



OpenRoads

OpenBridge



# Item Types Enhancements in OpenRoads Designer 2022 Release 1

# OpenRoads - Item Type Fundamentals – Part 1

## Fundamentals of Item Types

- Item Type Properties
- Pick Lists
- Custom Property Types
- Calculated Properties
- Expression Builder
- Lookup Expression

# OpenRoads - Item Type Fundamentals – Part 2

## Using Item Types with Civil Data

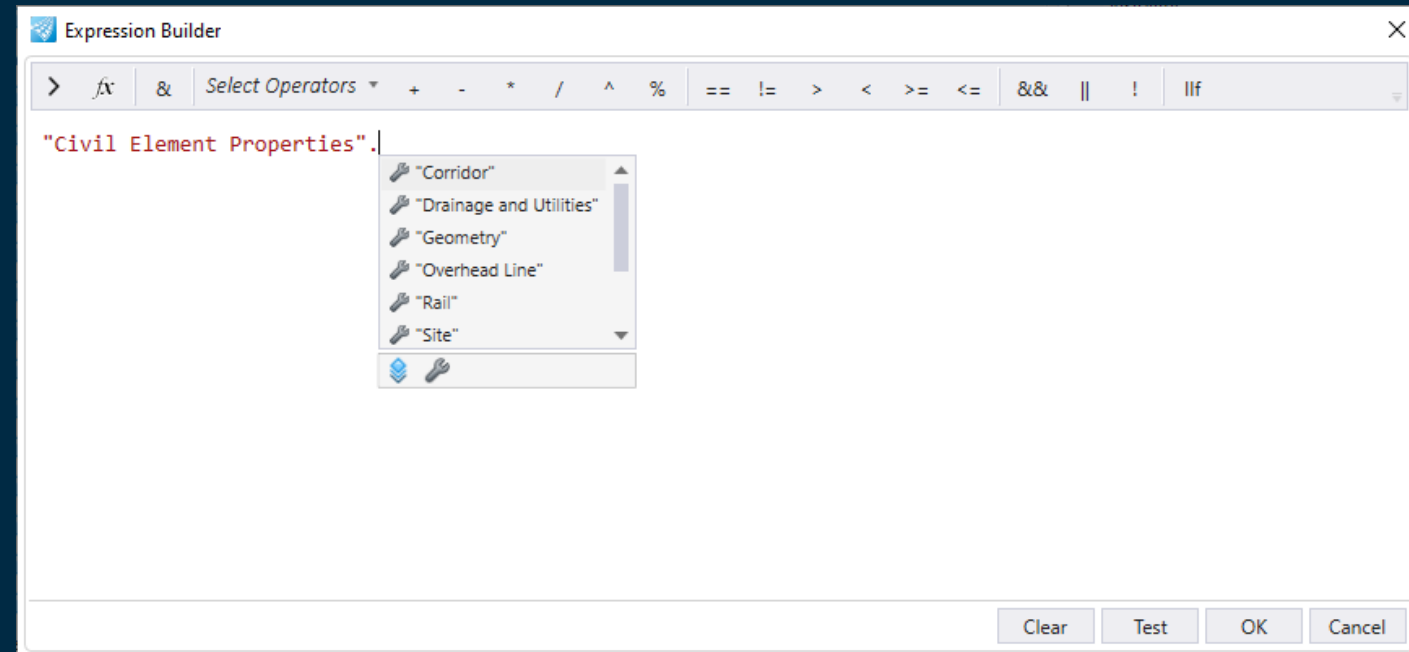
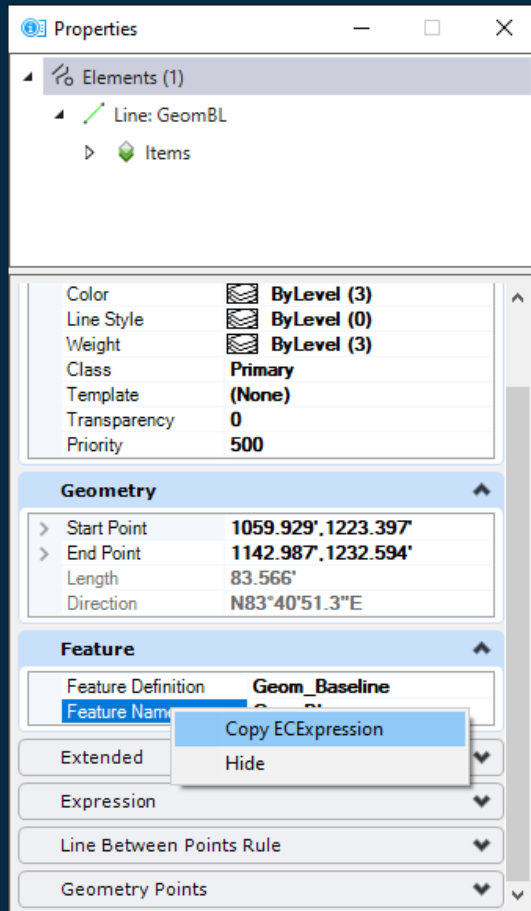
- Item Types with Feature Definitions
- Single Source of Truth
- Propagation, Prioritization, and Conflict Resolution
- Asset Manager
- Annotation and Labeling
- Display Styles and Display Rules
- Items Browser
- Reports

# Agenda

- ✓ Civil Properties in Expression Builder
- ✓ Station and Offset Expressions
- ✓ Showing Item Types in User Interface
- ✓ Drainage Elements
- ✓ Item Type Last Valid Value
- ✓ Hierarchical Pick Lists
- ✓ Spaces and Special Characters in Lookup Spreadsheets
- ✓ Latitude and Longitude Expressions
- ✓ Item Type Text when Attaching Item Types
- ✓ “Item Types Text” View Attribute

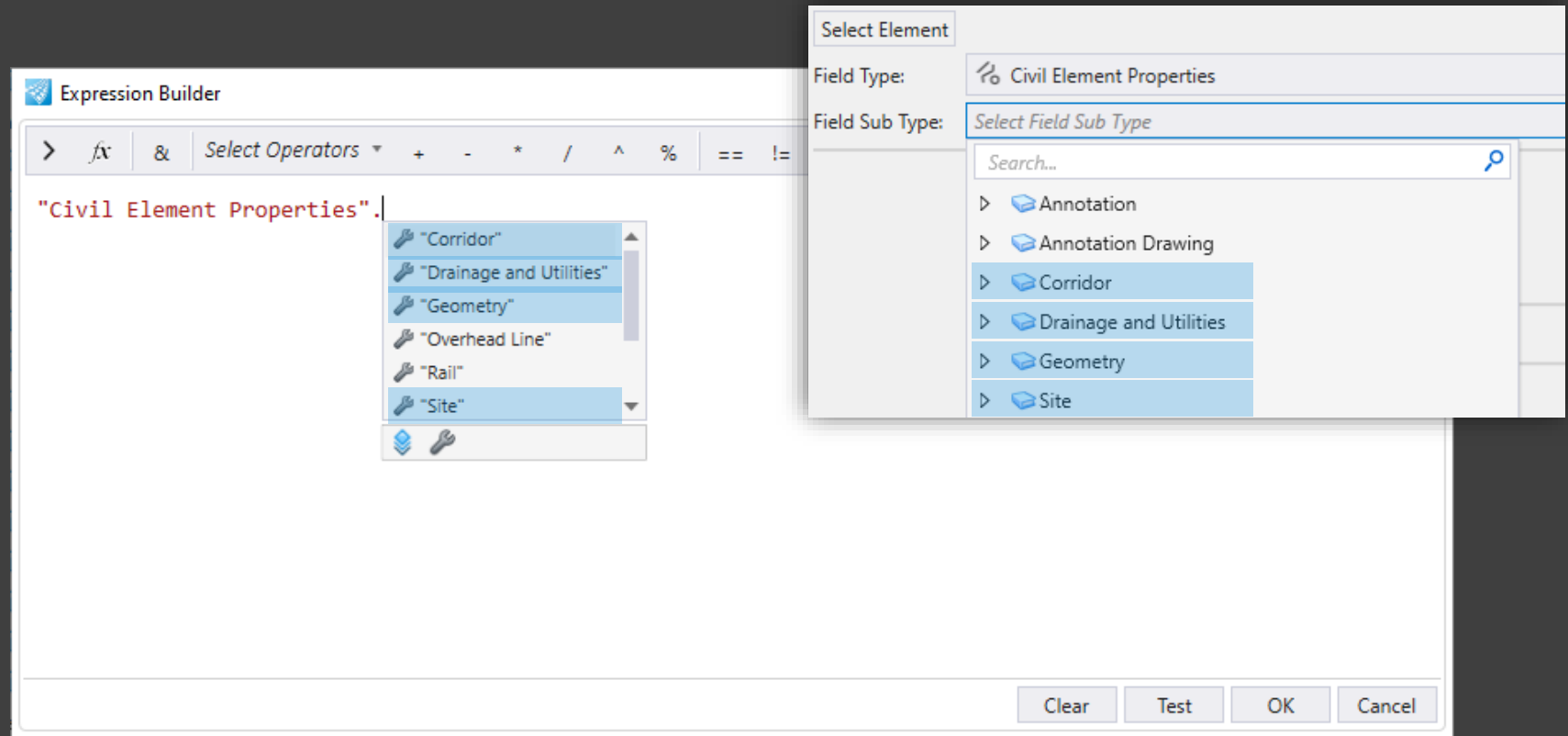
# Civil Properties in Item Type Expression Builder

- Browse and Auto Complete while Typing
- Copy from Properties Window





# Civil Element Properties added to Expression Builder



- Auto completion as you type “Civil Element Properties”
- Organized like Text Favorite Manager



# Copy from Properties Window

Properties

- Elements (1)
  - Complex Element: Mainline

Feature

|                    |               |
|--------------------|---------------|
| Feature Definition | Geom_Baseline |
| Feature Name       | Mainline      |

General

Geometry

Extended

Expression Builder

Select Operators + - \* / ^ == != > < >= <= && || ! ||if

```
"Civil Element Properties"."Geometry"."Feature"."Feature With Name"."Feature Name"()
```

Clear Test OK Cancel

Configuration variable to enable  
**CIVILPROPERTYECEXPRESSION = 1**



OpenRail Modeling | Item Types Townhall.dgn [2D - V8 DGN] - OpenRail Designer CE 2022 Release 1

File Home Terrain Geometry Site Corridors Rail Model Detailing Drawing Production Drawing Utilities Collaborate View Help

Element Selection Coordinate System Geographic Asset Manager Attach Item Detach Item Picklist Import/Export Reports

Primary Selection Geographic Item Types Reports

View 1, Default | View 2, Default-3D

Element Selection

Item Types

Libraries Utilities

- Assets
- Location
- Pay Items
- Town Hall
  - Examples
    - Feature Name
- Clearance Point
- LV Assets

Properties

**Property Definition**

|               |       |
|---------------|-------|
| Type          | Text  |
| Is Array      | False |
| Is ReadOnly   | False |
| Visibility    | Show  |
| Default Value |       |

**Calculated Property**

|                      |        |
|----------------------|--------|
| Expression           | (None) |
| Use last valid value | True   |
| Failure Value        |        |

**Picklist Options**

|                 |        |
|-----------------|--------|
| Picklist Source | (None) |
| Settings        | (None) |

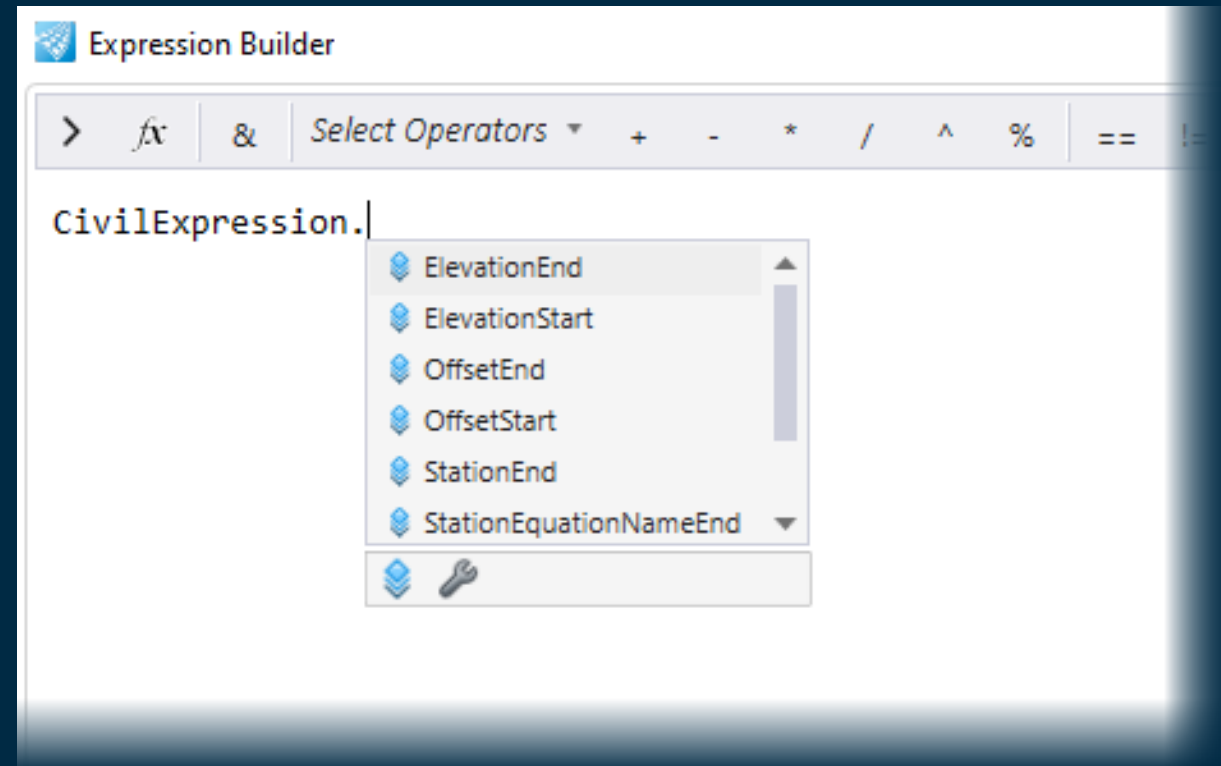
To see properties something must be selected.

Multi-Model Views | 1 2 3 4 5 6 7 8 | Node: CB- \ Point: 2, Level: Util\_Storm\_Nodes | Default



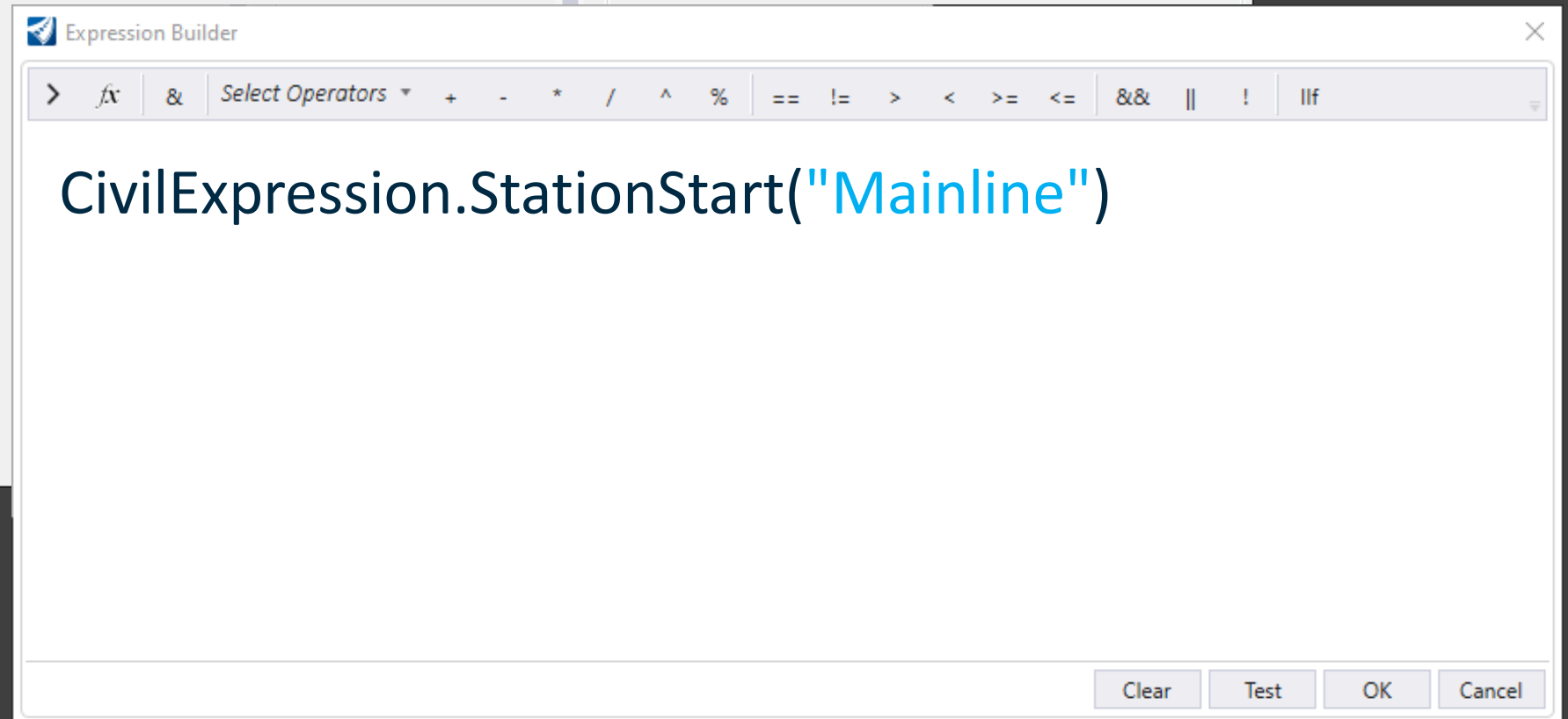
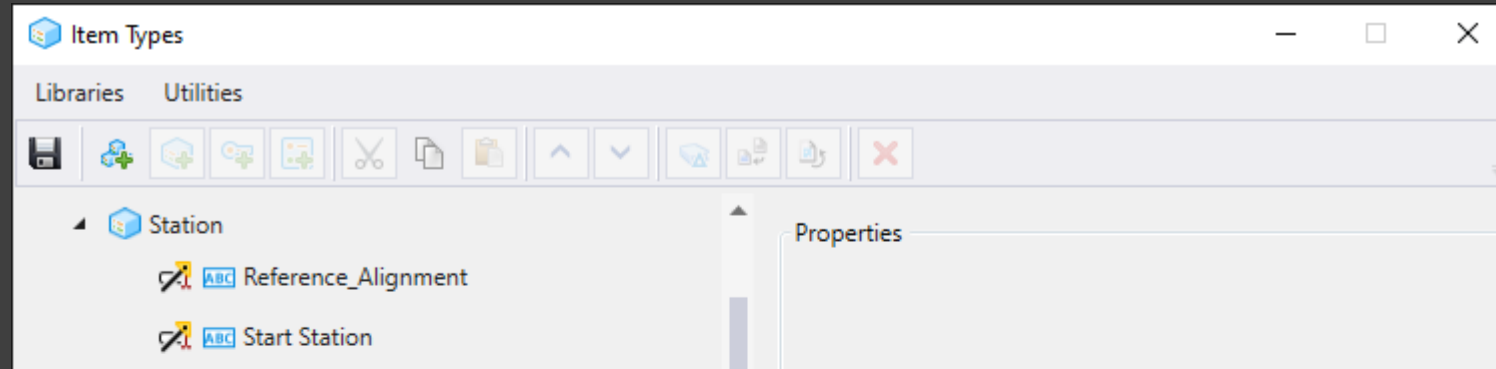
# Station and Offset Expressions

- Compute stations and offsets
- Relative to a specified alignment
- Customizable formatting
- Values automatically updated like other item type expressions



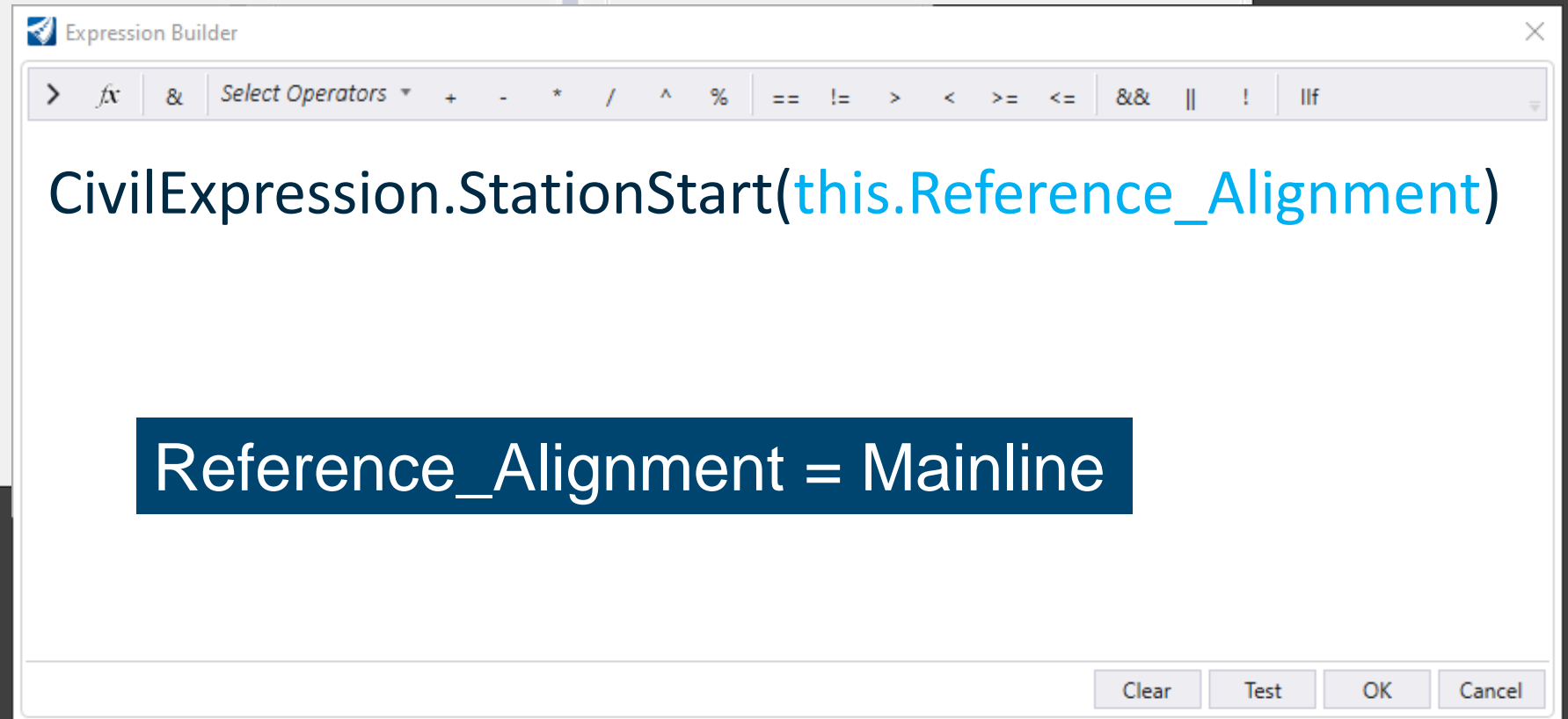
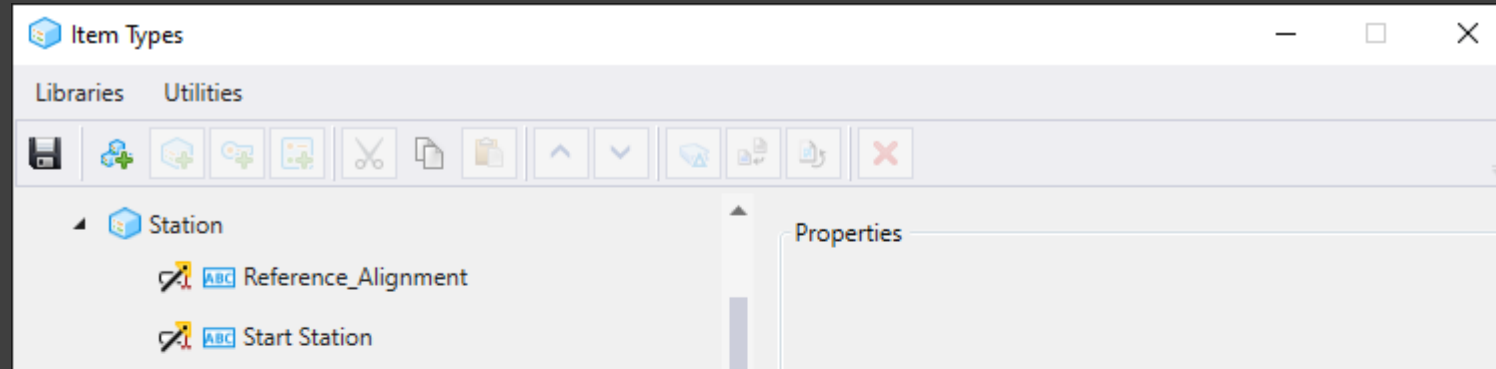


# Start Station Expression





# Start Station Expression





# Formatting Station values in Expression

Expression Builder

> fx & Select Operators + - \* / ^ % == != > < >= <= && || ! ||f

`System.String.Format("{0:0+00.000}", CivilExpression.StationStart(this.Reference_Alignment))` **101+65.010**

`System.String.Format("{0:0+00}", CivilExpression.StationStart(this.Reference_Alignment))` **101+65**

Clear Test OK Cancel



# Formatting Station values in Expression

Item Types

Libraries Utilities

Station

- Reference\_Alignment
- Start Station**
- End Station

Properties

**Property Definition**

|               |       |
|---------------|-------|
| Type          | Text  |
| Is Array      | False |
| Is ReadOnly   | True  |
| Visibility    | Show  |
| Default Value |       |

**Calculated Property**

|                      |                               |
|----------------------|-------------------------------|
| Expression           | System.String.Format("{0:0+00 |
| Use last valid value | True                          |
| Failure Value        |                               |

**Picklist Options**

|                 |        |
|-----------------|--------|
| Picklist Source | (None) |
| Settings        | (None) |



OpenRail Modeling

Item Types Townhall.dgn [3D - V8 DGN] - OpenRail Designer CE 2022 Release 1

Search Ribbon (F4)

File Home Terrain Geometry Site Corridors Rail Model Detailing Drawing Production Drawing Utilities Collaborate View Help

Import/Export Design Elements Standards Civil Toggles Reports Lines Arcs Point Offsets and Tapers Reverse Curves Spirals Modify Complex Geometry Open Profile Model Set Active Profile Profile Creation Lines Curves Element Profiles Modify Complex Geometry Transform Simplify Geometry Complex Redefine Table Editor Event Point List

Primary Selection General Tools Horizontal Vertical Common Tools

View 1, Default

View 2, Default-3D

Element Selection

Properties

To see properties something must be selected.

File Saving > Saving Utility Projects

Default



# Calculations with Station Expressions

Item Types

Libraries Utilities

Station

- Reference\_Alignment
- Start Station
- End Station
- Length**

Properties

**Property Definition**

|               |               |
|---------------|---------------|
| Type          | Number        |
| Is Array      | False         |
| Is ReadOnly   | True          |
| Visibility    | Show          |
| Default Value |               |
| Units         | Working Units |

**Calculated Property**

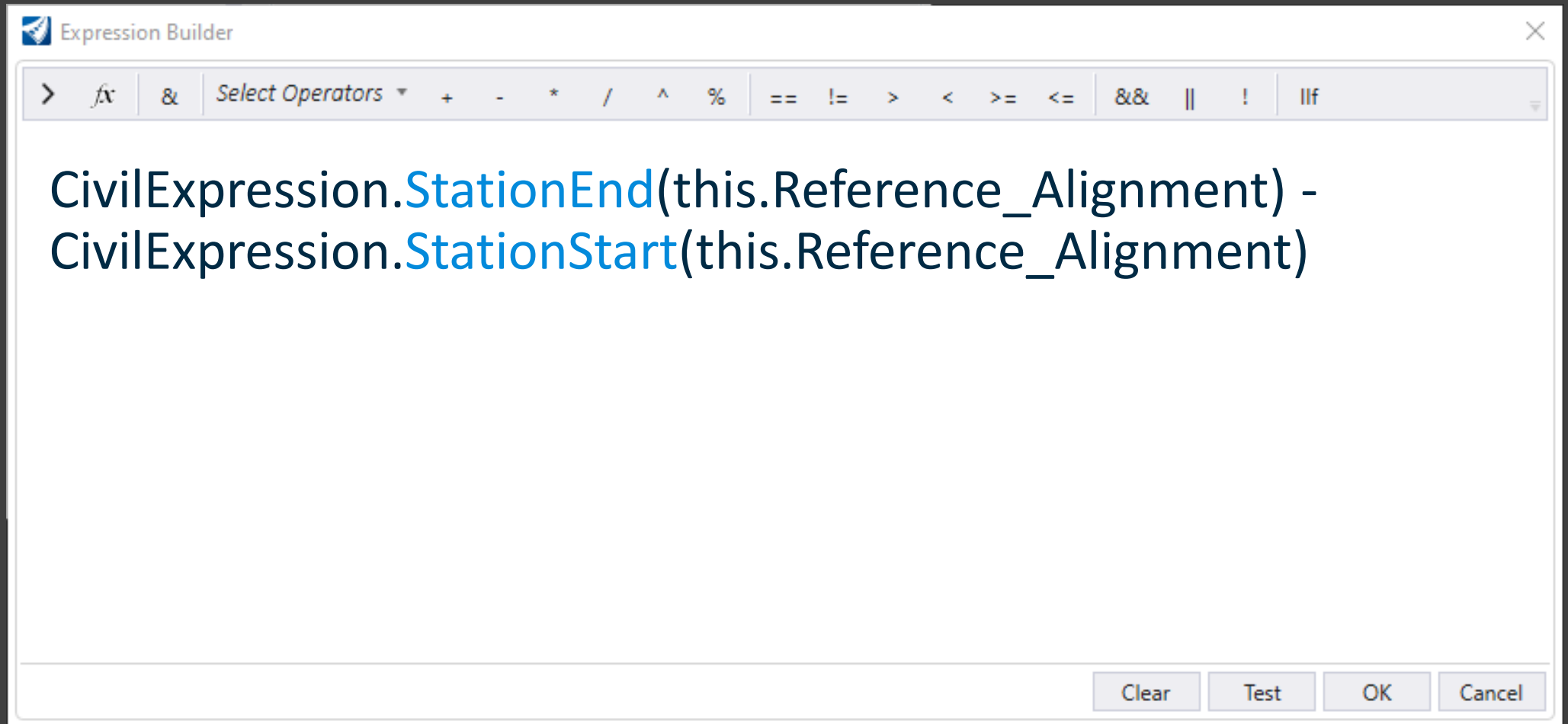
|                      |                                |
|----------------------|--------------------------------|
| Expression           | CivilExpression.StationEnd(thi |
| Use last valid value | True                           |
| Failure Value        |                                |

**Picklist Options**

|                 |        |
|-----------------|--------|
| Picklist Source | (None) |
| Settings        | (None) |



# Calculations with Station Expressions







OpenRoads Modeling RampB\_Gore.dgn [3D - V8 DGN] - OpenRoads Designer CE 2022 Release 1

File Home Terrain Geometry Site Corridors Model Detailing Drawing Production Drawing Utilities Collaborate View Help

Element Selection Coordinate System Asset Manager Attach Item Detach Item Picklist Import/Export Reports

Primary Selection Geographic Item Types Reports

View 2, Default-3D

Element Selection

Properties

To see properties something must be selected.

File Saving > Settings Saved

Multi-Model Views

1 2 3 4 5 6 7 8

Default

# Showing Item Types in User Interface

## Tool Settings Window

**Line**

**Parameters**

Distance 113.326

Line Direction N74°22'17.2"E

**Feature**

Feature Definition Road\_Curb\_Back

Name RdCBk

**Pay Item - Curb**

Description (None)

Item\_Number

Unit

Design\_Length

3D\_Length

**Station Offset**

Reference Alignment

Start Station 0+00.000

Start Offset 0.00 Rt.

## Quick Properties

**Line**

> Start Point 11033.757,9868.929'

> End Point 11260.207,9929.476'

Length 234.404'

Direction N75°01'51.2"E

Feature Definition Road\_Curb\_Back

Feature Name RdCBk

Description CONCRETE CURB TYPE

Item\_Number 62-10110

Unit LF

Design\_Length 234.404'

3D\_Length 0.000'

Reference Alignment Mainline

Start Station 0+00.000 [Mainline]

Start Offset 20.00 Rt.

End Station 2+34.404 [Mainline]

End Offset 20.00 Rt.

Length 234.404'

Direction N75°01'51.2"E

> Start Point  11033.757,9868.929

> End Point  11260.207,9929.476

# Display Item Types in User Interface?

Tool  
Settings  
Window

`CIVIL_TOOL_SETTINGS_OMIT_ITEMTYPES = True`

Quick  
Properties

`CIVIL_QUICK_PROPERTIES_OMIT_ITEMTYPES = True`

*Item Types are always shown in the Properties window*

# Drainage Elements

- Support Item Types on Feature Definitions
- Integrated with Expression Builder
- Single Source of Truth – same item type visible in plan, profile, and 3d models

The screenshot shows the 'Item Types' application window. The left pane displays a tree view under 'Drainage and Utilities' with 'Conduits' expanded to show 'Mannings n'. The right pane shows the 'Properties' for this item type, including a 'Property Definition' table, a 'Calculated Property' section with an expression, and 'Picklist Options'.

| Property Definition |        |
|---------------------|--------|
| Type                | Number |
| Is Array            | False  |
| Is ReadOnly         | True   |
| Visibility          | Show   |
| Default Value       |        |
| Units               | (None) |

| Calculated Property  |  |
|----------------------|--|
| Expression           | :"Drainage"."Conduit Element Manager"."Mannings n" |
| Use last valid value | True   |
| Failure Value        |  |

| Picklist Options |        |
|------------------|--------|
| Picklist Source  | (None) |
| Settings         | (None) |

# Item Type Last Valid Value

Accurate Last Valid Values are critical before sharing data to a non-OpenCivil application such as MicroStation or publishing to an iTwin.

The screenshot shows the 'Item Types' application window. The left pane displays a tree view of item types under 'Pay Items', with 'Pay Item - Curb' selected. The right pane shows the 'Properties' for this item type, organized into three sections: 'Property Definition', 'Calculated Property', and 'Picklist Options'. The 'Use last valid value' property is highlighted in yellow.

| Property Definition |       |
|---------------------|-------|
| Type                | Text  |
| Is Array            | False |
| Is ReadOnly         | True  |
| Visibility          | Show  |
| Default Value       |       |

| Calculated Property  |   |
|----------------------|---|
| Expression           | Lookup.GetEntry("Pay_Items","Description",this.Description) |
| Use last valid value | True  |
| Failure Value        |   |

| Picklist Options |        |
|------------------|--------|
| Picklist Source  | (None) |
| Settings         | (None) |



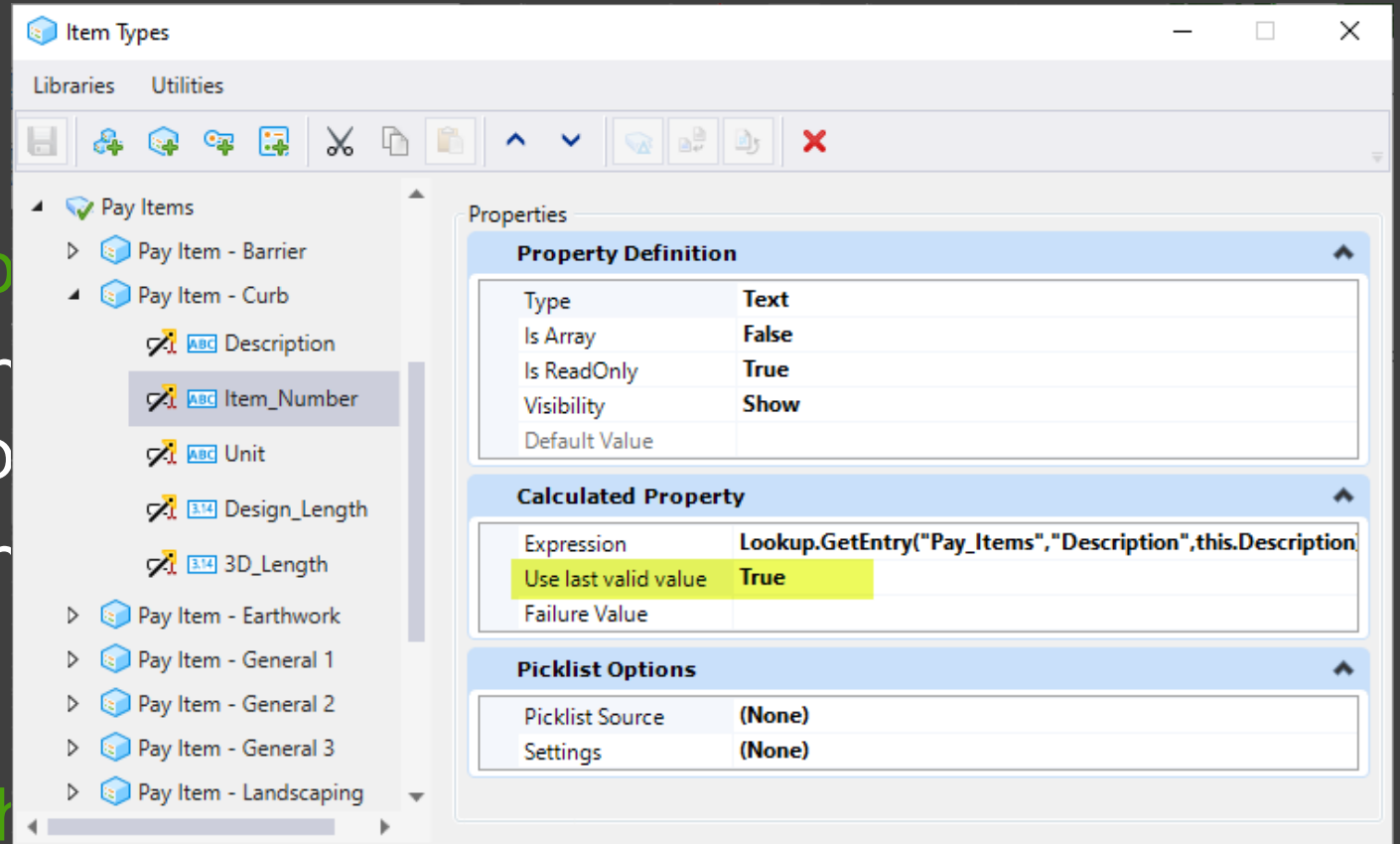
# Item Type Expression Processing

## Item Type

- When and p
- When

## But... wh

- The **Last Valid Value** is used if enabled.





## Item Type Last Valid Value

### Item Type Last Valid Value is stored...

- When an element is selected, and properties are displayed.

### But... what about ruled civil elements?

- The **Last Valid Value** is updated whenever a file is closed when running OpenSite, OpenRoads, or OpenRail Designer

## To Override Update Item Types on Close ...

`CIVIL_ITEMTYPE_UPDATE_LASTVALIDVALUE_ON_CLOSE = False`

## To Manually Update Item Types...

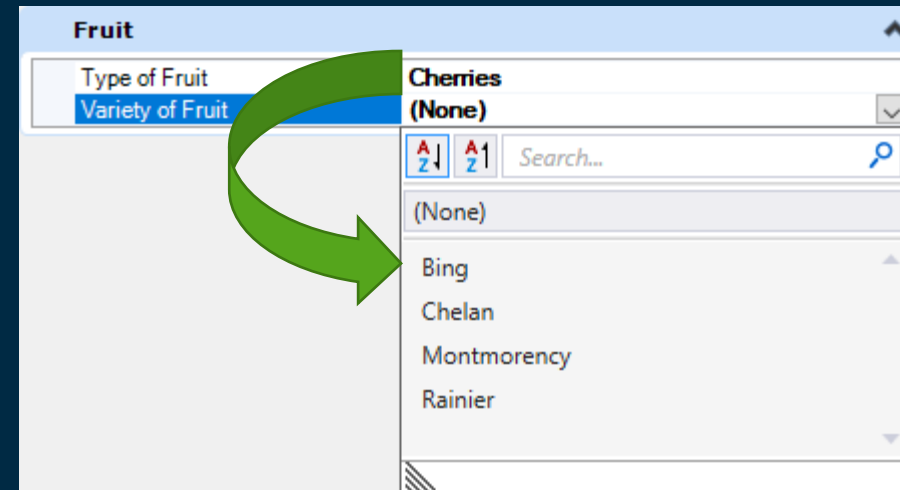
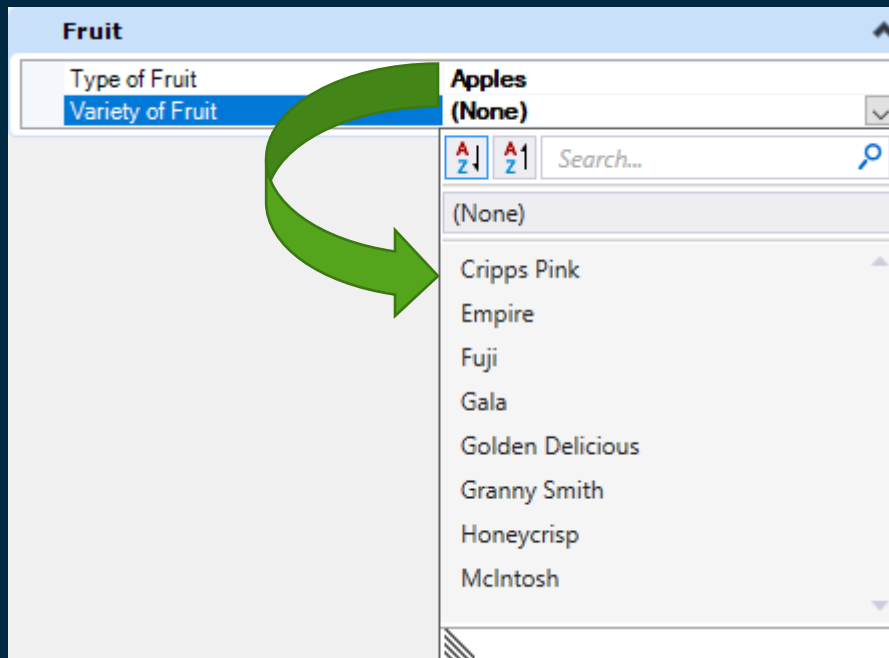
`ItemTypesLKG` macro from the example workspace.

*This macro can be run on individual files or entire projects using the Batch Process utility.*



# Hierarchical Pick Lists

Values in pick list are filtered by the value of another property





OpenRail Modeling - Item Types Townhall.dgn [2D - V8 DGN] - OpenRail Designer CE 2022 Release 1

File Home Terrain Geometry Site Corridors Rail Model Detailing Drawing Production Drawing Utilities Collaborate View Help

Element Selection Design Elements Standards Import/Export Civil Toggles Reports Lines Arcs Point Offsets and Tapers Reverse Curves Spirals Modify Complex Geometry Open Profile Model Set Active Profile Profile Creation Lines Curves Element Profiles Modify Complex Geometry Transform Simplify Geometry Complex Redefine Table Editor Event Point List

View 1, Default View 2, Default-3D

Properties

To see properties something must be selected.

Element Selection

Multi-Model Views 1 2 3 4 5 6 7 8

Display complete

Default



# Setting up Hierarchical Pick Lists

Item Types

Libraries Utilities

Assets

- Ownership
- Sign
  - ABC Sign\_Series
  - ABC Sign\_Selection
  - ABC Mounting Type
  - ABC Sign\_Code
  - ABC Sign\_Name
  - ABC Height
  - ABC Width
- Fruit
  - Fruit
- Location

Properties

**Property Definition**

|               |       |
|---------------|-------|
| Type          | Text  |
| Is Array      | False |
| Is ReadOnly   | False |
| Visibility    | Show  |
| Default Value |       |

**Calculated Property**

|                      |        |
|----------------------|--------|
| Expression           | (None) |
| Use last valid value | True   |
| Failure Value        |        |

**Picklist Options**

|                 |                               |
|-----------------|-------------------------------|
| Picklist Source | Excel Files (*.xlsx)          |
| Settings        | {"IsFirstRowHeader":true,"Ran |

Picklist Settings

Excel File : Sign Lookup.xlsx

Picklist Option : Column

First Row Contains Headings

Excel Sheet Name : Signs

Column Name : Series

OK Cancel



# Setting up Hierarchical Pick Lists

Item Types

Libraries Utilities

Assets

- Ownership
- Sign
  - Sign\_Series
  - Sign\_Selection**
  - Mounting Type
  - Sign\_Code
  - Sign\_Name
  - Height
  - Width
- Fruit
- Location

Properties

| Property Definition |       |
|---------------------|-------|
| Type                | Text  |
| Is Array            | False |
| Is ReadOnly         | False |
| Visibility          | Show  |
| Default Value       |       |

| Calculated           |      |
|----------------------|------|
| Expression           |      |
| Use last valid value | True |
| Failure Value        |      |

| Picklist Options |                               |
|------------------|-------------------------------|
| Picklist Source  | Excel Files (*.xlsx)          |
| Settings         | {"IsFirstRowHeader":true,"Ran |

Picklist Settings

Excel File : Sign Lookup.xlsx

Picklist Option : Custom

First Row Contains Headings

Excel Sheet Name : Signs

Picklist Column : Picklist Name

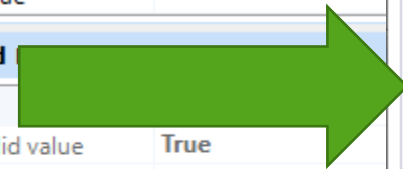
Excel Filter

Key Excel Column : Series

Key Value From :  Excel  Item Type

ItemType Property : Sign\_Series

OK Cancel



# Spaces and Special Characters in Lookup Spreadsheets

|    | A  | B         | C         |
|----|--|-----------|-----------|
| 1  | Picklist Name                                  | Standard  | Sign Code |
| 2  | Street Name Sign x8 [D-3]                      | U.S. 2004 | D-3       |
| 3  | Street Name Sign x12 [D-3]                     | U.S. 2004 | D-3       |
| 4  | Destination Sign x18 [D1-1]                    | U.S. 2004 | D1-1      |
| 5  | Destination Sign x18 [D1-1a]                   | U.S. 2004 | D1-1a     |
| 6  | Supplemental Plaques to Bicycle Route Sign x   |           |           |
| 7  | Supplemental Plaques to Bicycle Route Sign x   |           |           |
| 8  | Supplemental Plaques to Bicycle Route Sign x   |           |           |
| 9  | Destination Sign x30 [D1-2]                    |           |           |
| 10 | Destination Sign x30 [D1-2a]                   |           |           |
| 11 | Destination Sign x42 [D1-3]                    |           |           |
| 12 | Destination Sign x42 [D1-3a]                   | U.S. 2004 | D1-3a     |
| 13 | Reference Location Signs (miles) 10x18 [D10-1] | U.S. 2004 | D10-1     |
| 14 | Reference Location Signs (miles) 12x24 [D10-1] | U.S. 2004 | D10-1     |
| 15 | Reference Location Signs (km) 10x18 [D10-1M]   | U.S. 2004 | D10-1M    |
| 16 | Reference Location Signs (km) 12x24 [D10-1M]   | U.S. 2004 | D10-1M    |

Expression Builder

> fx & Select Operators + - \* / ^ % == != > < >= <= && ||

```
Lookup.GetEntry("Signs", "Picklist Name", this["Sign_Selection"])["Sign Code"]
```

# Latitude and Longitude Expressions

- Geographic Coordinate System required
- Expressions to compute
  - Latitude
  - Longitude
  - Pass point to expression
- Examples provided in delivered workspaces

Properties

Elements (1)

- Complex Element: RdCBk1
  - Items
    - Line
    - Bspline Curve
    - Line
  - Depends On

General

Geometry

**Feature**

|                    |                |
|--------------------|----------------|
| Feature Definition | Road_Curb_Back |
| Feature Name       | RdCBk1         |

Extended

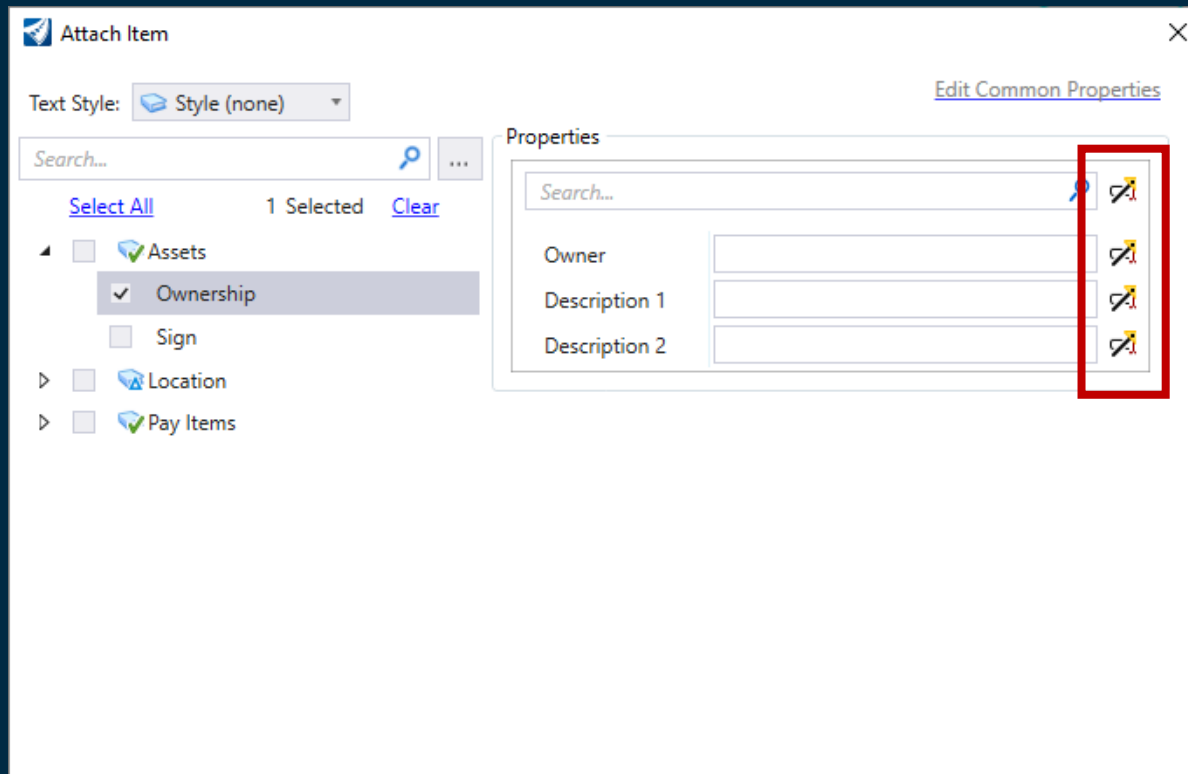
**Station Offset**

|                     |                     |
|---------------------|---------------------|
| Reference Alignment | Mainline            |
| Start Station       | 0+56.686 [Mainline] |
| Start Offset        | 12.00 Lt.           |
| End Station         | 2+71.420 [Mainline] |
| End Offset          | 22.00 Lt.           |

**Lat Long**

|                 |             |
|-----------------|-------------|
| Start Latitude  | 40.196959   |
| Start Longitude | -104.839712 |
| End Latitude    | 40.196897   |
| End Longitude   | -104.838951 |

# Item Type Text when Attaching Item Types

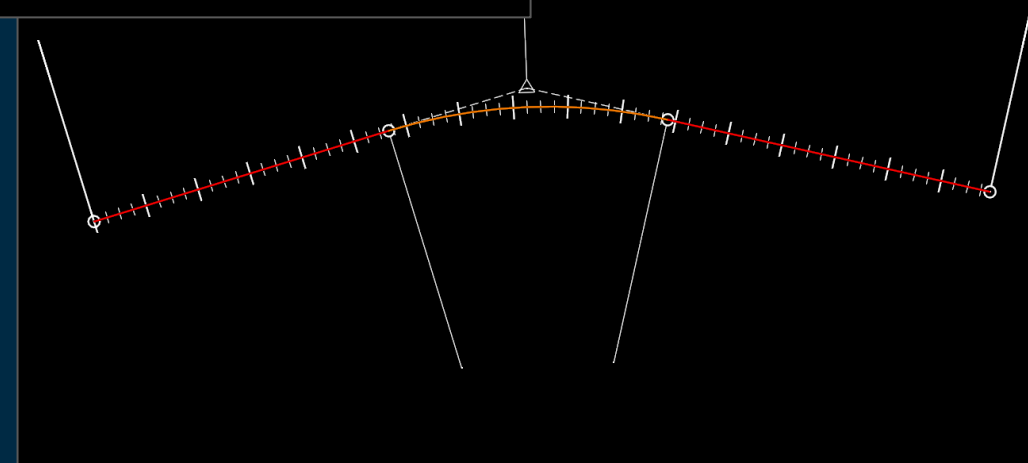
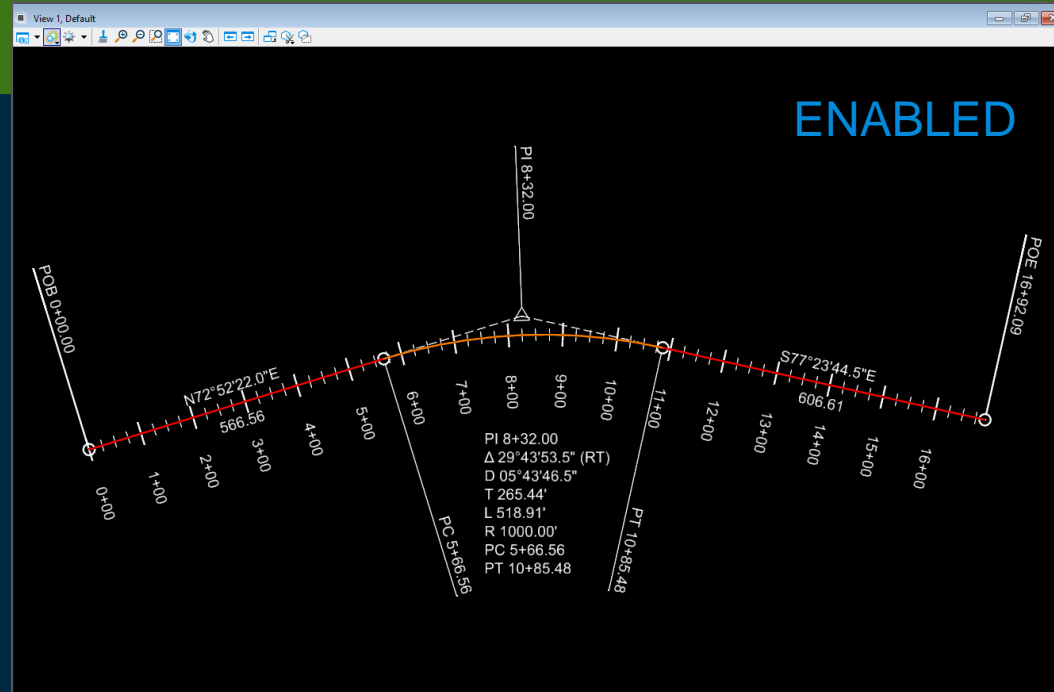
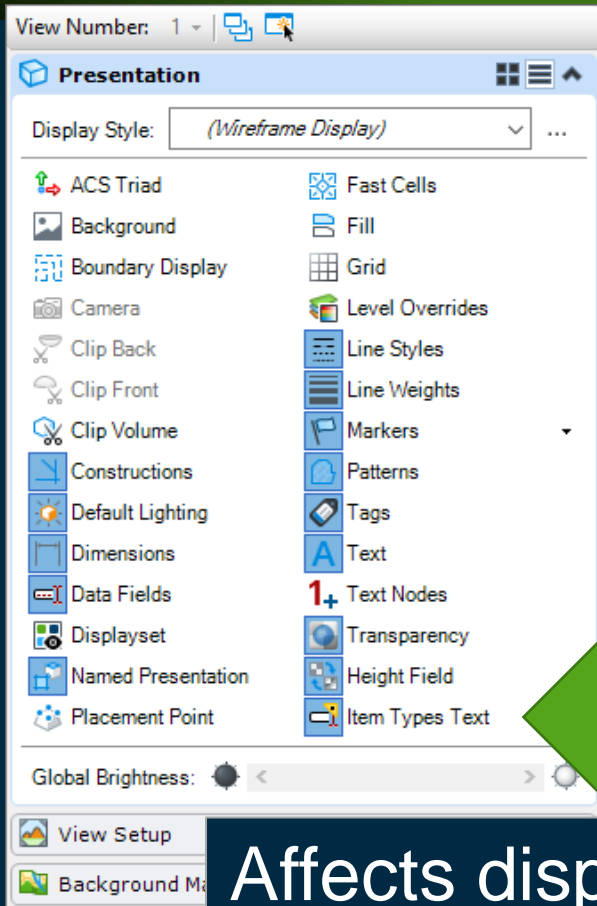


Fast way to Place Text Field as part of attaching item type

Previous workflow

1. Open Text Editor
2. Insert Field
3. Select Element
4. Select Item Type
5. Place Text

# “Item Types Text” View Attribute



Affects display of ALL text fields,  
not just Item Types fields





OpenRoads

OpenBridge

OpenSite

OpenRail



# Thank You!

