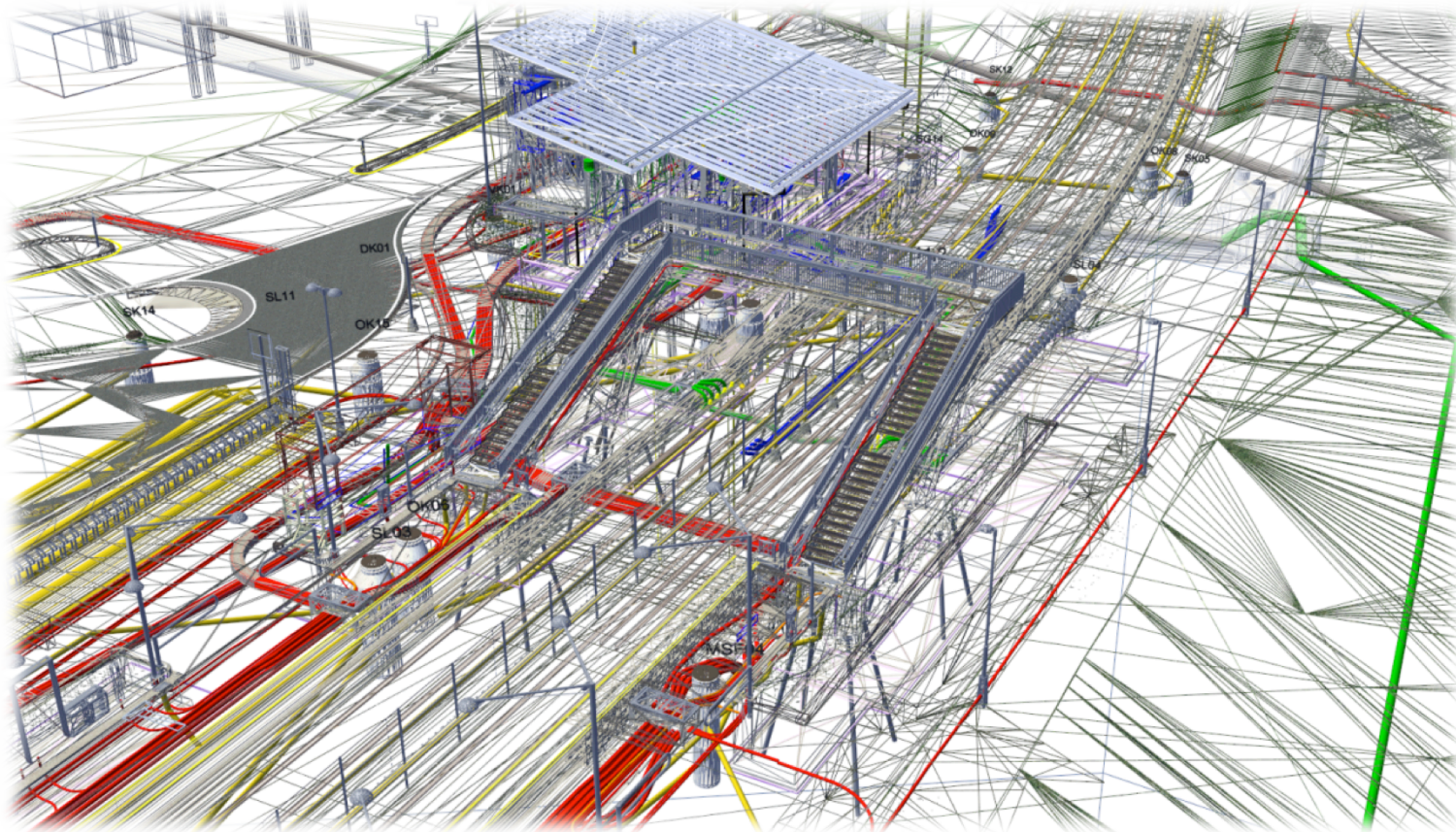


HB 138 – Require Collaboration model as part of the work flow

Collaboration model:

A collection of DTM, sub-surface models and all domain models within the same model. All data should have their correct 3D geometry and could be used directly to produce stake out data. This model should also be used to run clash detections.

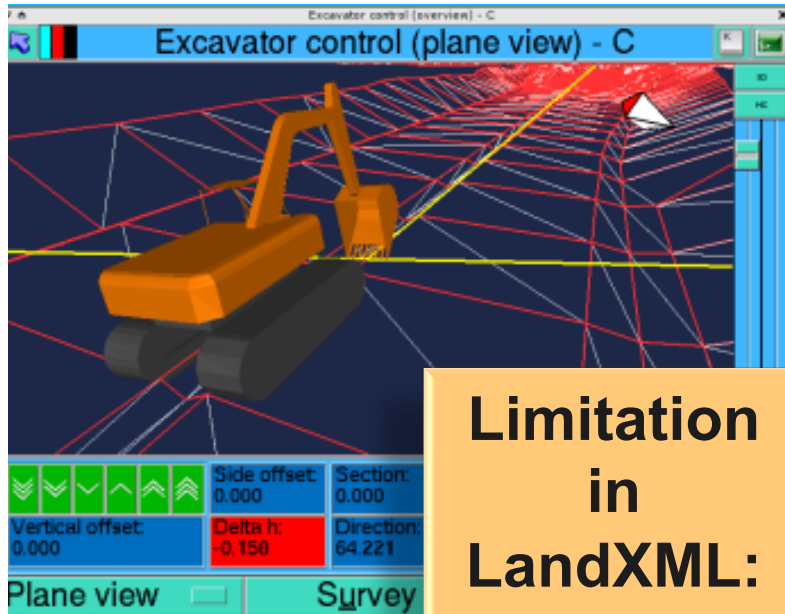
Format: It should be possible to view the collaboration model in a free viewer, where you could move around in 3D



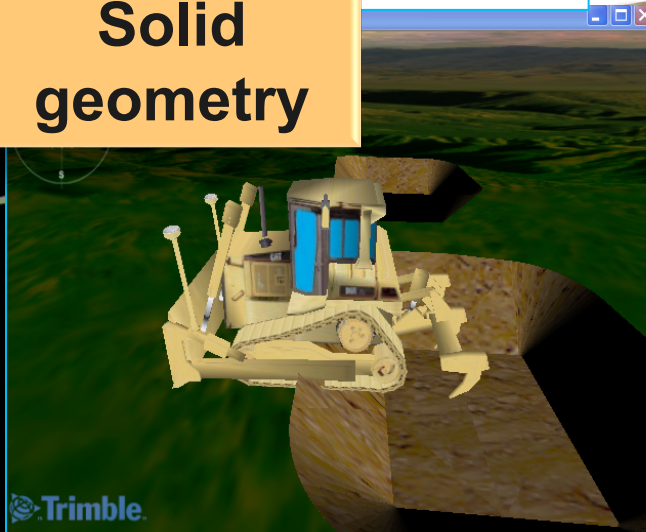
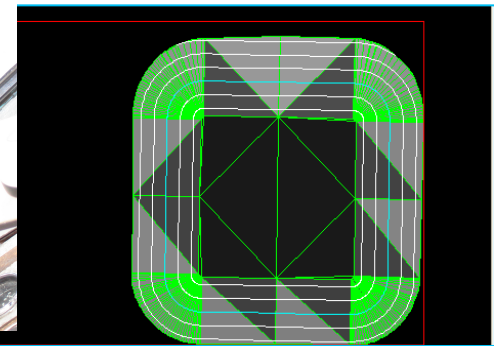
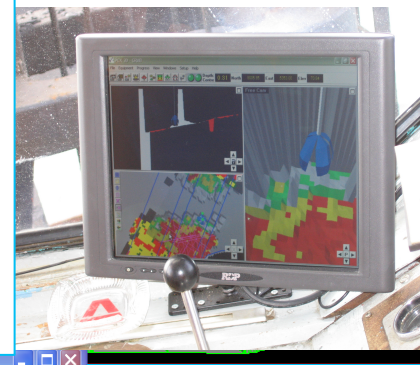
HB 138 – Kap 6. Models_Requirement_setting out data

One should be able to pick all necessary stake out data from the models

- Direct export to LandXML format for construction works fine today: Leica, Trimble, SBG, Scanlaser, Topcon etc. reads it.



**Limitation
in
LandXML:
Solid
geometry**



Which LandXML formats works as stake out data - today

TYPE 1 – LandXML <IrregularLine>;

=> Read by Leica Roadrunner, TOPCON, GEO and ANMASK (for windows)_Pure line-model (Hor and Vert kept separate)

TYPE 2 – LandXML <IrregularLine>;

=> Read by Mikrofyn - Visual Digger machine guidance)_Pure line-model (Hor and Vert kept separate. Vertical are given by a point elevation list)

TYPE 3 – LandXML <BreakLine>, <BoundaryLine> and <Surface>;

=> Read by Trimble SCS 900 (PRO), Autodesk Civil 3D and more_ 3D breaklines and triangle model

TYPE 4 – LandXML <CrossSect>;

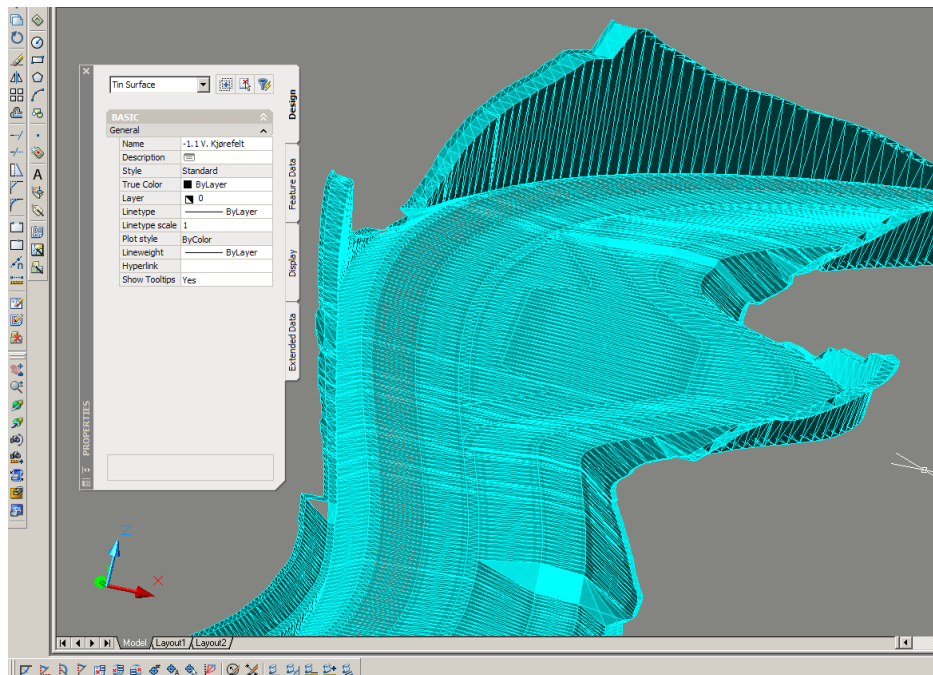
=> Read by Trimble Access and GEO)_Cross Section based format, with distance and slope angle

TYPE 5 – LandXML <Tunnel CrossSect>

=> Read by Atlas Copco, AMV, Gemini, Trimble and Leica

TYPE 6 – LandXML <surface>

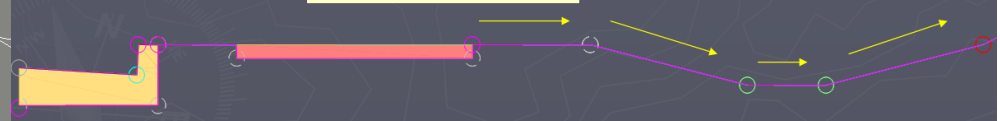
=> Read by most systems. Same as TYPE 3, but for exchanging terrain data/Landscaping.



LAND
xml
.org

Cross Section Points Slope - Distance

0.0% slope for 2.0 feet



Each cross section point defined by Distance and Slope (in percent %) measured from PGL or previous point.

BA-Nettwork: Initiative in 2009, to look at extending LandXML for road, with more in-data, not only result data

Møtereferat

Møte vedrørende: Arbeidsgruppa_BA-nettverket. LandXML standard
Møtedato: 12.08.2009
Møtested: ViaNova Systems AS
Møtetid: 10.00 – 16.00

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Suggested minimum for a LandXML Road - format

1. Centerline <Alignment> Horizontal radius/clothoides
2. Centerline <Alignment> Vertical geometry_ Radius/Lines
3. Reference line
4. Road surface and Road Bed: Slope per surface(%)
 - Distance from inner surface ~width
 - If line geometry are used as boarder lines for a given surface (and codes for different calculation methods to use such a border line: ex: use elevation from surface slope, but horizontal geometry from line)
 - Boundaries
5. Road Structural Layers
 - must be coded
 - Thickness of each layer
 - “From – To”
 - Gradient in transition zone between layers
6. Rock shelf
7. Datum
8. Inner slope for Road Structure (code this)
9. Minimum depth of ditch delta Z beneath Road bed
10. Deep blasting (may be solved as Road Bed or simpler)
11. Mass replacement (excavation angle)
12. How about the relation to other designed objects. Novapoint and other software could build relation to objects, ditches etc...

Challenges with the model deliverance within infrastructure

Lack of open export formats to export volume objects, attribute values, relation between object and inn-data, in correct coordinate reference system



What standard for object modelling support our world best ?

OGC
Making location.com

TC 204
Intelligent transport systems

TC 211
Geographic information/Geomatics

GML
CITY GML

INSPIRE
Infrastructure for Spatial Information in the European Community

Quadri

buildingSMART
International home of openBIM
interoperable building data

TC 59
Buildings and civil engineering works

IFC
IFD

ISO