

Stringlines for Leica Stake Out from Terrain

During construction, surveyors use Leica Infinity software to define a road project for the Leica field instrument. On the field instrument, the road project will use a geometry feature for centerline and longitudinal stringlines to identify lines that can be staked out, such as the edge of pavement or the toe of slope. The OpenRoads/OpenSite Designer software is used to model roadway corridors – template points are pushed along an alignment to create named longitudinal features, and component meshes are defined. As a final product, terrains are created from the corridor named longitudinal features. The information about the proposed roadway is delivered to the project design team, other disciplines and construction in a terrain. This document will explain how to extract the named longitudinal features from terrains for loading into Leica Infinity as stringlines.

A note about discontinuous features: OpenRoads/OpenSite Designer creates longitudinal features by connecting template points with the same name together. When there is a gap and a point name does not appear for a template drop and then is used again on a later template, the gap is honored in ORD/OSD by not displaying any graphics in that area. In ORD/OSD what looks like separate pieces, actually belong to the same element and have the same name. The LandXML export handles discontinuous ORD/OSD features by creating two separate surface features with the same name. The stringline process below takes advantage of the Leica Infinity ability to display and utilize separate surface features that have the same name.

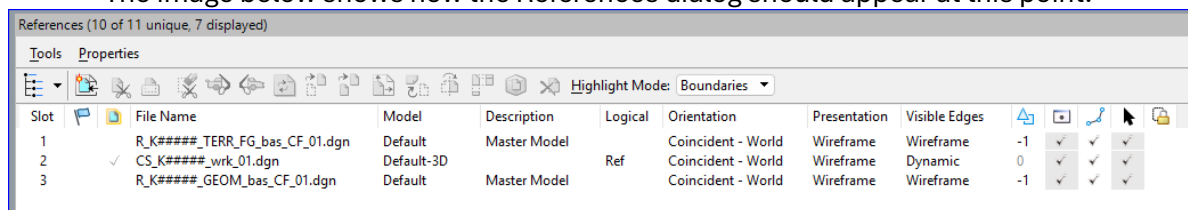
Design Deliverables: Stored in 1_Design\6_Civil_Data

Designers should deliver a Geometry Base Container File (R_K#####_GEOM_bas_CF_###.dgn) and a Finish Grade Terrain Base Container File (R_K#####_TERR_FG_bas_CF_###.dgn) in the 6_Civil_Data folder. Construction Surveyors will attach these container files with live nesting to a working DGN file in the Construction_Engineering or Construction_Survey folder.

GEOMETRY: Use OpenRoads Designer or OpenSite Designer to create a LandXML file of the centerline alignment for staking out

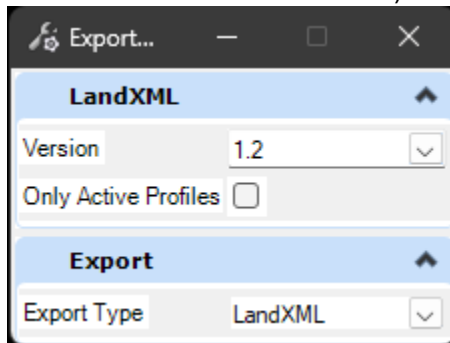
1. Create a new working DGN file from a 2D seed in the Construction_Engineering or Construction_Survey folder (work in the Default model only).
2. Attach a reference to the delivered TERRAIN container file (live nesting, depth=3). (***The nesting depth must be deep enough to access the civil data in the published corridor that was used to create the terrain: wrk->TERR_bas_CF(0)->TERR_pub(1)->CORR_bas_CF(2)->CORR_pub(3).***)
3. Set As Active Terrain Model to create the Default-3D managed model in your active file. (***Leave the reference to the Default-3D model displayed, it is necessary for the terrain later.***)
4. Attach a reference to the delivered GEOMETRY container file (live nesting, depth=1).

The image below shows how the References dialog should appear at this point.



5. Fit the view and locate the centerline graphics.
6. **Select** the centerline graphics.

7. Use the command **Export Geometry** (It is probably easiest to type "export" into the Search Ribbon and select it from there).



8. Left click in View 1 to accept the heads-up prompts:
 - a. Export Type: LandXML
 - b. The selected elements
 - c. LandXML Version (doesn't matter which one)
 - d. Only Active Profiles: **No** (this will export all profiles, even if they aren't the active one, which is a good setting in case the designer has forgotten to set a profile active)
9. When the Export to LandXML dialog opens - navigate to a folder and save the data with a name like "C_AlignmentFromGeometry.xml" (in PW, use the 0_Temp folder and No Wizard).
10. Clear the selection set.

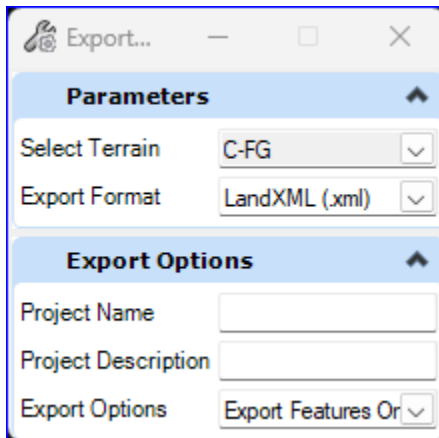
The image below shows the LandXML open in Notepad++. A horizontal alignment named "C" and a profile named "vert_C".

The image shows a Notepad++ window with the file 'C_AllProfilesAlignmentFromGeometry.xml' open. The XML content is as follows:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <LandXML xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3   xsi:schemaLocation="http://www.landxml.org/schema/LandXML-1.2
4     http://www.landxml.org/schema/landxml-1.2/LandXML-1.2.xsd" version="1.2" date=
5     "2026-04-16" time="09:09:49" xmlns="http://www.landxml.org/schema/LandXML-1.2">
6   <Units>
7     <Imperial areaUnit="squareFoot" linearUnit="foot" volumeUnit="cubicYard"
8       temperatureUnit="fahrenheit" pressureUnit="inHG" directionUnit=
9       "radians" />
10  </Units>
11  <Application name="OpenRoads Designer" version="24.00.02.25" manufacturer=
12    "Bentley Systems, Inc." manufacturerURL="http://www.bentley.com" />
13  <CgPoints />
14  <Alignments>
15    <Alignment name="C" length="799.999999999801" state="proposed" staStart=
16      "19730.000000000036">
17      <CoordGeom name="C" state="proposed">
18        <Line dir="1.7106743462080896" length="799.999999999801">
19          <Start>1320195.8695306161 467001.14987466403 0</Start>
20          <End>1320988.0559389335 466889.61201348156 0</End>
21          <Feature>
22            <Property label="style" value="Alignment\CL_Main" />
23          </Feature>
24        </Line>
25      </CoordGeom>
26      <Profile>
27        <ProfAlign name="vert_C">
28          <PVI>20029.999999999611 359.55519502256573</PVI>
29          <PVI>20029.9999999998 359.55519502256089</PVI>
30          <PVI>20039.999999999851 360.17008740316646</PVI>
31          <PVI>20049.999999999534 360.7849797837718</PVI>
32          <PVI>20059.999999999392 361.38829582361183</PVI>
33          <PVI>20069.999999999523 361.97198017315776</PVI>
34          <PVI>20080.000000000153 362.55566452270398</PVI>
35          <PVI>20089.999999999705 363.16525452748806</PVI>
36          <PVI>20099.999999999076 363.77695990310912</PVI>
37          <PVI>20109.999999999651 364.3769074735265</PVI>
38          <PVI>20120.00000000012 364.97685504394394</PVI>
39          <PVI>20129.999999999774 365.59164977183673</PVI>
40          <PVI>20139.999999999622 366.18840784569255</PVI>
41          <PVI>20149.999999999702 366.76424136363659</PVI>
42          <PVI>20160.000000000138 367.33521427708297</PVI>
```

TERRAIN: Use OpenRoads Designer or OpenSite Designer to create a LandXML file of multiple stringlines to upload for staking out

11. Continue in the same working DGN file that already has the reference to the delivered terrains attached.
12. Use the command **Export To File** (found on the Terrain tab in the Miscellaneous group).
13. Choose the terrain, **Select Terrain**, from the pick list on the tool settings dialog, set the **Export Format** to **LandXML (.xml)**, and set the **Export Options** to **Export Features Only** as shown in the dialog below.



14. Left click in View 1 to accept the heads-up prompts:
 - a. Export Format: **LandXML (.xml)**
 - b. Project Name and Project Description (can be left blank)
 - c. Export Options: **Export Features Only** (this will limit the export to the stringlines only)
15. When the Export Terrain dialog opens - navigate to a folder and save the data with a name like "C-FG_StringlinesFromTerrain.xml" (in PW, use the 0_Temp folder and No Wizard).
16. **<Esc>** to exit the command.

The image below shows the LandXML open in Notepad++. Note there are two breaklines named SGSh_R and two breaklines named Dch_R.

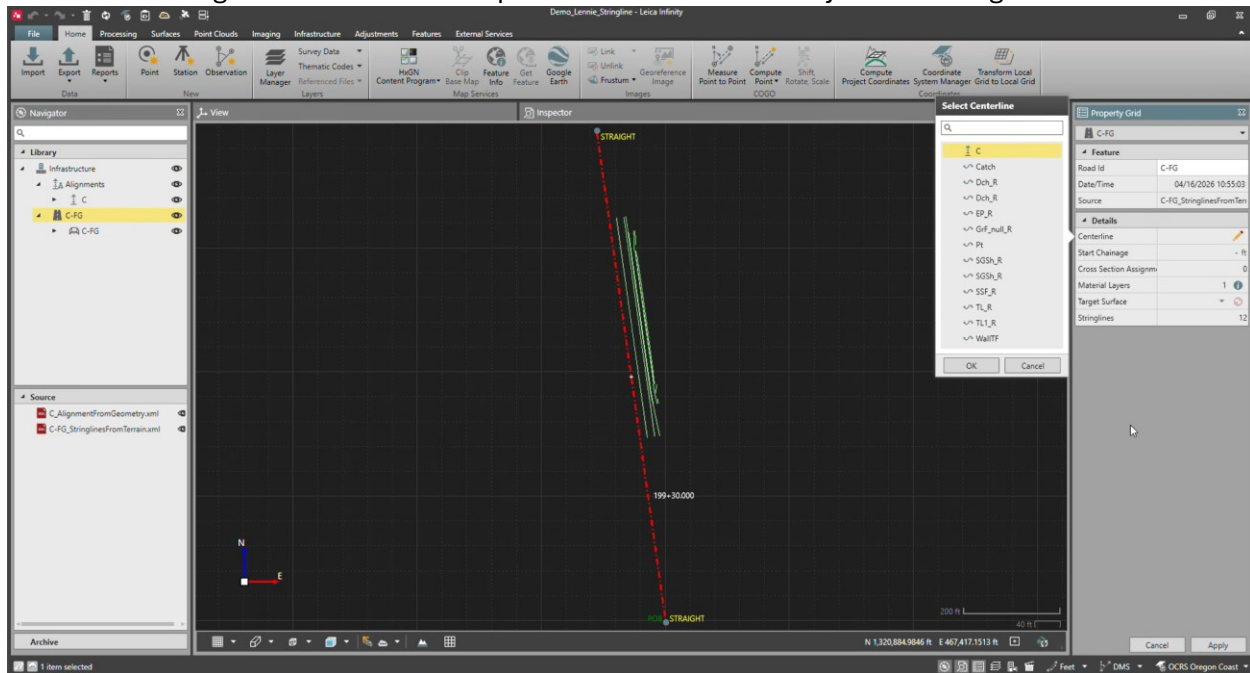
```
C-FG_StringlinesFromTerrain.xml
1  <?xml version="1.0" encoding="UTF-8"?>
2  <LandXML xsi:schemaLocation="http://www.landxml.org/schema/LandXML-1.2
   http://www.landxml.org/schema/LandXML-1.2/LandXML-1.2.xsd" xmlns=
   "http://www.landxml.org/schema/LandXML-1.2" xmlns:xsi=
   "http://www.w3.org/2001/XMLSchema-instance" version="1.2" date="2026-04-16" time
   ="10:18:23">
3    <Units>
4      <Imperial areaUnit="squareFoot" linearUnit="foot" volumeUnit="cubicYard"
5        temperatureUnit="fahrenheit" pressureUnit="inHG"/>
6    </Units>
7    <Application name="OpenRoads Designer" version="24.00.02.25" manufacturer=
8      "Bentley Systems, Inc." manufacturerURL="http://www.bentley.com"/>
9    <Surfaces>
10     <Surface name="C-FG">
11       <SourceData>
12         <Breaklines>
13           <Breakline brkType="standard" name="EP R">
14             </Breakline>
15           <Breakline brkType="standard" name="TL1 R">
16             </Breakline>
17           <Breakline brkType="standard" name="TL R">
18             </Breakline>
19           <Breakline brkType="standard" name="GrF null R">
20             </Breakline>
21           <Breakline brkType="standard" name="WallTF">
22             </Breakline>
23           <Breakline brkType="standard" name="SGSh R">
24             </Breakline>
25           <Breakline brkType="standard" name="SGSh R">
26             </Breakline>
27           <Breakline brkType="standard" name="Dch R">
28             </Breakline>
29           <Breakline brkType="standard" name="Dch R">
30             </Breakline>
31           <Breakline brkType="standard" name="SSF R">
32             </Breakline>
33           <Breakline brkType="standard" name="Pt">
34             </Breakline>
35           <Breakline brkType="standard" name="Catch">
36             </Breakline>
37         </Breaklines>
38       </SourceData>
39     </Surface>
40   </Surfaces>
41 </LandXML>
```

ROAD: Use Leica Infinity to define a Road from the imported LandXML files

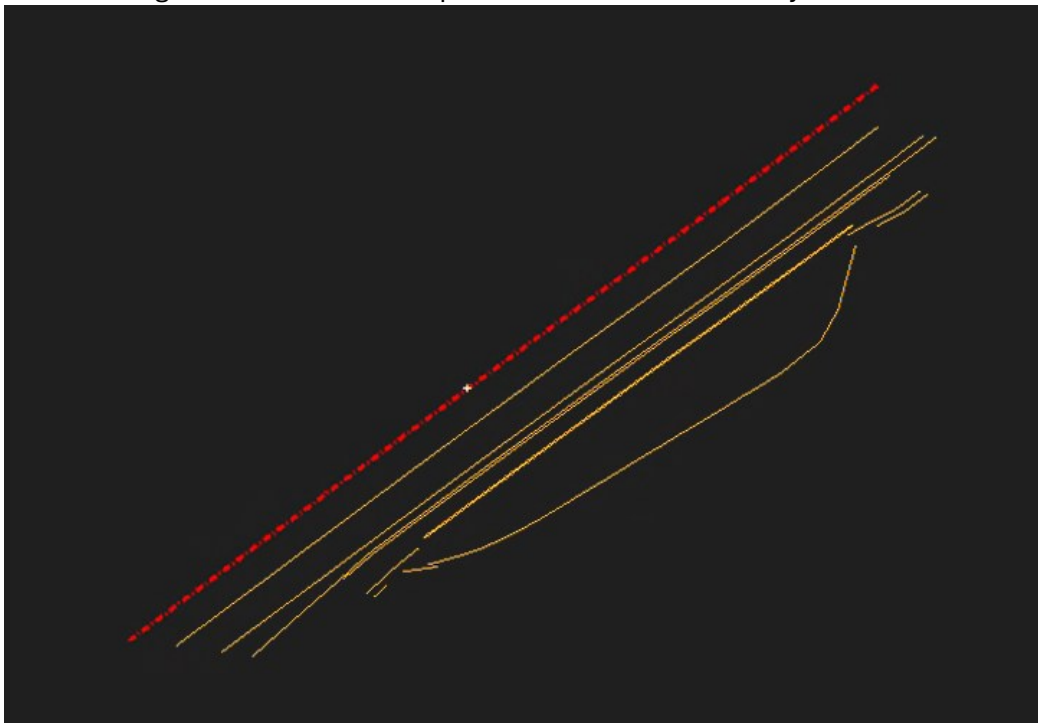
Manually build the “Road” in Leica Infinity using the CL alignment from the geometry and the surface features from the terrain.

1. Open Leica Infinity and create a New Project.
2. Import "C_AlignmentFromGeometry.xml" and "C-FG_StringlinesFromTerrain.xml".
3. Edit the Road job that was imported and set the active centerline to the C alignment.

The image below shows the imported data in Leica Infinity while setting the Centerline.

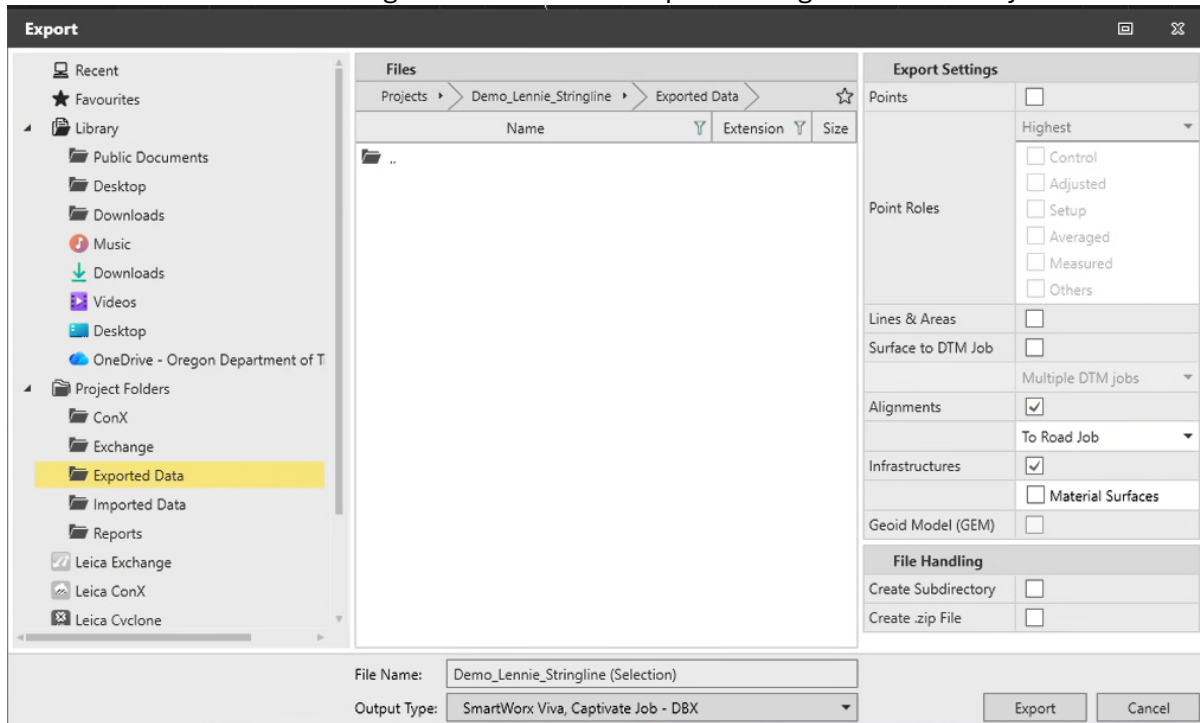


The image below shows the imported data in a Leica Infinity isometric view.



4. Select the Road job and Export the Selection to Output Type: Captivate Job – DBX, ensuring that you select both Alignments and Infrastructures.

The image below shows the Export Settings in Leica Infinity.



The image below shows the DBX files.

