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## Geomath/LandXML Interaction

Geomath can read and write Horizontal Alignment, Vertical Profile, Roadway Cross Section, Roadway Description, and Ground Information from/to and XML file in the standard LandXML format. The following sections explain how each item is treated for reading and writing.

### **Horizontal alignments:**

Geomath creates a horizontal alignment based on the information placed in the <Alignment> element, under the <CoordGeom> section.

Geomath saves the horizontal alignment information in the <Alignment> element, under the <CoordGeom> section.

### **- Vertical profiles:**

Geomath creates a vertical profile based on the information placed in the <Alignment> element - <Profile> sub-element, under <ProfAlign> section.

Geomath saves the vertical profile information in the LandXML format, by creating an <Alignment> element (if the corresponding alignment doesn't exist), with a <Profile> sub-element and with the information set under the <ProfAlign> section.

### **- Roadway Cross Sections:**

In LandXML version 1.0, this information is placed in the <GradeModel> element - <GradeSurface> sub-element, under the <Zones> section. The <Zones> section contains a series of zones that are a structure that describes a portion of the cross section of the road. Each zone runs along the alignment at the width specified in the <ZoneWidth> element and at the cross slope defined in the <ZoneSlope> element. Each zone has a starting and an ending value for station, width and cross slope values. The zone can then be modified by multiple <ZoneWidth> and <ZoneSlope> elements (the zone width is independent from zone slope). <Zones> also specify which side of the alignment the following <Zone> objects apply. There must be a minimum of one <Zones> object and a maximum of two – one for each side of the roadway. Using the information available in the GradeModel, Geomath creates the roadway cross sections.

In LandXML version 1.1, this information is placed in the <Alignment> element - <CrossSects> sub-element, under the <CrossSect> section. In each cross section <CrossSect> there are two collections of design cross sections, Left and Right of the center line or profile grade line.

<DesignCrossSectSurfs> is a collection of <DesignCrossSectSurf> elements – at least one is required and a maximum of two may be defined (for right and left side of PGL).

<DesignCrossSectSurf> is a collection of <CrossSectPnt> elements (points given by

offset/elevation or slope/distance). Using the information available in the <Alignment> - <CrossSects> section, Geomath creates the roadway cross sections.

Geomath creates the roadway cross sections in a similar manner to the one used by LandXML version 1.1. Therefore, Geomath saves the roadway cross section information in the LandXML format, by creating an <Alignment> element (if the corresponding alignment doesn't exist), with a <CrossSects> sub-element, and with the information set under the <CrossSect> section. The writing process is compatible only with the version 1.1.

#### **- Roadways:**

For version 1.0, the <Roadway> element needs to have specified both the alignment and the grade model references in order to create the roadway. The referenced alignment will come with the information about the horizontal alignment and vertical profile, and the referenced grade model will provide the information about the roadway cross section. Having the full set of information about the horizontal alignment, vertical profile and the roadway cross section, Geomath creates a roadway using these 3 elements as references.

For version 1.1, the <Roadway> element needs to have specified only the alignment reference in order to create the roadway. All the information about horizontal alignment, vertical profile and roadway cross section are saved in the referenced alignment. Having the full set of information about the horizontal alignment, vertical profile and the roadway cross section, Geomath creates a roadway using these 3 elements as references.

Geomath saves the roadway information in the LandXML format, by creating a <Roadway> element and setting the alignment reference (having the alignment already saved with information about horizontal alignment, vertical profile and roadway cross section). The writing process is compatible only with version 1.1.

#### **- Grounds**

Geomath creates a ground based on the information placed in the <Surface> element - <Definition> section – this section contains a set of points and faces (triangles/grid) resulted after the triangulation process.

Geomath saves the vertical profile information in the LandXML format, by creating a <Surface> element, with the information set under the <Definition> section.