Civil 3D corridors for railroads.
Vault as a component of BIM: Actual Experience

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Class summary

This round table discussion will elaborate on creating Civil 3D corridors for railroad projects. The speaker will introduce the potential of application of pre-made railroad structures (Vb.Net) in designs consisting of two, three or more tracks. He will share the experience of organizing teamwork in big projects between several engineers and/or other project members. The speaker will also share practical experience on why working with Vault is superior to working with a server using Civil Data shortcuts. The discussion will include the analysis of a work model (Civil 3D + Vault) enabling an engineer to create a digital 3D model and a manager without specific knowledge of the software to monitor and control the progress of the project.

Key learning objectives

At the end of this class, you will be able to:

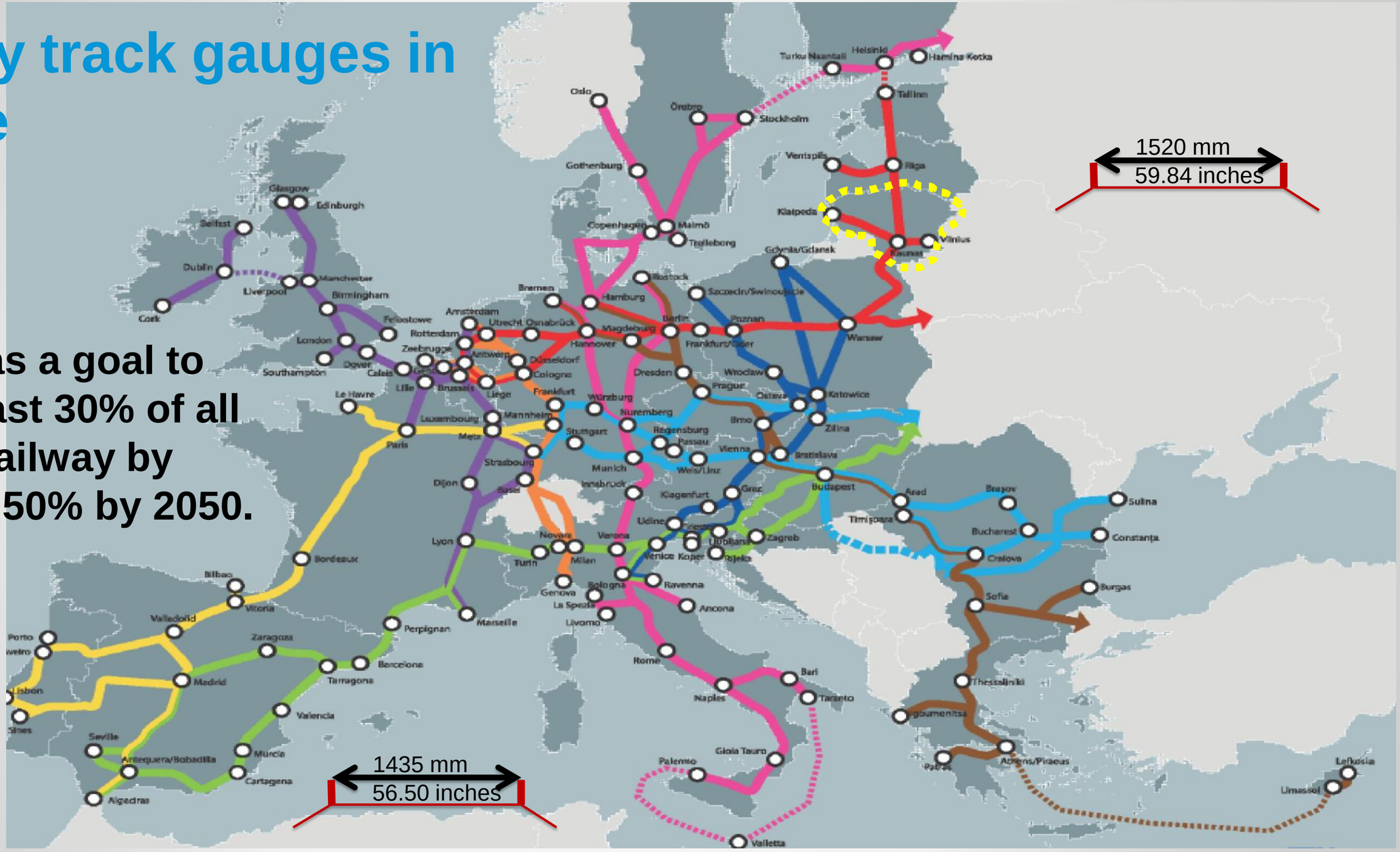
- Find out how railroad corridors can be created effectively using Civil 3D custom subassemblies.
- Receive practical experience on creating corridors for railways consisting of two, three or more tracks.
- Receive practical guidance on organizing big railroad projects. Find out the advantages of Vault against Data Shortcuts.
- Find out how Civil 3D and Vault ensure smooth cooperation between a BIM expert and a manager without specific knowledge.

Agenda

- Why we use Civil 3D for railway designing.
- Creating railway structure using Civil 3D subassemblies, VB.NET.
- Creating railway corridors for two or three tracks.
- Managing big railway projects; advantages of Vault as compared to Data Shortcuts.
- The potential of Vault for ensuring efficient cooperation between a BIM model expert and a manager without specific knowledge in the field.

Railway track gauges in Europe

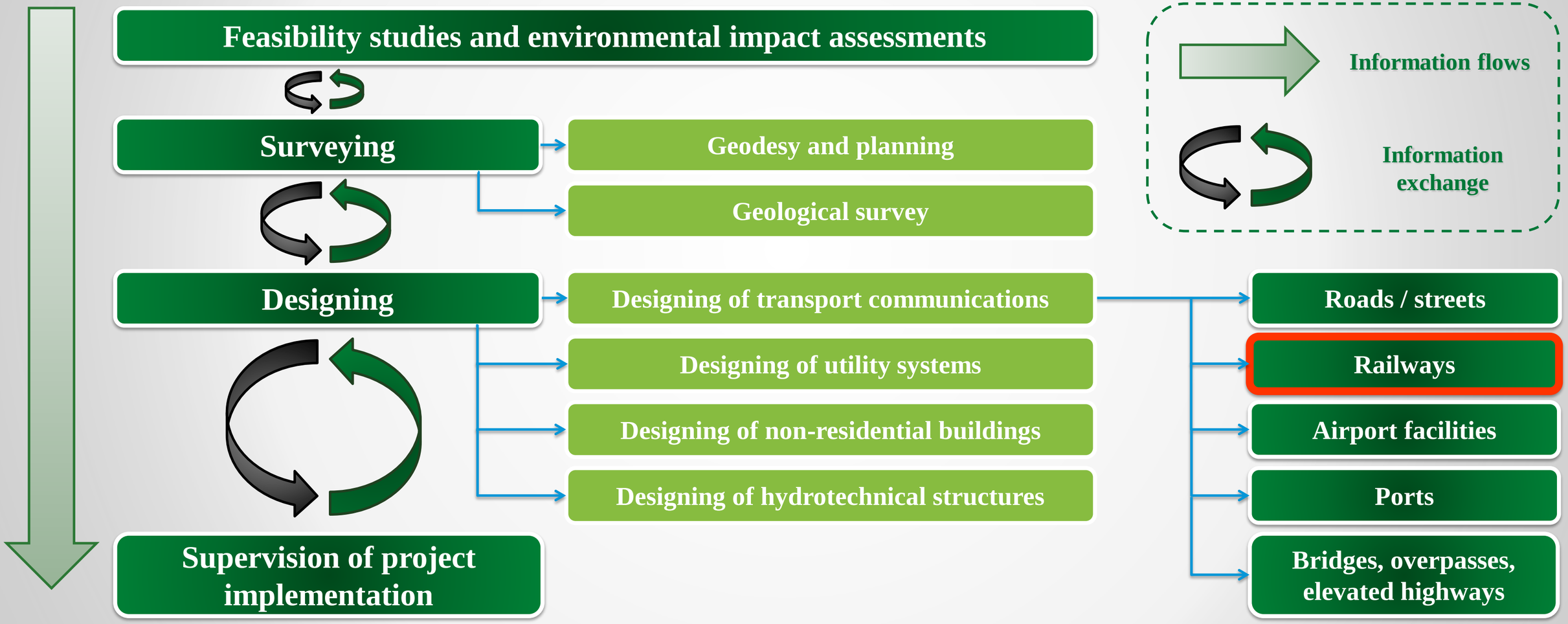
The EU has a goal to shift at least 30% of all cargo to railway by 2030, and 50% by 2050.



Why has Civil 3D been chosen for railway designing?

- Kelprojektas has been designing infrastructure objects since 1956, but railways were picked up only in 2009.
- Railway designing involves replacement or modernisation of the entire surrounding infrastructure, which requires smooth cooperation between all participants of the project.
- Today the railway division of the company employs around 30 people and we have designed over 300 km (180 miles) of railways.

Services provided by JSC Kelprojektas, and information flows within the company



Why has Civil 3D been chosen for railway designing?

	AutoCAD Civil 3D	USA software provider B...	Russia software provider C...	Slovenia software provider	German software provider
Alignment designing Best fit Alignment	+/-	+/+	+-/+	-+/+	+-/+
Profile designing	+	+	+	+	+
Switch designing	-	-+	-	-	+
Structure designing	+	+-	-+	-+	-+
Teamwork	+	+-	-+	-+	-+
Integration with other systems	+	+-	-	-	-
Familiarity for employees	+	-	-	-	-

Civil 3D can accomplish more than it seems at first sight. SDK and VB.NET open a wide range of possibilities.

Creating railway structures using Civil 3D custom subassemblies. VB.NET

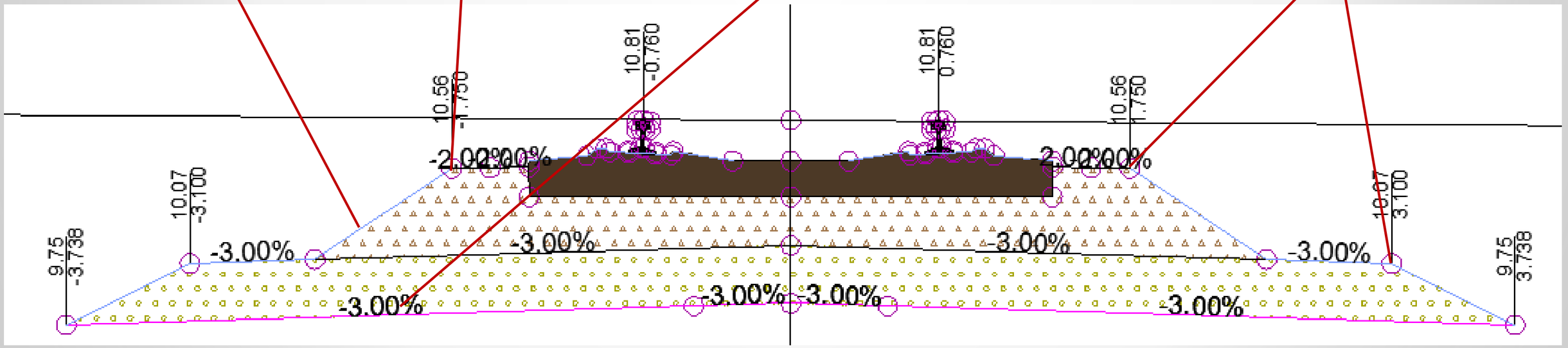
```
If nlsl1 = 0 Then
    P6 = New Point2d(P4.X, P13.Y + Math.Abs(P4.X) * vslope6)
    If dOutsideElevationS <> -1000 Then
        vslope6 = (oOrigin.Elevation + P13.Y - dOutsideElevationS) / Abs((dxS - P13.X))
        P6 = New Point2d(dxS * flip, (P13.Y - Abs(dxS) * vslope6))
        P5 = New Point2d(P6.X, P13.Y + Math.Abs(P6.X) * vSlope2)
    End If
Else
    P6 = New Point2d(dxS * flip, P5.Y + (Math.Abs(dxS) - Math.Abs(P5.X)) * vslope6)
End If
```

Set Point code manually

Set Link code manually

Grade can be calculated using a formula

Offset target
Height target
Set Point code manually

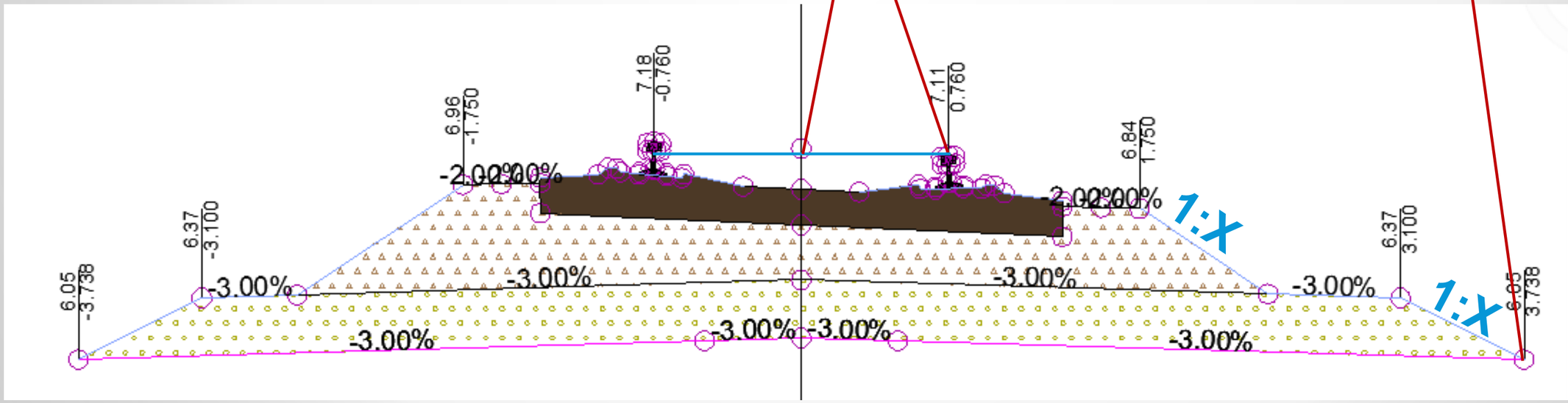


Creating railway structures using Civil 3D custom subassemblies. VB.NET

```
P1 = New Point2d(0, Abs(dxB) * vSlope1)
P2 = New Point2d(dxB, (P1.Y + Abs(dxB) * vSlope1))
If vSlope1 < 0 Then
    P1 = New Point2d(0, Abs(dxB) * vSlope1 * -1)
    P2 = New Point2d(dxB, 0)
End If
```

The longitudinal profile is designed at the axis, but the height of the inner rail is retained in a cant.

Each point is calculated using a formula. E.g., intersection of two lines.



Creating railway structures using Civil 3D custom subassemblies. VB.NET

Lineweight	--
Hyperlink	--
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Default Loop In Layou...	--
Default Loop Offset In...	--
Geometry Generate M...	.NET
.NET Class Name	Subassembly.KelprojektoGLZ6
.NET Assembly Name	C:\ProgramData\Autodesk\C3D 2014\enu\C3D...
ADVANCED	
Parameters	
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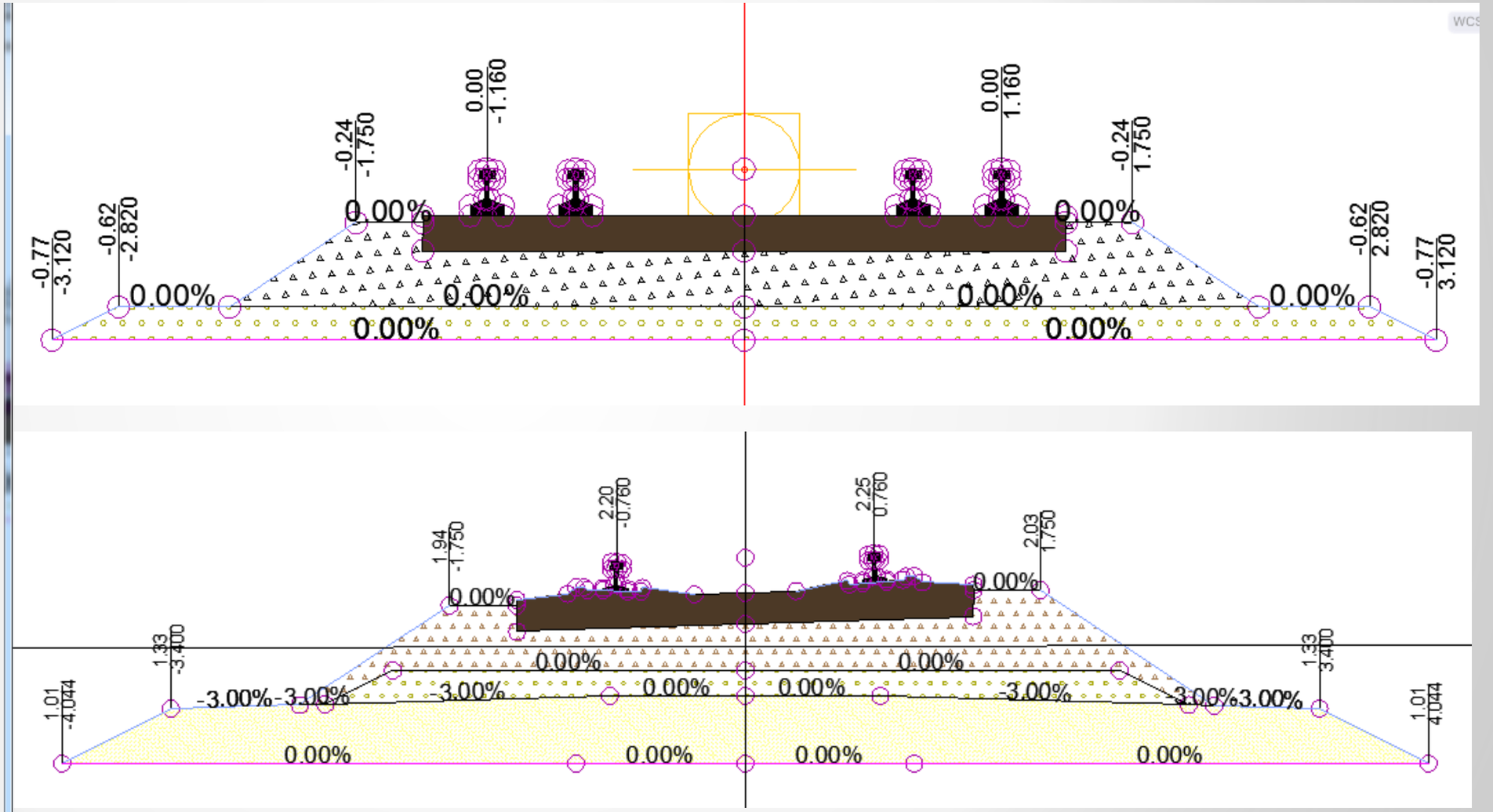
Side	Right
Gylis1	0.2100m
Gylis2	0.1850m
Gylis3	0.2500m
Gylis4	0.1500m
Gylis5	0.0300m
BA	0.1720m
Slait_nuol_1:	1.5000m
Konstr_nuol_1:	2.0000m
Nuolydis1	0.00%
Nuolydis2	0.00%
Nuolydis3	0.00%
Nuolydis4	0.00%
Nuolydis5	0.00%
Nuolydis6	0.00%
Nuolydis7	0.00%
SlopeOut	Horizontal
Plotis1	0.7600m
Plotis2	1.3500m
Plotis3	1.7500m
Plotis4	3.4000m
Plotis5	0.3000m
Plotis6	0.5000m
Plotis7	0.2000m
Version	R2010

OK Cancel Help



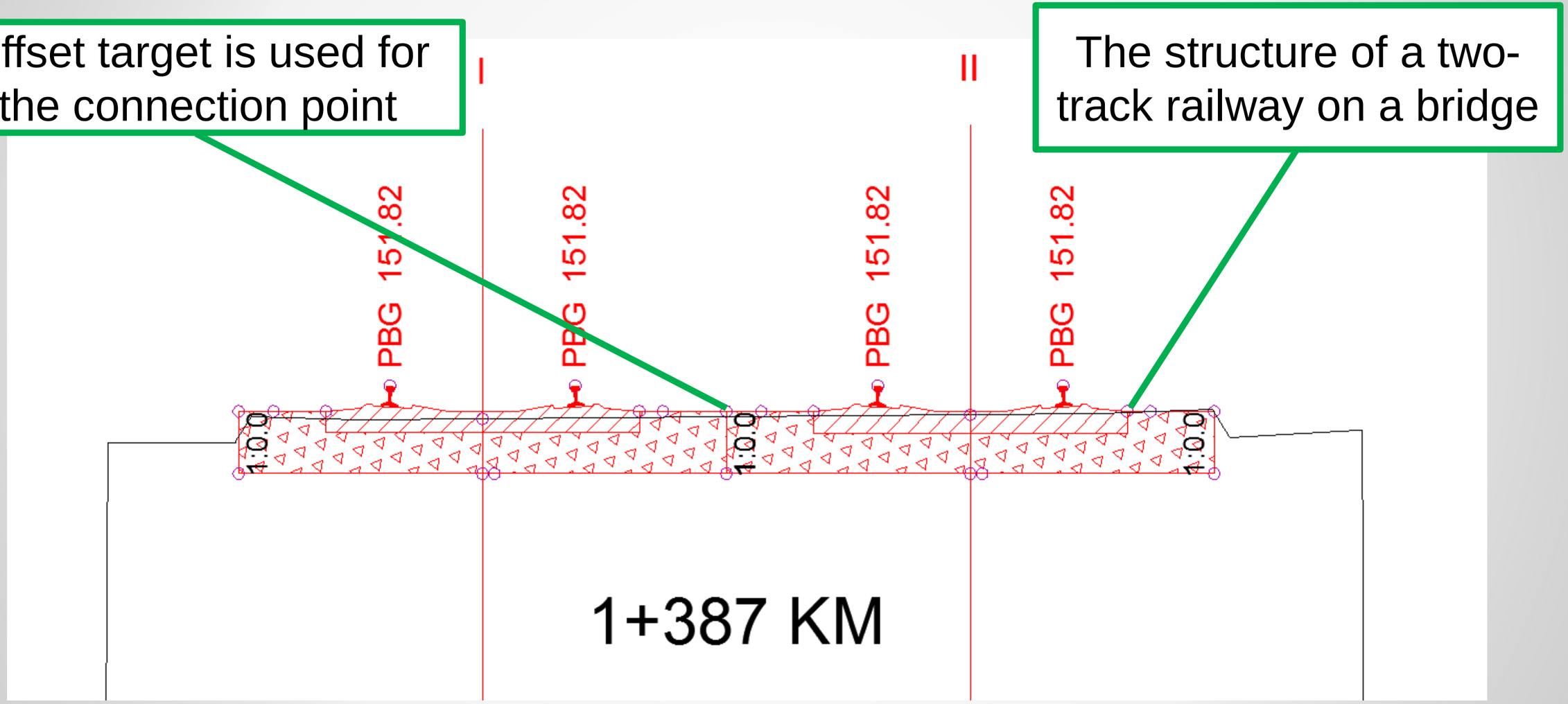
Creating railway structures using Civil 3D custom subassemblies. VB.NET

- What do you use for creating Civil 3D corridors in railway projects?
- How many different railway structures do you have? Do you use standard structures or create individual ones for each project?
- What do you think about the possibilities offered by VB.NET? Do you use this in your projects?

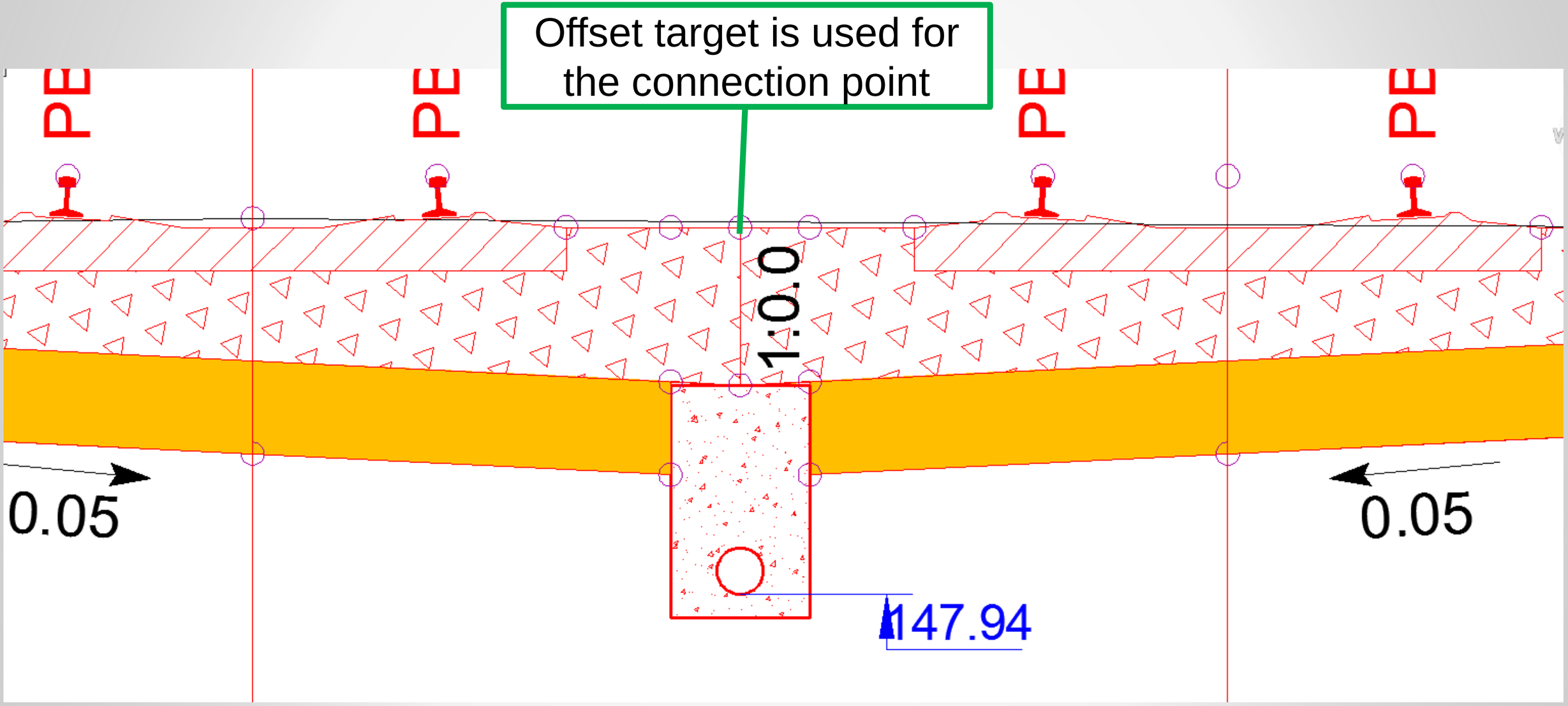
Creating railway corridors for two or three tracks

Offset target is used for the connection point

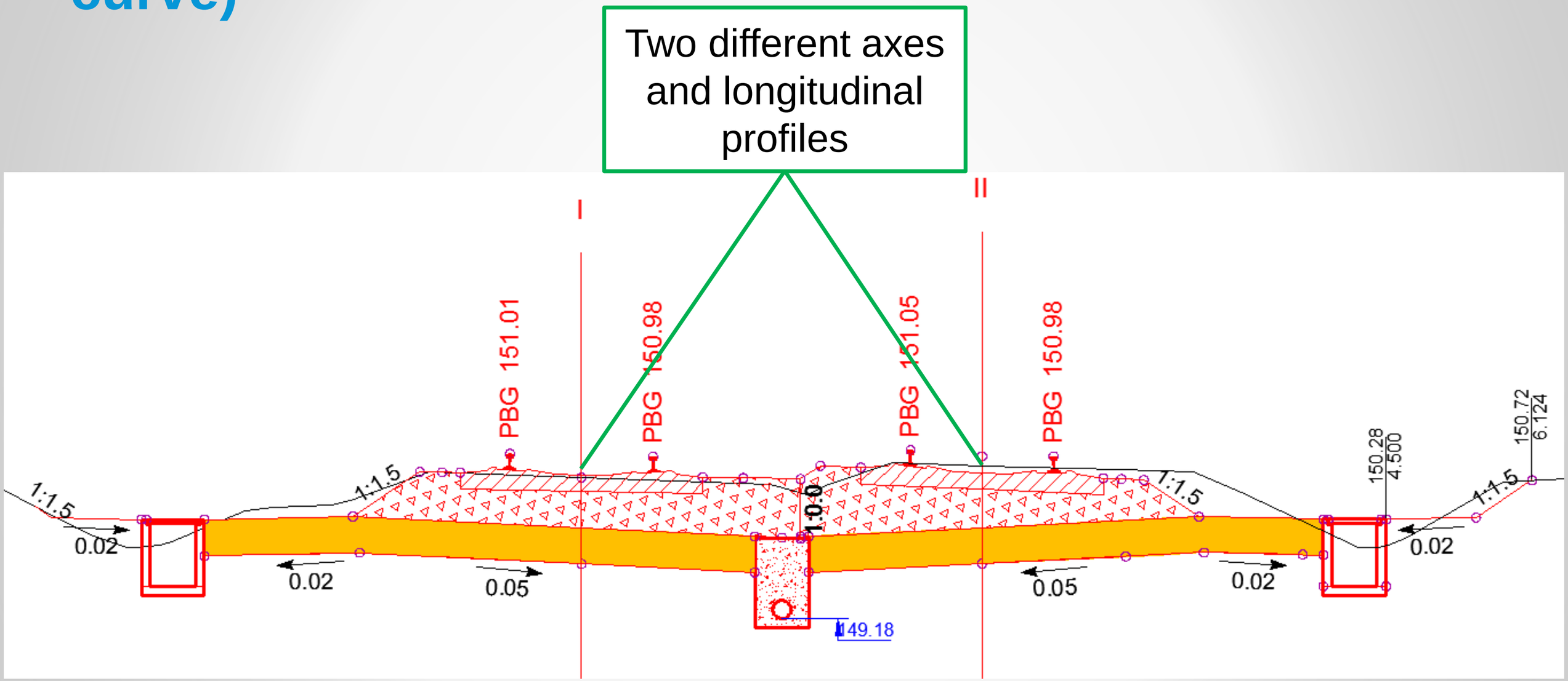
The structure of a two-track railway on a bridge



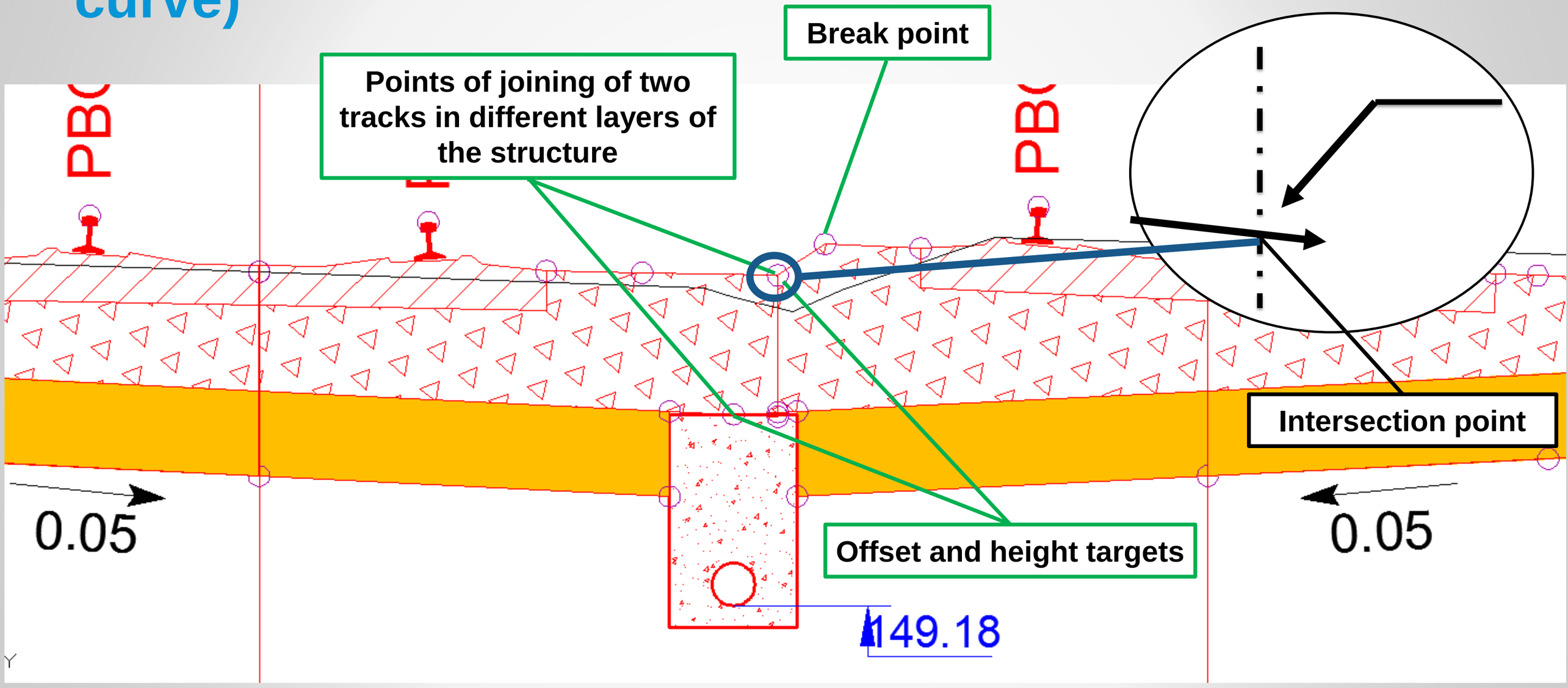
Creating railway corridors for two or three tracks



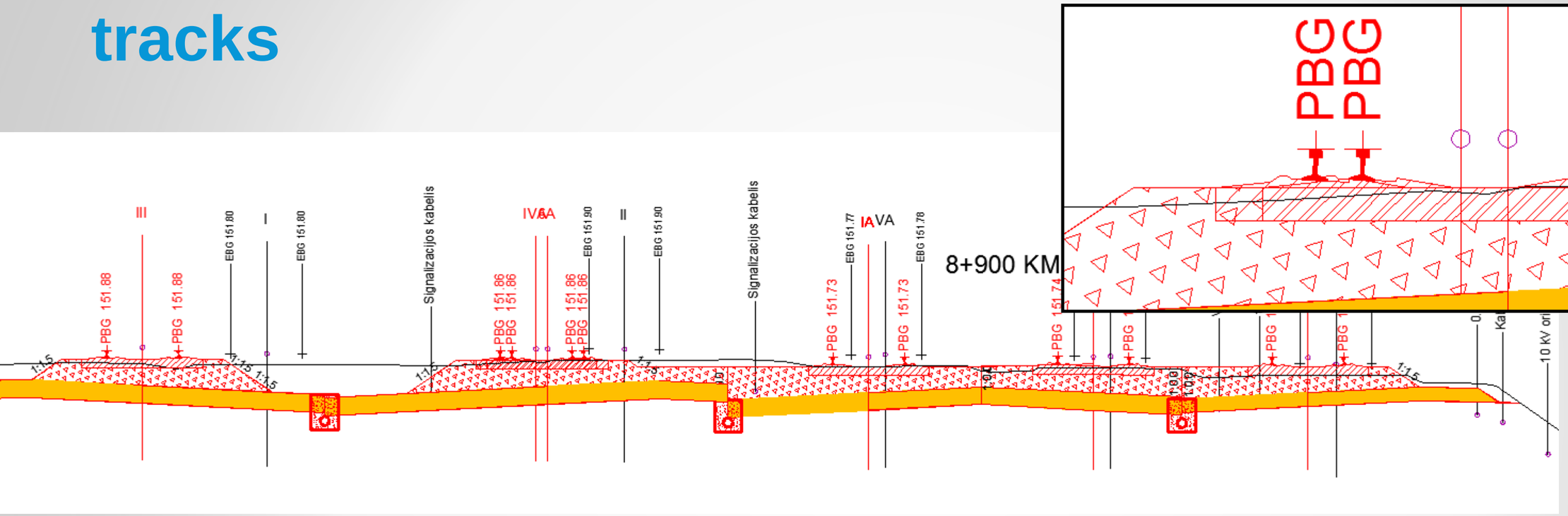
Creating railway corridors for two or three tracks (in a curve)

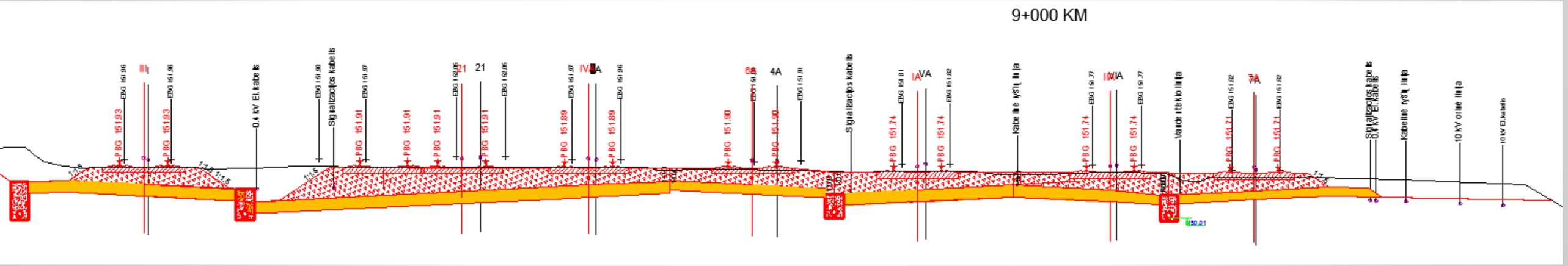


Creating railway corridors for two or three tracks (in a curve)



Creating railway corridors for two, three or more tracks





Creating railway corridors for two, three or more tracks

- How do you model railways with multiple tracks?
- Can you create a full model that can be used to produce detailed cross-section drawings and calculate quantities?
- Please, share your know-how on creating BIM models.

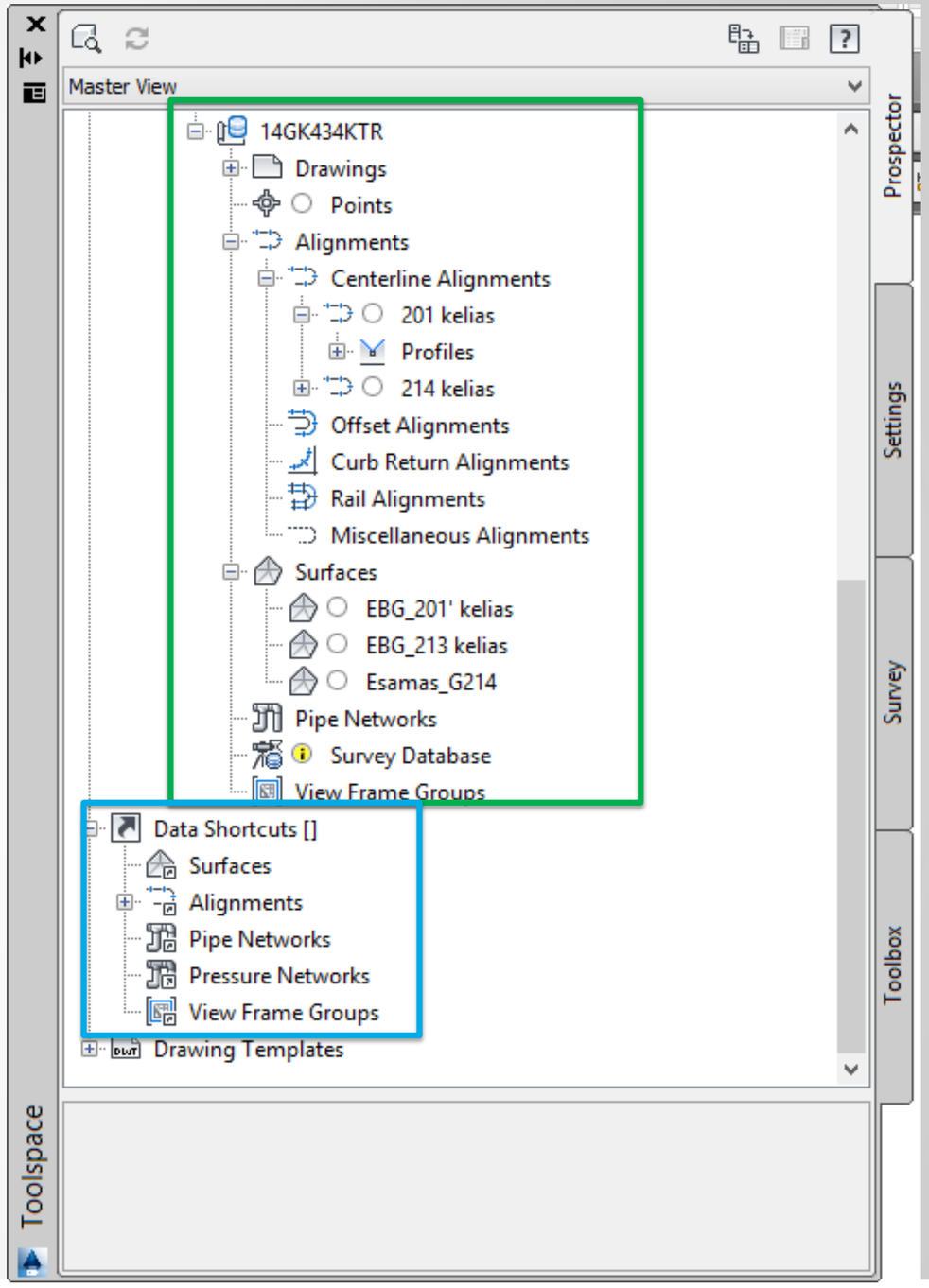
Managing big railway projects.
Advantages of Vault as compared to Data Shortcuts.

Divide et impera! Divide and rule! The maxim favoured by Ancient Roman conquerors

- Create separate files for different track axes and longitudinal profiles.
- Create separate files for different railway corridors. Optimal work involves 5–10 km (3–6 miles).
- Create separate cross-section files for each corridor file.
- Civil 3D Data Shortcuts technology enables everyone to see each other's information and work efficiently in a team.

Advantages of Vault as compared to Data Shortcuts

- The entire project in a single place;
- Ability to work effectively in a team with remote subdivisions;
- Open files are stored on local disks making the work with files faster than on the network;
- Ability to work with files off-line;
- Ability to go back several versions;
- Ability to see where the file is used and by whom.

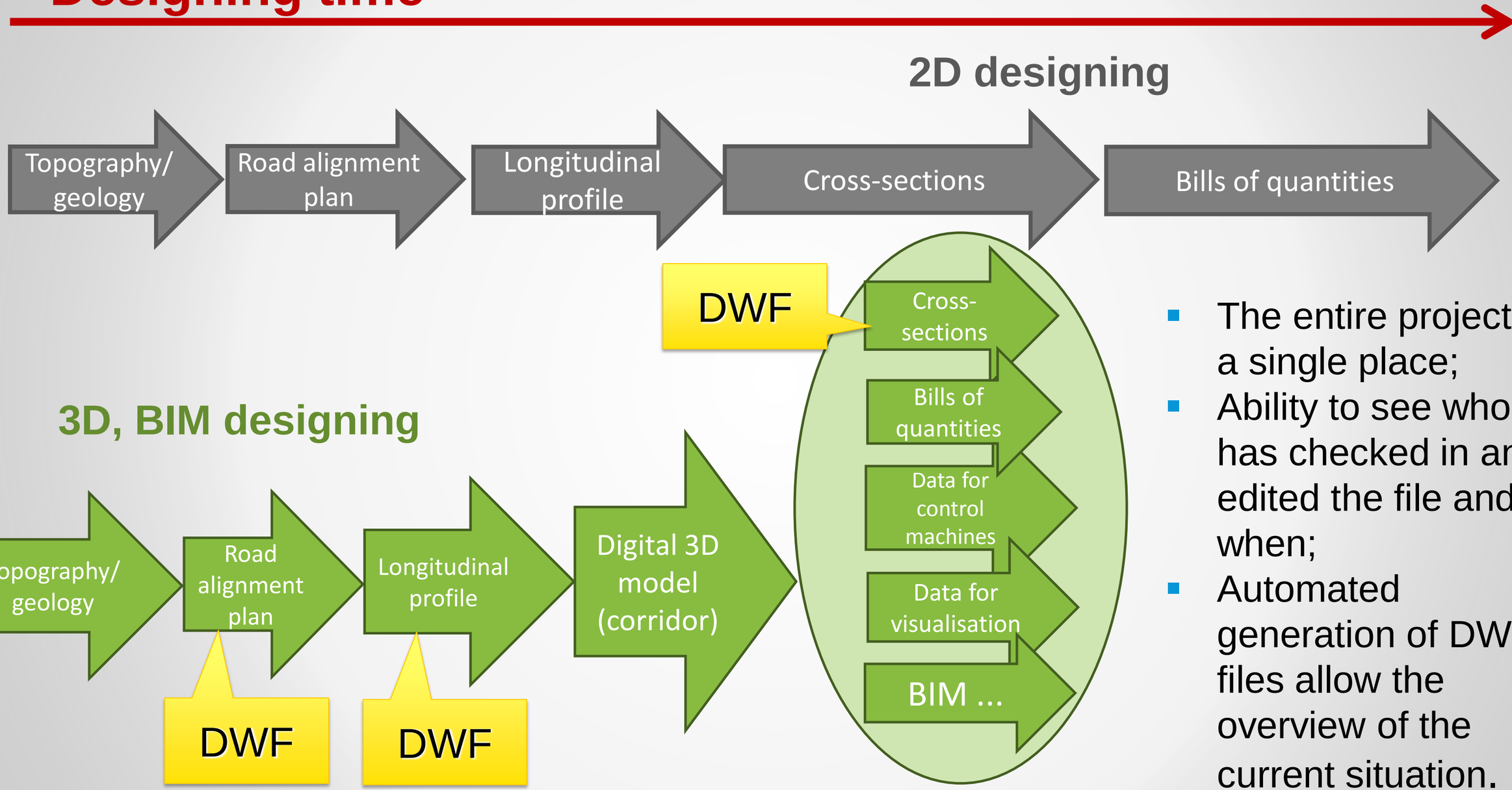


Managing big railway projects.
Advantages of Vault as compared to Data Shortcuts.

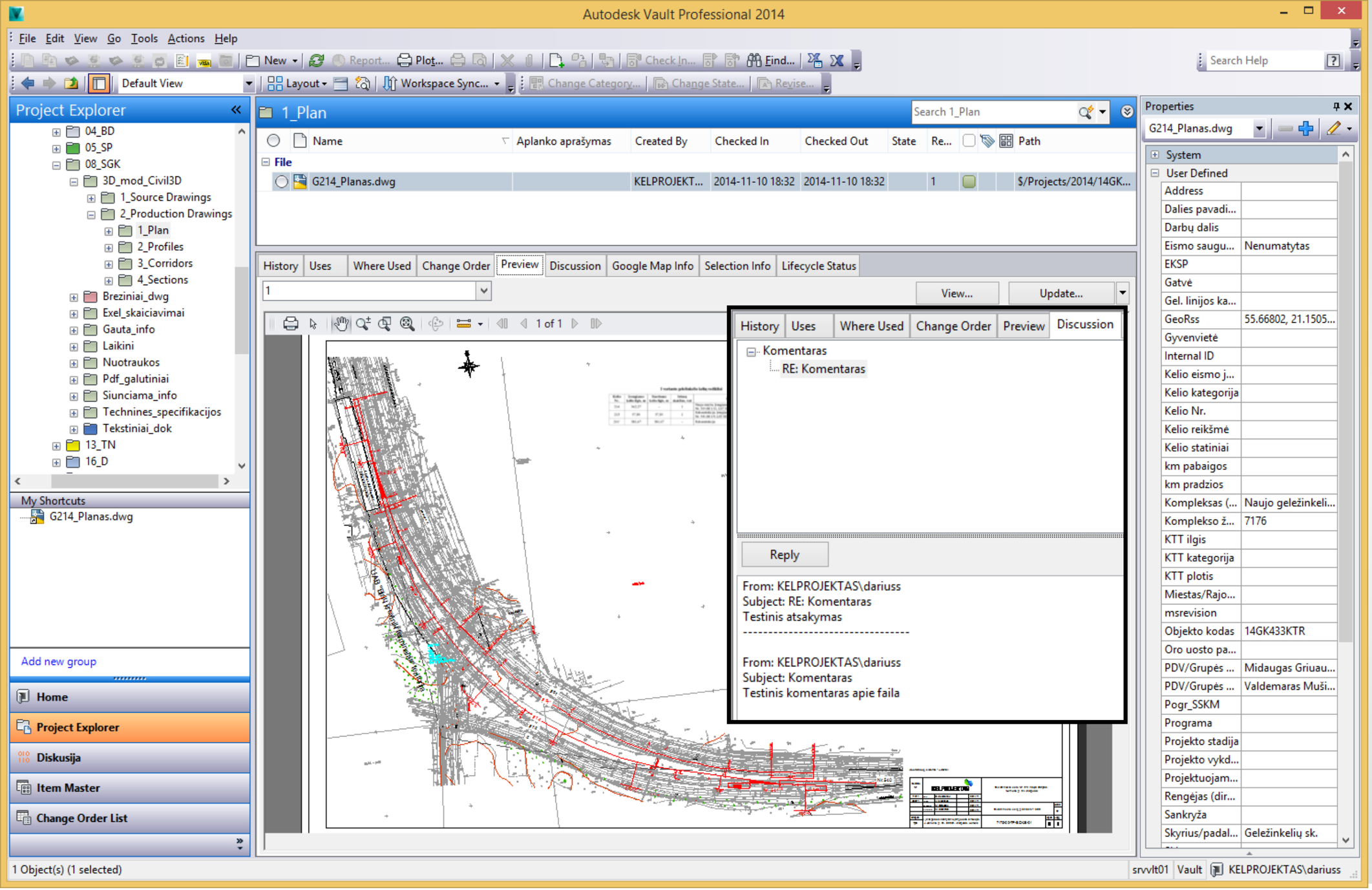
- What strategy do you apply for designing big railway projects?
- What advantages do you see of working in Vault as compared to Data Shortcuts?
- How do you organise work with remote divisions with slower server connection?

The potential of Vault for ensuring efficient cooperation between a BIM model expert and a manager without specific knowledge in the field.

Designing time



- The entire project in a single place;
- Ability to see who has checked in and edited the file and when;
- Automated generation of DWF files allow the overview of the current situation.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File Edit View Go Tools Actions Help
New Report... Plot... Check In... Find...
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08_SGK
3D_mod_Civil3D
1_Source Drawings
2_Production Drawings
1_Plan
2_Profiles
3_Corridors
4_Sections
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The potential of Vault for ensuring efficient cooperation between a BIM model expert and a manager without specific knowledge in the field.

- What do you think about the possibilities of using Vault for project management?
- How do you monitor projects, and what problems do you encounter?