DIGGS Data Model

documentInformation

project

samplingFeature

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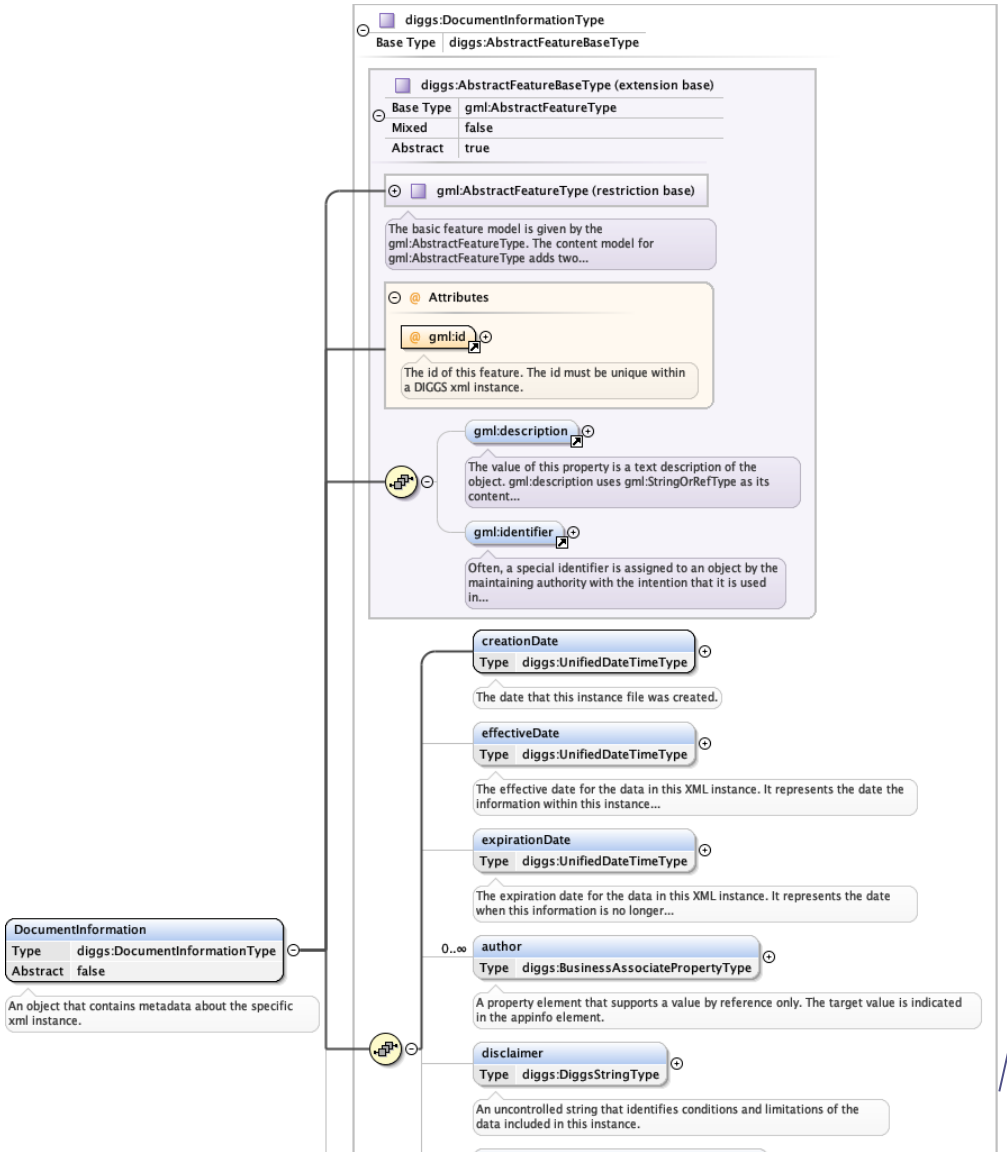
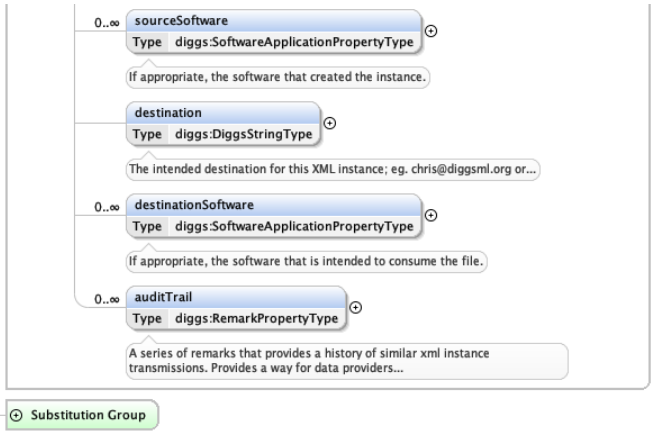
documentInformation



An object that contains metadata about the specific xml instance.



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Project

- A business activity that utilzes of a collection of sampling features, activities, samples, measurements and observations. A project may occur at a physical location, in which case it can optionally contain geometries.

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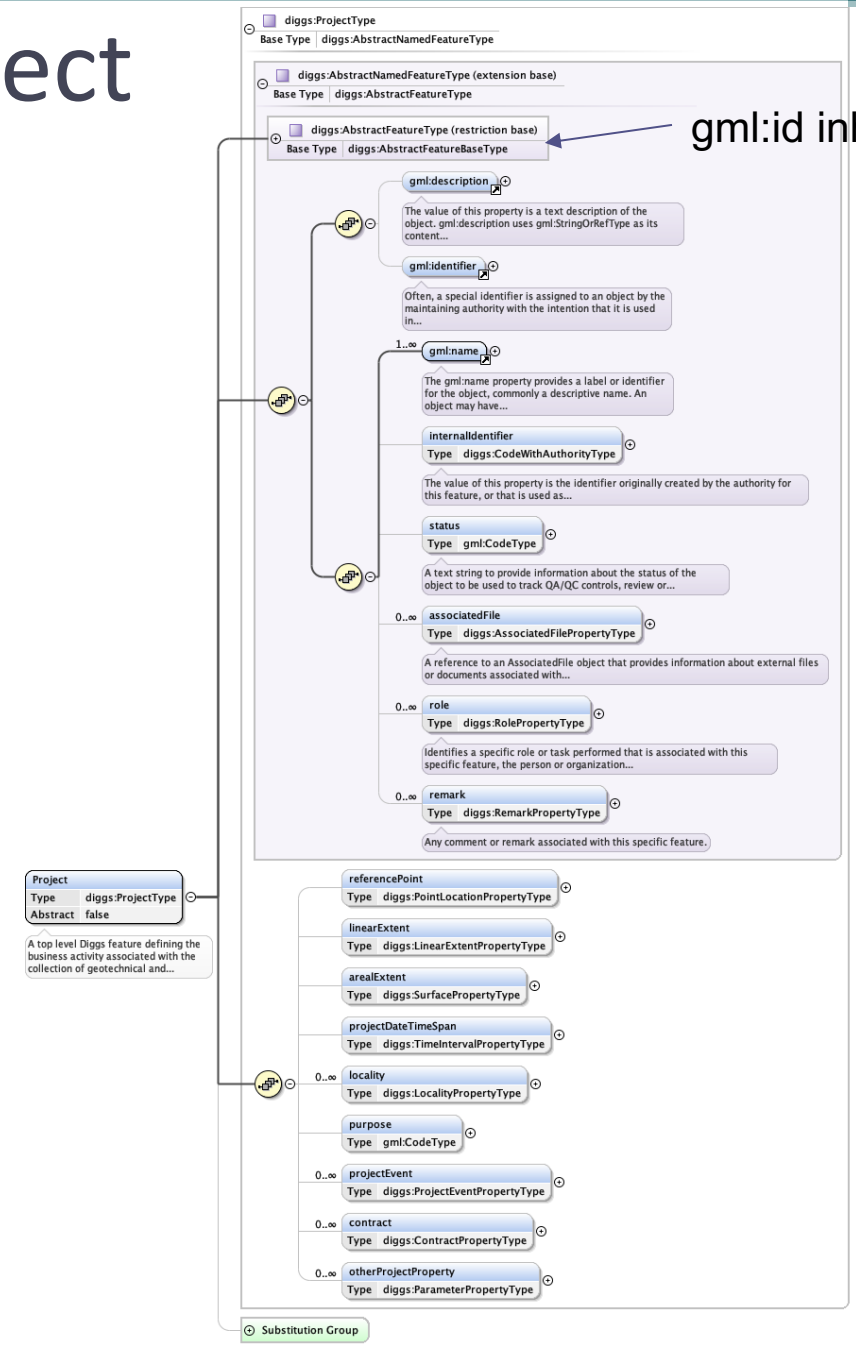
Project



gml:id inherited from here

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Sampling Features

- What are we investigating?

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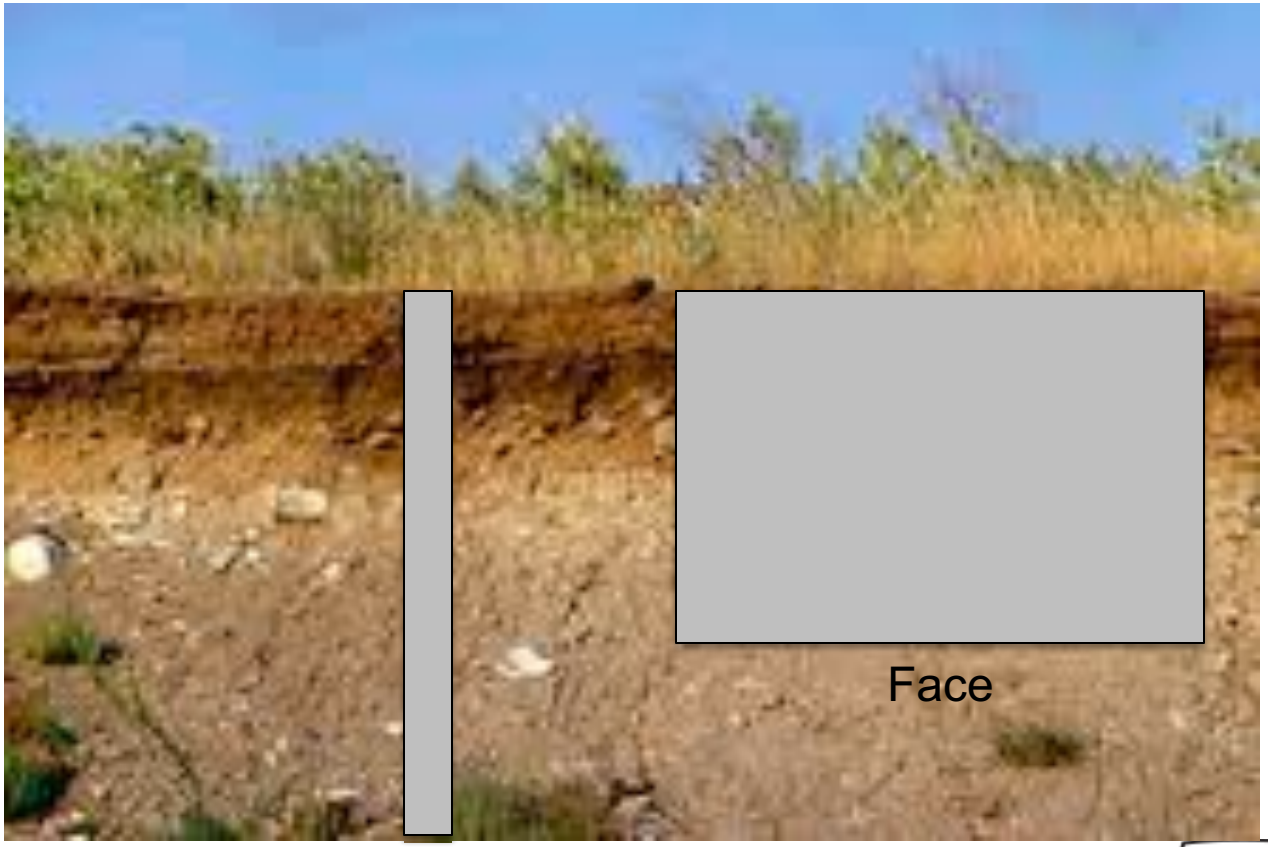
We observe/measure properties of the investigation target via a *sampling feature*



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Current Diggs Sampling Features

1D (modeled by a GML LineString)

- Borehole
- Sounding
- Transect
- Trial Pit (AGS Legacy)
- Well (Installation)

2D (modeled by a GML Polygon)

- TrenchWall

0D (modeled by a GML Point)

- Station

Borehole

Face

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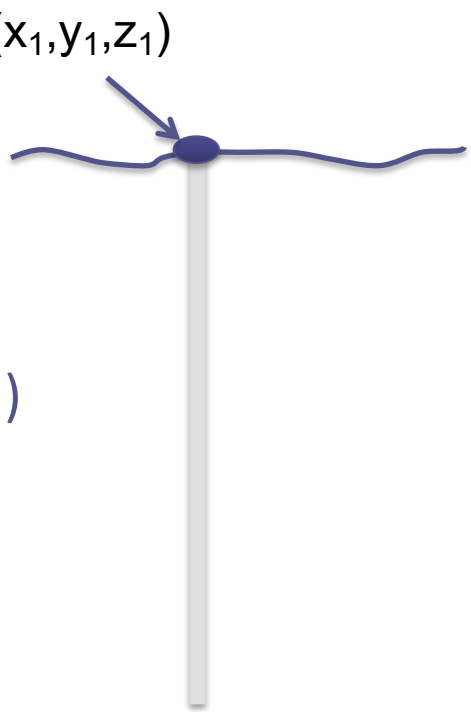
Sampling Features define the geographic and geometric context of the data we obtain

- Borehole Geometry
  - referencePoint (GML point)
    - Usually at one end of the borehole path
      - Eg. top of hole at land surface, rig table, etc.)
    - Represented in 3 dimensions (x, y, z)
    - Useful for map view representations




```
<referencePoint>
    <PointLocation gml:id="cpt1" srsName="urn:diggs:def:crs:DIGGS:0.1:26911_5703" srsDimension="3">
      <gml:pos>387416.665116977 3742645.12297961 6</gml:pos>
    </PointLocation>
</referencePoint>
```

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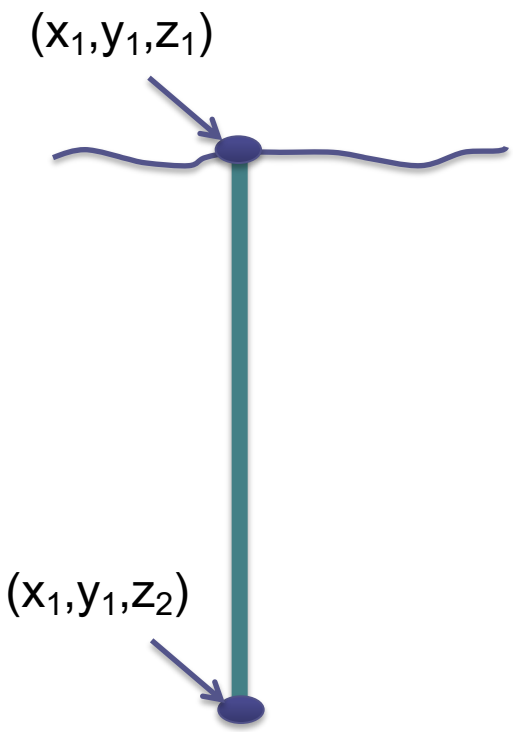
Sampling Features define the geographic and geometric context of the data we obtain

- Borehole Geometry
  - centerLine (GML LineString)
    - A connected set of vertices that define the borehole path
    - Represented in 3 dimensions
    - A borehole can have more than one centerLine property




```
<centerLine>
    <LinearExtent gml:id="ls1" srsDimension="3" srsName="urn:diggs:def:crs:DIGGS:0.1:26911_5703">
      <gml:posList>387416 3742645 6 387416 3742645 1.44</gml:posList>
    </LinearExtent>
</centerLine>
```

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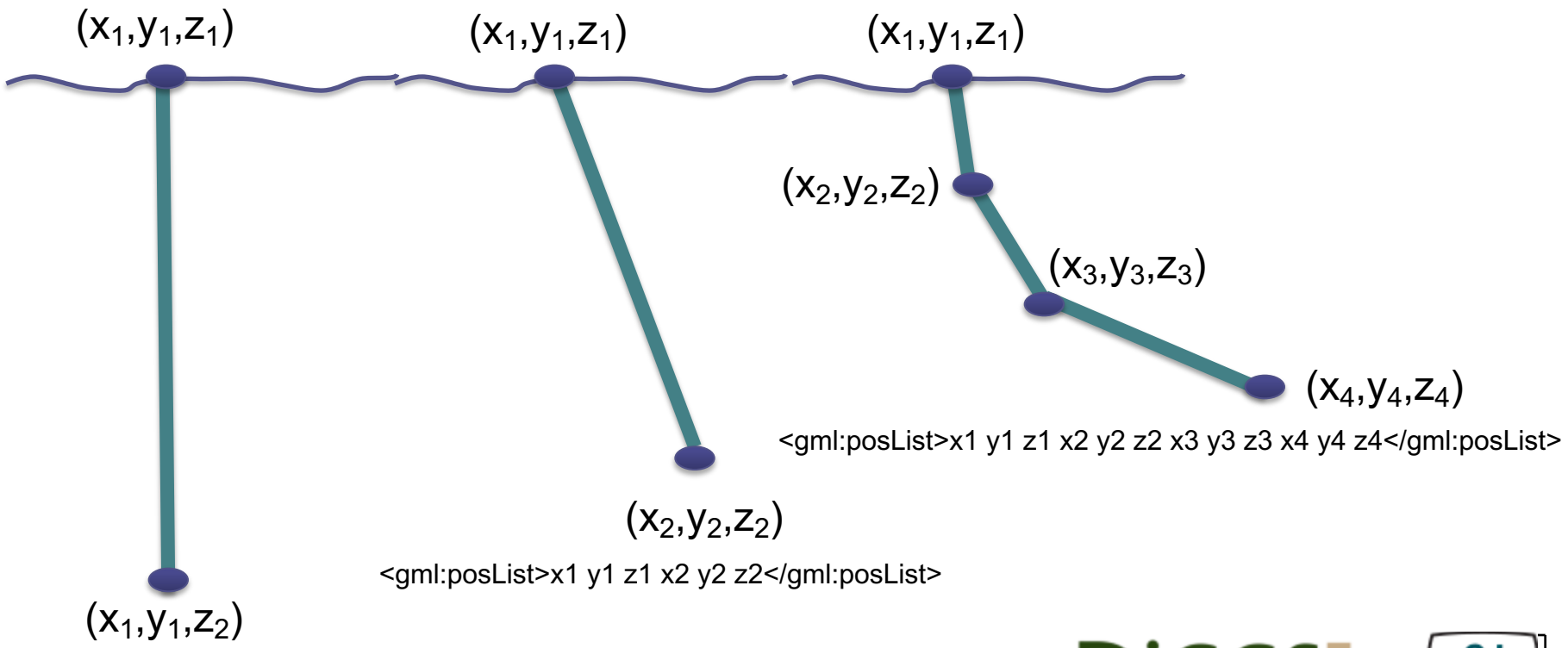
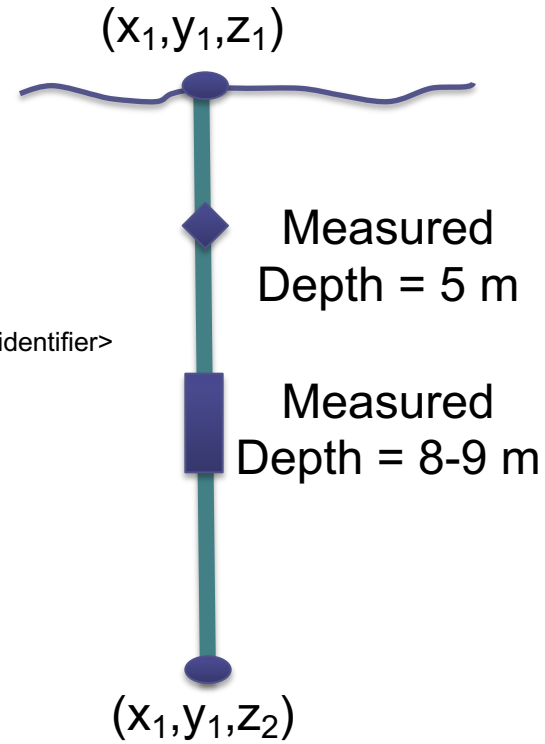
Can DIGGS represent inclined or deviated boreholes?

- YES!! (it's all in the gml:posList property)



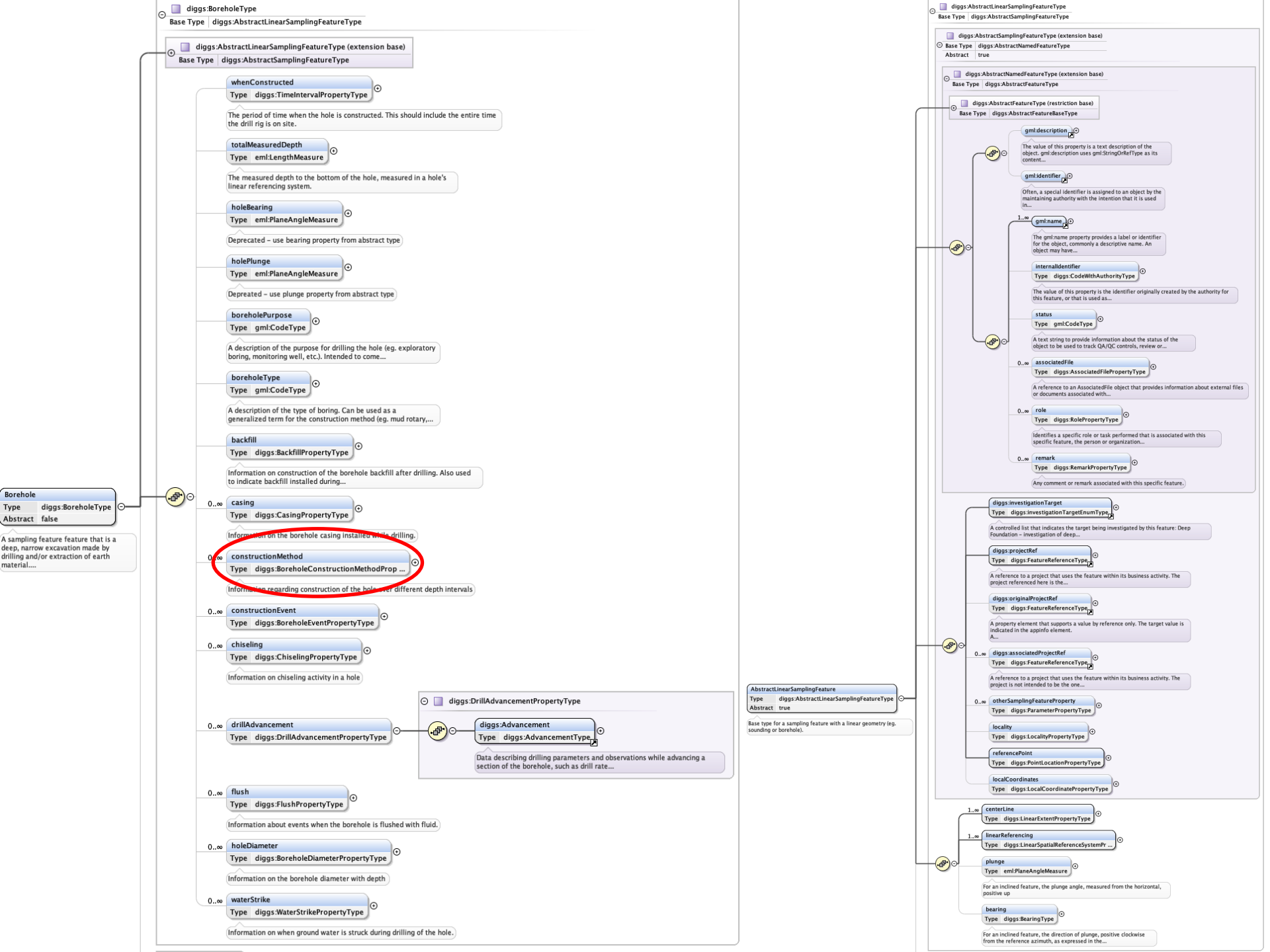
How do we represent the position of samples/measurements within a borehole?

- Linear referencing (GML 3.3)

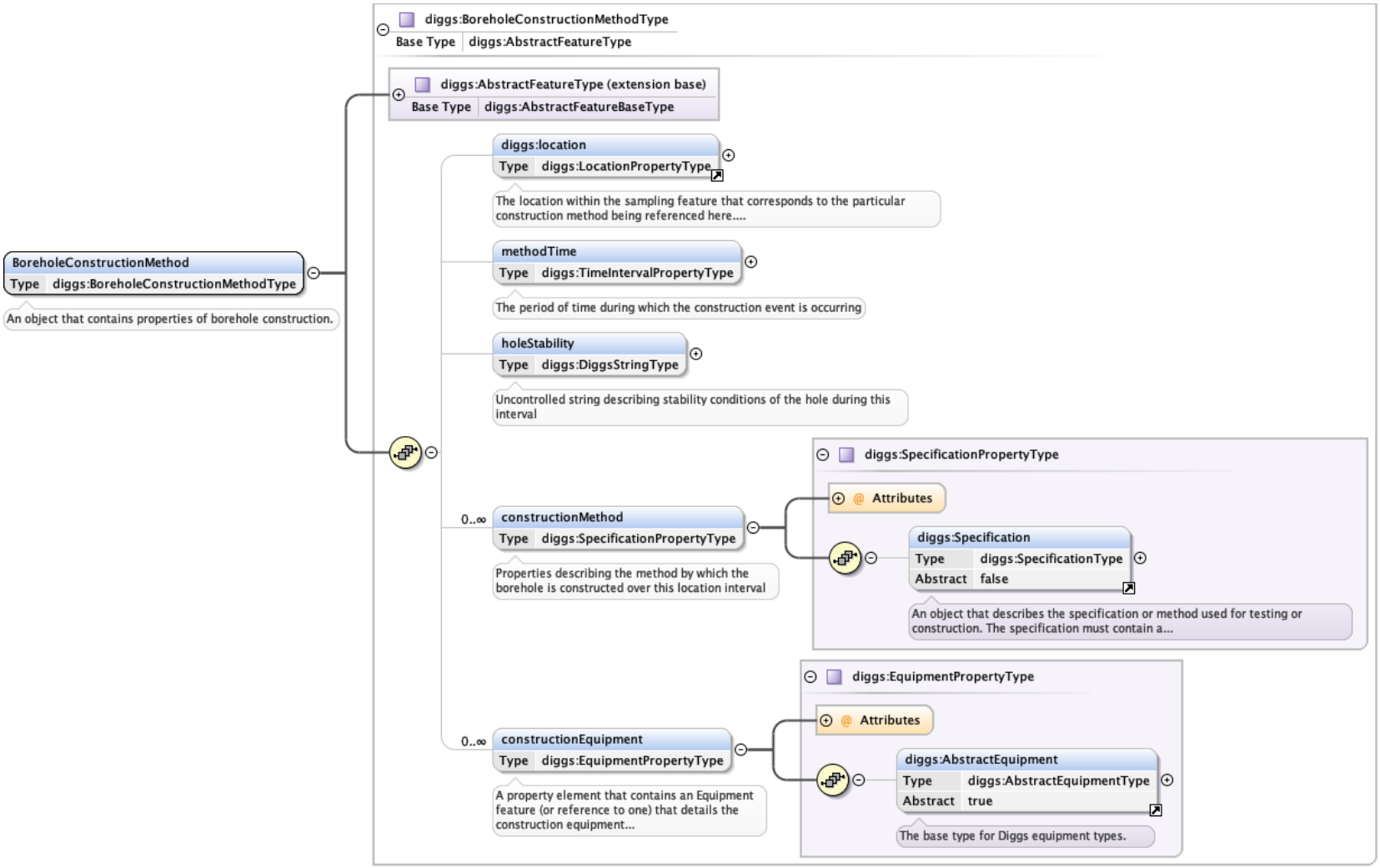



```
<linearReferencing>
    <LinearSpatialReferenceSystem gml:id="cptsr1">
      <gml:identifier codeSpace="urn:x-diggs:def:authority:DIGGSINC">urn:diggs:def:fi:DIGGSINC:cptsr1</gml:identifier>
      <glr:linearElement xlink:href="#ls1"/>
      <glr:lrm>
        <glr:LinearReferencingMethod gml:id="lrcpt1">
          <glr:name>chainage</glr:name>
          <glr:type>absolute</glr:type>
          <glr:units>m</glr:units>
        </glr:LinearReferencingMethod>
      </glr:lrm>
    </LinearSpatialReferenceSystem>
</linearReferencing>
```

```
<sampleLocation>
        <LinearExtent gml:id="lpt122" srsName="#cptsr1" srsDimension="1">
          <gml:posList>5 8.9</gml:posList>
        </LinearExtent>
</sampleLocation>
```


Borehole
Type diggs:BoreholeType
Abstract false
A sampling feature feature that is a deep, narrow excavation made by drilling and/or extraction of earth material....
diggs:BoreholeType
Base Type diggs:AbstractLinearSamplingFeatureType
diggs:AbstractLinearSamplingFeatureType (extension base)
Base Type diggs:AbstractSamplingFeatureType
whenConstructed
Type diggs:TimeIntervalPropertyType
The period of time when the hole is constructed. This should include the entire time the drill rig is on site.
totalMeasuredDepth
Type eml:LengthMeasure
The measured depth to the bottom of the hole, measured in a hole's linear referencing system.
holeBearing
Type eml:PlaneAngleMeasure
Deprecated – use bearing property from abstract type
holePlunge
Type eml:PlaneAngleMeasure
Depreated – use plunge property from abstract type
boreholePurpose
Type gml:CodeType
A description of the purpose for drilling the hole (eg. exploratory boring, monitoring well, etc.). Intended to come...
boreholeType
Type gml:CodeType
A description of the type of boring. Can be used as a generalized term for the construction method (eg. mud rotary,...
backfill
Type diggs:BackfillPropertyType
Information on construction of the borehole backfill after drilling. Also used to indicate backfill installed during...
0..∞ casing
Type diggs:CasingPropertyType
Information on the borehole casing installed while drilling.
0..∞ constructionMethod
Type diggs:BoreholeConstructionMethodProp ...
Information regarding construction of the hole over different depth intervals
0..∞ constructionEvent
Type diggs:BoreholeEventPropertyType
0..∞ chiseling
Type diggs:ChiselingPropertyType
Information on chiseling activity in a hole
0..∞ drillAdvancement
Type diggs:DrillAdvancementPropertyType
diggs:DrillAdvancementPropertyType
diggs:Advancement
Type diggs:AdvancementType
Data describing drilling parameters and observations while advancing a section of the borehole, such as drill rate...
0..∞ flush
Type diggs:FlushPropertyType
Information about events when the borehole is flushed with fluid.
0..∞ holeDiameter
Type diggs:BoreholeDiameterPropertyType
Information on the borehole diameter with depth
0..∞ waterStrike
Type diggs:WaterStrikePropertyType
Information on when ground water is struck during drilling of the hole.
AbstractLinearSamplingFeature
Type diggs:AbstractLinearSamplingFeatureType
Abstract true
Base type for a sampling feature with a linear geometry (eg. sounding or borehole).
diggs:AbstractLinearSamplingFeatureType
Base Type diggs:AbstractSamplingFeatureType
diggs:AbstractSamplingFeatureType (extension base)
Base Type diggs:AbstractNamedFeatureType
Abstract true
diggs:AbstractNamedFeatureType (extension base)
Base Type diggs:AbstractFeatureType
diggs:AbstractFeatureType (restriction base)
Base Type diggs:AbstractFeatureBaseType
gml:description
The value of this property is a text description of the object. gml:description uses gml:StringOrRefType as its content...
gml:identifier
Often, a special identifier is assigned to an object by the maintaining authority with the intention that it is used in...
1..∞ gml:name
The gml:name property provides a label or identifier for the object, commonly a descriptive name. An object may have...
internalIdentifier
Type diggs:CodeWithAuthorityType
The value of this property is the identifier originally created by the authority for this feature, or that is used as...
status
Type gml:CodeType
A text string to provide information about the status of the object to be used to track QA/QC controls, review or...
0..∞ associatedFile
Type diggs:AssociatedFilePropertyType
A reference to an AssociatedFile object that provides information about external files or documents associated with...
0..∞ role
Type diggs:RolePropertyType
Identifies a specific role or task performed that is associated with this specific feature, the person or organization...
0..∞ remark
Type diggs:RemarkPropertyType
Any comment or remark associated with this specific feature.
diggs:investigationTarget
Type diggs:investigationTargetEnumType
A controlled list that indicates the target being investigated by this feature: Deep Foundation – investigation of deep...
diggs:projectRef
Type diggs:FeatureReferenceType
A reference to a project that uses the feature within its business activity. The project referenced here is the...
diggs:originalProjectRef
Type diggs:FeatureReferenceType
A property element that supports a value by reference only. The target value is indicated in the appinfo element. A...
0..∞ diggs:associatedProjectRef
Type diggs:FeatureReferenceType
A reference to a project that uses the feature within its business activity. The project is not intended to be the one...
0..∞ otherSamplingFeatureProperty
Type diggs:ParameterPropertyType
locality
Type diggs:LocalityPropertyType
referencePoint
Type diggs:PointLocationPropertyType
localCoordinates
Type diggs:LocalCoordinatePropertyType
1..∞ centerLine
Type diggs:LinearExtentPropertyType
1..∞ linearReferencing
Type diggs:LinearSpatialReferenceSystemPr ...
plunge
Type eml:PlaneAngleMeasure
For an inclined feature, the plunge angle, measured from the horizontal, positive up
bearing
Type diggs:BearingType
For an inclined feature, the direction of plunge, positive clockwise from the reference azimuth, as expressed in the...

ConstructionMethod



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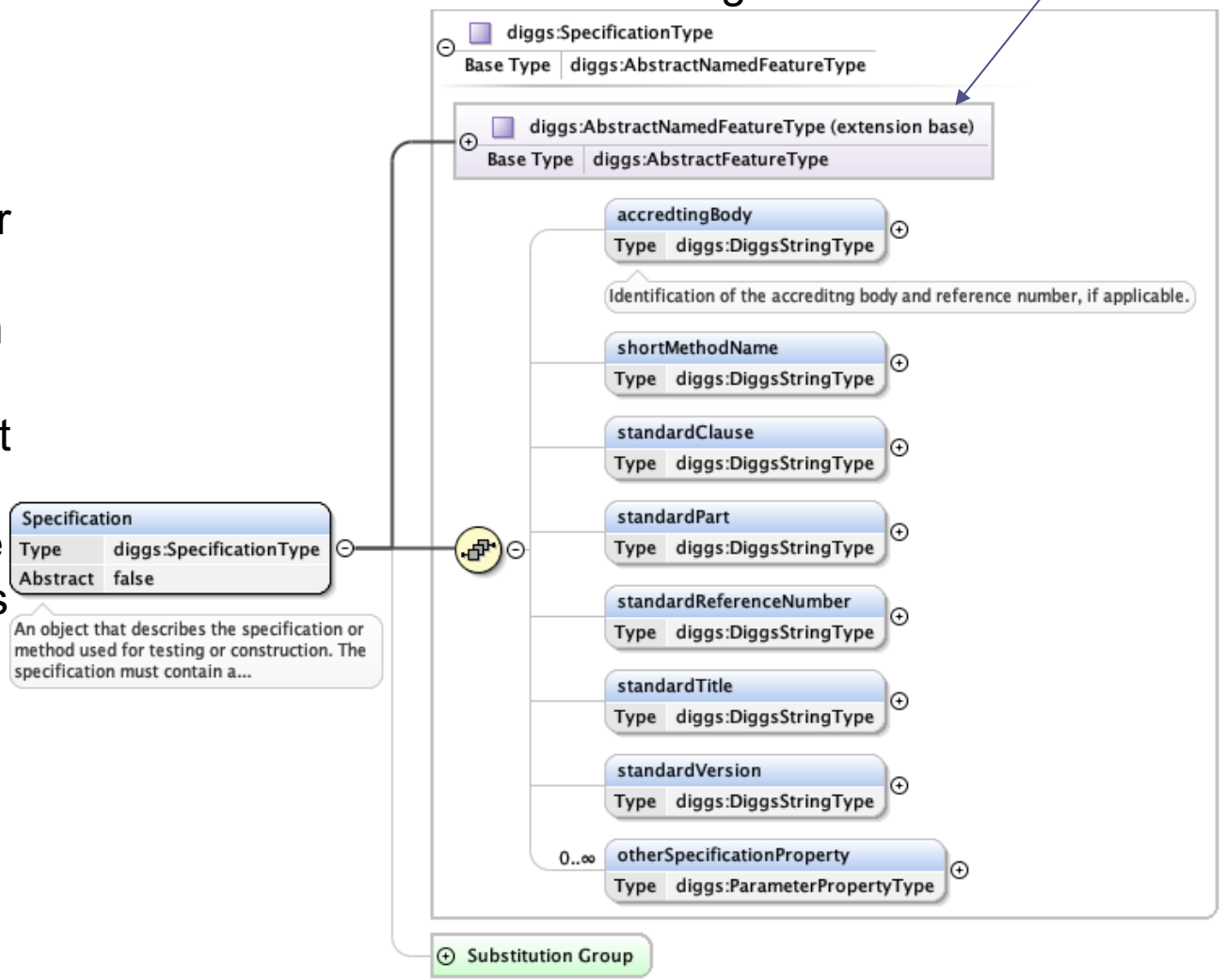
Specification

An object that describes the specification or method used for testing or construction. The specification must contain a gml:name, which may be simply a text string that describes the test specification or procedure used. - eg. ASTM 2722 as informative. Non-standardized specifications should be described under the gml:description property or within the optional properties.

gml:id, gml:description, gml:name



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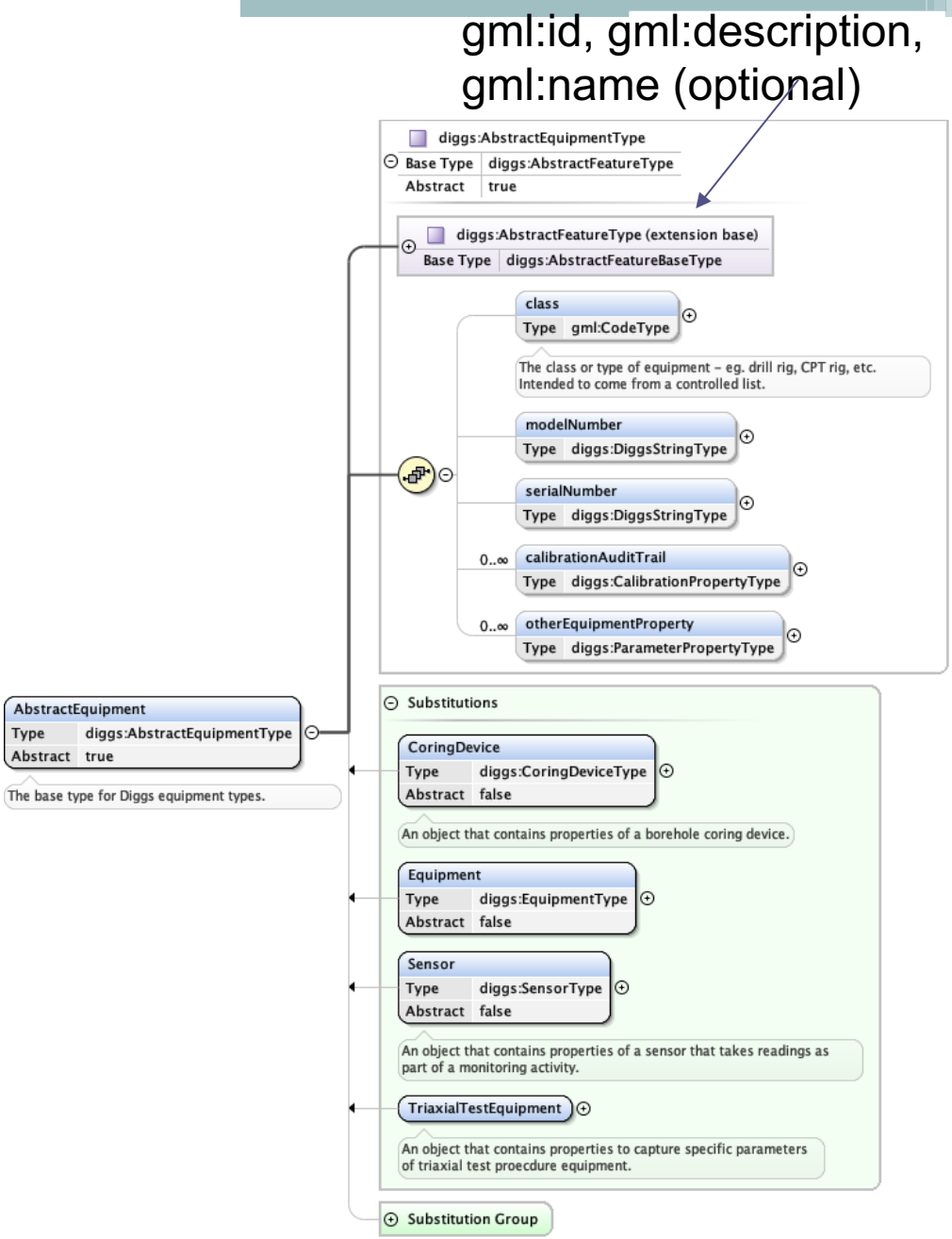
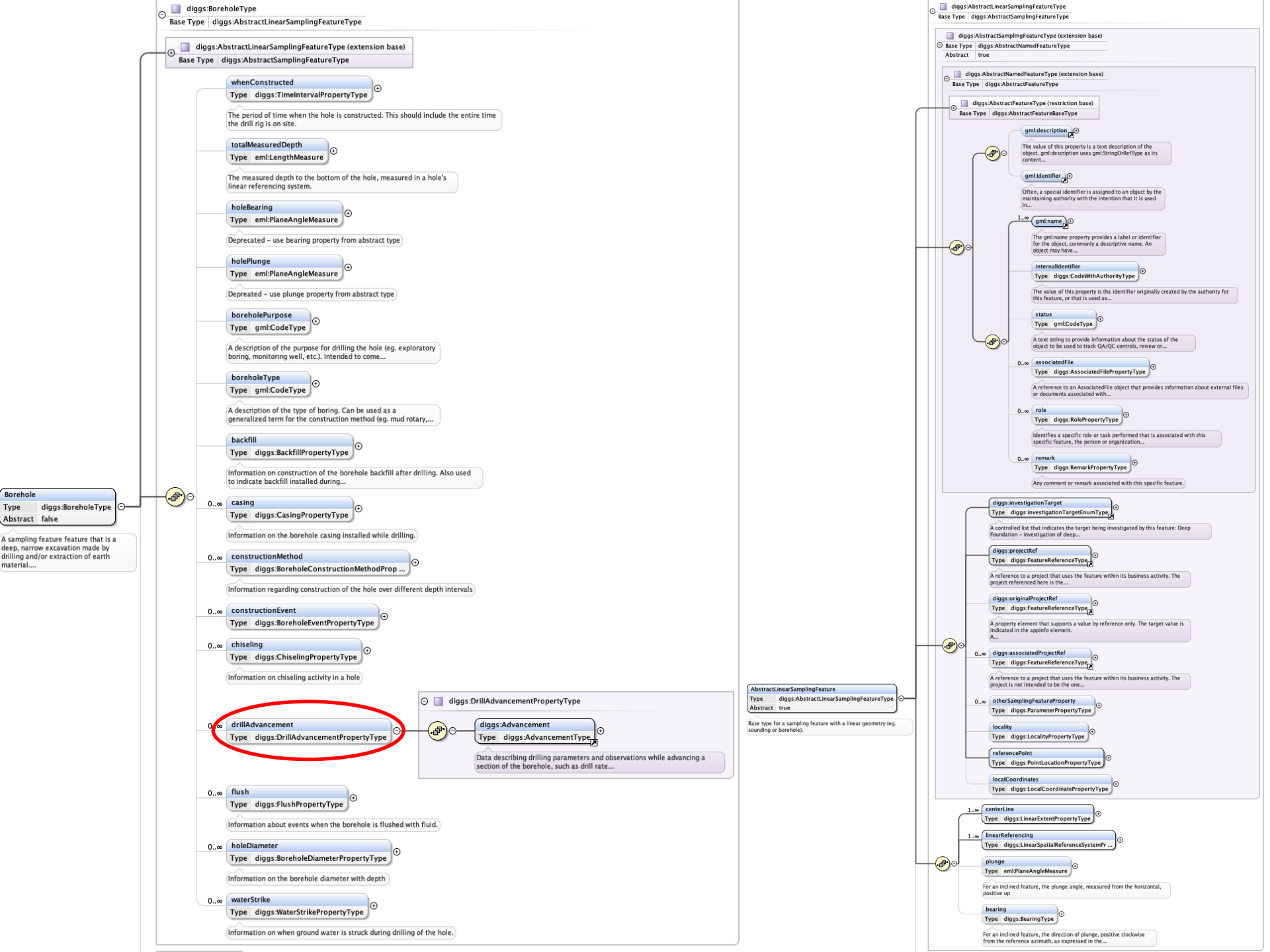
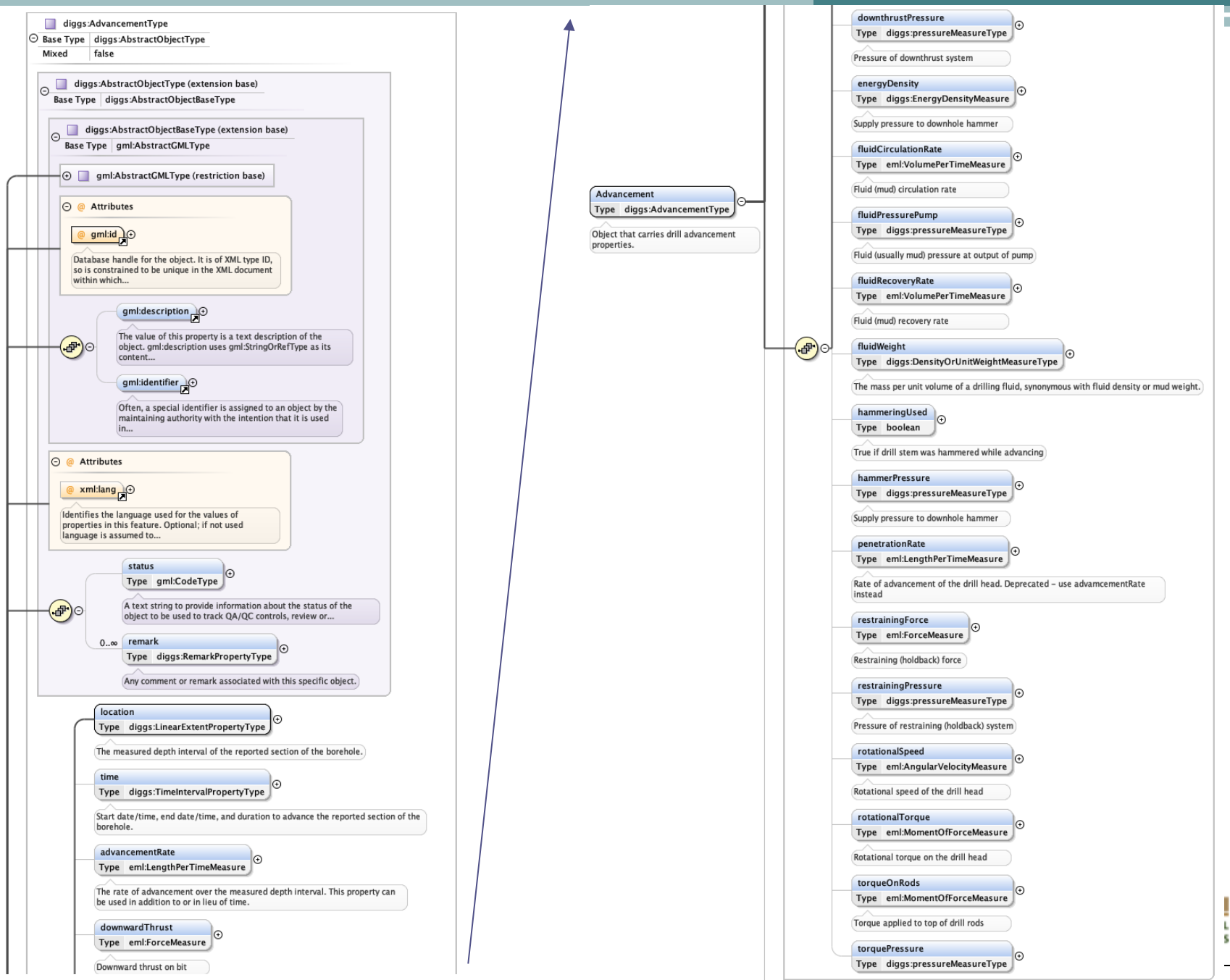
Equipment

An object that contains properties of equipment used to construct, test, or monitor objects within the geotechnical and geoenvironmental domains.




Borehole
Type diggs:BoreholeType
Abstract false
A sampling feature feature that is a deep, narrow excavation made by drilling and/or extraction of earth material....
diggs:BoreholeType
Base Type diggs:AbstractLinearSamplingFeatureType
diggs:AbstractLinearSamplingFeatureType (extension base)
Base Type diggs:AbstractSamplingFeatureType
whenConstructed
Type diggs:TimeIntervalPropertyType
The period of time when the hole is constructed. This should include the entire time the drill rig is on site.
totalMeasuredDepth
Type eml:LengthMeasure
The measured depth to the bottom of the hole, measured in a hole's linear referencing system.
holeBearing
Type eml:PlaneAngleMeasure
Deprecated – use bearing property from abstract type
holePlunge
Type eml:PlaneAngleMeasure
Depreated – use plunge property from abstract type
boreholePurpose
Type gml:CodeType
A description of the purpose for drilling the hole (eg. exploratory boring, monitoring well, etc.). Intended to come...
boreholeType
Type gml:CodeType
A description of the type of boring. Can be used as a generalized term for the construction method (eg. mud rotary,...
backfill
Type diggs:BackfillPropertyType
Information on construction of the borehole backfill after drilling. Also used to indicate backfill installed during...
0..∞ casing
Type diggs:CasingPropertyType
Information on the borehole casing installed while drilling.
0..∞ constructionMethod
Type diggs:BoreholeConstructionMethodProp ...
Information regarding construction of the hole over different depth intervals
0..∞ constructionEvent
Type diggs:BoreholeEventPropertyType
0..∞ chiseling
Type diggs:ChiselingPropertyType
Information on chiseling activity in a hole
0..∞ drillAdvancement
Type diggs:DrillAdvancementPropertyType
diggs:DrillAdvancementPropertyType
diggs:Advancement
Type diggs:AdvancementType
Data describing drilling parameters and observations while advancing a section of the borehole, such as drill rate...
0..∞ flush
Type diggs:FlushPropertyType
Information about events when the borehole is flushed with fluid.
0..∞ holeDiameter
Type diggs:BoreholeDiameterPropertyType
Information on the borehole diameter with depth
0..∞ waterStrike
Type diggs:WaterStrikePropertyType
Information on when ground water is struck during drilling of the hole.
AbstractLinearSamplingFeature
Type diggs:AbstractLinearSamplingFeatureType
Abstract true
Base type for a sampling feature with a linear geometry (eg. sounding or borehole).
diggs:AbstractLinearSamplingFeatureType
Base Type diggs:AbstractSamplingFeatureType
diggs:AbstractSamplingFeatureType (extension base)
Base Type diggs:AbstractNamedFeatureType
Abstract true
diggs:AbstractNamedFeatureType (extension base)
Base Type diggs:AbstractFeatureType
diggs:AbstractFeatureType (restriction base)
Base Type diggs:AbstractFeatureBaseType
gml:description
The value of this property is a text description of the object. gml:description uses gml:StringOrRefType as its content...
gml:identifier
Often, a special identifier is assigned to an object by the maintaining authority with the intention that it is used in...
1..∞ gml:name
The gml:name property provides a label or identifier for the object, commonly a descriptive name. An object may have...
internalIdentifier
Type diggs:CodeWithAuthorityType
The value of this property is the identifier originally created by the authority for this feature, or that is used as...
status
Type gml:CodeType
A text string to provide information about the status of the object to be used to track QA/QC controls, review or...
0..∞ associatedFile
Type diggs:AssociatedFilePropertyType
A reference to an AssociatedFile object that provides information about external files or documents associated with...
0..∞ role
Type diggs:RolePropertyType
Identifies a specific role or task performed that is associated with this specific feature, the person or organization...
0..∞ remark
Type diggs:RemarkPropertyType
Any comment or remark associated with this specific feature.
diggs:investigationTarget
Type diggs:investigationTargetEnumType
A controlled list that indicates the target being investigated by this feature: Deep Foundation – investigation of deep...
diggs:projectRef
Type diggs:FeatureReferenceType
A reference to a project that uses the feature within its business activity. The project referenced here is the...
diggs:originalProjectRef
Type diggs:FeatureReferenceType
A property element that supports a value by reference only. The target value is indicated in the appinfo element. A...
0..∞ diggs:associatedProjectRef
Type diggs:FeatureReferenceType
A reference to a project that uses the feature within its business activity. The project is not intended to be the one...
0..∞ otherSamplingFeatureProperty
Type diggs:ParameterPropertyType
locality
Type diggs:LocalityPropertyType
referencePoint
Type diggs:PointLocationPropertyType
localCoordinates
Type diggs:LocalCoordinatePropertyType
1..∞ centerLine
Type diggs:LinearExtentPropertyType
1..∞ linearReferencing
Type diggs:LinearSpatialReferenceSystemPr ...
plunge
Type eml:PlaneAngleMeasure
For an inclined feature, the plunge angle, measured from the horizontal, positive up
bearing
Type diggs:BearingType
For an inclined feature, the direction of plunge, positive clockwise from the reference azimuth, as expressed in the...


diggs:AdvancementType
Base Type diggs:AbstractObjectType
Mixed false
diggs:AbstractObjectType (extension base)
Base Type diggs:AbstractObjectBaseType
diggs:AbstractObjectBaseType (extension base)
Base Type gml:AbstractGMLType
gml:AbstractGMLType (restriction base)
Attributes
gml:id
Database handle for the object. It is of XML type ID, so is constrained to be unique in the XML document within which...
gml:description
The value of this property is a text description of the object. gml:description uses gml:StringOrRefType as its content...
gml:identifier
Often, a special identifier is assigned to an object by the maintaining authority with the intention that it is used in...
Attributes
xml:lang
Identifies the language used for the values of properties in this feature. Optional; if not used language is assumed to...
status
Type gml:CodeType
A text string to provide information about the status of the object to be used to track QA/QC controls, review or...
0..∞
remark
Type diggs:RemarkPropertyType
Any comment or remark associated with this specific object.
location
Type diggs:LinearExtentPropertyType
The measured depth interval of the reported section of the borehole.
time
Type diggs:TimeIntervalPropertyType
Start date/time, end date/time, and duration to advance the reported section of the borehole.
advancementRate
Type eml:LengthPerTimeMeasure
The rate of advancement over the measured depth interval. This property can be used in addition to or in lieu of time.
downwardThrust
Type eml:ForceMeasure
Downward thrust on bit
Advancement
Type diggs:AdvancementType
Object that carries drill advancement properties.
downthrustPressure
Type diggs:pressureMeasureType
Pressure of downthrust system
energyDensity
Type diggs:EnergyDensityMeasure
Supply pressure to downhole hammer
fluidCirculationRate
Type eml:VolumePerTimeMeasure
Fluid (mud) circulation rate
fluidPressurePump
Type diggs:pressureMeasureType
Fluid (usually mud) pressure at output of pump
fluidRecoveryRate
Type eml:VolumePerTimeMeasure
Fluid (mud) recovery rate
fluidWeight
Type diggs:DensityOrUnitWeightMeasureType
The mass per unit volume of a drilling fluid, synonymous with fluid density or mud weight.
hammeringUsed
Type boolean
True if drill stem was hammered while advancing
hammerPressure
Type diggs:pressureMeasureType
Supply pressure to downhole hammer
penetrationRate
Type eml:LengthPerTimeMeasure
Rate of advancement of the drill head. Deprecated – use advamcementRate instead
restrainingForce
Type eml:ForceMeasure
Restraining (holdback) force
restrainingPressure
Type diggs:pressureMeasureType
Pressure of restraining (holdback) system
rotationalSpeed
Type eml:AngularVelocityMeasure
Rotational speed of the drill head
rotationalTorque
Type eml:MomentOfForceMeasure
Rotational torque on the drill head
torqueOnRods
Type eml:MomentOfForceMeasure
Torque applied to top of drill rods
torquePressure
Type diggs:pressureMeasureType