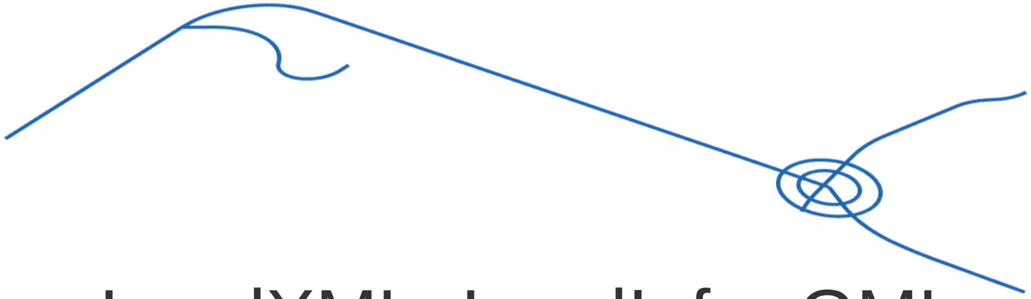

LandXML, LandInfra GML

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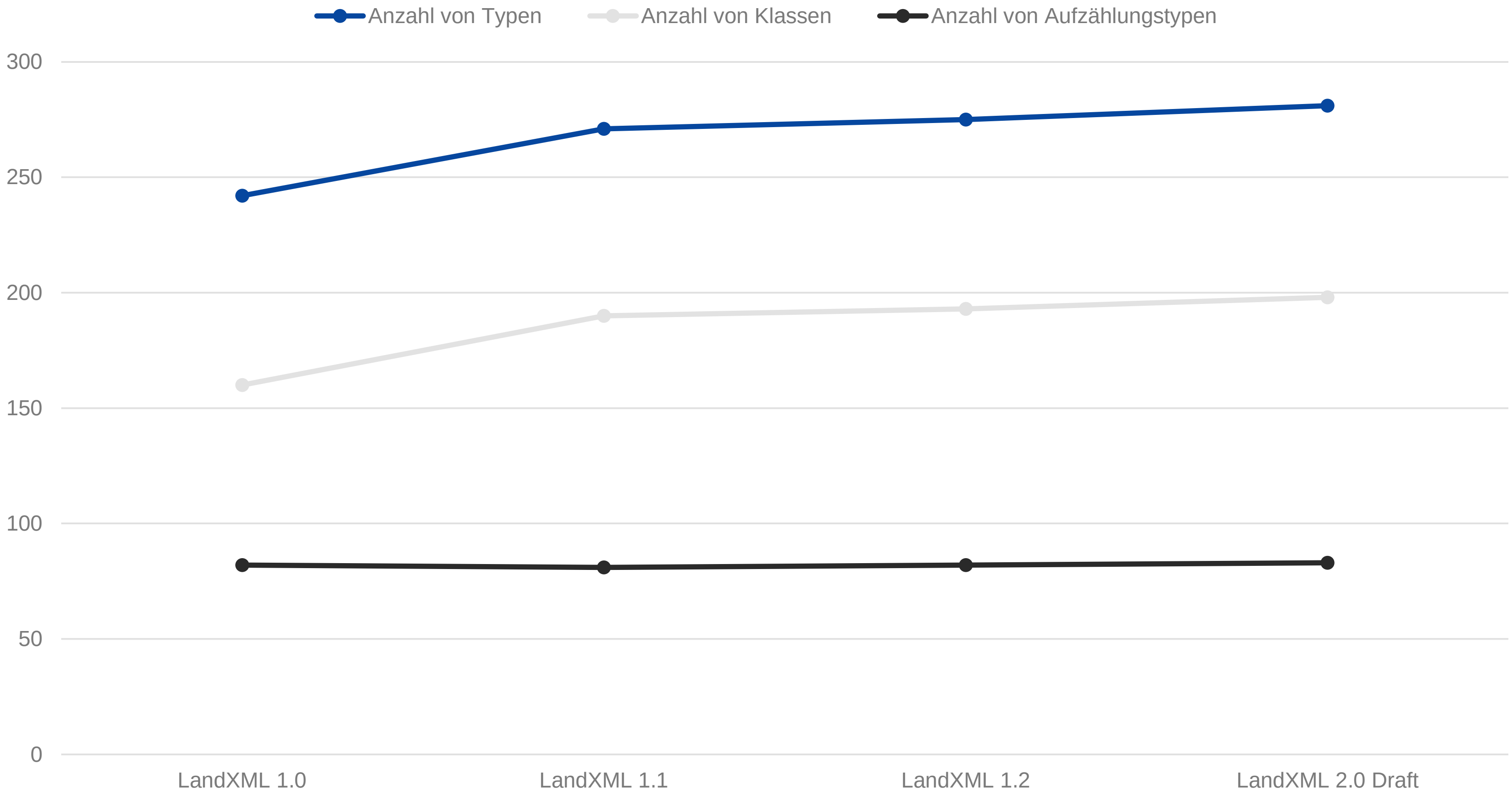
LandXML

- http://www.landxml.org/ (kostenloser Viewer für LandXML 2.0 verfügbar)

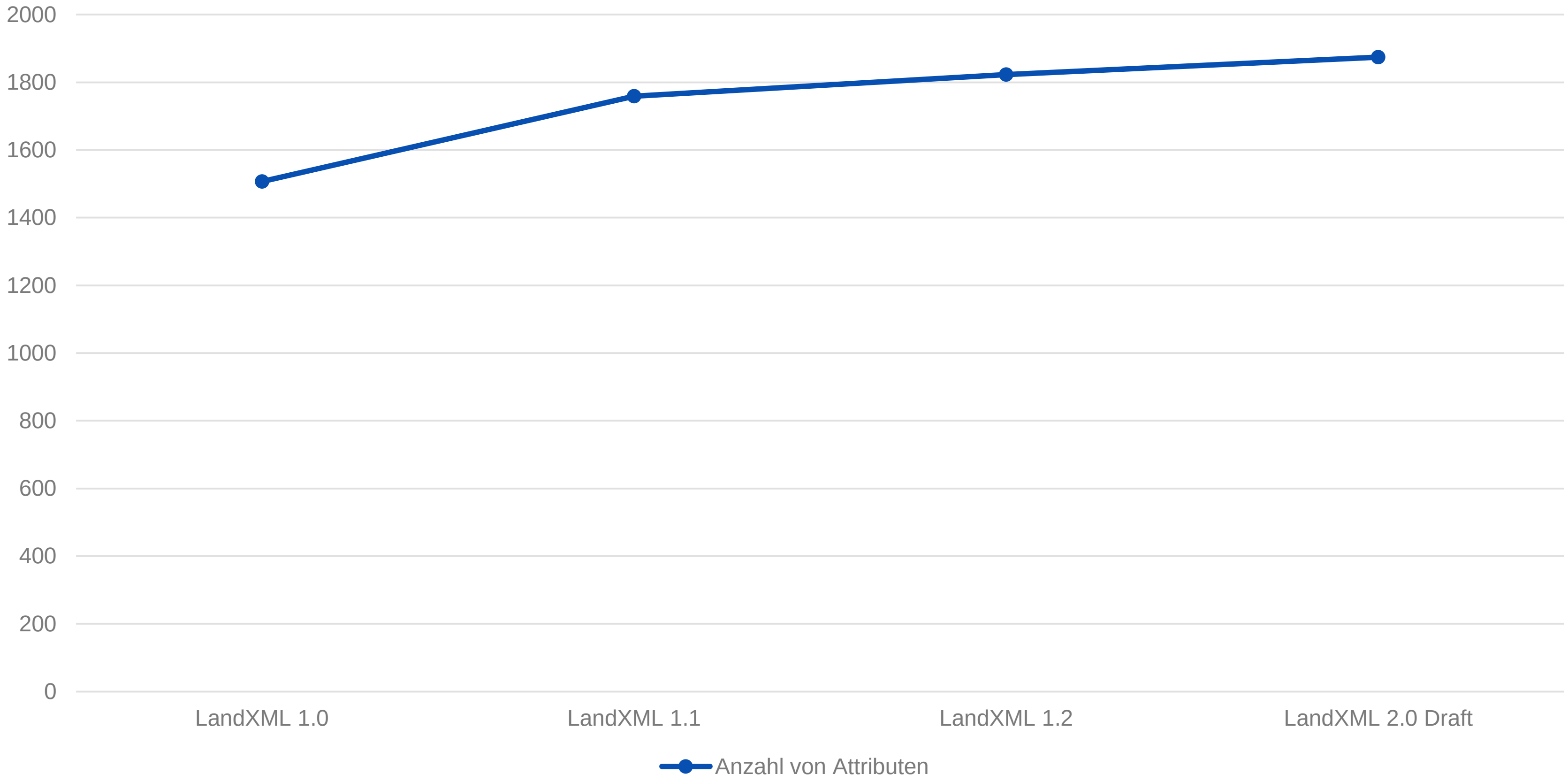
Version	Datum
LandXML 0.88	10.07.2000
LandXML 1.0	07.06.2002
LandXML 1.1	21.07.2006
LandXML 1.2	29.07.2008
LandXML 2.0 (Working Draft)	10.06.2016

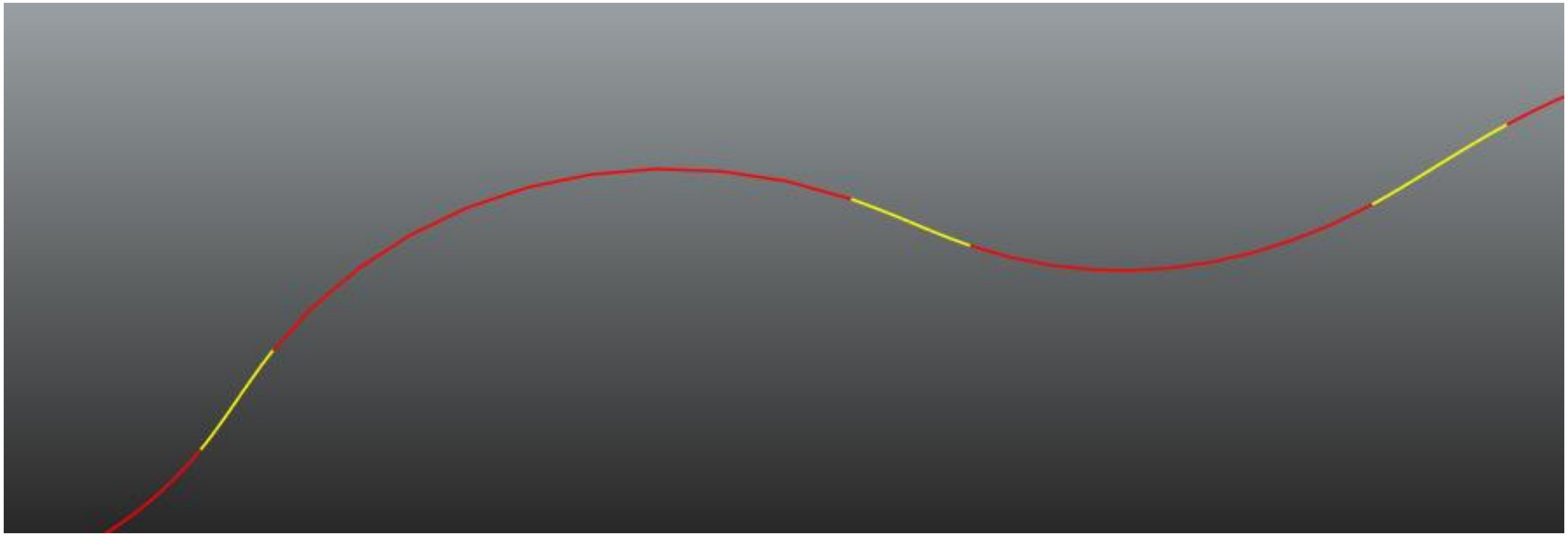
- Pseudo-Standard
- „Launched January 2000, LandXML.org is committed to providing an non-proprietary data standard (LandXML), driven by an industry consortium of partners. There is no direct cost to join LandXML.org, nor specific level of participation required.”

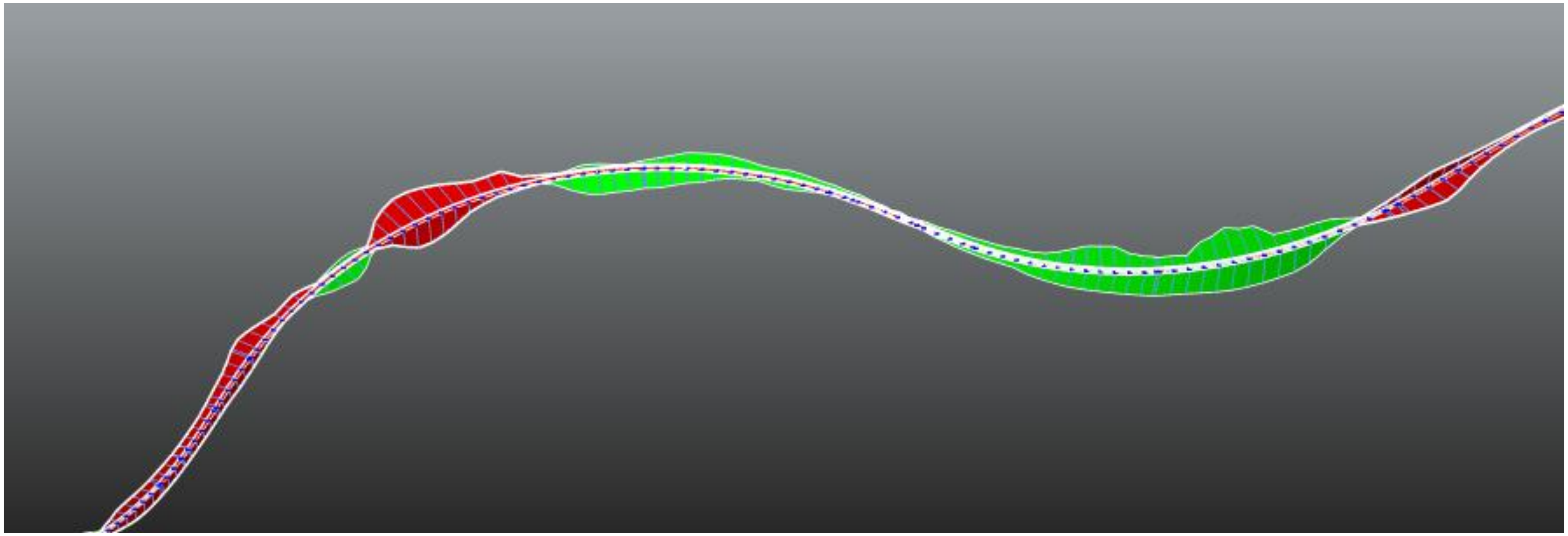
Anstieg bei der Anzahl der Klassen, Aufzählungstypen und der Anzahl der Attribute im LandXML Quasistandard

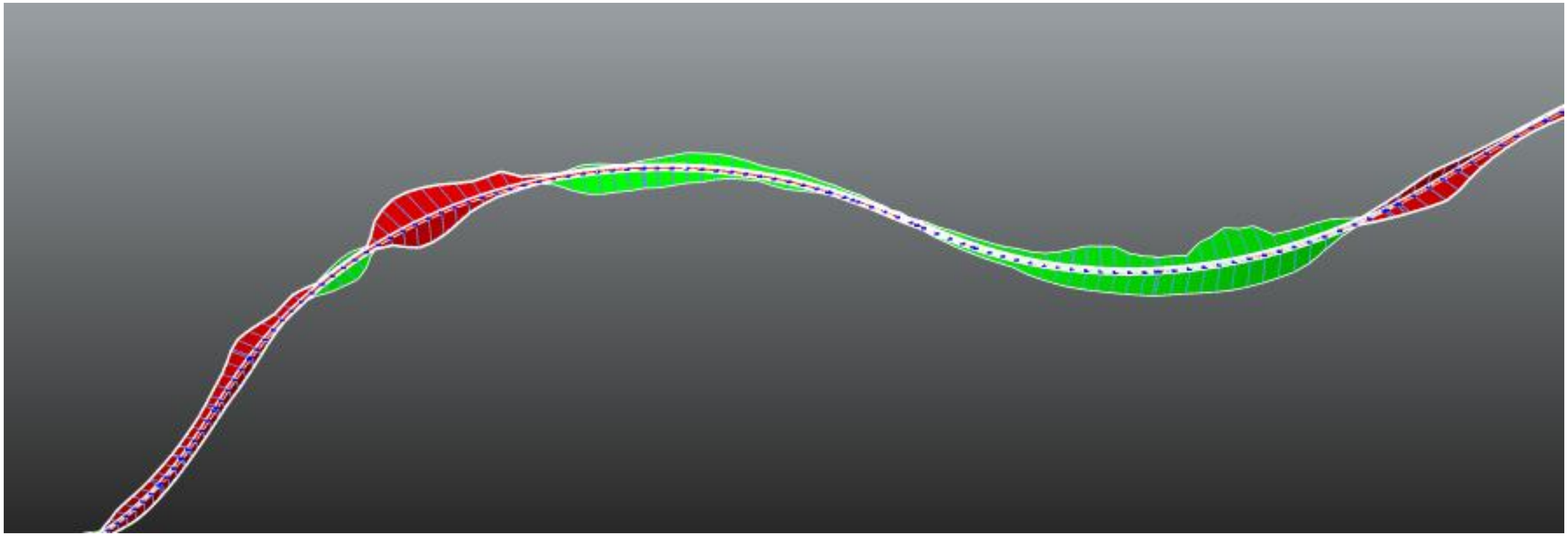


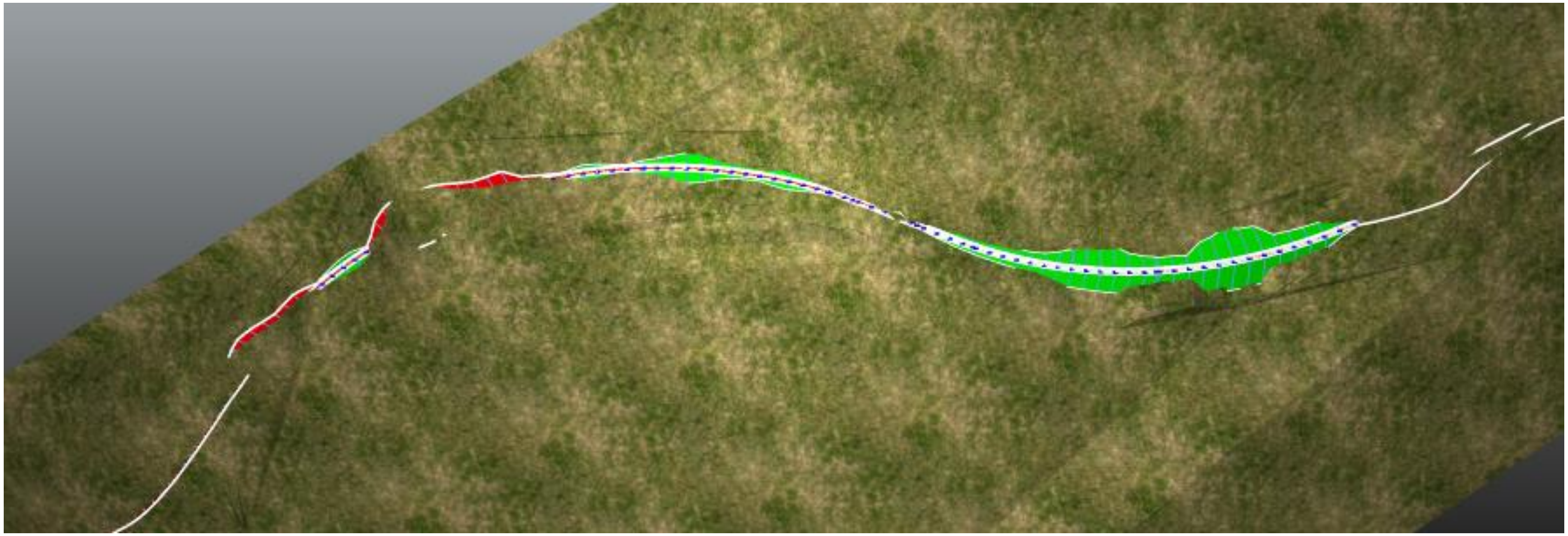
Anzahl von Attributen in den verschiedenen Versionen von LandXML

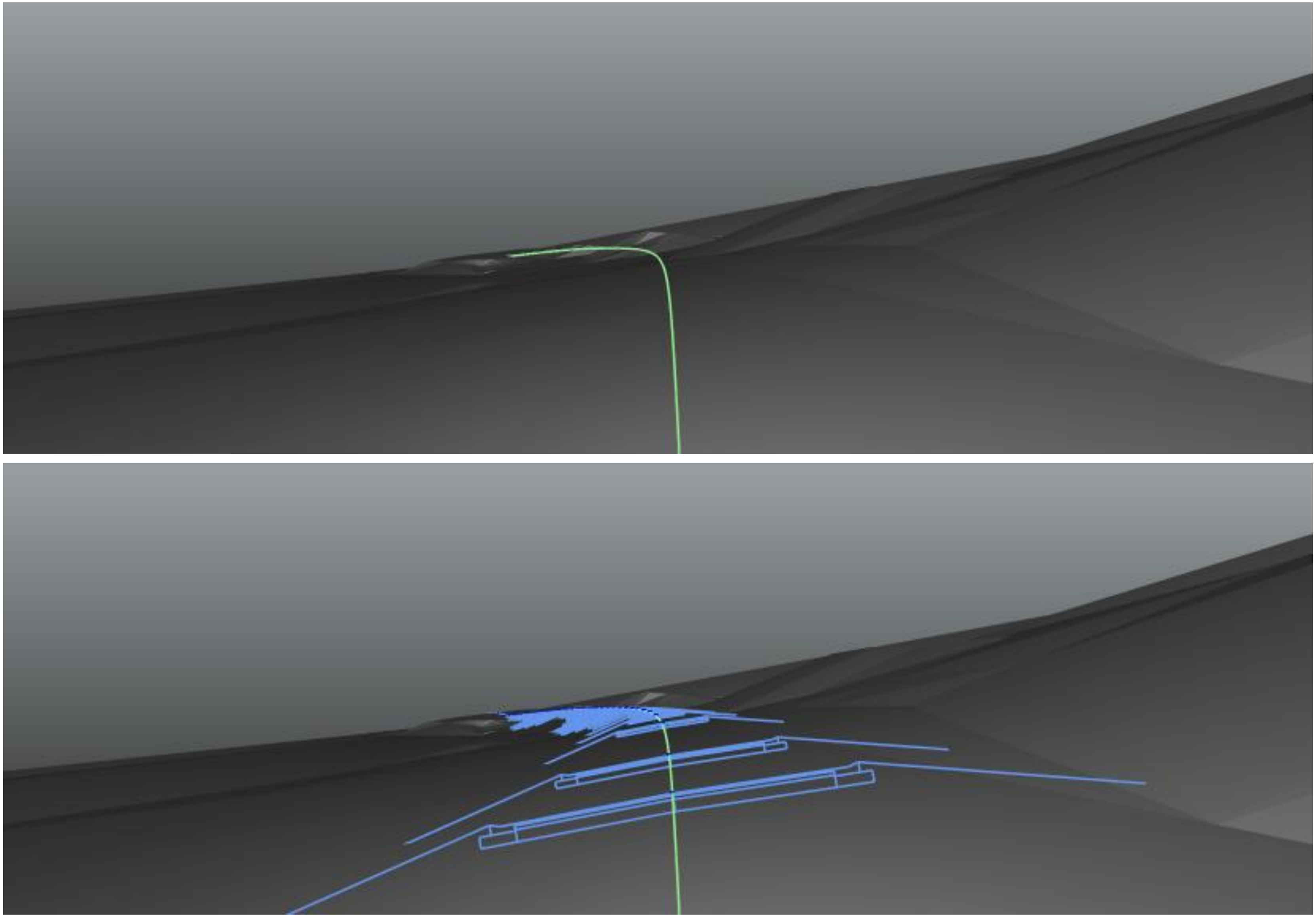


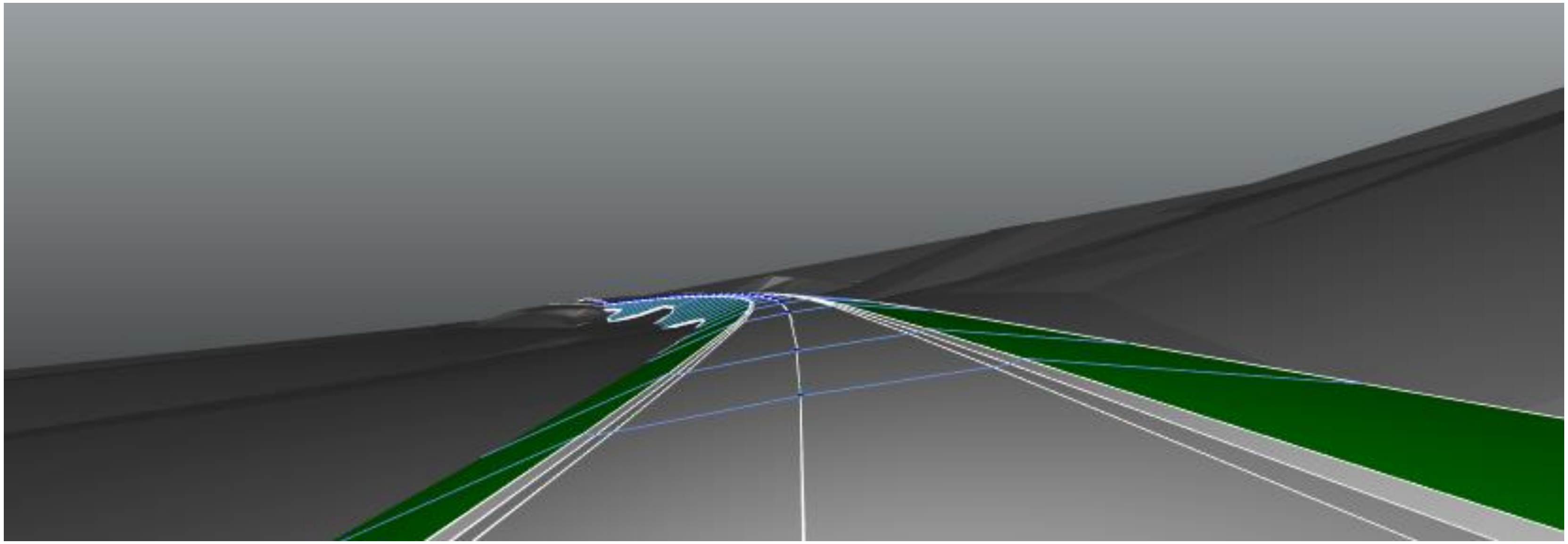




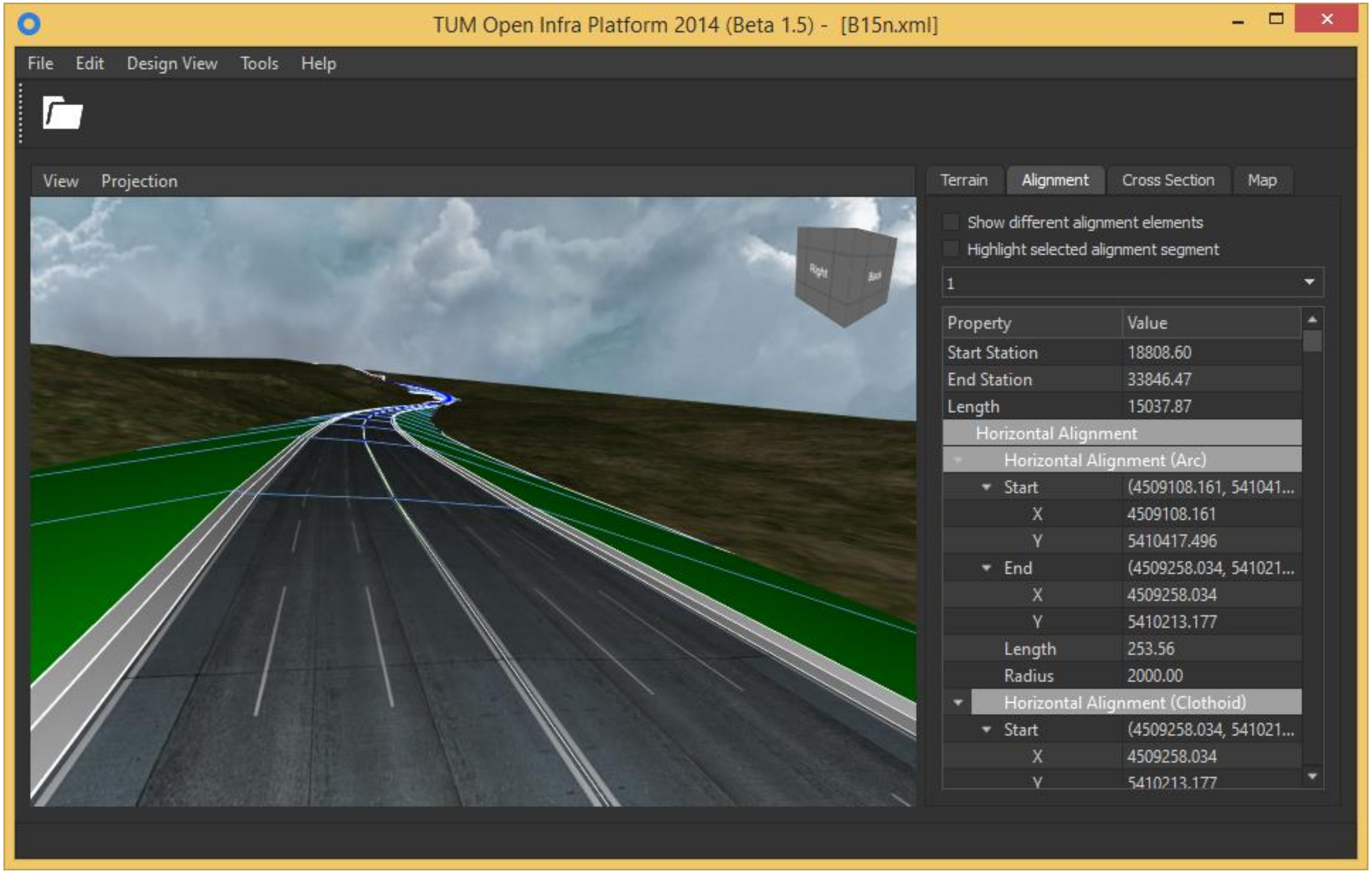








TUM Open Infra Platform


TUM Open Infra Platform 2014 (Beta 1.5) - [B15n.xml]
File
Edit
Design View
Tools
Help
View
Projection
Right
Back
Terrain
Alignment
Cross Section
Map

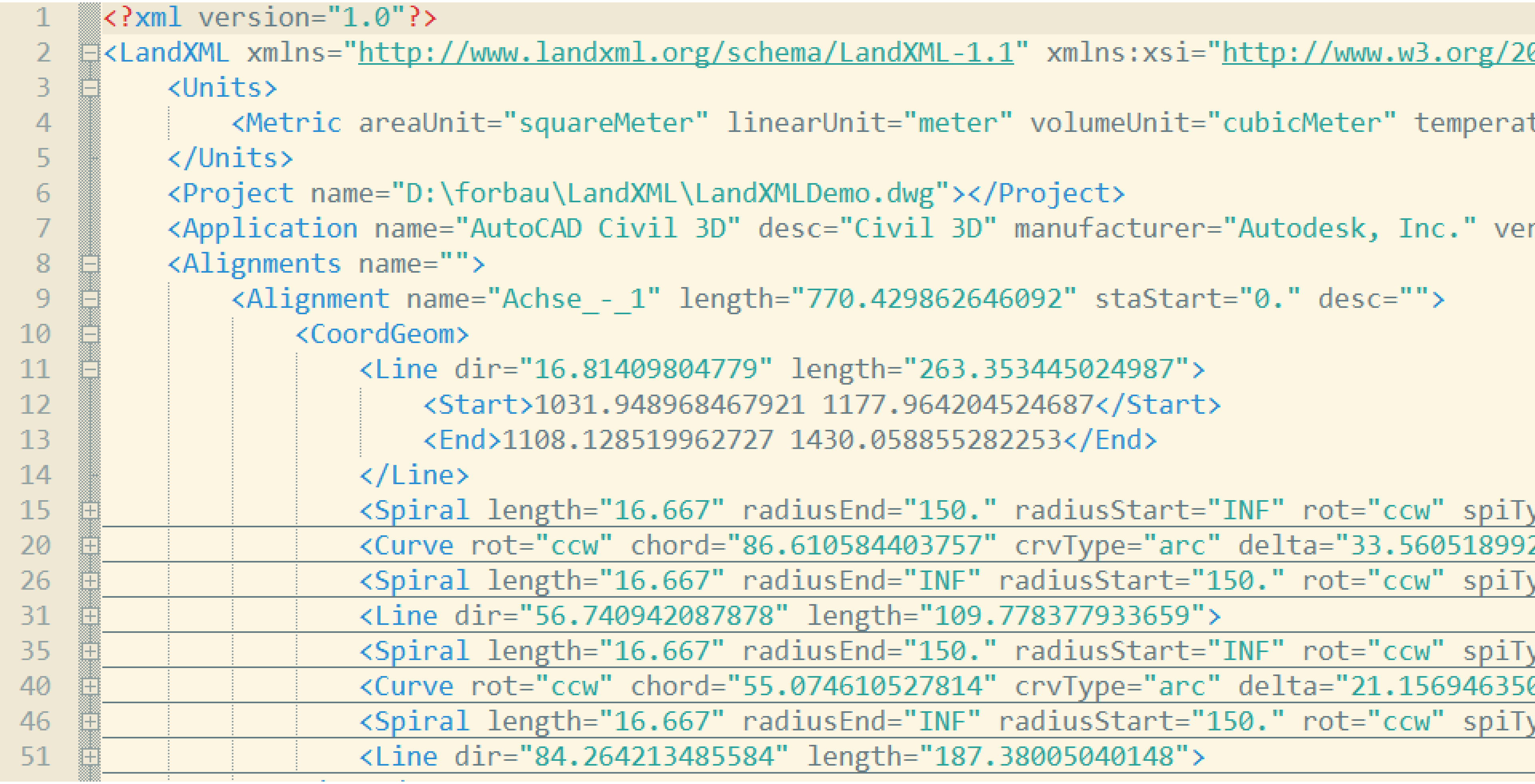
☐ Show different alignment elements
☐ Highlight selected alignment segment

1

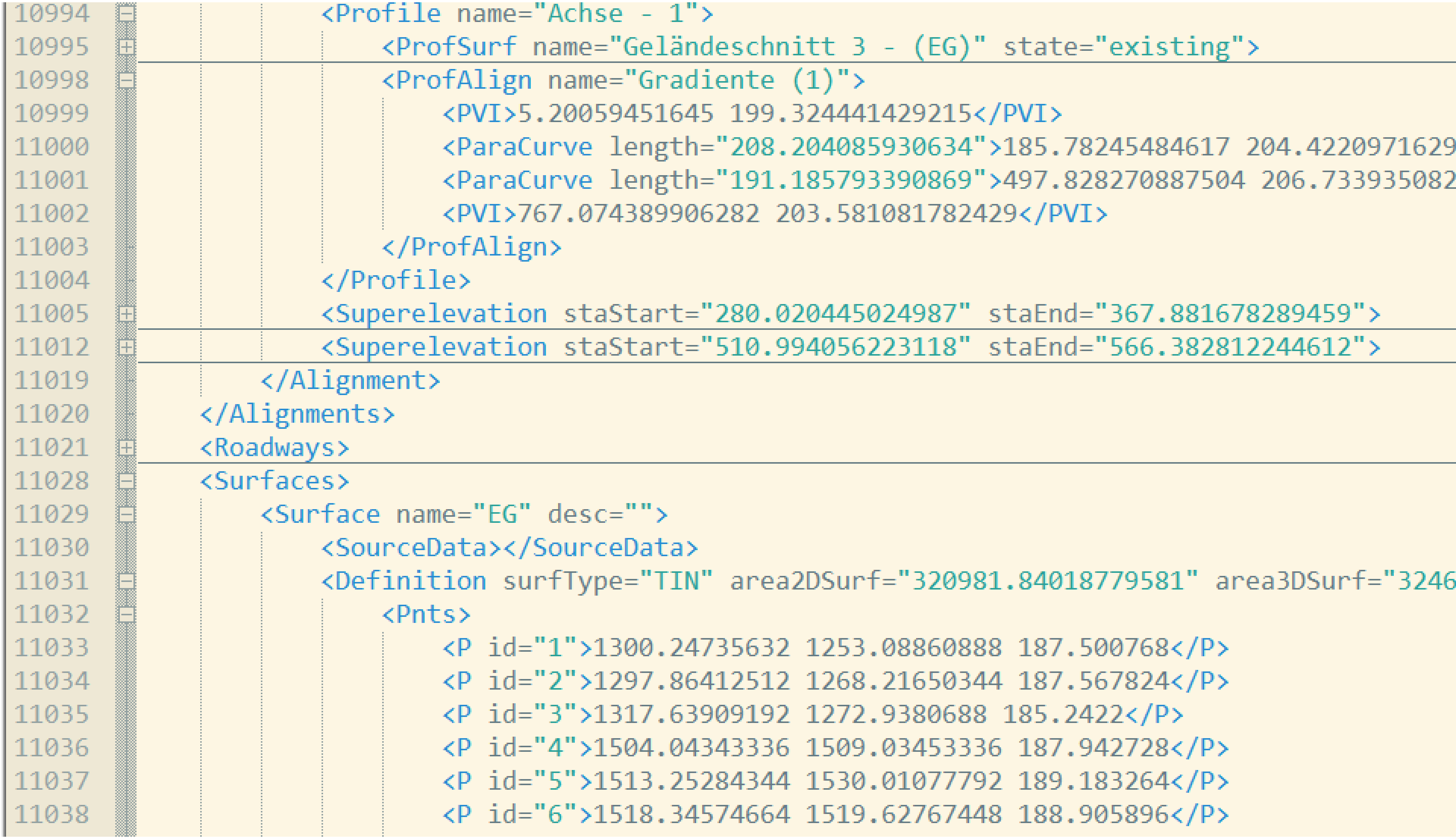
Property	Value
Start Station	18808.60
End Station	33846.47
Length	15037.87
Horizontal Alignment	
Horizontal Alignment (Arc)	
Start	(4509108.161, 541041...
X	4509108.161
Y	5410417.496
End	(4509258.034, 541021...
X	4509258.034
Y	5410213.177
Length	253.56
Radius	2000.00
Horizontal Alignment (Clothoid)	
Start	(4509258.034, 541021...
X	4509258.034
Y	5410213.177

Kann hier heruntergeladen werden: http://go.tum.de/309508

Aufbau



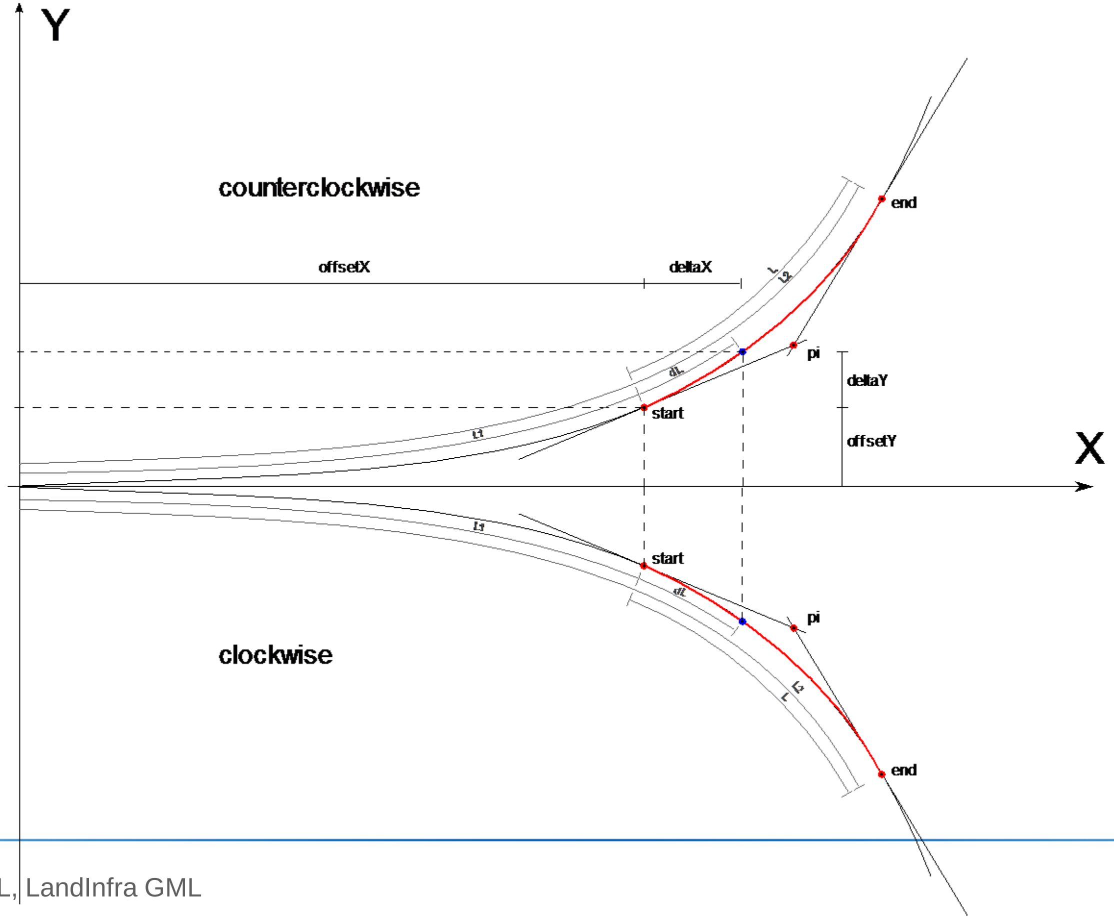
```
<?xml version="1.0"?>
<LandXML xmlns="http://www.landxml.org/schema/LandXML-1.1" xmlns:xsi="http://www.w3.org/20
    <Units>
        <Metric areaUnit="squareMeter" linearUnit="meter" volumeUnit="cubicMeter" temperat
    </Units>
    <Project name="D:\forbau\LandXML\LandXMLDemo.dwg"></Project>
    <Application name="AutoCAD Civil 3D" desc="Civil 3D" manufacturer="Autodesk, Inc." ver
    <Alignments name="">
        <Alignment name="Achse_-_1" length="770.429862646092" staStart="0." desc="">
            <CoordGeom>
                <Line dir="16.81409804779" length="263.353445024987">
                    <Start>1031.948968467921 1177.964204524687</Start>
                    <End>1108.128519962727 1430.058855282253</End>
                </Line>
                <Spiral length="16.667" radiusEnd="150." radiusStart="INF" rot="ccw" spiTy
                <Curve rot="ccw" chord="86.610584403757" crvType="arc" delta="33.56051899
                <Spiral length="16.667" radiusEnd="INF" radiusStart="150." rot="ccw" spiTy
                <Line dir="56.740942087878" length="109.778377933659">
                <Spiral length="16.667" radiusEnd="150." radiusStart="INF" rot="ccw" spiTy
                <Curve rot="ccw" chord="55.074610527814" crvType="arc" delta="21.15694635
                <Spiral length="16.667" radiusEnd="INF" radiusStart="150." rot="ccw" spiTy
                <Line dir="84.264213485584" length="187.38005040148">
```



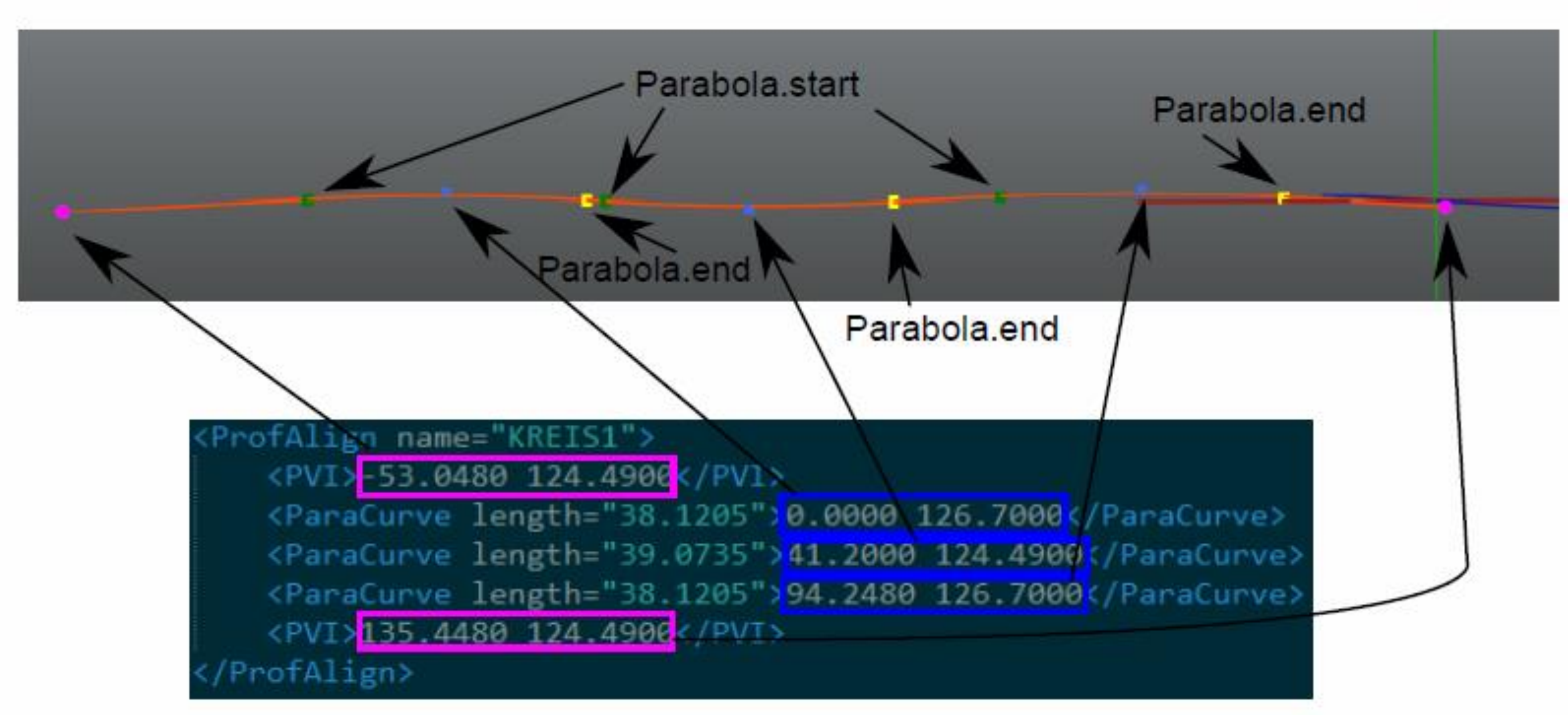
```xml
            <Profile name="Achse - 1">
                <ProfSurf name="Geländeschnitt 3 - (EG)" state="existing">
                <ProfAlign name="Gradiente (1)">
                    <PVI>5.20059451645 199.324441429215</PVI>
                    <ParaCurve length="208.204085930634">185.78245484617 204.4220971629
                    <ParaCurve length="191.185793390869">497.828270887504 206.733935082
                    <PVI>767.074389906282 203.581081782429</PVI>
                </ProfAlign>
            </Profile>
            <Superelevation staStart="280.020445024987" staEnd="367.881678289459">
            <Superelevation staStart="510.994056223118" staEnd="566.382812244612">
        </Alignment>
    </Alignments>
    <Roadways>
    <Surfaces>
        <Surface name="EG" desc="">
            <SourceData></SourceData>
            <Definition surfType="TIN" area2DSurf="320981.84018779581" area3DSurf="3246
                <Pnts>
                    <P id="1">1300.24735632 1253.08860888 187.500768</P>
                    <P id="2">1297.86412512 1268.21650344 187.567824</P>
                    <P id="3">1317.63909192 1272.9380688 185.2422</P>
                    <P id="4">1504.04343336 1509.03453336 187.942728</P>
                    <P id="5">1513.25284344 1530.01077792 189.183264</P>
                    <P id="6">1518.34574664 1519.62767448 188.905896</P>
```

Klothoiden

```
<Spiral length="77.500241" radiusEnd="367.000000" radiusStart="500.000000" rot="ccw" spiType="clothoid">
    <Start>5333537.722476 4467861.369007</Start>
    <PI>5333516.54507 4467896.290146</PI>
    <End>5333503.483954 4467930.775243</End>
</Spiral>
```

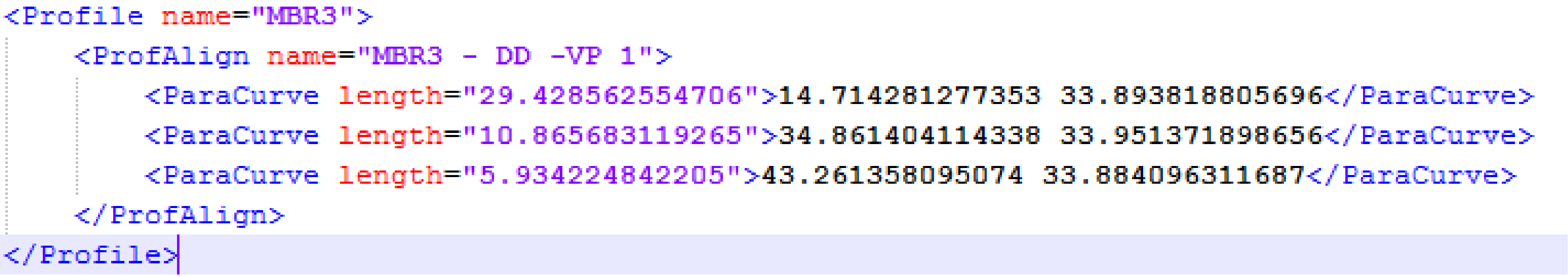

Y
counterclockwise
offsetX
deltaX
L
L2
end
pi
deltaY
dL
start
L1
offsetY
X
L1
start
dL
pi
clockwise
L
L2
end

Höhenplan

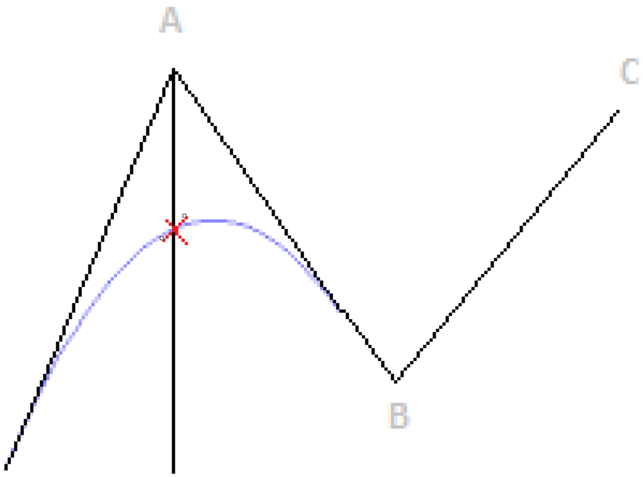

Parabola.start
Parabola.end
Parabola.end
Parabola.end

```
<ProfAlign name="KREIS1">
    <PVI>-53.0480 124.4900</PVI>
    <ParaCurve length="38.1205">0.0000 126.7000</ParaCurve>
    <ParaCurve length="39.0735">41.2000 124.4900</ParaCurve>
    <ParaCurve length="38.1205">94.2480 126.7000</ParaCurve>
    <PVI>135.4480 124.4900</PVI>
</ProfAlign>
```

Höhenplan

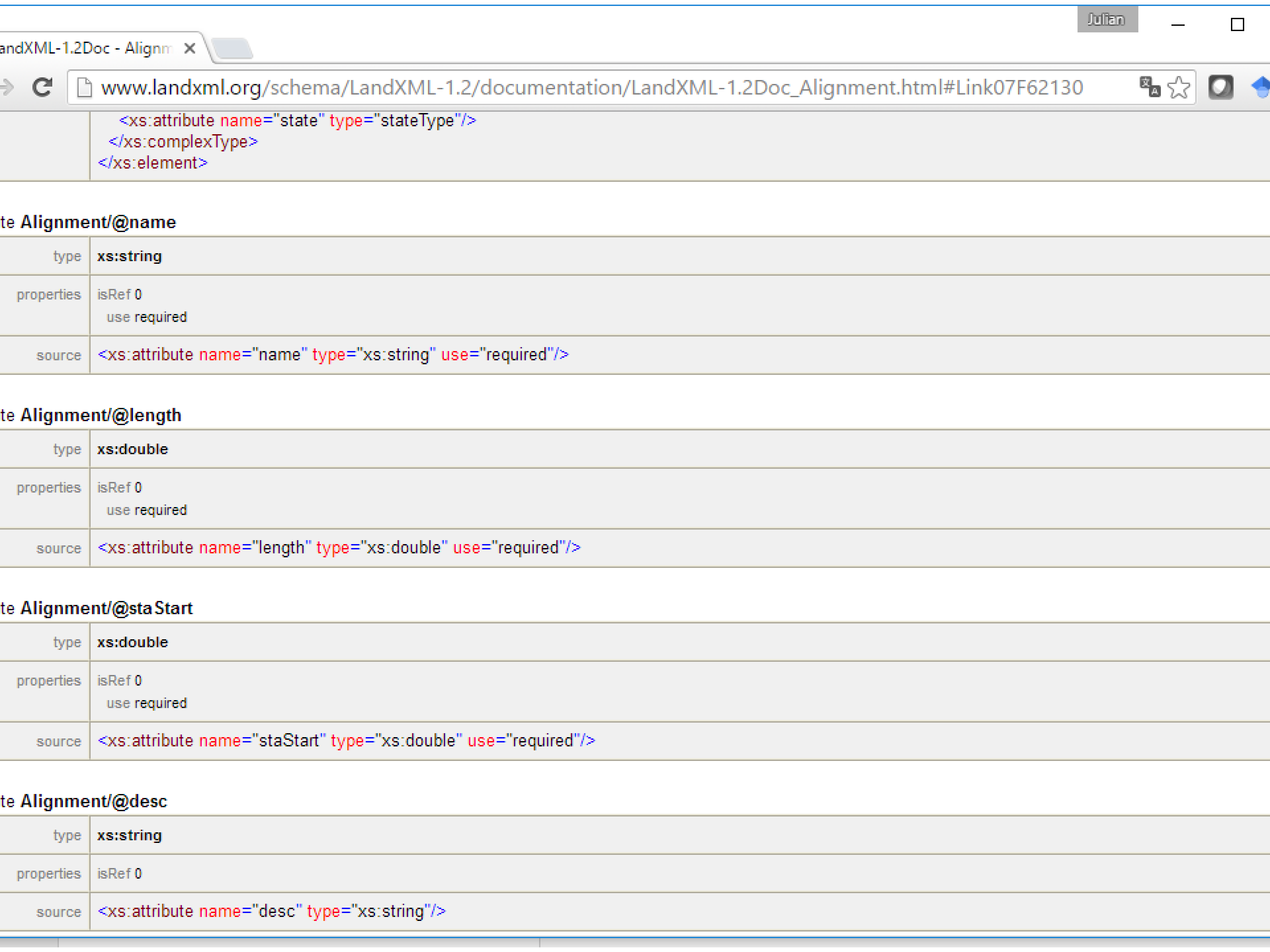


```xml
<Profile name="MBR3">
    <ProfAlign name="MBR3 - DD -VP 1">
        <ParaCurve length="29.428562554706">14.714281277353 33.893818805696</ParaCurve>
        <ParaCurve length="10.865683119265">34.861404114338 33.951371898656</ParaCurve>
        <ParaCurve length="5.934224842205">43.261358095074 33.884096311687</ParaCurve>
    </ProfAlign>
</Profile>
```



LandXML: Die negativen Seiten

- One Man Show: Nathan Crews
- Zwischen 2008 und 2014 war das Projekt inaktiv: Keine Updates, keine Reaktion auf E-Mails
- Ursprünglich von einem Mitarbeiter von Autodesk entwickelt (jetzt bei Carlson Software beschäftigt)


Julian
andXML-1.2Doc - Alignm
www.landxml.org/schema/LandXML-1.2/documentation/LandXML-1.2Doc_Alignment.html#Link07F62130

```
    <xs:attribute name="state" type="stateType"/>
  </xs:complexType>
</xs:element>
```

te Alignment/@name

type	**xs:string**
properties	isRef 0 use required
source	`<xs:attribute name="name" type="xs:string" use="required"/>`

te Alignment/@length

type	**xs:double**
properties	isRef 0 use required
source	`<xs:attribute name="length" type="xs:double" use="required"/>`

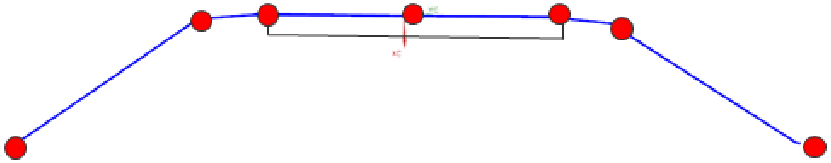
te Alignment/@staStart

type	**xs:double**
properties	isRef 0 use required
source	`<xs:attribute name="staStart" type="xs:double" use="required"/>`

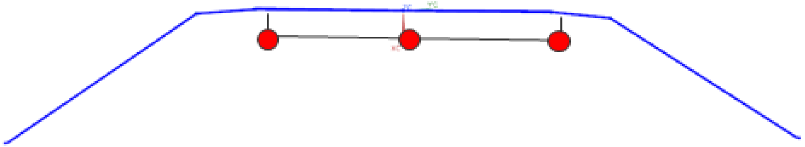
te Alignment/@desc

type	**xs:string**
properties	isRef 0
source	`<xs:attribute name="desc" type="xs:string"/>`

Probleme: Straßenquerschnitte LandXML 1.2



“20” means „slop, road top layer and slop“



“30” means “the second layer of road body”

RIB STRATIS / AKG VESTRA

```
<DesignCrossSectSurf>
         <CrossSectPnt code="Slope left">4. -0.55</CrossSectPnt>
         <CrossSectPnt code="”Slope right">4. -0.25</CrossSectPnt>
</DesignCrossSectSurf>
```

LandInfra

- Initiiert vom Open Geospatial Consortium (OGC)
- Leitung durch Paul Scarponcini
- 2013 gestartet
- 2014: “OGC Draft LandInfra Conceptual Model”
- 2015: Approval gestartet
- 1. Dezember 2015: December 1, the LandInfraSWG approved the submittal of the OGC® Land and Infrastructure Conceptual Model Standard (LandInfra) 1.0 as OGC 15-111 for processing as an OGC standard
- Basiert auf UML

Sollte ursprünglich auf LandXML 1.2 basieren

Quelle: OGC Land and Infrastructure Conceptual Model Standard (LandInfra) verion 0.2:

- "be supported by a recognized, dependable Standards Developing Organization, OGC"
- "align with existing OGC (and TC211 and SQL/MM) standards, including the modular spec"
- "benefit from functionality already supported by GML, including features, geometry, coordinate reference systems, linear referencing, and surface modeling (TIN)"
- "initially focus on alignments/roads, survey, and land parcels, the subject areas which have identified need and committed resources for development"
- "using modular extensions, be able to expand into other areas (e.g., "wet" infrastructure pipe networks) as resources become available"
- "be use-case driven"

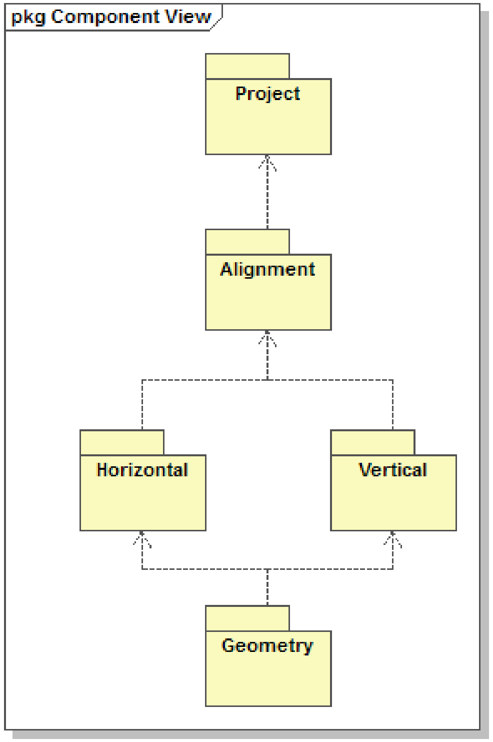
Sollte ursprünglich auf LandXML basieren

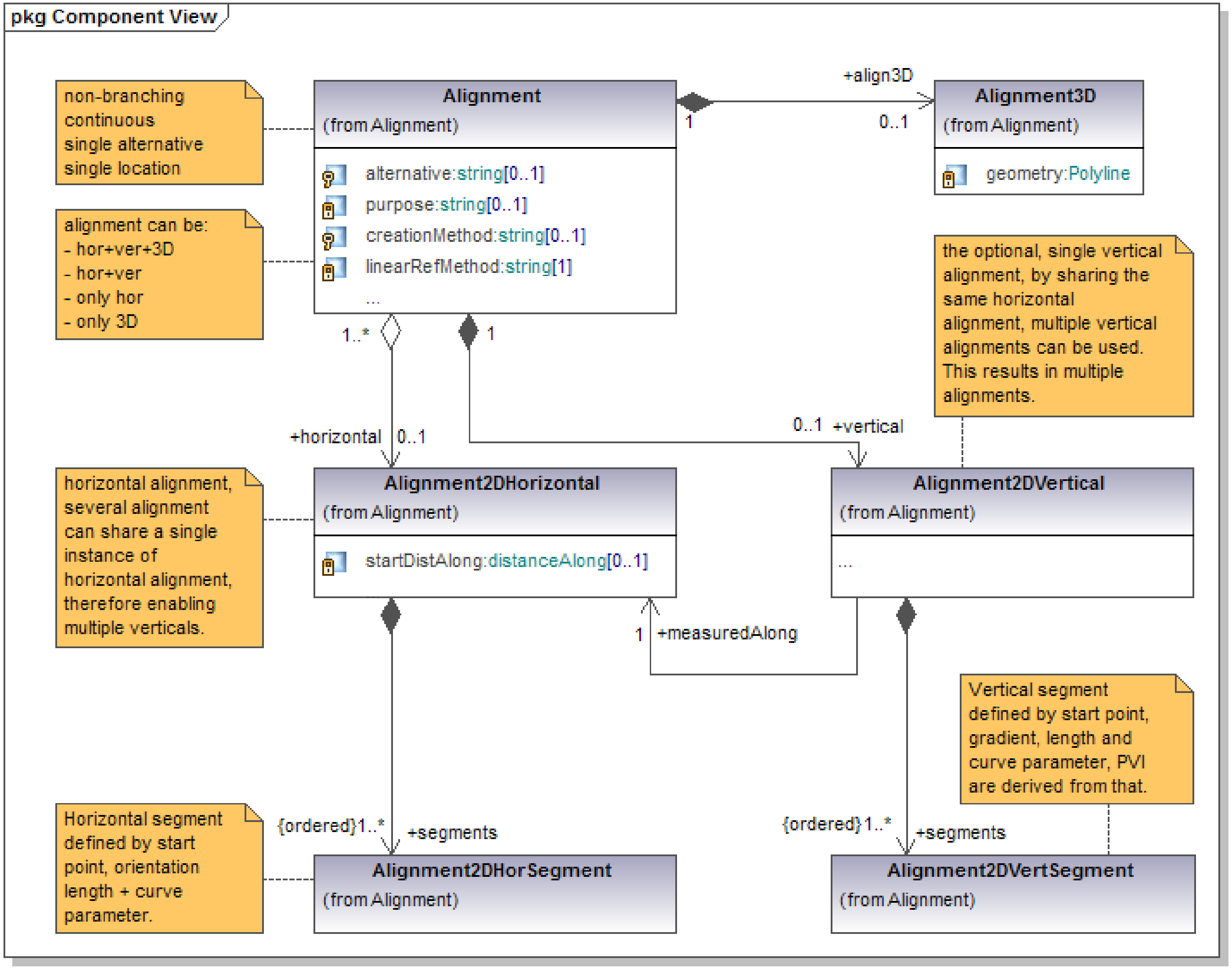
- “be based on a UML conceptual model developed prior to GML (and any other future) encoding”
- “have more up-to-date functionality”
- “be synchronized with the concurrent efforts by buildingSMART International in their development of Infrastructure-based Industry Foundation Classes (IFCs)”
- “be more easily integrated with CityGML and TransXML”

→ Neuentwicklung

Konzeptuelles Modell

- Gemeinsame Entwicklung mit buildingSMART (IFC Alignment)
- Alignment Modell wurde gemeinsam entwickelt
- Im Rahmen von buildingSMART durch IFC Alignment 1.0 implementiert


pkg Component View
Project
Alignment
Horizontal
Vertical
Geometry


pkg Component View
Alignment
(from Alignment)
alternative:string[0..1]
purpose:string[0..1]
creationMethod:string[0..1]
linearRefMethod:string[1]
...
+align3D
1
0..1
Alignment3D
(from Alignment)
geometry:Polyline
1..*
1
+horizontal
0..1
0..1
+vertical
Alignment2DHorizontal
(from Alignment)
startDistAlong:distanceAlong[0..1]
Alignment2DVertical
(from Alignment)
...
1
+measuredAlong
{ordered}1..*
+segments
{ordered}1..*
+segments
Alignment2DHorSegment
(from Alignment)
Alignment2DVertSegment
(from Alignment)

non-branching
continuous
single alternative
single location

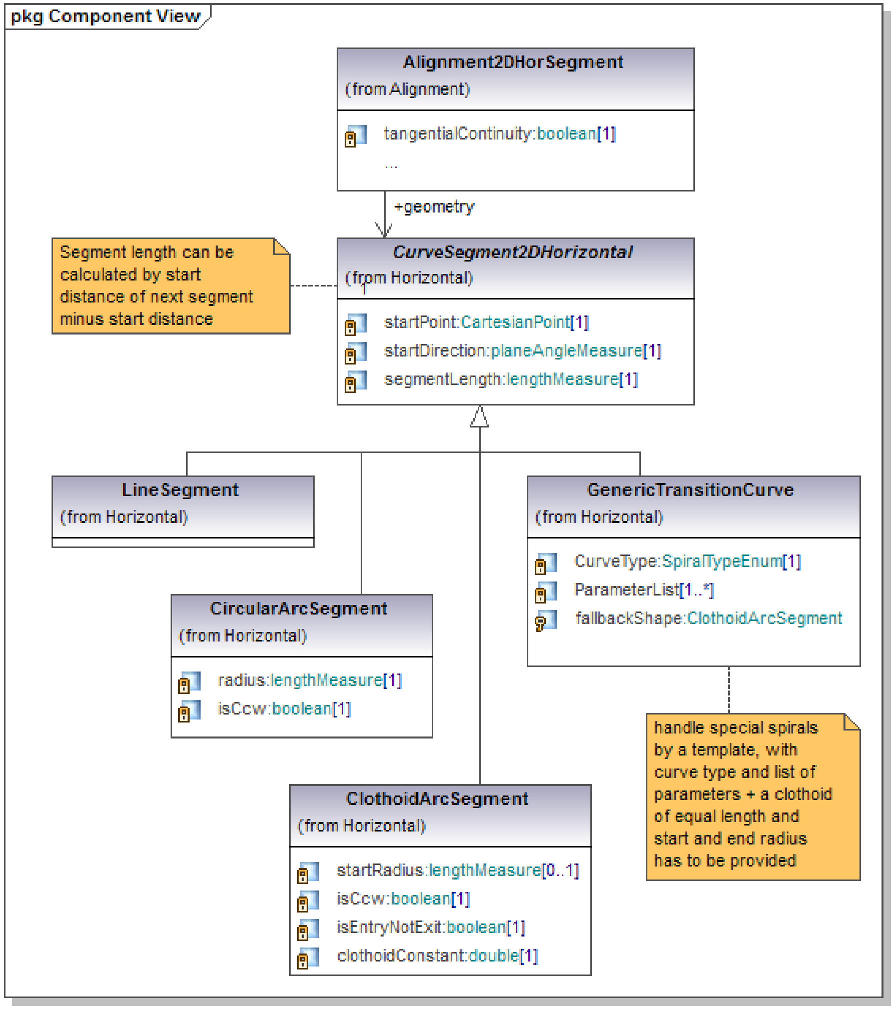
alignment can be:
- hor+ver+3D
- hor+ver
- only hor
- only 3D

the optional, single vertical alignment, by sharing the same horizontal alignment, multiple vertical alignments can be used. This results in multiple alignments.

horizontal alignment, several alignment can share a single instance of horizontal alignment, therefore enabling multiple verticals.

Vertical segment defined by start point, gradient, length and curve parameter, PVI are derived from that.

Horizontal segment defined by start point, orientation length + curve parameter.



pkg Component View

Alignment2DHorSegment
(from Alignment)
tangentialContinuity:boolean[1]
...

+geometry
1

Segment length can be calculated by start distance of next segment minus start distance

CurveSegment2DHorizontal
(from Horizontal)
startPoint:CartesianPoint[1]
startDirection:planeAngleMeasure[1]
segmentLength:lengthMeasure[1]

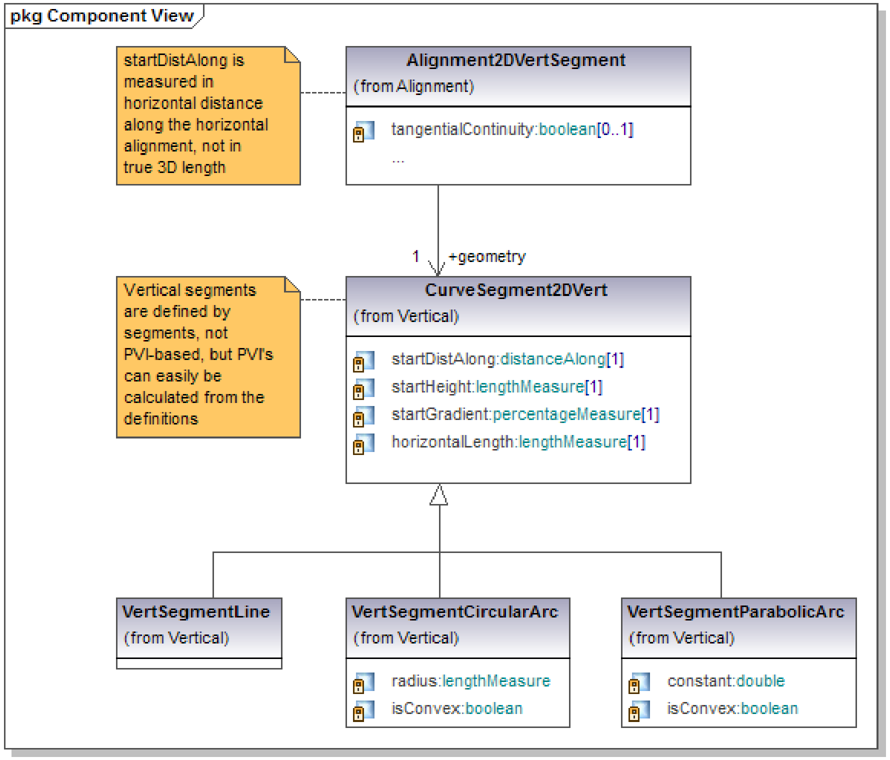
LineSegment
(from Horizontal)

GenericTransitionCurve
(from Horizontal)
CurveType:SpiralTypeEnum[1]
ParameterList[1..*]
fallbackShape:ClothoidArcSegment

CircularArcSegment
(from Horizontal)
radius:lengthMeasure[1]
isCcw:boolean[1]

handle special spirals by a template, with curve type and list of parameters + a clothoid of equal length and start and end radius has to be provided

ClothoidArcSegment
(from Horizontal)
startRadius:lengthMeasure[0..1]
isCcw:boolean[1]
isEntryNotExit:boolean[1]
clothoidConstant:double[1]



pkg Component View

startDistAlong is measured in horizontal distance along the horizontal alignment, not in true 3D length

Alignment2DVertSegment
(from Alignment)
tangentialContinuity:boolean[0..1]
...

1 +geometry

Vertical segments are defined by segments, not PVI-based, but PVI's can easily be calculated from the definitions

CurveSegment2DVert
(from Vertical)
startDistAlong:distanceAlong[1]
startHeight:lengthMeasure[1]
startGradient:percentageMeasure[1]
horizontalLength:lengthMeasure[1]

VertSegmentLine
(from Vertical)

VertSegmentCircularArc
(from Vertical)
radius:lengthMeasure
isConvex:boolean

VertSegmentParabolicArc
(from Vertical)
constant:double
isConvex:boolean

Quellen

- http://www.landxml.org/