

# infraBIM OPEN

LYON 2024 JAN 29-31

Optimizing **BIM Infrastructure Design**  
with the integration of **IDS** and **bSDD**

***Rachele A. Bernardello***  
*LIM.lab/ – University of Padova*

***Mauro Coletto***  
*SierraSoft Srl*



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2024

# The authors



**Rachele A. Bernardello**

LIM.lab/ – University of Padova



Research Fellow at the University of Padova, Department of Civil, Environmental and Building engineer.

BIM coordinator and BIM consultant.

Research interest in Building Information Modelling and Information exchange referred to Cultural Heritage and simulation environments.



**Mauro Coletto**

SierraSoft Srl



Founder and CEO of SierraSoft I have been working in the field of infrastructure and topography software for more than 30 years.

At SierraSoft I am involved in the processes of technological innovation, software development and BIM work methodology.

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# The entities



## LIM.lab/ – University of Padova

LIM.lab is the Computerized Modeling Laboratory of the ICEA Department of the University of Padova and conducts research and teaching support activities in 4 core areas of interest:

- Smartgeometry.
- Interoperable data models for the construction industry.
- BIM for historic buildings.
- BIM for infrastructures.



## SierraSoft

SierraSoft is a company that creates and markets BIM software solutions for the surveying, infrastructure design and construction industries.

SierraSoft products are available in several languages (Italian, English, German, Spanish, Portuguese, French, etc.), they include the main international standards and have been adapted to comply with the specific requirements of several countries (Italy, USA, Germany, Spain, Portugal, France, etc.).

SierraSoft products are used in more than 15 countries by surveyors, architects, engineers, engineering companies, architecture companies, construction companies, research institutes, public bodies.

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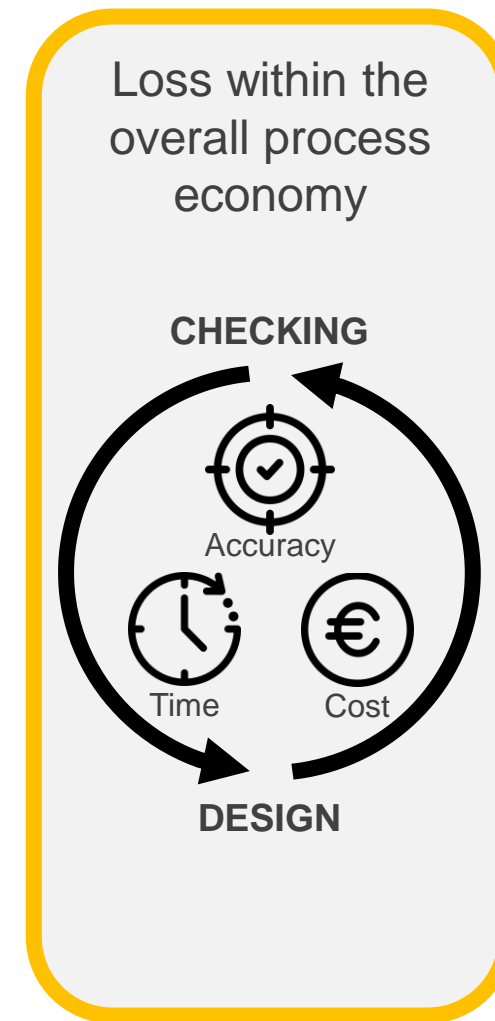
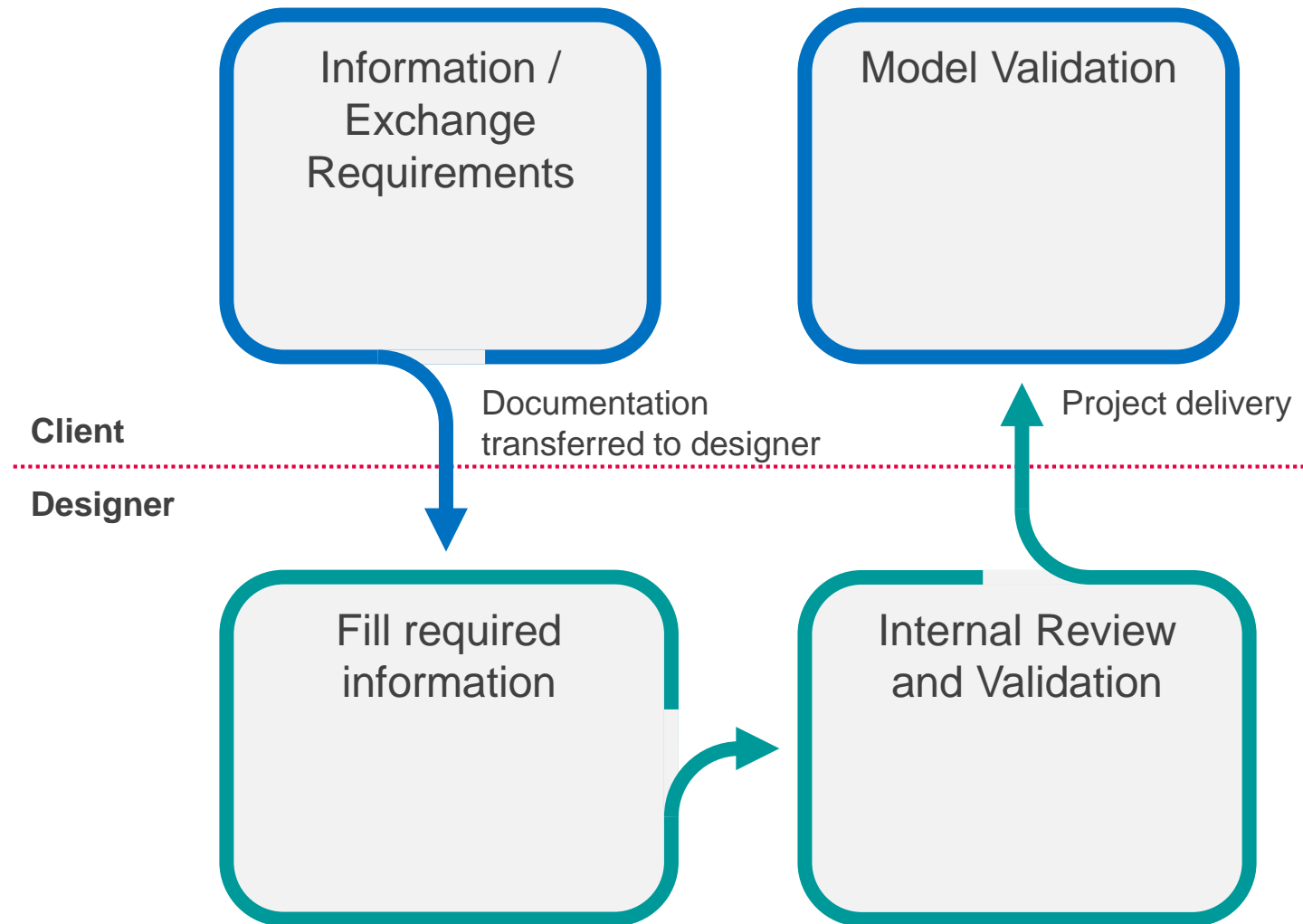
# Optimizing BIM Infrastructure Design with the integration of IDS and bSDD

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# BIM workflow

From information requirements to model validation



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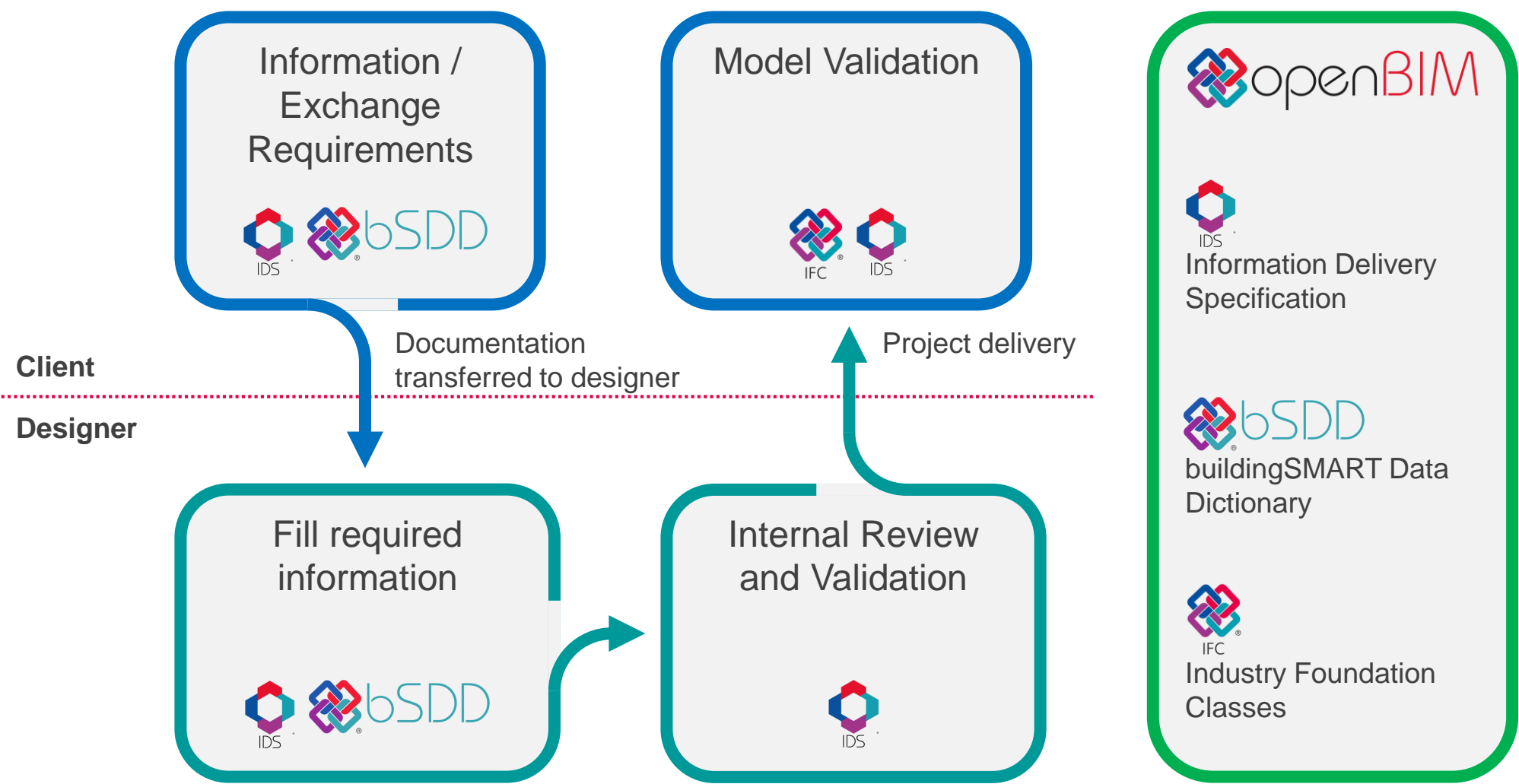
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# openBIM workflow: IDS, IFC, bSDD

From information requirements to model validation



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Information Delivery Specification

buildingSMART Data Dictionary

Industry Foundation Classes

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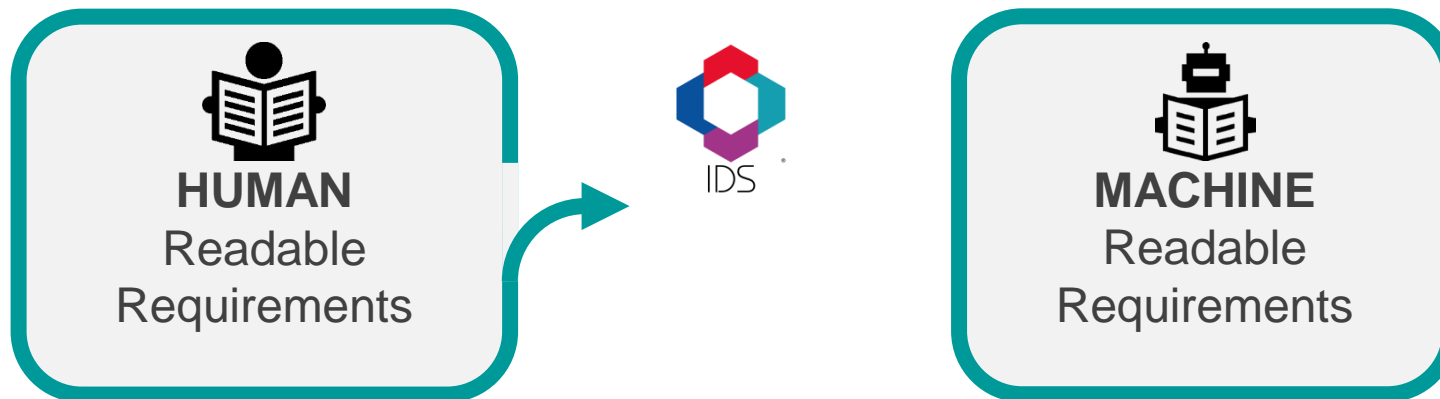
# IDS

## Information Delivery Specification

The IDS (Information Delivery Specification) is a standard from buildingSMART for defining a computer-interpretable document that defines model exchange requirements.

It defines how objects, classifications, materials, properties, and even values are to be delivered and exchanged.

Using IDS during the design phase enables designers to swiftly compile and verify information, aiding them in defining specific element characteristics and ensuring information model consistency. This also reduces the workload for the BIM coordinator when inputting data.



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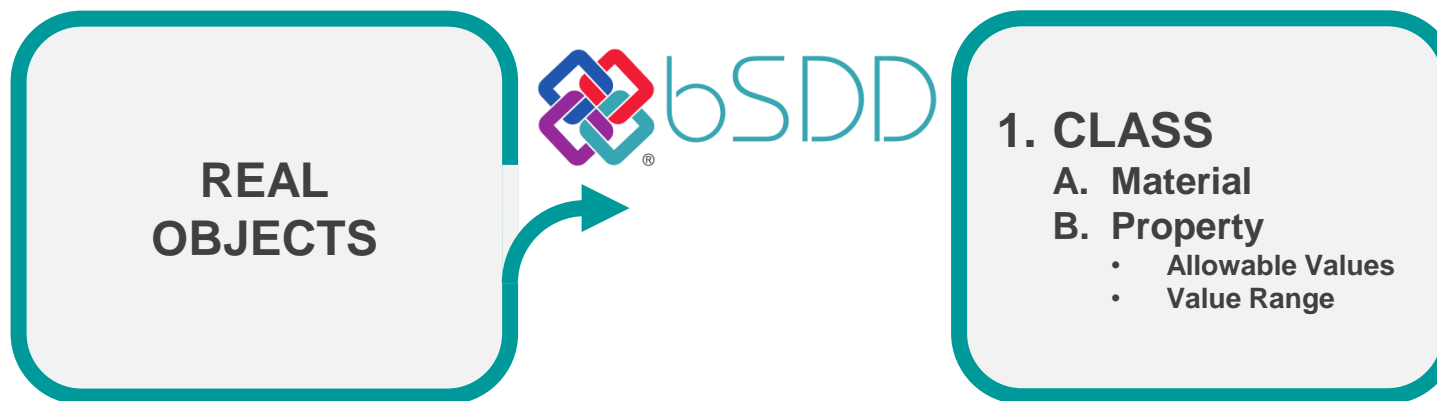
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The buildingSMART data dictionary (bSDD) is an online service from buildingSMART that hosts classes (terms) and properties, allowed values, units, translations, relationships among them, and more.

bSDD plays a pivotal role in mapping elements according to required standards and defining necessary properties, ensuring content compliance with project requirements. Moreover, integration with bSDD facilitates uniform element classification, streamlining compliance with client requirements and the integration of necessary elements into the model in line with project specifications (BEP).



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# Integrate IDS and bSDD in the flow of the design phase

## Importance of Accessible Services in BIM Software

- Meeting deadlines, ensuring quality, and maximizing earnings
- Easy accessibility within BIM modeling software
- Ensuring high standard of quality and saving time/money

## Real-time checking of Requirements

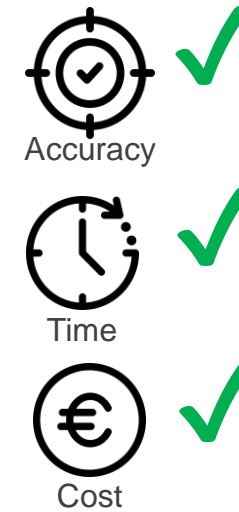
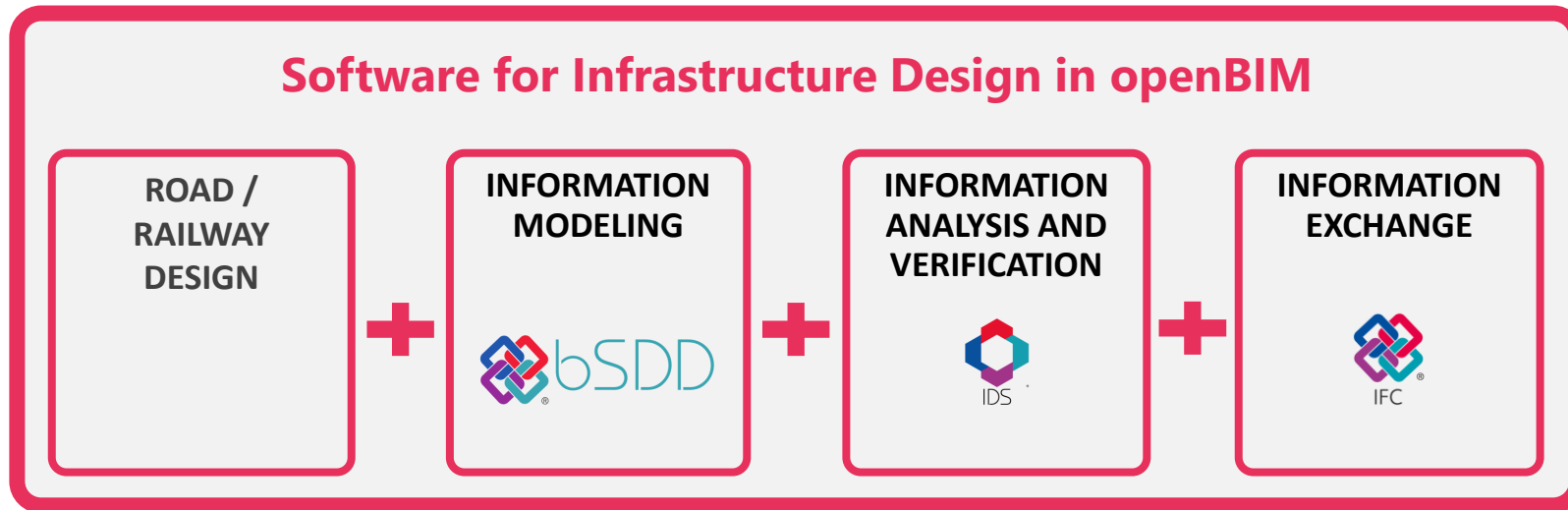
- Effective solution for designers
- Limits errors from early design stages
- Maximizes time for actual project creation

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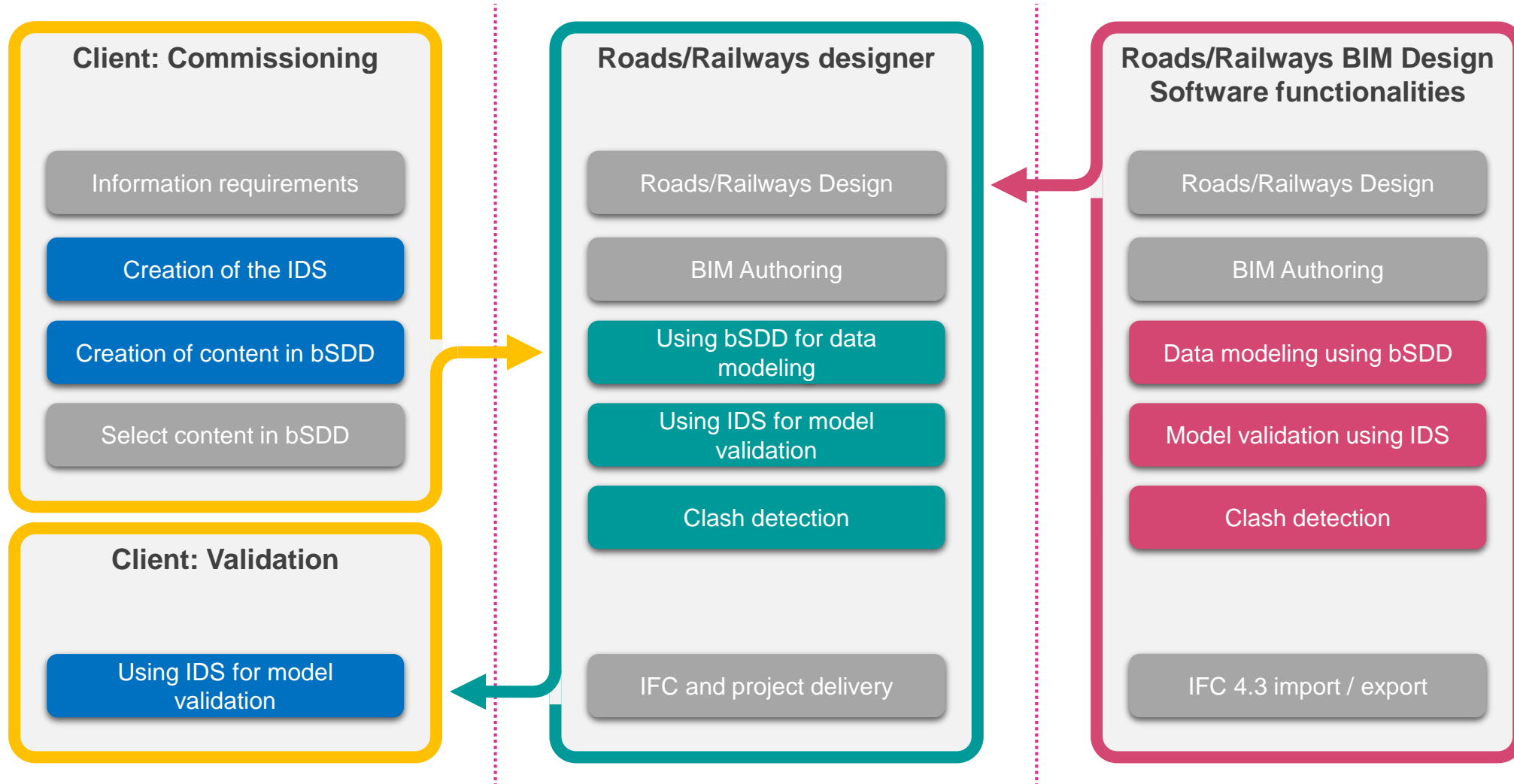
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# Process

## Optimizing design, modeling and checking



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# Where and how to apply IDS and bSDD

Where and how we apply IDS and bSDD completely changes the level of optimization and the resulting reduction in cost, time, and improvements in project quality.

We can use IDS and bSDD in three ways:

## 1. IFC Model file

On the final IFC file before delivering it to the client. This activity is subsequent to and separate from Design and BIM Authoring activities.

## 2. Model in proprietary format

IDS and bSDD are applied after the design is completed, inside the BIM authoring software, but separate from the design activity.

## 3. Parametric modeler of road/railway design

IDS and bSDD are used to define information modeling parameters, and the model is an automatic result of the design activity.

Design, BIM authoring and use of IDS and bSDD are part of the same activity.

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# The implementation: a case study

As proof of concept, we have established a specific case study: **the design of a road with a particular focus on road pavement.**

- We've mapped information requirements onto IDS.
- We've created a bSDD test domain for road pavement and courses, complete with their respective properties.
- Subsequently, we replicated the design workflow, encompassing data checks and road performance verification, all while adhering to IDS standards linked to bSDD.
- With regards to the software we used SierraSoft Infra Design Studio for Road Design which already includes parametric information modeling to which IDS and bSDD management has been integrated.

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# 1. Creation of the IDS (by Client)

## Information / Exchange Requirements

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usBIM.IDSeditor - Google Chrome

ids-editor.usbim.com/doc/35651eb5e0094842a007f830bb2f63b9/info

☰

usBIM.IDSeditor

IDS\_IBO

IDS\_IBO.ids

Bozza

Ultimo salvataggio alle ore 10:18:25

MC

✔ Documento valido ↻

Dati generali

Specifiche

1. Course WearingCourse

Report

XML

Audit

Dati generali

Titolo

IDS\_Road IBO Project

Email autore

rachele.bernardello@unipd.it

Scopo

IDS to project implementation

Milestone

Data

07/10/2024

Versione

1.0

Copyright

Descrizione

Versione 1.5.7.0

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ids-editor.usbim.com/doc/35651eb5e0094842a007f830bb2f63b9/specification/0

usBIM.IDSeditor

IDS\_IBO  
IDS\_IBO.ids

Bozza

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Documento valido

Dati generali

Specifiche

1. Course WearingCourse

Report

XML

Audit

Course WearingCourse

Generale

Filtri

Requisiti

Nome

Course WearingCourse

Identificatore

Versioni IFC

IFC4X3

Istruzioni

Descrizione

Specifica in formato leggibile

Il modello DEVE contenere entità che hanno

• classe IFC IFCCOURSE.USERDEFINED

• attributo ObjectType = WEARINGCOURSE

che SODDISFANO i seguenti requisiti

• AVERE classificazione **Propertes Road.ROD\_C.02** (Istruzioni: Must be classified as 'Strato di usura' according to the bSDD Propertes Road)

• AVERE classificazione **IFC.IfCourse** (Istruzioni: Must be classified as 'IfcCourse' according to the bSDD IFC 4.3)

• AVERE proprietà **Portanza** del PSet **Strato\_CaratteristichePrestazionali** (IFCREAL)

• AVERE proprietà **PSI** del PSet **Strato\_CaratteristichePrestazionali** (IFCREAL)

• AVERE proprietà **Aderenza** del PSet **Usura\_CaratteristichePrestazionali** (IFCREAL)

• AVERE proprietà **Thickness** del PSet **Qto\_CourseBaseQuantities** (IFCREAL) con valore  $\geq 0.02$  (nonché:  $\leq 0.07$ ) (Istruzioni: The value must be between 0.02 and 0.07)

• AVERE proprietà **Volume** del PSet **Qto\_CourseBaseQuantities** (IFCREAL)

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https://ids-editor.usbim.com/doc/35651eb5e0094842a007f830bb2f63b9/specification/0

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usBIM.IDSeditor - Google Chrome

ids-editor.usbim.com/doc/35651eb5e0094842a007f830bb2f63b9/xml

usBIM.IDSeditor

IDS\_IBO  
IDS\_IBO.ids

Bozza

Ultimo salvataggio alle ore 10:18:25

MC

Documento valido

Dati generali

Specifiche

1. Course WearingCourse

Report

XML

Audit

XML

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```
1 <ids:ids xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://standards.buildingsmart.org/IDS http://standards.buildingsmart.org/IDS/IDS_IBO.xsd">
2   <!-- edited with usBIM.IDSeditor (http://www.accasoftware.com) -->
3   <ids:info>
4     <ids:title>IDS_Road IBO Project</ids:title>
5     <ids:version>1.0</ids:version>
6     <ids:author>rachele.bernardello@unipd.it</ids:author>
7     <ids:date>2024-10-07</ids:date>
8     <ids:purpose>IDS to project implementation</ids:purpose>
9   </ids:info>
10  <ids:specifications>
11    <ids:specification ifcVersion="IFC4X3" name="Course WearingCourse" minOccurs="1" maxOccurs="unbounded">
12      <ids:applicability>
13        <ids:entity>
14          <ids:name>
15            <ids:simpleValue>IFCCOURSE</ids:simpleValue>
16          </ids:name>
17          <ids:predefinedType>
18            <ids:simpleValue>USERDEFINED</ids:simpleValue>
19          </ids:predefinedType>
20        </ids:entity>
21        <ids:attribute>
22          <ids:name>
23            <ids:simpleValue>ObjectType</ids:simpleValue>
24          </ids:name>
25          <ids:value>
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27          </ids:value>
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30      <ids:requirements>
31        <ids:classification minOccurs="1" maxOccurs="unbounded" instructions="Must be classified as 'Strato di usura' according to the bSDD Properties Road">
32          <ids:value>
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34          </ids:value>
35          <ids:system>
36            <ids:simpleValue>Properties Road</ids:simpleValue>
37          </ids:system>
38        </ids:classification>
39        <ids:classification minOccurs="1" maxOccurs="unbounded" instructions="Must be classified as 'IfcCourse' according to the bSDD IFC 4.3">
40          <ids:value>
41            <ids:simpleValue>IfcCourse</ids:simpleValue>
42          </ids:value>
43          <ids:system>
```

Versione 1.5.7.0

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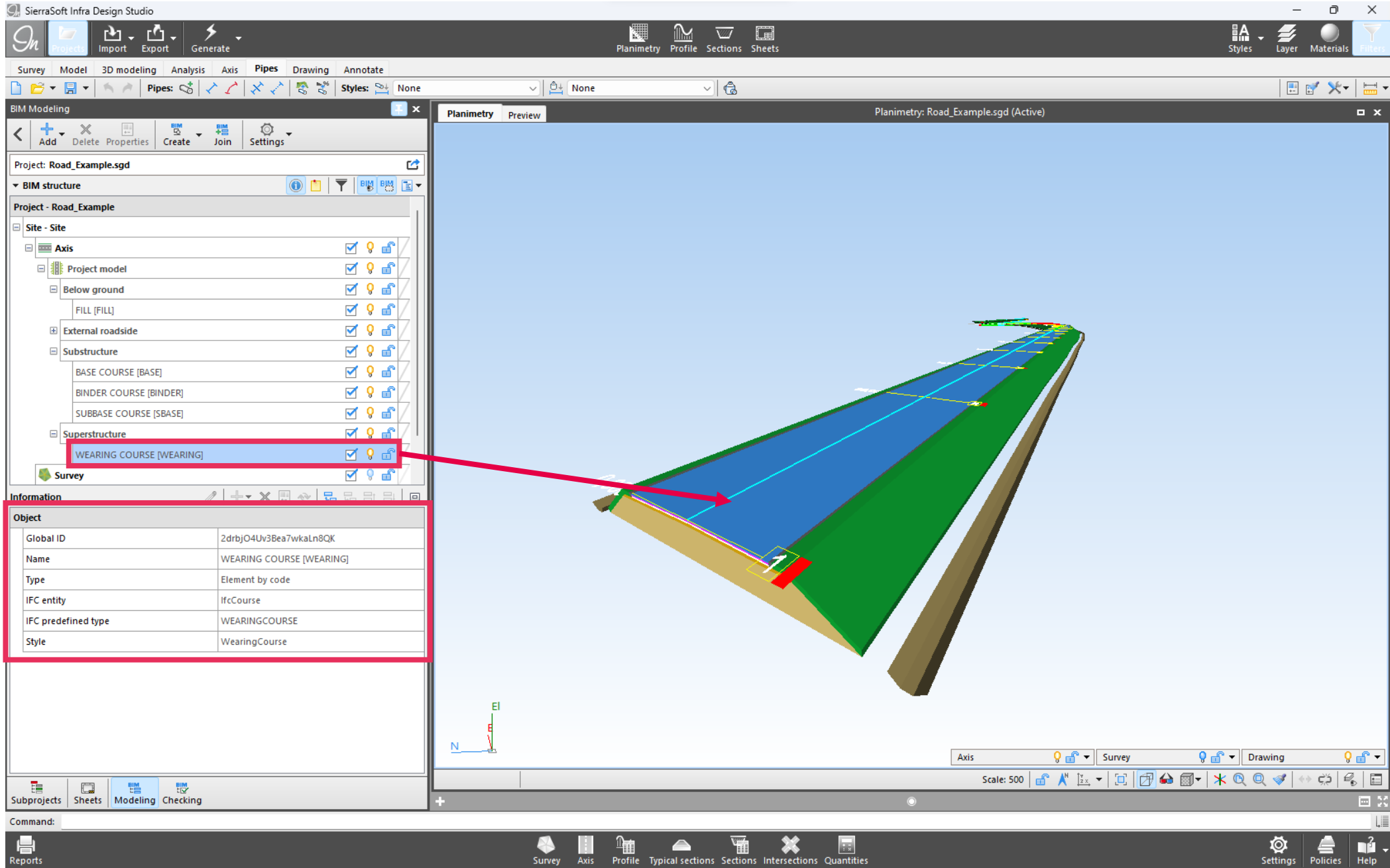
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## 2. Data modeling using bSDD

Fill required information

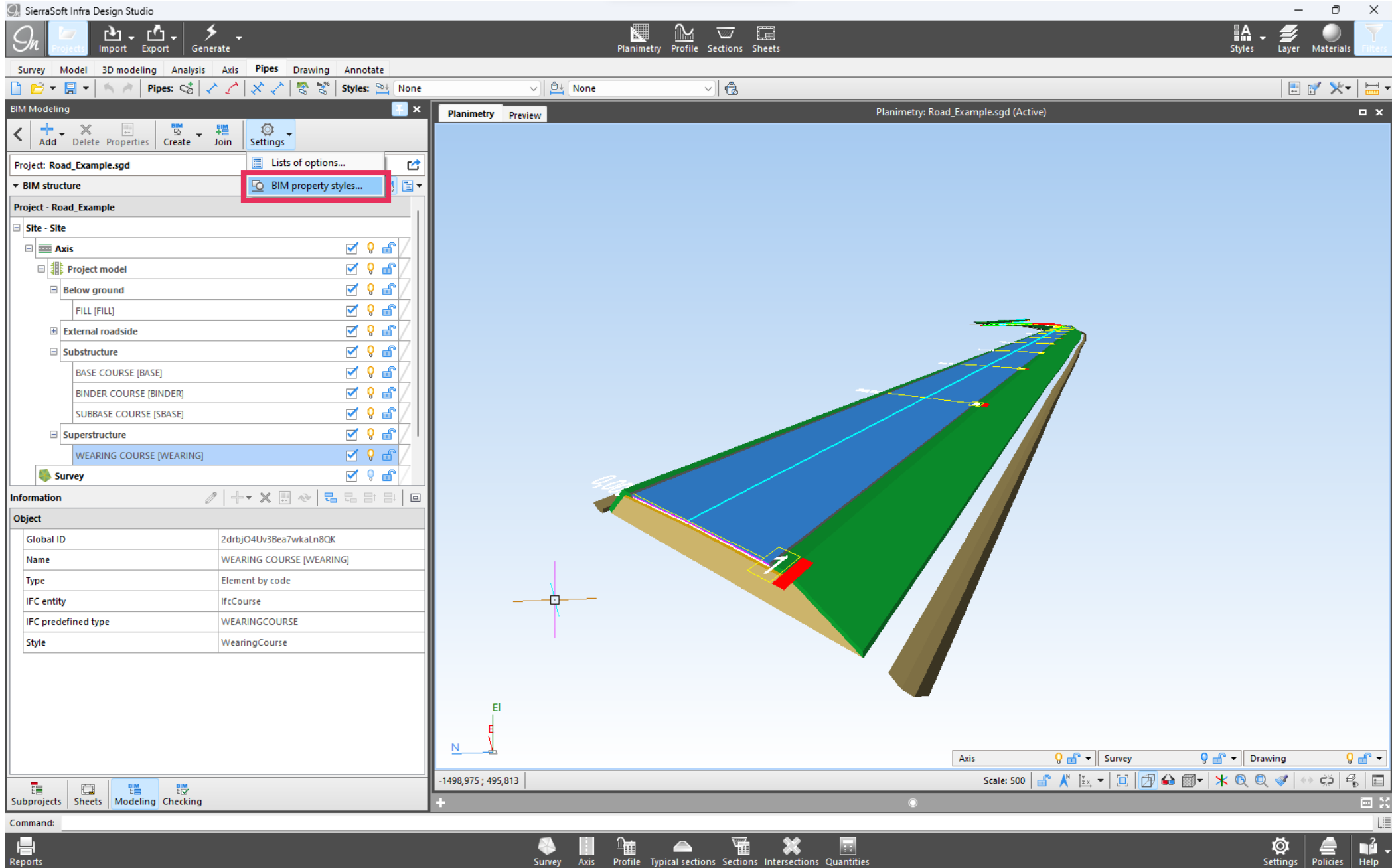
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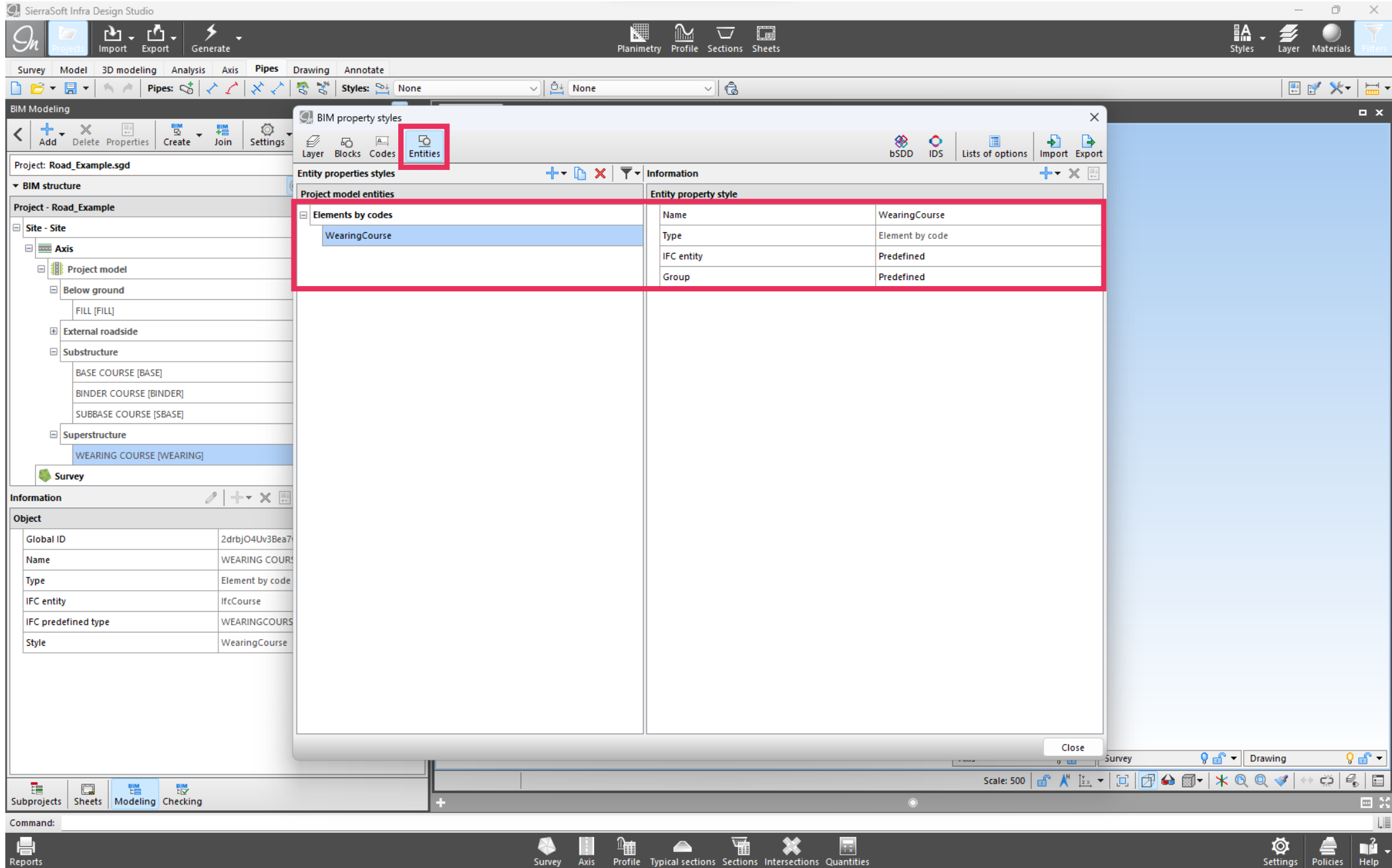
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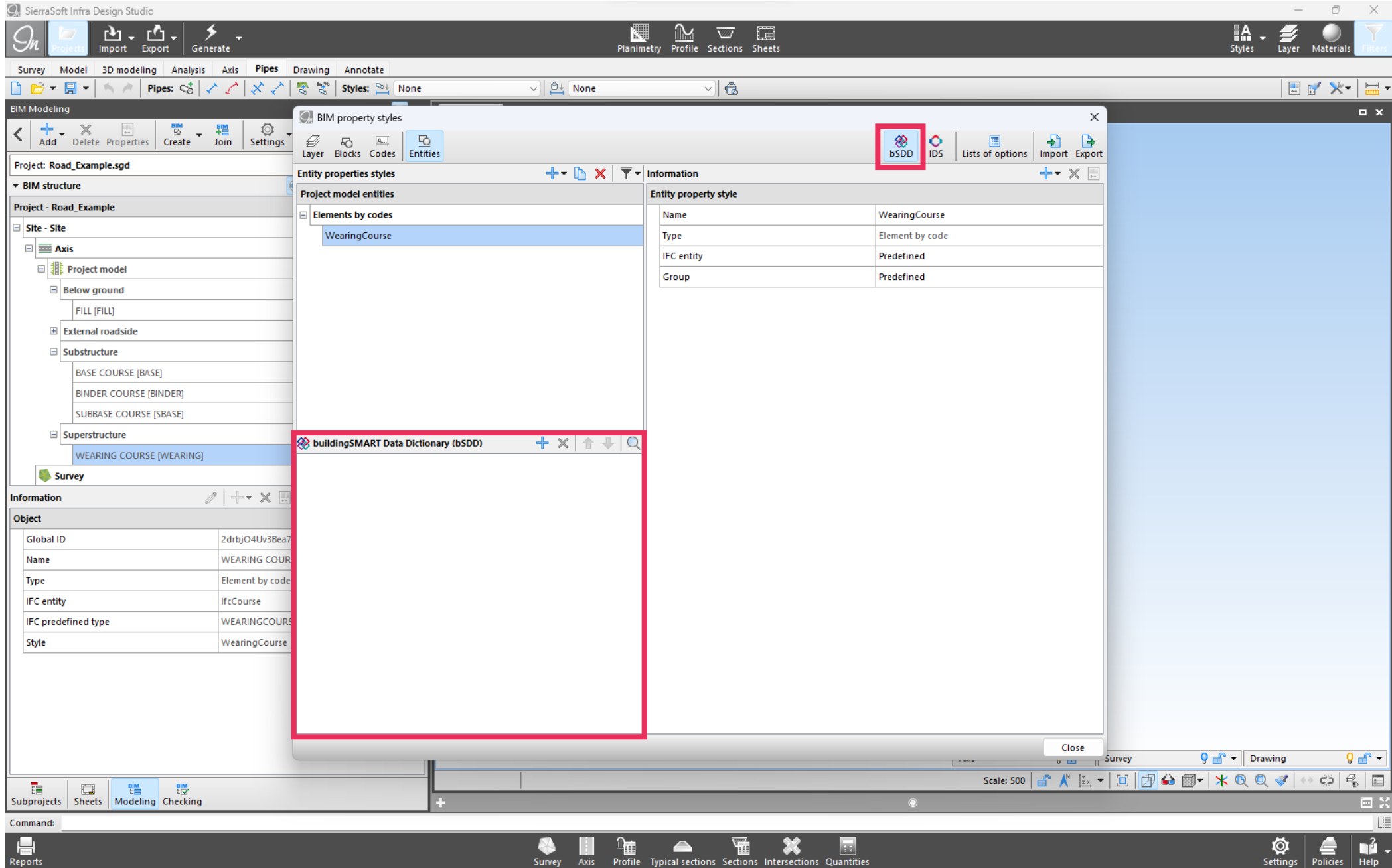
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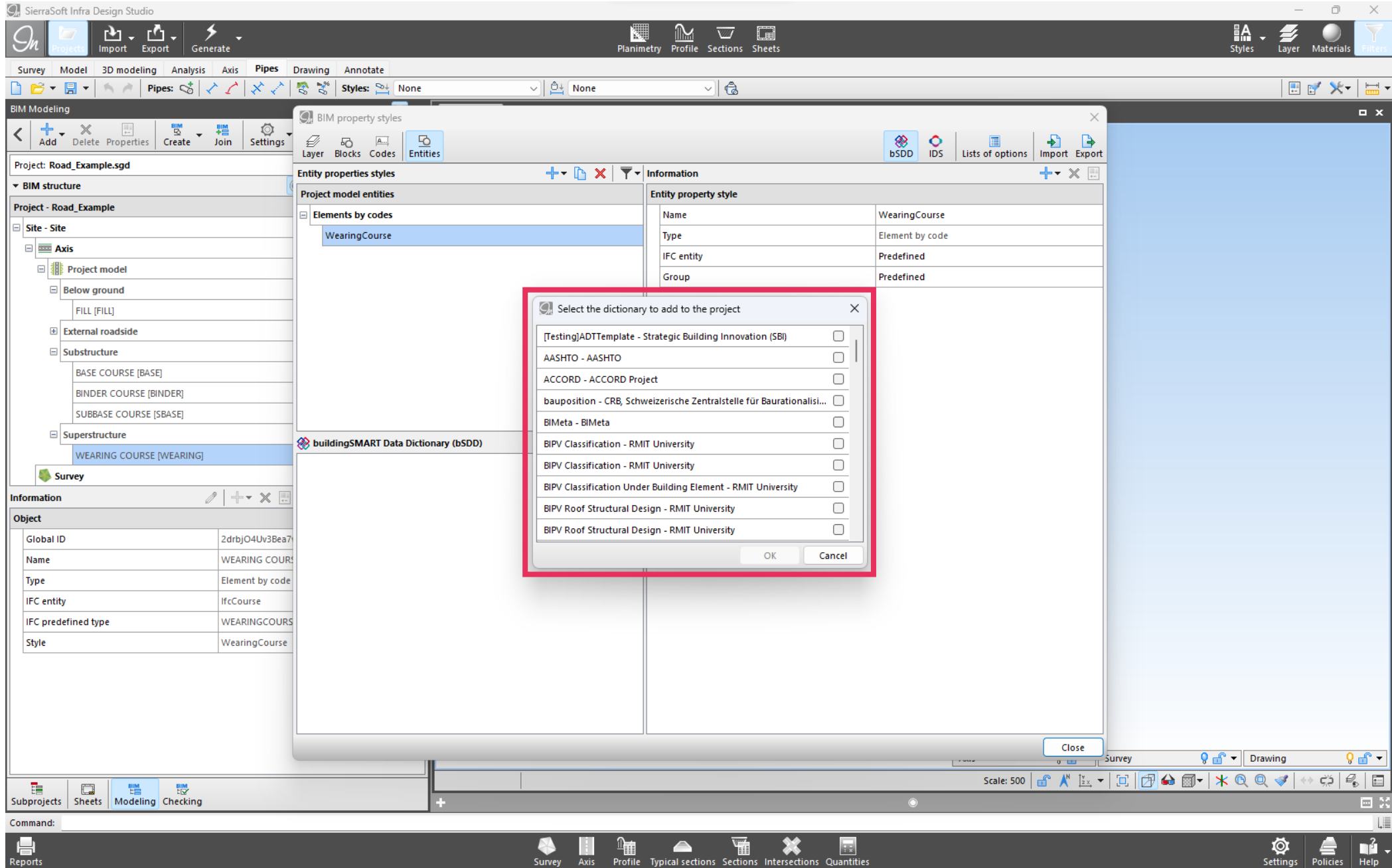
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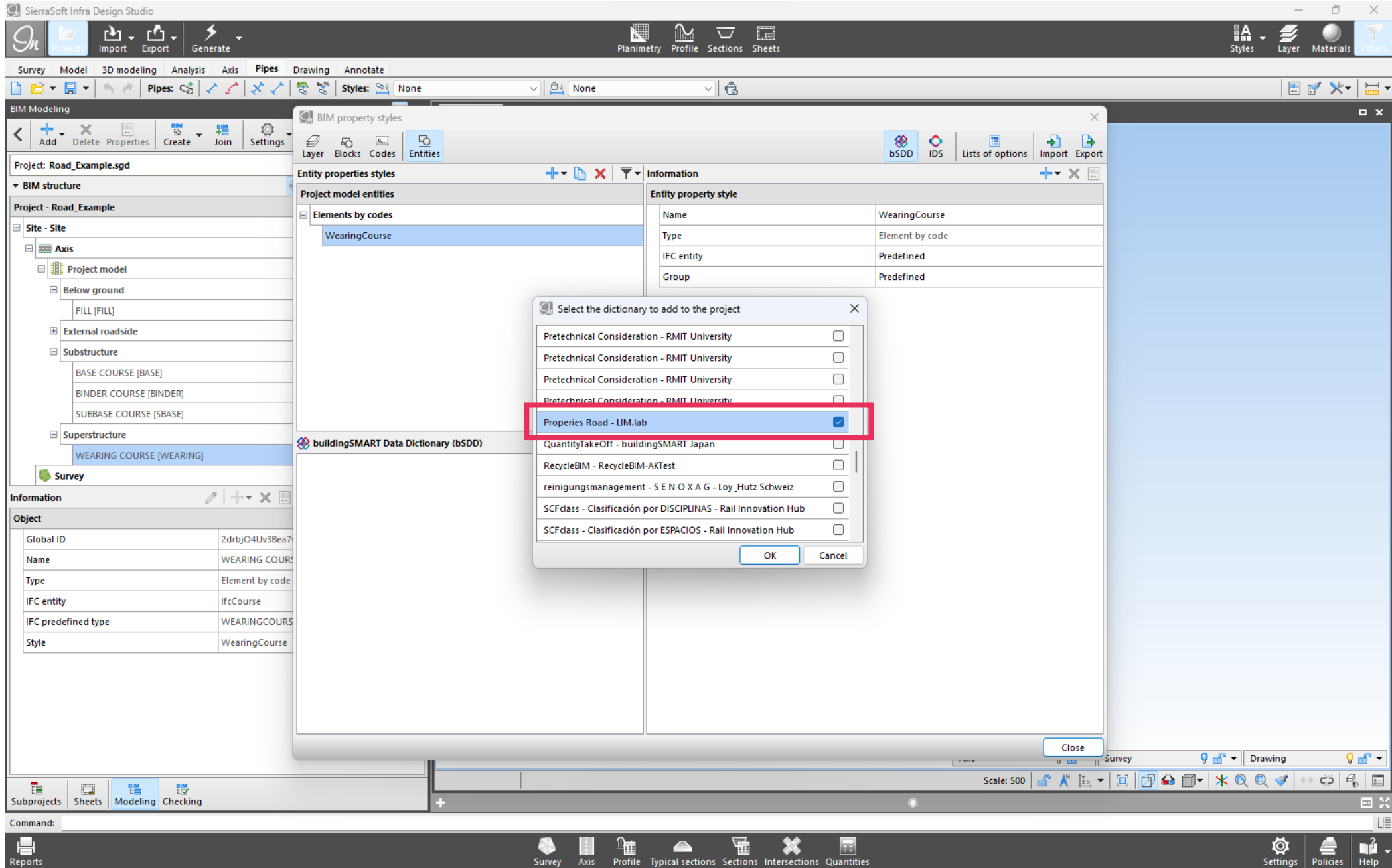
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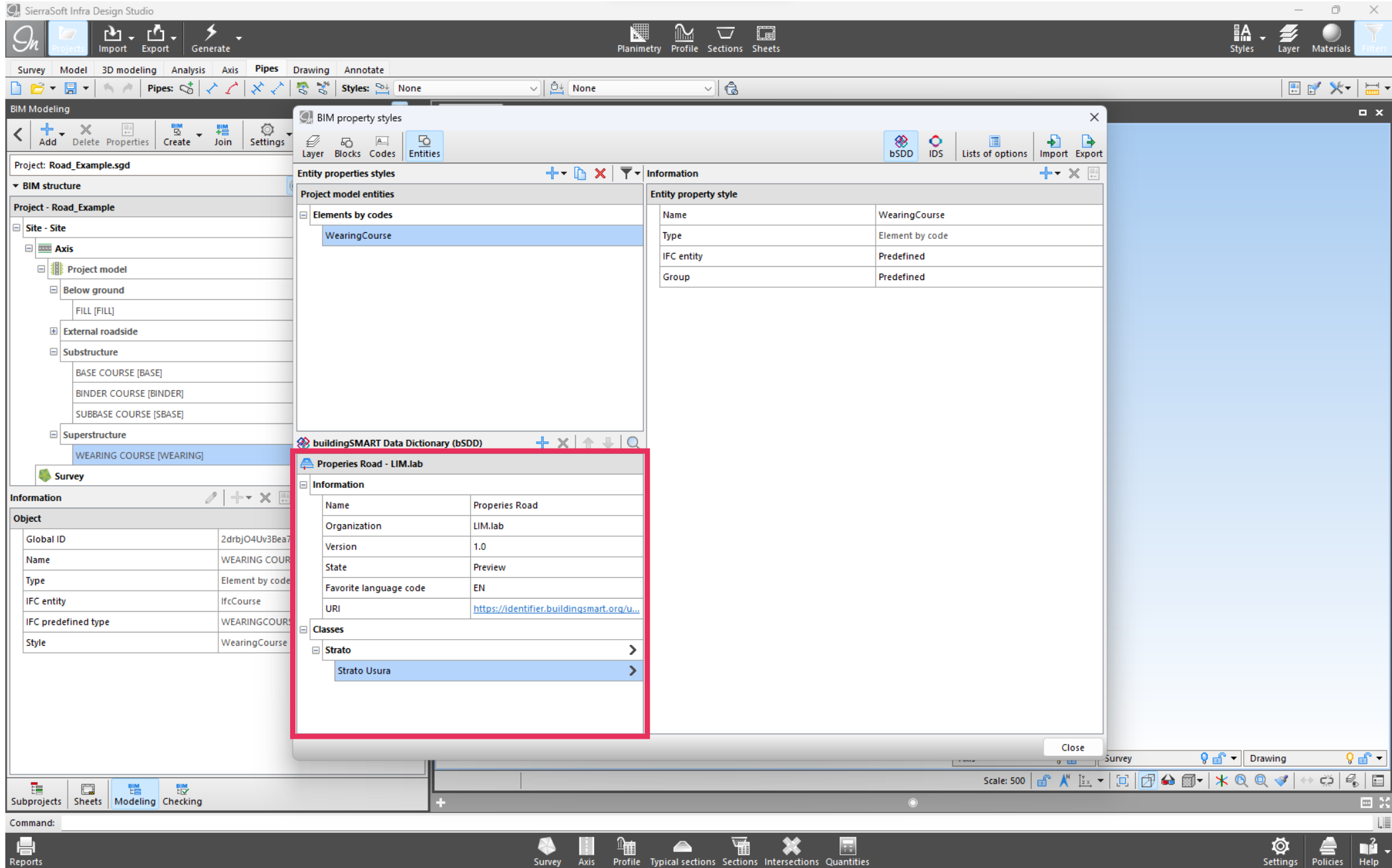
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SierraSoft Infra Design Studio

Planimetry Profile Sections Sheets

Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID: 2drbj04Uv3Bea7

Name: WEARING COUR

Type: Element by code

IFC entity: IfcCourse

IFC predefined type: WEARINGCOURS

Style: WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Entity property style

Name: WearingCourse

Type: Element by code

IFC entity: Predefined

Group: Predefined

buildingSMART Data Dictionary (bSDD)

Strato Usura

Information

Code: ROD\_C\_02

URI: <https://identifier.buildingsmart.org/uri/...>

Definition: La pavimentazione stradale si completa ...

Dictionary: Properies Road

Dictionary version: 1.0

Dictionary status: Preview

Organization: LIM.lab

State: Preview

Version date: 29/12/2023

Properties

Property set: Usura\_CaratteristichePrestazionali

Aderenza

Close

Subprojects Sheets Modeling Checking

Command:

Reports

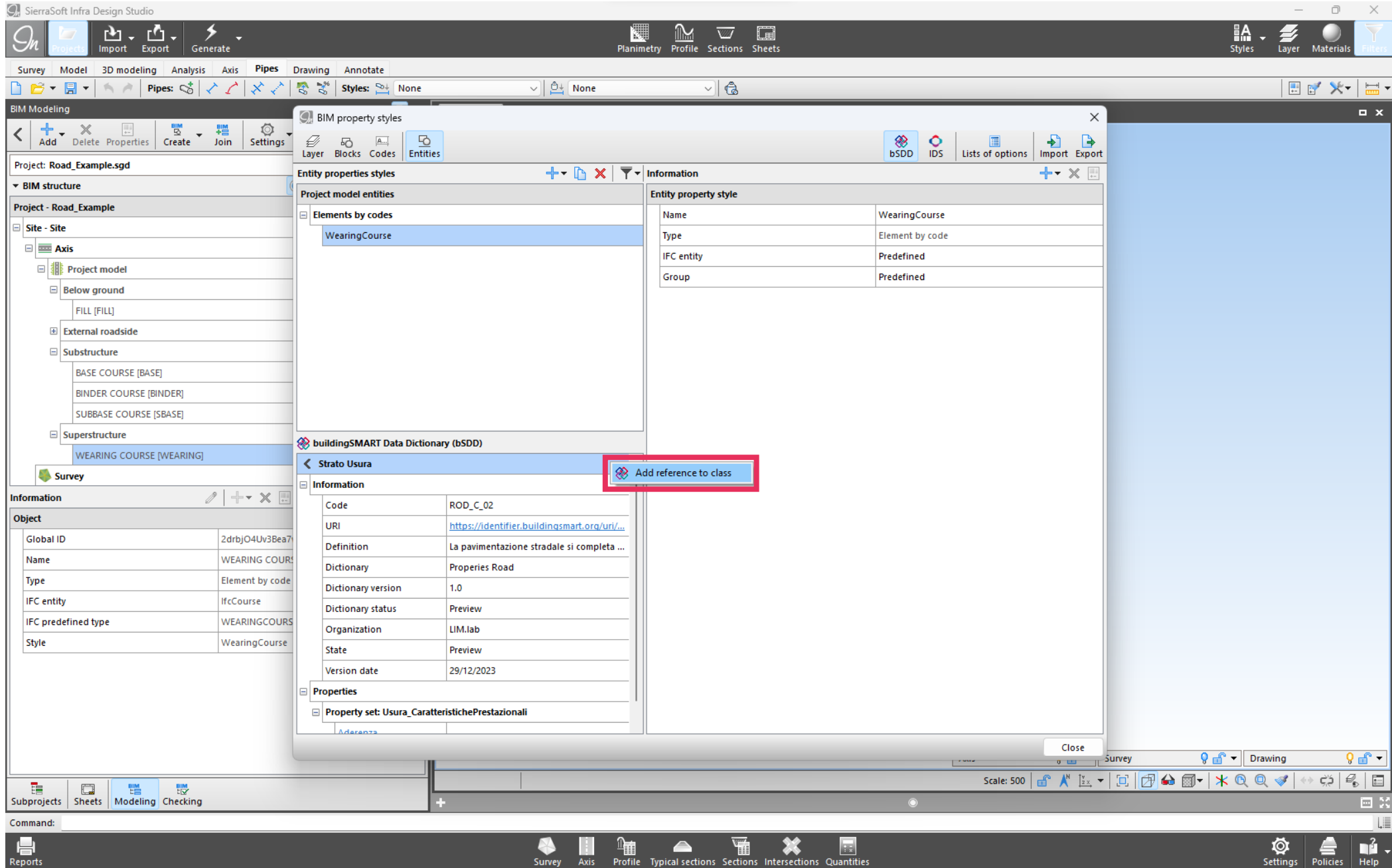
Survey Axis Profile Typical sections Sections Intersections Quantities

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Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID: 2drbj04Uv3Bea7h

Name: WEARING COURSE

Type: Element by code

IFC entity: IfcCourse

IFC predefined type: WEARINGCOURS

Style: WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	Predefined
Group	Predefined

Classification

Properties Road

Properties Road	ROD_C_02 Strato Usura
Name	Properties Road
Source	LIMlab
Edition	1.0
Edition date	26/12/2023

Reference

Reference	ROD_C_02 Strato Usura
Identification	ROD_C_02
Name	Strato Usura
Position	<a href="https://identifier.buildingsmart.org/uri/LIMlab...">https://identifier.buildingsmart.org/uri/LIMlab...</a>

buildingSMART Data Dictionary (bSDD)

Strato Usura

Information

Code	ROD_C_02
URI	<a href="https://identifier.buildingsmart.org/uri/...">https://identifier.buildingsmart.org/uri/...</a>
Definition	La pavimentazione stradale si completa ...
Dictionary	Properties Road
Dictionary version	1.0
Dictionary status	Preview
Organization	LIM.lab
State	Preview
Version date	29/12/2023

Properties

Property set: Usura\_CaratteristichePrestazionali

Aderenza

Close

Scale: 500

Survey Drawing

Subprojects Sheets Modeling Checking

Command:

Reports

Survey Axis Profile Typical sections Sections Intersections Quantities

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Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

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Project: Road\_Example.sgd

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Project - Road\_Example

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Below ground

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SUBBASE COURSE [SBASE]

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Survey

Information

Object

Global ID	2drbjO4Uv3Bea7h
Name	WEARING COURSE
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURS
Style	WearingCourse

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WearingCourse

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Definition	La pavimentazione stradale si completa ...
Dictionary	Properies Road
Dictionary version	1.0
Dictionary status	Preview
Organization	LIM.lab
State	Preview

Properties

Property set: Usura\_CaratteristichePrestazionali

Aderenza

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	Predefined
Group	Predefined

Classification

Properties Road

Name	Properies Road
Source	LIMlab
Edition	1.0
Edition date	26/12/2023

Reference

Identification	ROD_C_02
Name	Strato Usura
Position	<a href="https://identifier.buildingsmart.org/uri/LIMlab...">https://identifier.buildingsmart.org/uri/LIMlab...</a>

Close

Scale: 500

Subprojects Sheets Modeling Checking

Command:

Reports

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Planimetry Profile Sections Sheets

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Pipes: Styles: None

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BIM structure

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Name

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Type

Element by code

IFC entity

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IFC predefined type

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Style

WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

buildingSMART Data Dictionary (bSDD)

Information

Code

ROD\_C\_02

URI

<https://identifier.buildingsmart.org/uri/...>

Definition

La pavimentazione stradale si completa ...

Dictionary

Properties Road

Dictionary version

1.0

Dictionary status

Preview

Organization

LIM.lab

State

Preview

Version date

29/12/2023

Properties

Property set: Usura\_CaratteristichePrestazionali

Aderenza

Add reference to class

Add property

Entity property style

Name

WearingCourse

Type

Element by code

IFC entity

IfcCourse

IFC predefined type

Predefined

Group

Predefined

Classification

Properties Road

ROD\_C\_02 Strato Usura

Name

Properties Road

Source

LIMlab

Edition

1.0

Edition date

26/12/2023

Reference

ROD\_C\_02 Strato Usura

Identification

ROD\_C\_02

Name

Strato Usura

Position

<https://identifier.buildingsmart.org/uri/LIMlab...>

Scale: 500

Survey

Drawing

Subprojects Sheets Modeling Checking

Command:

Reports

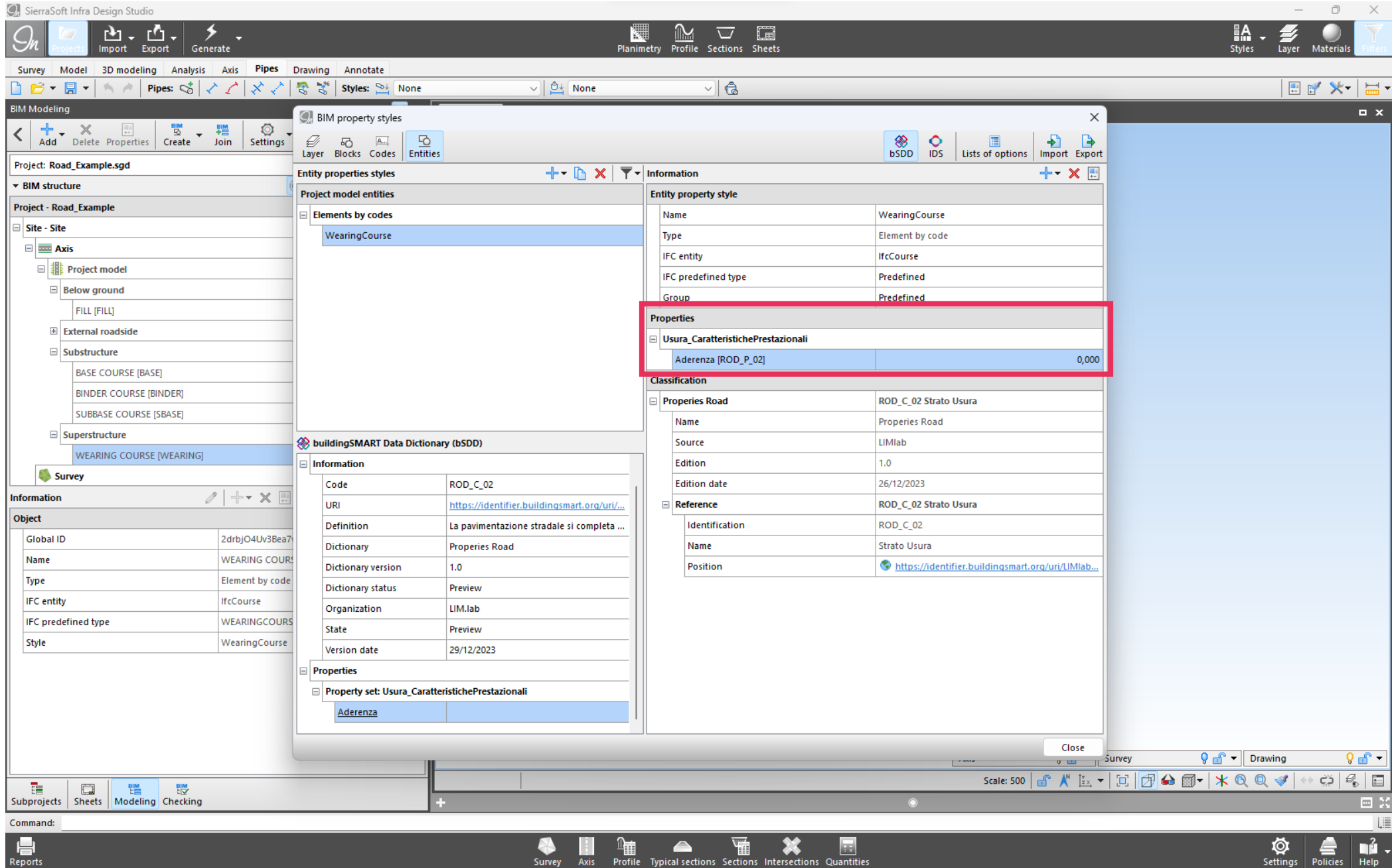
Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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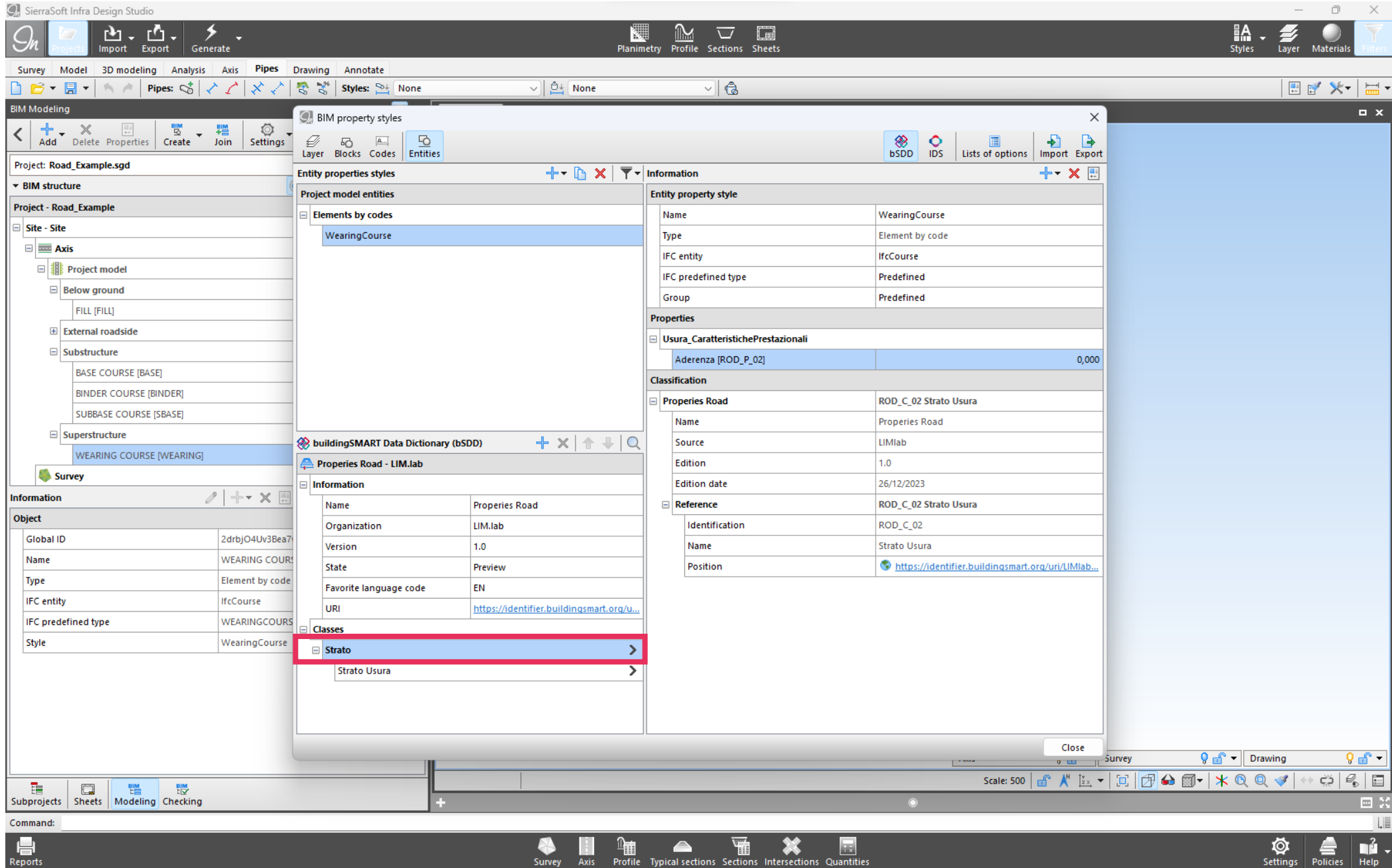
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Planimetry Profile Sections Sheets

Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID

2drbj04Uv3Bea7h

Name

WEARING COURSE

Type

Element by code

IFC entity

IfcCourse

IFC predefined type

WEARINGCOURSE

Style

WearingCourse

BIM property styles

Layer Blocks Codes Entities

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	Predefined
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD_P_02]	0,000
---------------------	-------

Classification

Properties Road

ROD_C_02 Strato Usura
-----------------------

Name

Properties Road

Source

LIMlab

Edition

1.0

Edition date

26/12/2023

Reference

ROD\_C\_02 Strato Usura

Identification

ROD\_C\_02

Name

Strato Usura

Position

<https://identifier.buildingsmart.org/uri/LIMlab...>

buildingSMART Data Dictionary (bSDD)

Code	ROD_C_01
URI	<a href="https://identifier.buildingsmart.org/uri/...">https://identifier.buildingsmart.org/uri/...</a>
Definition	Quantità di materia omogenea, di vario ...
Dictionary	Properties Road
Dictionary version	1.0
Dictionary status	Preview
Organization	LIM.lab
State	Preview
Version date	29/12/2023

Properties

Property set: Strato\_CaratteristichePrestazionali

Portanza	
PSI	

Add reference to class

Add property

Close

Scale: 500

Survey

Drawing

Subprojects Sheets Modeling Checking

Command:

Reports

Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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Project: Road\_Example.sgd

BIM structure

- Site - Site
  - Axis
    - Project model
      - Below ground
        - FILL [FILL]
      - External roadside
      - Substructure
        - BASE COURSE [BASE]
        - BINDER COURSE [BINDER]
        - SUBBASE COURSE [SBASE]
      - Superstructure
        - WEARING COURSE [WEARING]

Information

Object

Global ID	2drbj04Uv3Bea7h
Name	WEARING COURSE
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Style	WearingCourse

BIM property styles

Entity properties styles

Project model entities

- Elements by codes
  - WearingCourse

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	Predefined
Group	Predefined

Properties

- Usura\_CaratteristichePrestazionali
  - Aderenza [ROD\_P\_02] 0,000
- Strato\_CaratteristichePrestazionali
  - Portanza [ROD\_P\_01] 0,000
  - PSI [ROD\_P\_05] 0,000

buildingSMART Data Dictionary (bSDD)

Code	ROD_C_01
URI	<a href="https://identifier.buildingsmart.org/uri/...">https://identifier.buildingsmart.org/uri/...</a>
Definition	Quantità di materia omogenea, di vario ...
Dictionary	Properties Road
Dictionary version	1.0
Dictionary status	Preview
Organization	LIM.lab
State	Preview
Version date	29/12/2023

Classification

- Properties Road
  - ROD\_C\_02 Strato Usura
  - Name Properties Road
  - Source LIM.lab
  - Edition 1.0
  - Edition date 26/12/2023
- Reference
  - ROD\_C\_02 Strato Usura
  - Identification ROD\_C\_02
  - Name Strato Usura
  - Position <https://identifier.buildingsmart.org/uri/LIM.lab...>

Properties

- Property set: Strato\_CaratteristichePrestazionali
  - Portanza
  - PSI

Close

Scale: 500

Subprojects Sheets Modeling Checking

Command:

Reports

Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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# 3. Model validation and data modeling using IDS

## Internal Review and Validation

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Planimetry Profile Sections Sheets

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID	2drbj04Uv3Bea7
Name	WEARING COUR
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURS
Style	WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD_P_02]	0,000
---------------------	-------

Strato\_CaratteristichePrestazionali

Portanza [ROD_P_01]	0,000
PSI [ROD_P_05]	0,000

Information Delivery Specification (IDS)

Classification

Properties Road

Name	Properties Road
Source	LIMlab
Edition	1.0
Edition date	26/12/2023

Reference

Identification	ROD_C_02
Name	Strato Usura
Position	<a href="https://identifier.buildingsmart.org/uri/LIMlab...">https://identifier.buildingsmart.org/uri/LIMlab...</a>

Subprojects Sheets Modeling Checking

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Survey Axis Profile Typical sections Sections Intersections Quantities

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Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID

Name

Type

IFC entity

IFC predefined type

Style

2drbj04Uv3Bea7h

WEARING COURSE

Element by code

IfcCourse

WEARINGCOURSE

WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information Delivery Specification (IDS)

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

IDS file of the project

IDS files linked to the project

Close

Reference

Identification	ROD_C_02
Name	Strato Usura
Position	<a href="https://identifier.buildingsmart.org/uri/LIMlab...">https://identifier.buildingsmart.org/uri/LIMlab...</a>

Close

Scale: 500

Subprojects Sheets Modeling Checking

Command:

Reports

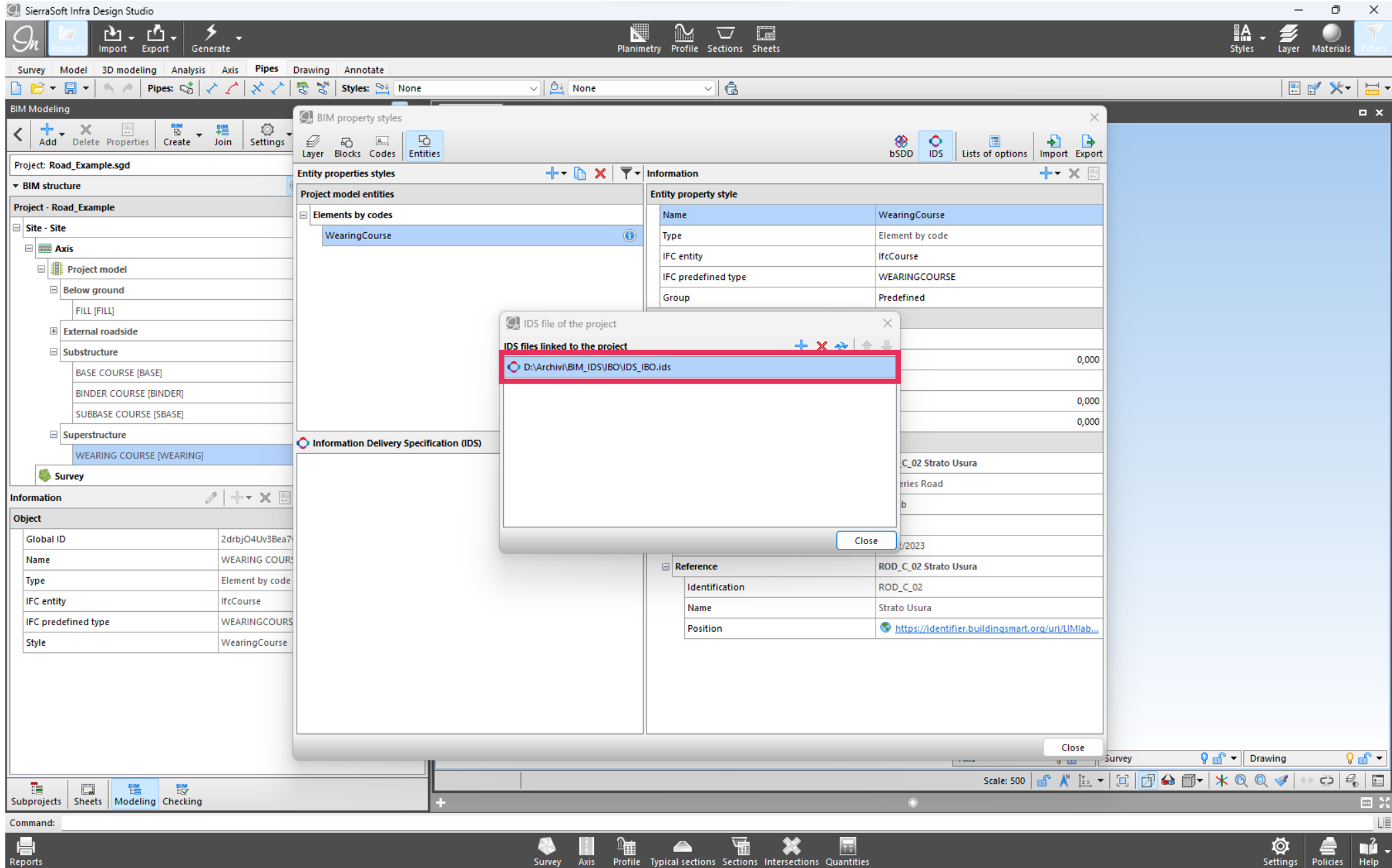
Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID	2drbjO4Uv3Bea
Name	WEARING COURSE
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Style	WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD_P_02]	0,000
---------------------	-------

Strato\_CaratteristichePrestazionali

Portanza [ROD_P_01]	0,000
PSI [ROD_P_05]	0,000

Classification

Properties Road

Name	Properties Road
Source	LIMlab
Edition	1.0
Edition date	26/12/2023

Reference

Identification	ROD_C_02
Name	Strato Usura
Position	<a href="https://identifier.buildingsmart.org/uri/LIMlab...">https://identifier.buildingsmart.org/uri/LIMlab...</a>

Information Delivery Specification (IDS)

IDS\_IBO.ids

Checked entity property styles not conforming to the IDS file:

WearingCourse

Specify: Course WearingCourse

- Classification not found or wrong  
Must be classified as 'IfcCourse' according to the bSDD IFC 4.3
- Property not found: Thickness
- Property not found: Volume

Close

Scale: 500

Subprojects Sheets Modeling Checking

Command:

Reports

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Settings Policies Help

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Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID	2drbj04Uv3Bea7h
Name	WEARING COURSE
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Style	WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information Delivery Specification (IDS)

IDS\_IBO.ids

Checked entity property styles not conforming to the IDS file:

WearingCourse

Specify: Course WearingCourse

Classification not found or wrong  
Must be classified as 'IfcCourse' according to the bSDD IFC 4.3

Property not found: Thickness

Property not found: Volume

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD\_P\_02]

0,000

Strato\_CaratteristichePrestazionali

Portanza [ROD\_P\_01]

0,000

PSI [ROD\_P\_05]

0,000

Classification

Properties Road

ROD\_C\_02 Strato Usura

Name

Properties Road

Source

LIMlab

Edition

1.0

Edition date

26/12/2023

Reference

ROD\_C\_02 Strato Usura

Identification

ROD\_C\_02

Name

Strato Usura

Position

<https://identifier.buildingsmart.org/uri/LIMlab...>

Close

Scale: 500

Survey

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Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID

Name

Type

IFC entity

IFC predefined type

Style

2drbj04Uv3Bea7h

WEARING COURSE

Element by code

IfcCourse

WEARINGCOURSE

WearingCourse

BIM property styles

Layer Blocks Codes Entities

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD\_P\_02]

0,000

Strato\_CaratteristichePrestazionali

Portanza [ROD\_P\_01]

0,000

PSI [ROD\_P\_05]

0,000

Classification

Properties Road

ROD\_C\_02 Strato Usura

Name

Properties Road

Source

LIMlab

Edition

1.0

Edition date

26/12/2023

Reference

ROD\_C\_02 Strato Usura

Identification

ROD\_C\_02

Name

Strato Usura

Position

<https://identifier.buildingsmart.org/uri/LIMlab...>

Close

Scale: 500

Survey

Drawing

Subprojects Sheets Modeling Checking

Command:

Reports

Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

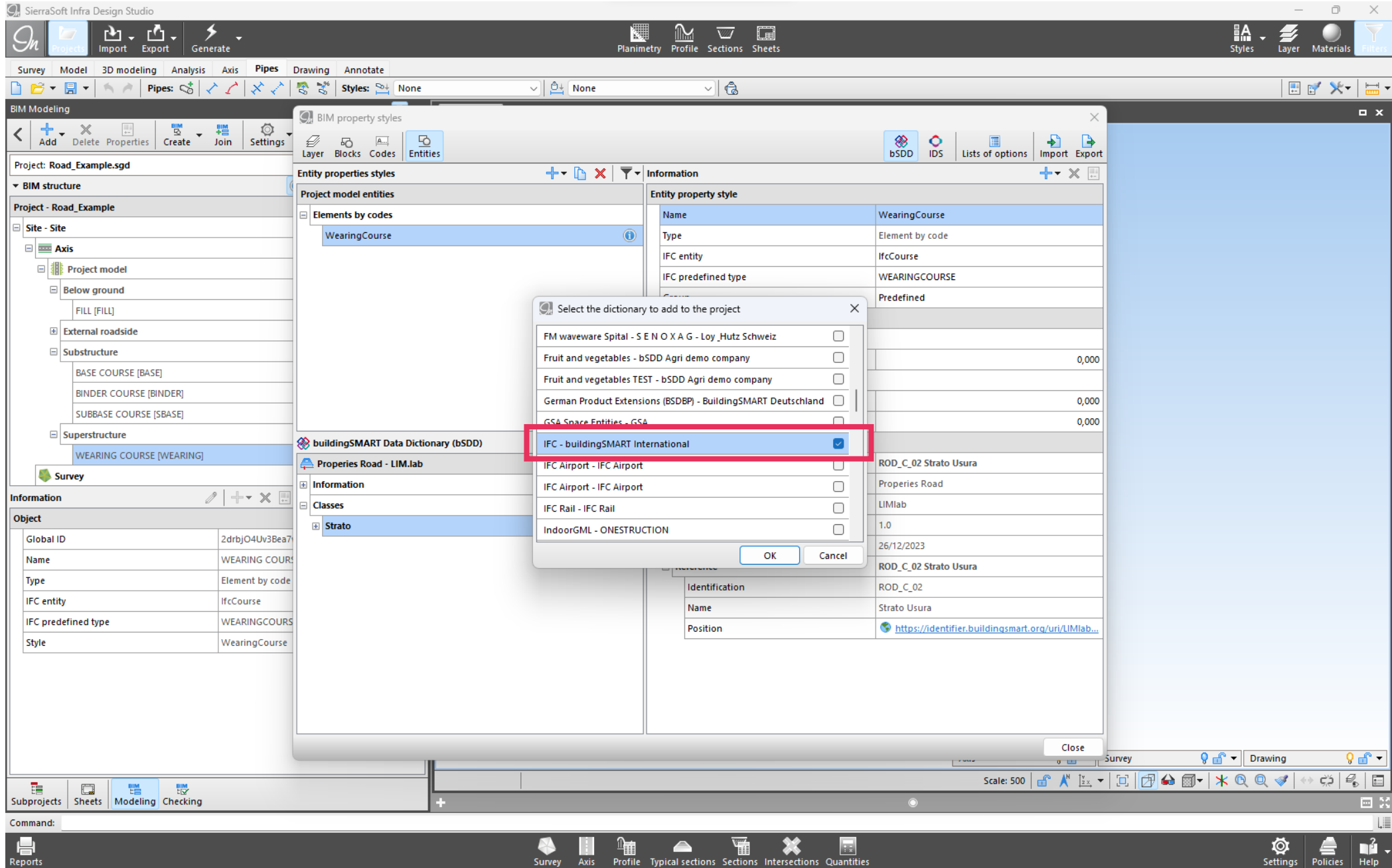
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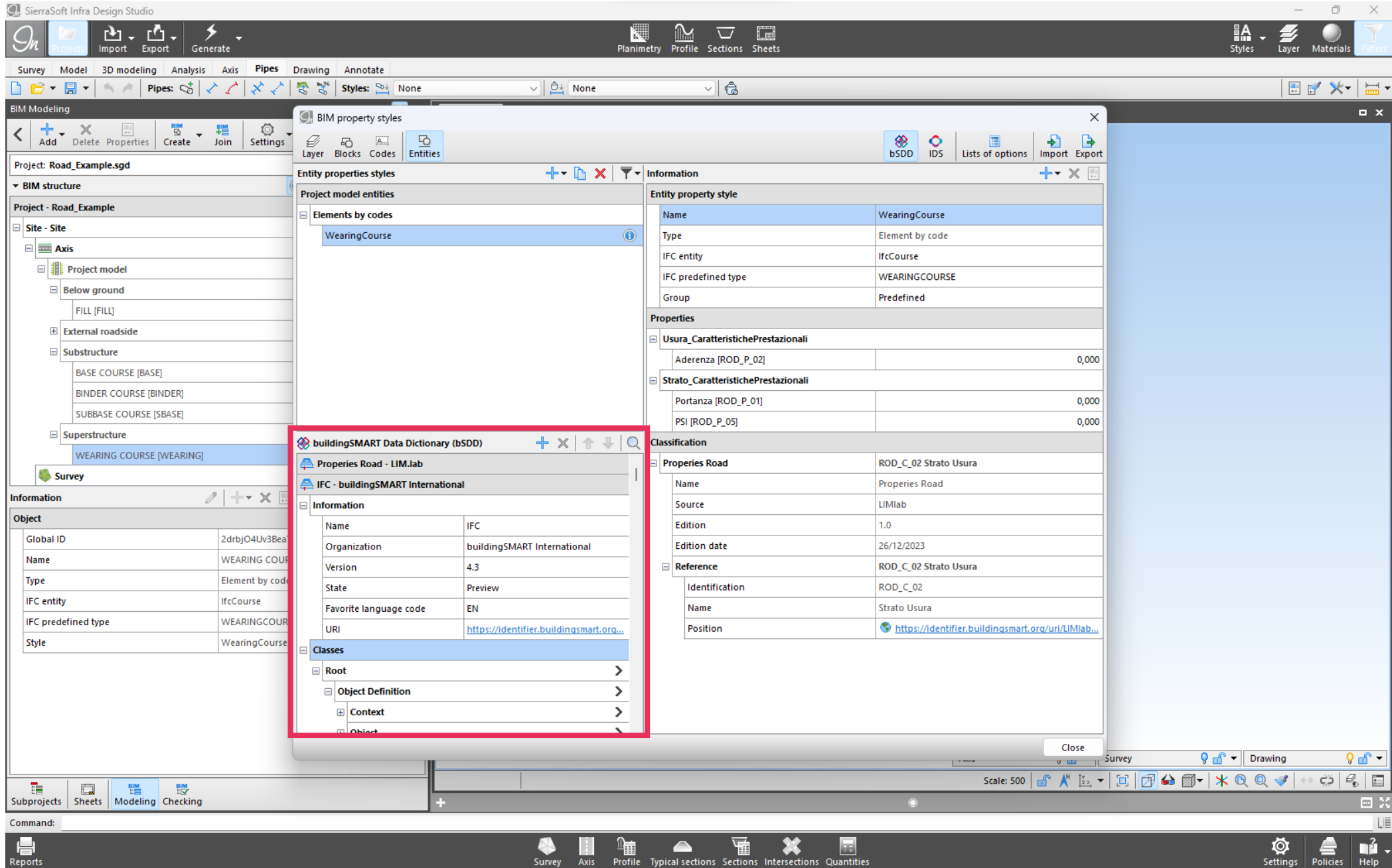
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with the integration of  
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IDS and bSDD

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Planimetry Profile Sections Sheets

Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID: 2drbj04Uv3Bea7h

Name: WEARING COURSE

Type: Element by code

IFC entity: IfcCourse

IFC predefined type: WEARINGCOURSE

Style: WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD\_P\_02]: 0,000

Strato\_CaratteristichePrestazionali

Portanza [ROD\_P\_01]: 0,000

PSI [ROD\_P\_05]: 0,000

Classification

Properties Road

Name: Properties Road

Source: LIMlab

Edition: 1.0

Edition date: 26/12/2023

Reference

Identification: ROD\_C\_02

Name: Strato Usura

Position: <https://identifier.buildingsmart.org/uri/LIMlab...>

buildingSMART Data Dictionary (bSDD)

Search: Course

Properties Road - LIMlab

IFC - buildingSMART International

Close

Scale: 500

Subprojects Sheets Modeling Checking

Command:

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Planimetry Profile Sections Sheets

Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID

2drbj04Uv3Bea7

Name

WEARING COUR

Type

Element by code

IFC entity

IfcCourse

IFC predefined type

WEARINGCOURS

Style

WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

buildingSMART Data Dictionary (bSDD)

Search: Course

Properties Road - LIM.lab

IFC - buildingSMART International

Classes

Course

Property Set: Bounded Course Common

Property Set: Course Application Conditions

Property Set: Course Common

Quantity Set: Course Base Quantities

Pavement

Core

Armour Unit

Membrane

Entity property style

Name

WearingCourse

Type

Element by code

IFC entity

IfcCourse

IFC predefined type

WEARINGCOURSE

Group

Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD\_P\_02]

0,000

Strato\_CaratteristichePrestazionali

Portanza [ROD\_P\_01]

0,000

PSI [ROD\_P\_05]

0,000

Classification

Properties Road

ROD\_C\_02 Strato Usura

Name

Properties Road

Source

LIMlab

Edition

1.0

Edition date

26/12/2023

Reference

ROD\_C\_02 Strato Usura

Identification

ROD\_C\_02

Name

Strato Usura

Position

<https://identifier.buildingsmart.org/uri/LIMlab...>

Close

Subprojects Sheets Modeling Checking

Command:

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Planimetry Profile Sections Sheets

Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID: 2drbj04Uv3Bea7

Name: WEARING COURSE

Type: Element by code

IFC entity: IfcCourse

IFC predefined type: WEARINGCOURSE

Style: WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD_P_02]	0,000
---------------------	-------

Strato\_CaratteristichePrestazionali

Portanza [ROD_P_01]	0,000
PSI [ROD_P_05]	0,000

buildingSMART Data Dictionary (bSDD)

Search: Course

Properties Road - LIM.lab

IFC - buildingSMART International

Classes

Course

Property Set: Bounded Course Common

Property Set: Course Application Conditions

Property Set: Course Common

Quantity Set: Course Base Quantities

Pavement

Core

Armour Unit

Membrane

Classification

Properties Road

ROD\_C\_02 Strato Usura

Name: Properties Road

Source: LIM.lab

Edition: 1.0

Edition date: 26/12/2023

Identification

ROD\_C\_02

Name: Strato Usura

Position: <https://identifier.buildingsmart.org/uri/LIM.lab...>

Close

Subprojects Sheets Modeling Checking

Command:

Reports

Survey Axis Profile Typical sections Sections Intersections Quantities

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IDS and bSDD

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Planimetry Profile Sections Sheets

Styles Layer Materials Filters

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID

2drbj04Uv3Bea7

Name

WEARING COURSE

Type

Element by code

IFC entity

IfcCourse

IFC predefined type

WEARINGCOURSE

Style

WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name

WearingCourse

Type

Element by code

IFC entity

IfcCourse

IFC predefined type

WEARINGCOURSE

Group

Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD\_P\_02]

0,000

Strato\_CaratteristichePrestazionali

Portanza [ROD\_P\_01]

0,000

PSI [ROD\_P\_05]

0,000

Classification

Properties Road

ROD\_C\_02 Strato Usura

IFC

IfcCourse Course

Name

IFC

Source

buildingsmart

Edition

4.3

Reference

IfcCourse Course

Identification

IfcCourse

Name

Course

Position

<https://identifier.buildingsmart.org/uri/buildi...>

buildingSMART Data Dictionary (bSDD)

Search: Course

Properties Road - LIM.lab

IFC - buildingSMART International

Classes

Course

Property Set: Bounded Course Common

Property Set: Course Application Conditions

Property Set: Course Common

Quantity Set: Course Base Quantities

Pavement

Core

Armour Unit

Membrane

Subprojects Sheets Modeling Checking

Command:

Reports

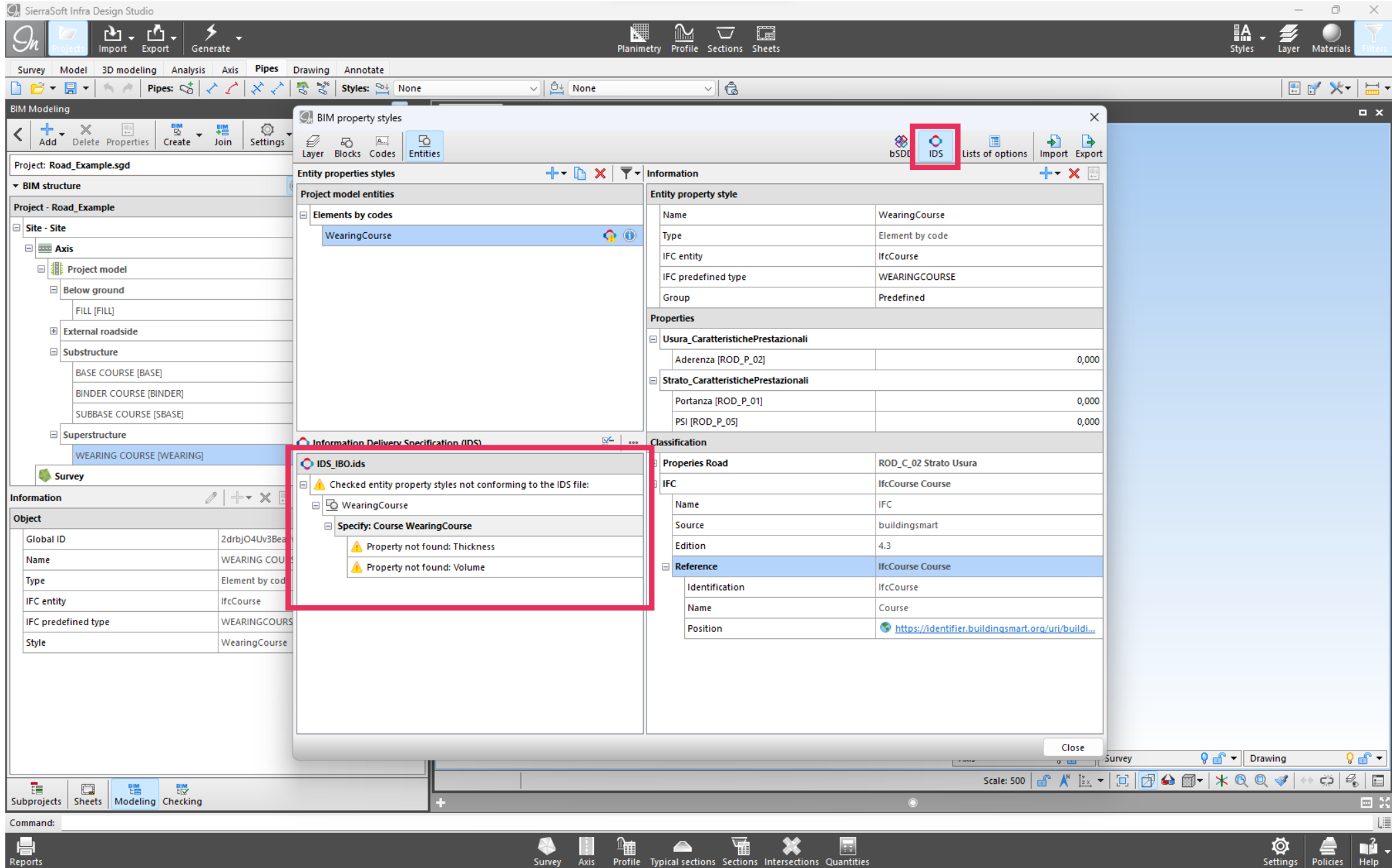
Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

# infra BIM OPEN

LYON  
2024  
JAN 29-31

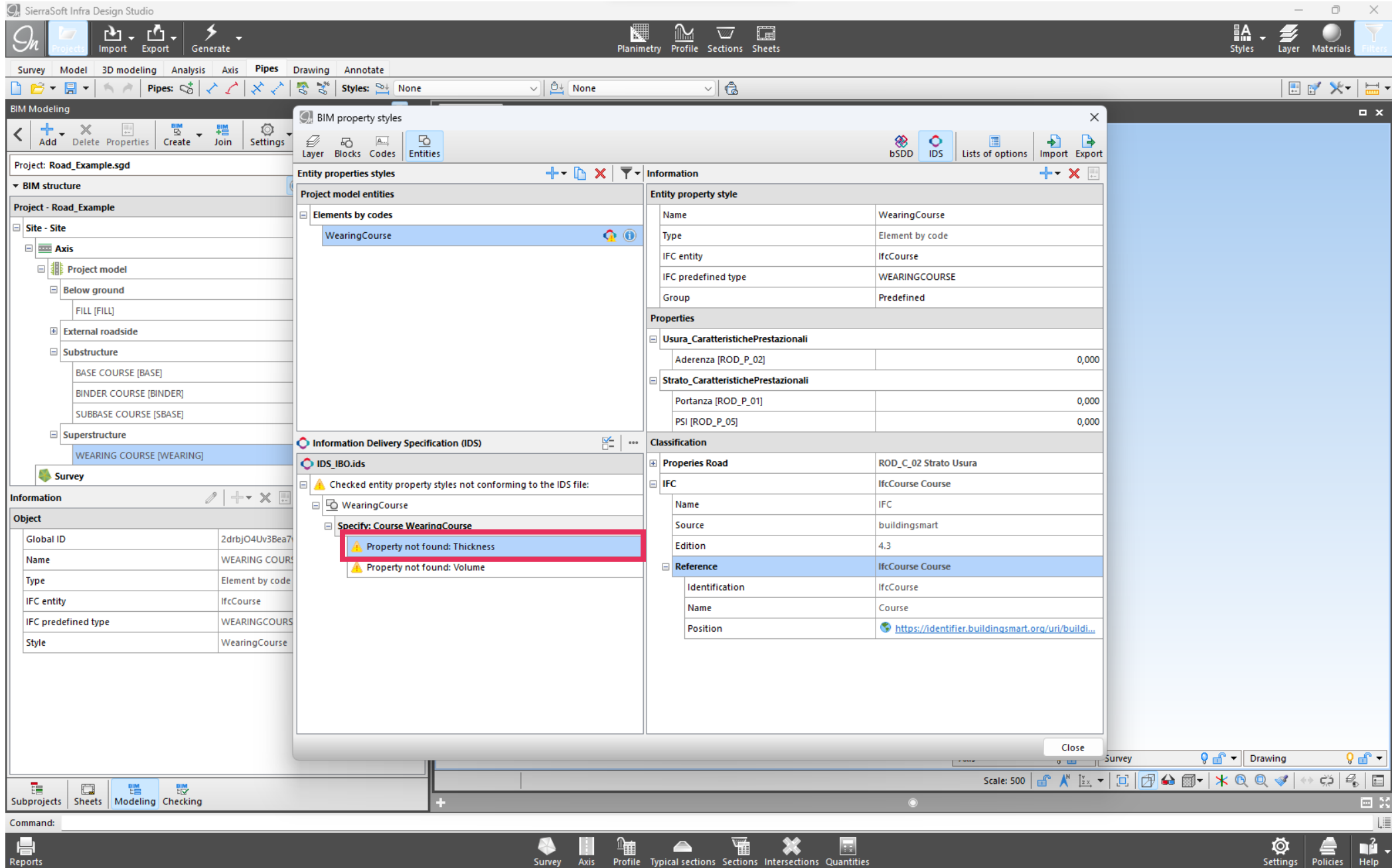
Optimizing BIM  
Infrastructure Design  
with the integration of  
IDS and bSDD



# infra BIM OPEN

LYON  
2024  
JAN 29-31

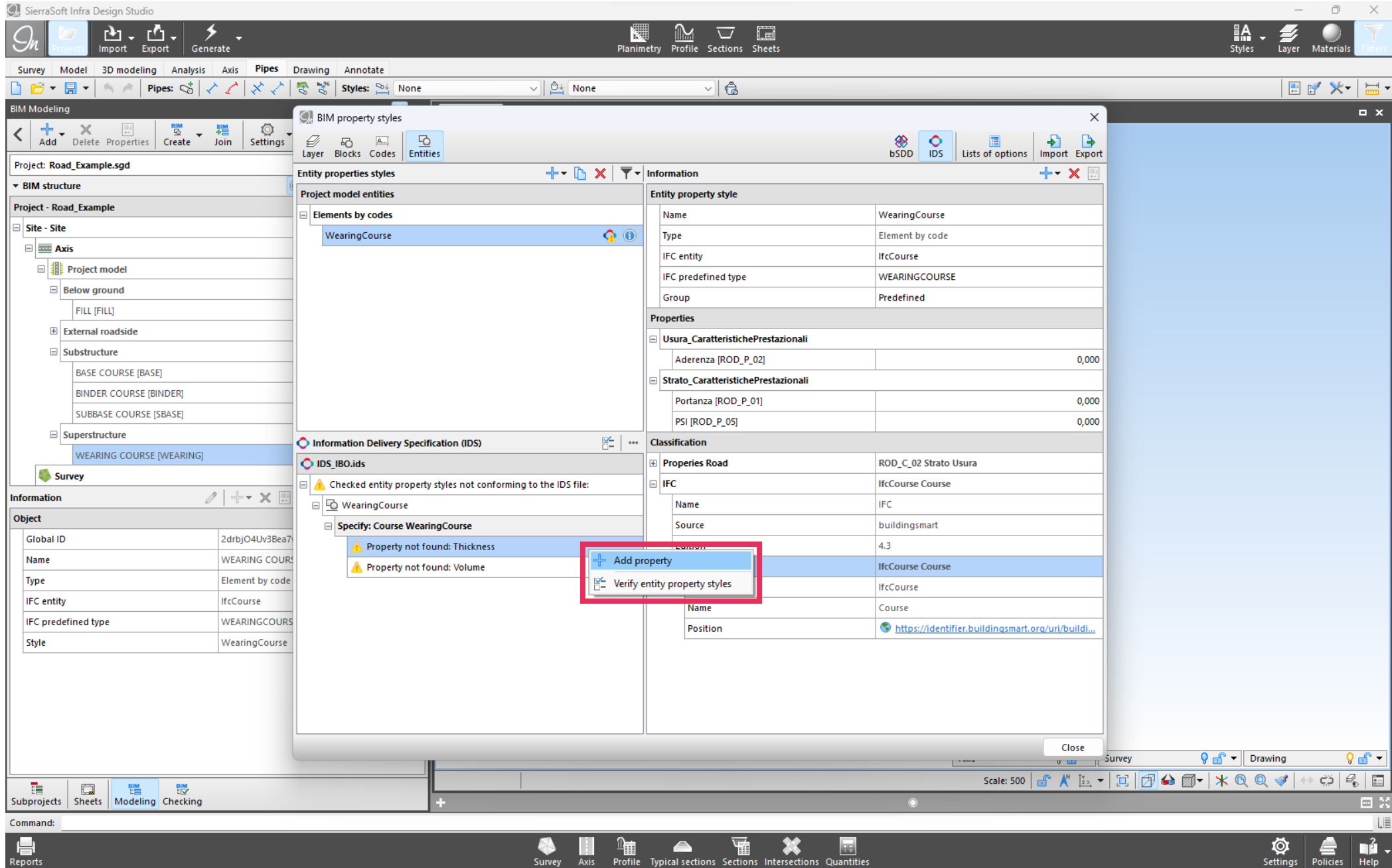
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Planimetry Profile Sections Sheets

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID	2drbj04Uv3Bea7h
Name	WEARING COURSE
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Style	WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD_P_02]	0,000
---------------------	-------

Strato\_CaratteristichePrestazionali

Portanza [ROD_P_01]	0,000
PSI [ROD_P_05]	0,000

Qto\_CourseBaseQuantities

Thickness [IFCPROPERTYSINGLEVALUE]	0,000
------------------------------------	-------

Classification

Properties Road

ROD_C_02 Strato Usura
-----------------------

IFC

IfcCourse Course
------------------

Checked entity property styles not conforming to the IDS file:

WearingCourse

Specify: Course WearingCourse

Wrong property value: Thickness

The value must be between 0.02 and 0.07

Property not found: Volume

Close

Scale: 500

Subprojects Sheets Modeling Checking

Command:

Reports

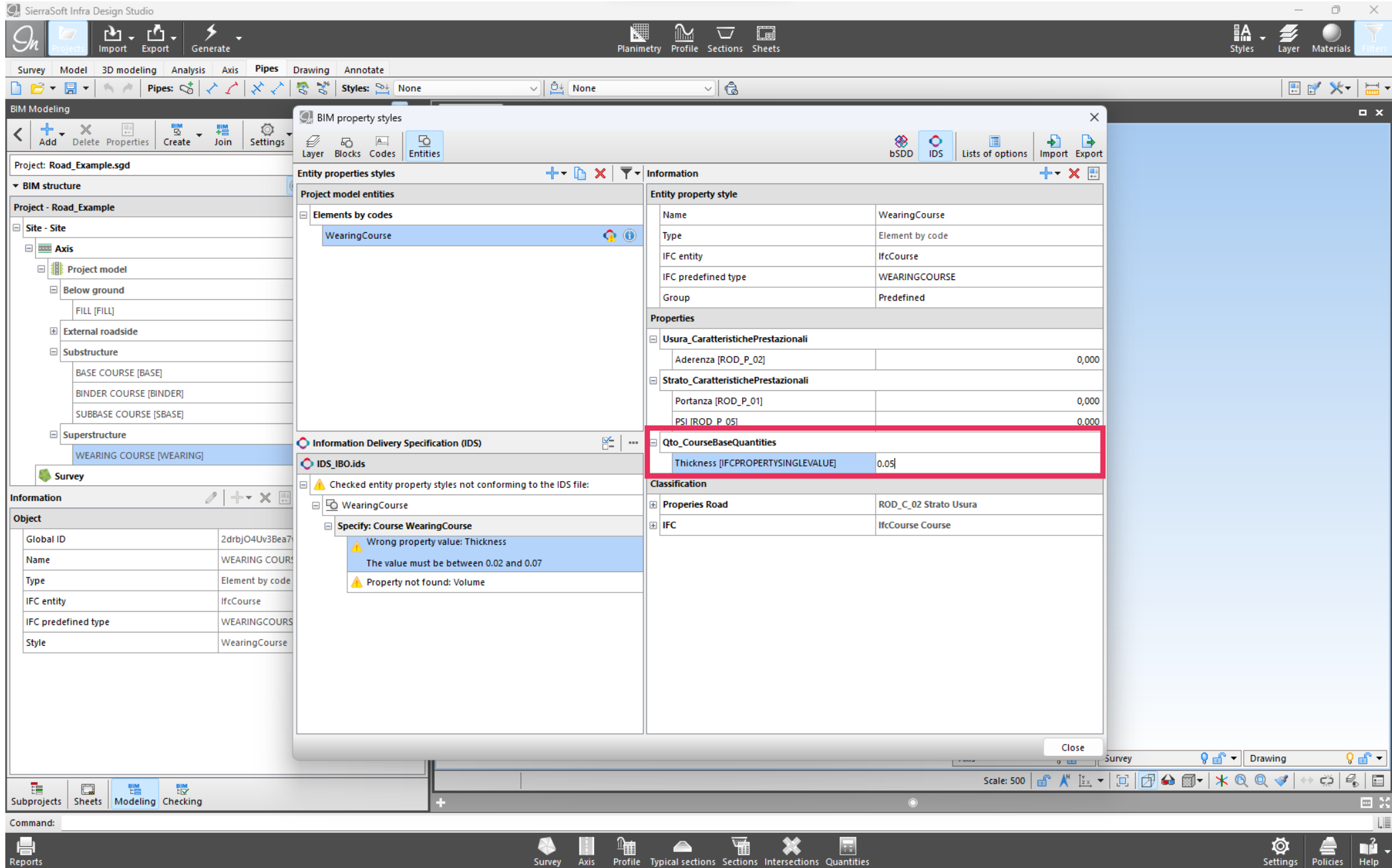
Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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Planimetry Profile Sections Sheets

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID	2drbj04Uv3Bea7h
Name	WEARING COURSE
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Style	WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information Delivery Specification (IDS)

IDS\_IBO.ids

Checked entity property styles not conforming to the IDS file:

WearingCourse

Specify: Course WearingCourse

Property not found: Volume

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD_P_02]	0,000
---------------------	-------

Strato\_CaratteristichePrestazionali

Portanza [ROD_P_01]	0,000
PSI [ROD_P_05]	0,000

Qto\_CourseBaseQuantities

Thickness [IFCPROPERTYSINGLEVALUE]	0,050
------------------------------------	-------

Classification

Properties Road

ROD_C_02 Strato Usura
-----------------------

IFC

IfcCourse Course
------------------

Close

Subprojects Sheets Modeling Checking

Command:

Reports

Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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Planimetry Profile Sections Sheets

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID	2drbj04Uv3Bea7h
Name	WEARING COURSE
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Style	WearingCourse

BIM property styles

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information Delivery Specification (IDS)

IDS\_IBO.ids

Checked entity property styles not conforming to the IDS file:

WearingCourse

Specify: Course WearingCourse

Property not found: Volume

Add property

Verify entity property styles

Entity property style

Name	WearingCourse
Type	Element by code
IFC entity	IfcCourse
IFC predefined type	WEARINGCOURSE
Group	Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD_P_02]	0,000
---------------------	-------

Strato\_CaratteristichePrestazionali

Portanza [ROD_P_01]	0,000
PSI [ROD_P_05]	0,000

Qto\_CourseBaseQuantities

Thickness [IFCPROPERTYSINGLEVALUE]	0,050
------------------------------------	-------

Classification

Properties Road

ROD_C_02 Strato Usura
-----------------------

IFC

IfcCourse Course
------------------

Close

Scale: 500

Subprojects Sheets Modeling Checking

Command:

Reports

Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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Planimetry Profile Sections Sheets

Survey Model 3D modeling Analysis Axis Pipes Drawing Annotate

Pipes: Styles: None

BIM Modeling

Project: Road\_Example.sgd

BIM structure

Project - Road\_Example

Site - Site

Axis

Project model

Below ground

FILL [FILL]

External roadside

Substructure

BASE COURSE [BASE]

BINDER COURSE [BINDER]

SUBBASE COURSE [SBASE]

Superstructure

WEARING COURSE [WEARING]

Survey

Information

Object

Global ID

Name

Type

IFC entity

IFC predefined type

Style

2drbj04Uv3Bea7

WEARING COURSE

Element by code

WEARING COURSE

Entity properties styles

Project model entities

Elements by codes

WearingCourse

Information Delivery Specification (IDS)

IDS IBO.ids

Checked entity property styles conforming to the IDS file:

WearingCourse

Entity property style

Name

Type

IFC entity

IFC predefined type

Group

WearingCourse

Element by code

IfcCourse

WEARINGCOURSE

Predefined

Properties

Usura\_CaratteristichePrestazionali

Aderenza [ROD\_P\_02]

55,000

Strato\_CaratteristichePrestazionali

Portanza [ROD\_P\_01]

450,000

PSI [ROD\_P\_05]

2,500

Qto\_CourseBaseQuantities

Thickness [IFCPROPERTYSINGLEVALUE]

0.050

Volume

[VOLUME]

Classification

Properties Road

ROD\_C\_02 Strato Usura

IFC

IfcCourse Course

Scale: 500

Survey

Drawing

Subprojects Sheets Modeling Checking

Command:

Reports

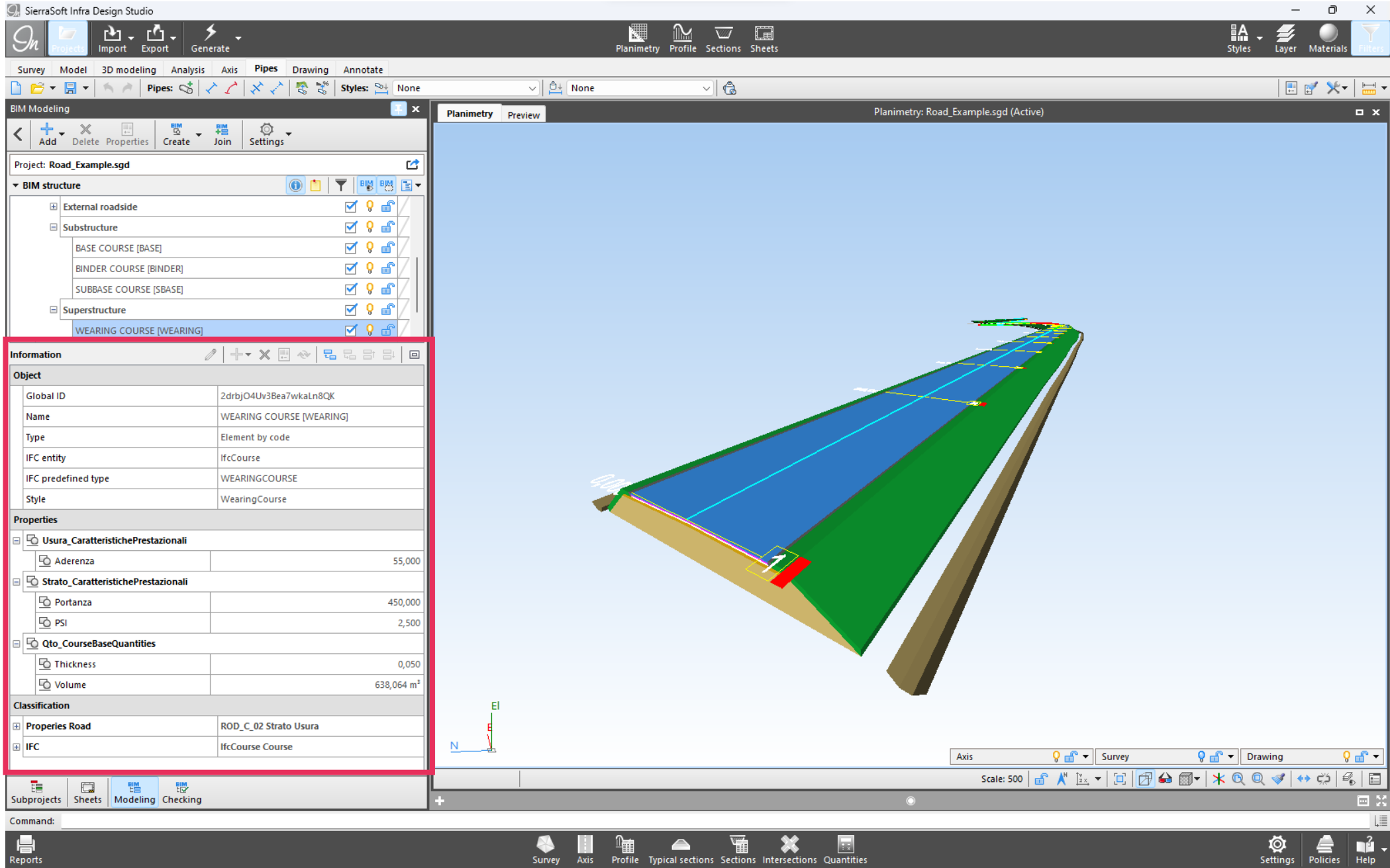
Survey Axis Profile Typical sections Sections Intersections Quantities

Settings Policies Help

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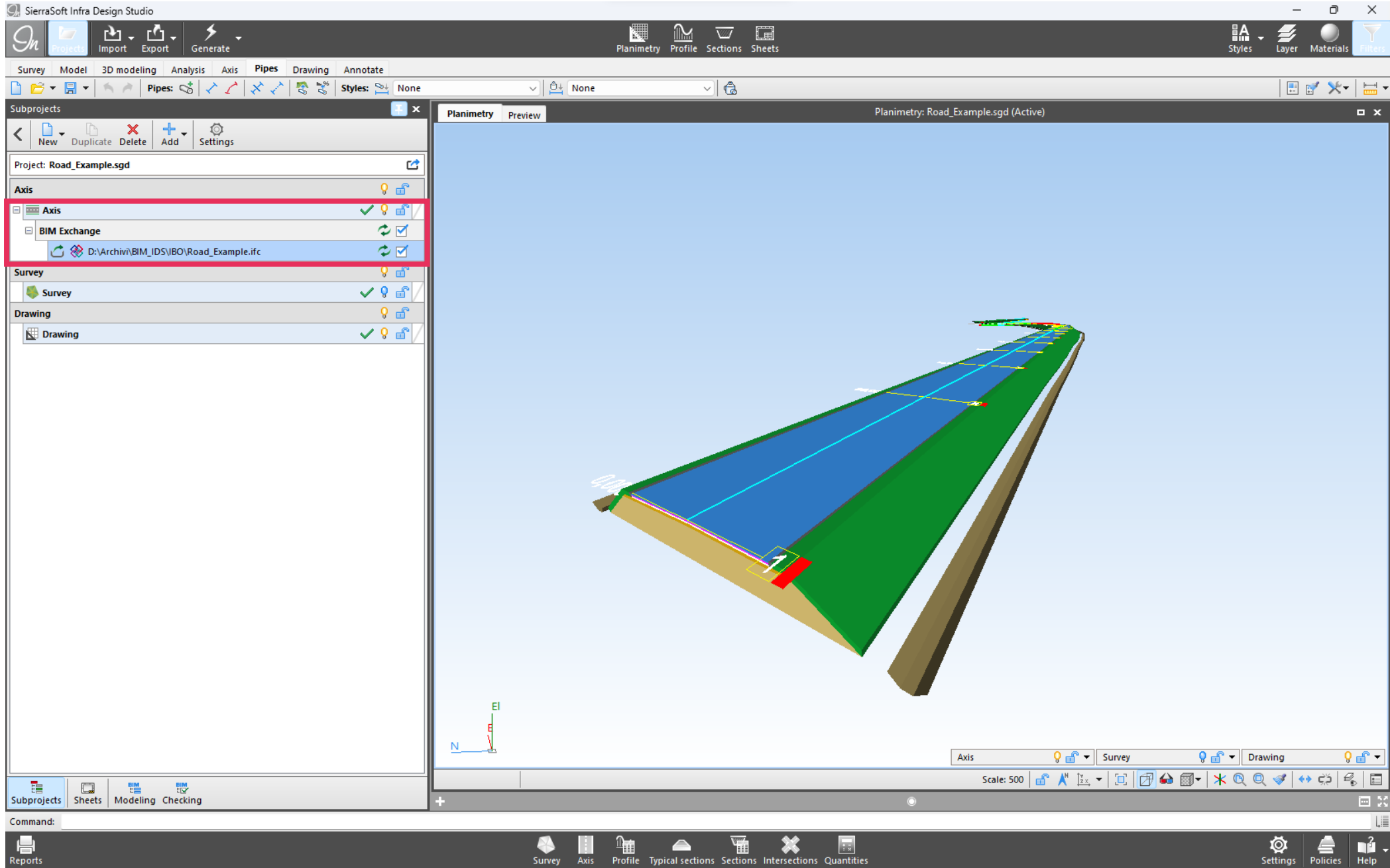
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# IFC delivery

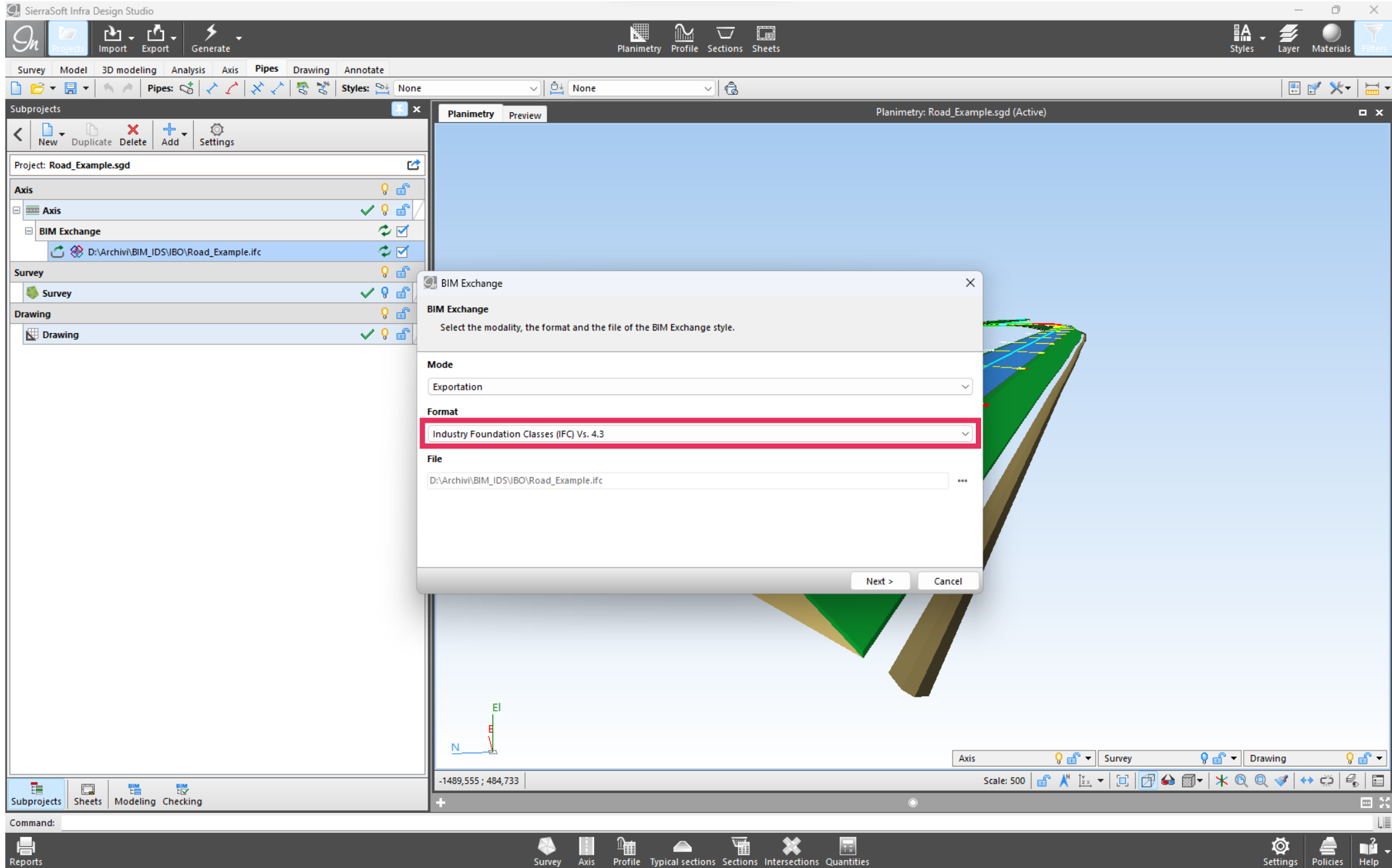
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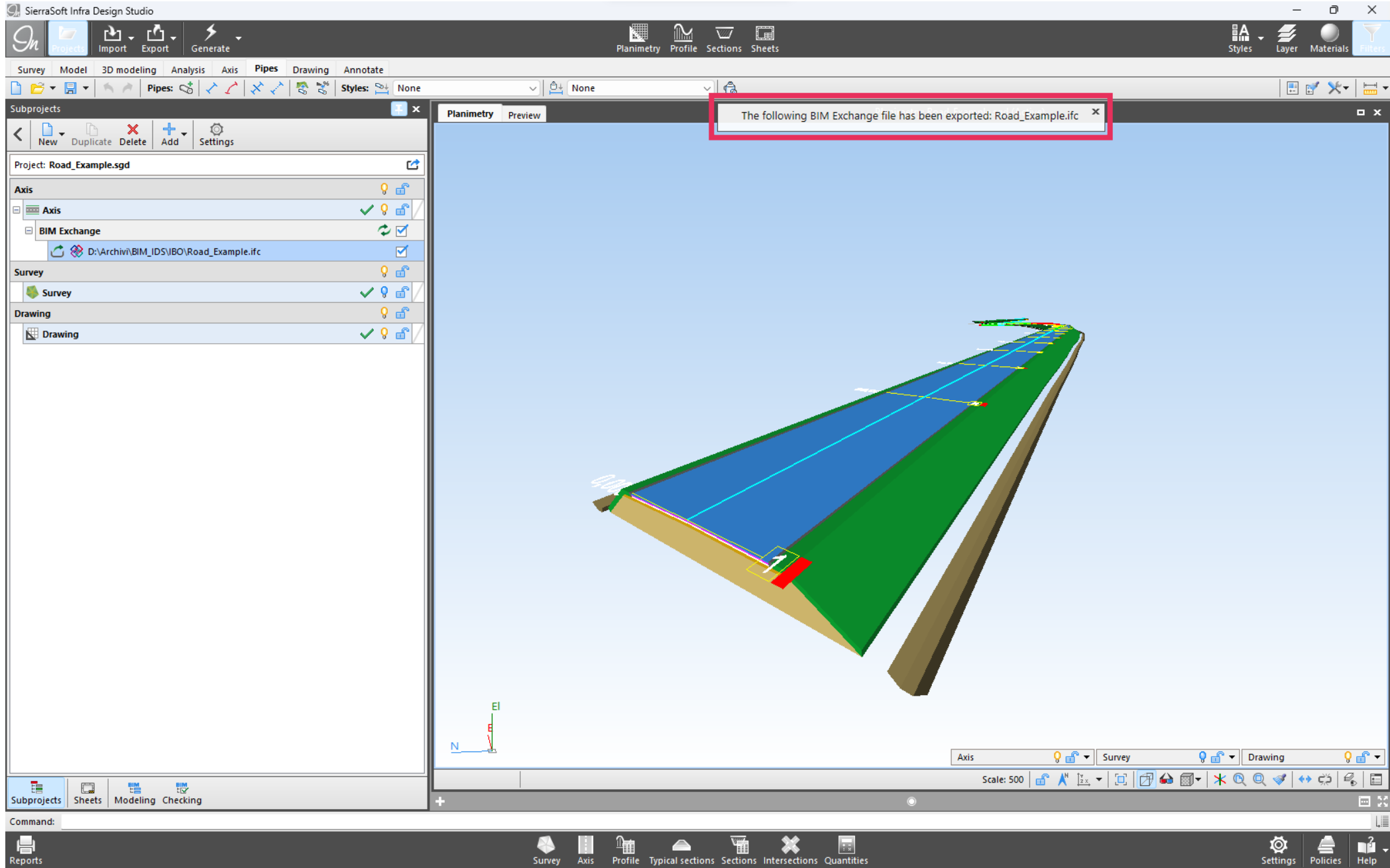
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BIMvision 2.27.0 - D:\Archivi\BIM\_IDS\IBO\Road\_Example.ifc

FILE VISTA OGGETTI SEZIONI MISURAZIONE MODIFICHE PLUGINS

3D Proiezioni nello spazio Vista 2D

Resetta l'ingrandimento Vai a Modalità di volo

Predefinito Davanti Dietro Dall'alto Dalla destra Dalla sinistra Ruota verso sinistra Ruota verso destra

Opzioni Colore di oggetto Minimappa

X Y Z Separa i piani

Cancella selezionato Cancella tutto

Asse X Asse Y Asse Z

Notifiche (1) Plugin Store

Struttura IFC

Attivo	Tipo	Nome	Descrizione
<input checked="" type="checkbox"/>	Progetto	Road_Example	
<input checked="" type="checkbox"/>	Sito	Site	
<input checked="" type="checkbox"/>	Infrastruttura		
<input checked="" type="checkbox"/>	IfcRoad	Axis	
<input checked="" type="checkbox"/>	IfcFacilityPart	Below ground	
<input checked="" type="checkbox"/>	IfcRoadPart	External roadside	
<input checked="" type="checkbox"/>	IfcFacilityPart	Substructure	
<input checked="" type="checkbox"/>	IfcFacilityPart	Superstructure	
<input checked="" type="checkbox"/>	IfcCourse	WEARING COURSE	

Proprietà Posizione Classificazione Relazioni

Nome	Valore	U.m.
<strong>Element Specific</strong>		
Guid	2drbj04Uv3Bea7wkaLn8QK	
IfcEntity	IfcCourse	
Name	WEARING COURSE	
ObjectType	WEARINGCOURSE	
PredefinedType	USERDEFINED	
<strong>Qto_CourseBaseQuantities</strong>		
Thickness	0,05	
Volume	638,064	m3
<strong>Strato_CaratteristichePrestazionali</strong>		
Portanza	450	
PSI	2,5	
<strong>Usura_CaratteristichePrestazionali</strong>		
Aderenza	55	

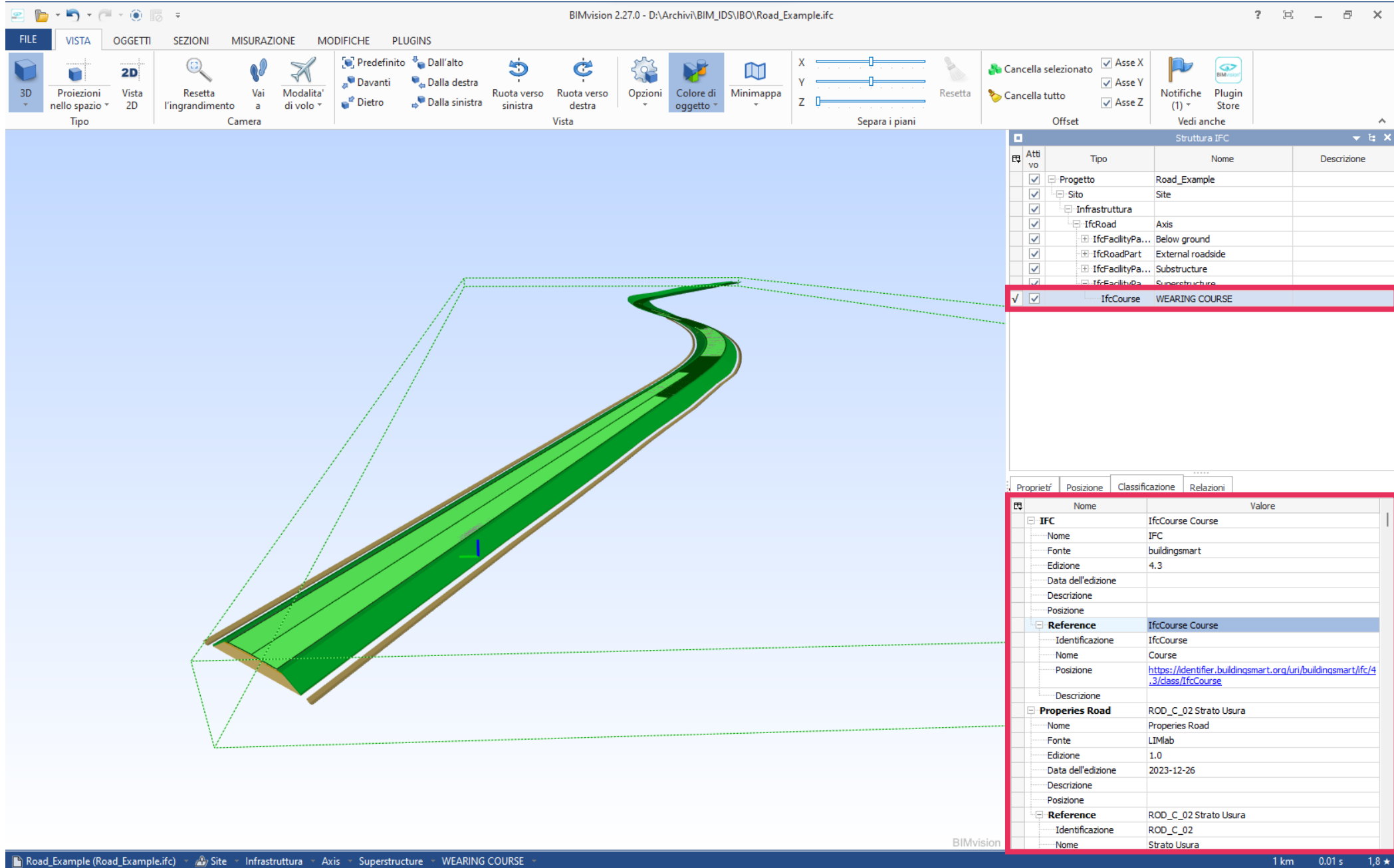
BIMvision

Road\_Example (Road\_Example.ifc) Site Infrastruttura Axis Superstructure WEARING COURSE 1 km 0.00 s 1,8

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# 4. Model validation using IDS (by Client)

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usBIM.brower v.2.0.12 - Google Chrome  
browser.usbim.com/doc/afbbd7be00d04de48da5883ebbb6de0c

usBIM.IDS Road\_Example V2 Documento in sola lettura

Cerca

▼ Road\_Example  
▼ Road\_Example [Project] (1)  
▼ Site [Site] (1)  
▼ Axis [Road] (2)  
▼ [FacilityPartCommon] (3)  
    > Below ground [EarthworksFi...]  
    > Substructure [Course] (3)  
    > Superstructure [Course] (1)  
WEARING COURSE  
▼ External roadside [RoadPart] (4)  
    > [Kerb] (2)  
    > [DistributionChamberElemen...]  
    > [PipeSegment] (2)  
    > [EarthworksFill] (2)

SINISTRA

Specifiche di "IDS\_Road IBO Project"  
Home

▼ Course WearingCourse  
    • WEARING COURSE

Specifica di "Course WearingCourse"

Informazioni specifica

Versione ifc: IFC4X3

Il modello **DEVE AVERE** entità che hanno:

- classe IFC IFCCOURSE
- attributo ObjectType.WEARINGCOURSE

che **SODDISFANO** i seguenti requisiti:

- **AVERE** proprietà **Strato\_CaratteristichePrestazionali.Portanza** (IFCREAL)
- **AVERE** proprietà **Strato\_CaratteristichePrestazionali.PSI** (IFCREAL)
- **AVERE** proprietà **Usura\_CaratteristichePrestazionali.Aderenza** (IFCREAL)
- **AVERE** proprietà **Qto\_CourseBaseQuantities.Thickness** (IFCREAL) con valore  $\geq 0.02$  (nonchè:  $\leq 0.07$ )
- **AVERE** proprietà **Qto\_CourseBaseQuantities.Volume** (IFCVOLUMEMEASURE)
- **AVERE** classificazione **Properties Road.ROD\_C\_02**
- **AVERE** classificazione IFC.IfCourse

Report segnalazioni

Non ci sono segnalazioni da visualizzare

Gerarchia

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# Optimizing BIM Infrastructure Design with the integration of IDS and bSDD

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# Conclusion

## Optimizing BIM Infrastructure Design with the integration of IDS and bSDD

1. IDS and bSDD are fundamental in the automation and optimization of BIM workflows.
2. bSDD:
  - Allows client to define its information requirements in a machine-readable manner.
  - Enables the designer to clearly understand the client's requests.
3. Having a single environment where it is possible to integrate and leverage the potential of design software and openBIM standards for the project itself increases accuracy and reduces costs due to multiple project checks.

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# Optimizing BIM Infrastructure Design with the integration of IDS and bSDD



**Rachele A. Bernardello**

LIM.lab/ – University of Padova



**Mauro Coletto**

SierraSoft Srl



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Thank you very much for your attention

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# Optimizing BIM Infrastructure Design with the integration of IDS and bSDD



**Rachele A. Bernardello**

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[www.dicea.unipd.it](http://www.dicea.unipd.it)



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[www.sierrasoft.com](http://www.sierrasoft.com)

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## Please let us have any questions you may have or meet us at SierraSoft Booth

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