

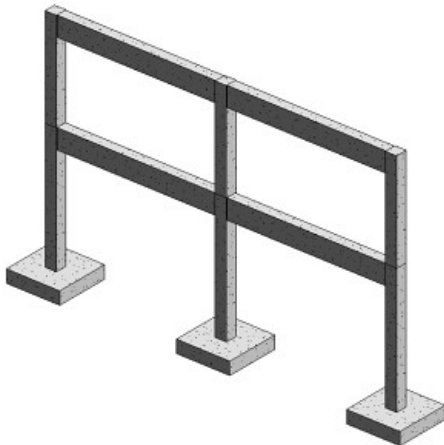
Betoonkonstruktsioonide tööjoonised

Ülesande püstitus

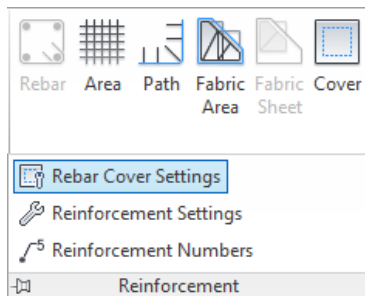
Selles näites tutvud lähemalt betoonkonstruktsioonidele armatuuri lisamise võimalustega. Lisaks vaatame lähemalt, kuidas luua tööjooniseid.

Armatuuri katte määramine

1. *Autodesk Revit > ava fail > Concrete Frame.rvt.*

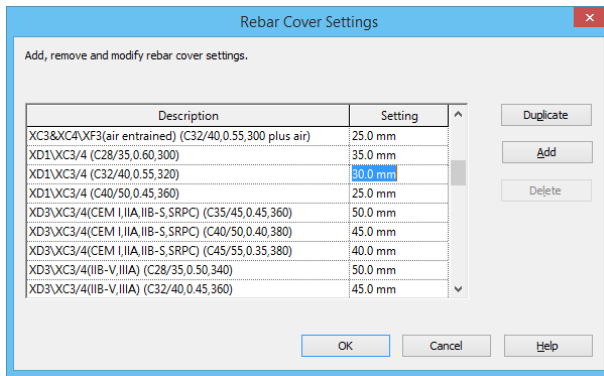


2. *Paanil Structure > Reinforcement > Rebar Cover Settings.*

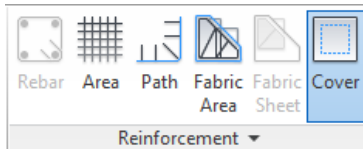


Märkus: Dialoogis *Rebar Cover Settings* saad määrata kõik projektis kasutatavad katted.

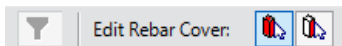
3. Dialoogis *Rebar Cover Settings*:
 - Vali rida *XD1\XC3/4 (C32/40,0.55,320)*.
 - *Setting = 30 mm*.
 - Kliki OK.



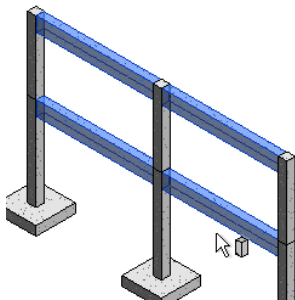
4. Paanil *Structure > Reinforcement > Cover*.



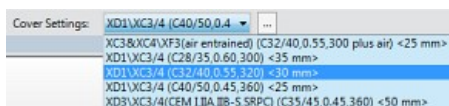
5. Valimaks kogu elementi, *Options bar > vali > Pick Elements*.



6. Joonise alas hoiä all CTRL klahvi ning valid pildil näidatud talad.



7. *Options bar > Cover Settings > vali > XD1\XC3/4 (C32/40,0.55,320)*



8. Vajuta ESC klahvi, et käsust väljuda.

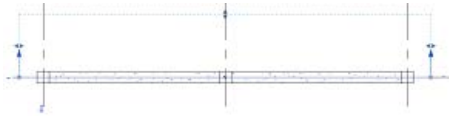
9. Joonise alas vali üks eelnevalt valitud taladest.

10. Paletil *Properties > veendu > Rebar Cover* sätetes.

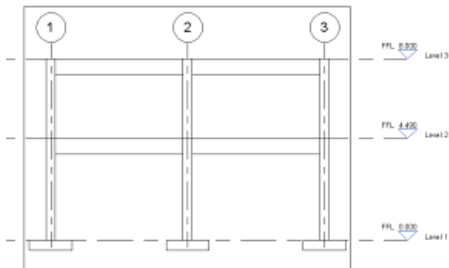
Structural	
Cut Length	5660.0
Structural Usage	Girder
Start Attachment Type	End Elevation
End Attachment Type	End Elevation
Enable Analytical Model	<input checked="" type="checkbox"/>
Rebar Cover - Top Face	XD1\XC3/4 (C32/40,0.55, ...
Rebar Cover - Bottom Face	XD1\XC3/4 (C32/40,0.55, ...
Rebar Cover - Other Faces	XD1\XC3/4 (C32/40,0.55, ...
Estimated Reinforcement ...	0.00 cm ²

Armatuuri lisamine

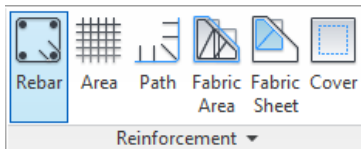
1. Aktiveeri *Level 2* vaade.
2. Kasutades *Section* töövahendit lisa lõige nii nagu näidatud pildil.



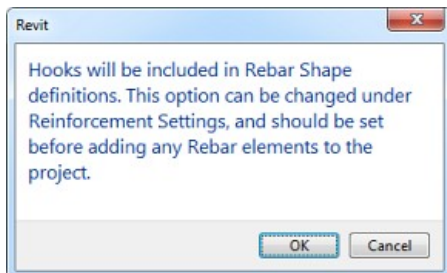
3. Aktiveeri just loodud lõike vaade.



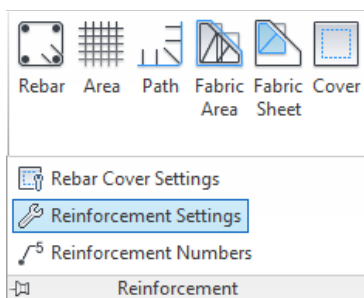
4. Paanil *Structure > Reinforcement > Rebar*.



5. *Revit* dialoogis klikki *Cancel*.

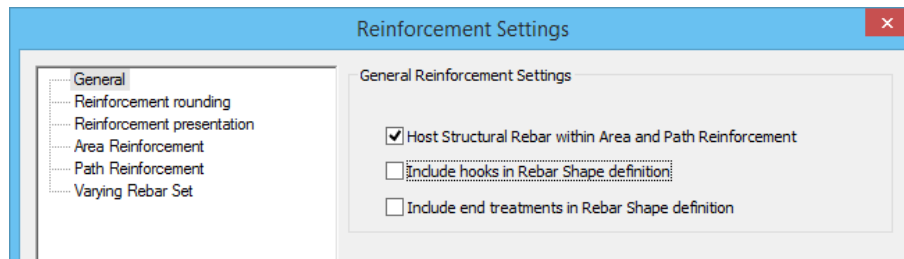


6. Paanil *Structure > Reinforcement > Reinforcement Settings*.

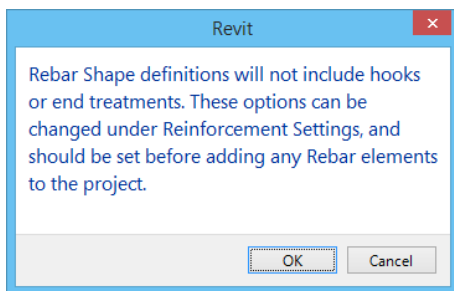


7. Dialoogis *Reinforcement Settings*:
 - Vasakul paanil vali *General*.
 - Paremal paanil tühista linnuke *Include Hooks in Rebar Shape Definition*.

- Kliki OK.



8. Paanil *Structure > Rebar*. Sel korral öeldakse, et konkse ei lisata.
9. *Revit* dialoogis kliki OK.

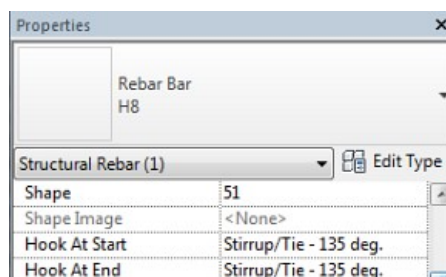


10. *Rebar Shape Browser > vali > Rebar Shape: 51*.

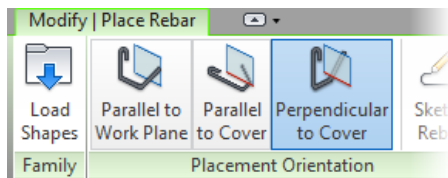


11. Paetil *Properties*:

- *Type > Rebar Bar: H8*.
- *Hook At Start > Stirrup/Tie – 135deg*.
- *Hook At End > Stirrup/Tie – 135deg*.
- Kliki *Apply*.

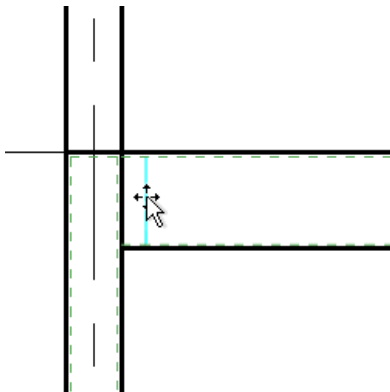


12. Dialoogis *Revit*, kliki OK.
13. Paanil *Modify | Place Rebar > Placement Orientation > Perpendicular to Cover*.



Märkus: Tasapinnalise armatuuri lisamiseks on kolm meetodit. Kui oled lõike vaates, mis on risti elemendiga, lisab valik *Parallel to Cover* armatuuri risti vaatega. Samas kui *Parallel to Work Plane* lisab armatuuri paralleelselt lõike vaatega (ka juhul kui vaade ei oma töötasapinda ehk *Work Plane*).

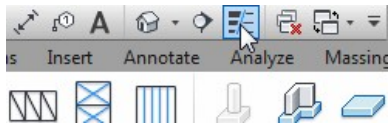
14. Joonise alas vali punkt nii nagu näidatud pildil, et lisada armatuur.



15. Vajuta ESC klahvi, et käsk lõpetada.

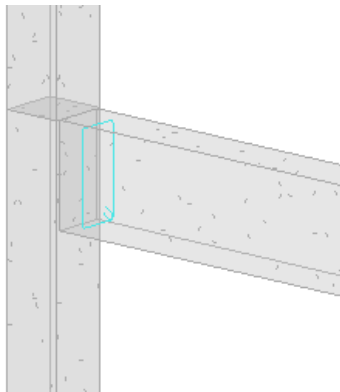
Armatuuri kuva muutmine

1. Paanil *Quick Access > Thin Lines*.

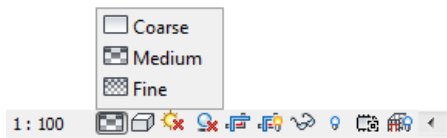


2. Aktiveeri vaade *Reinforcement 1*.

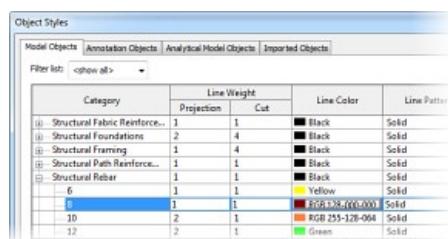
Märkus: Pane tähele, et sarrust kuvatakse 3D vaates.



3. Aktiveeri eelmine vaade, *Section 1*.
4. *View Control bar > Detail Level >* vali *Coarse, Medium* ning *Fine* detailsusastmete vahel, et näha muudatusi joonisel.

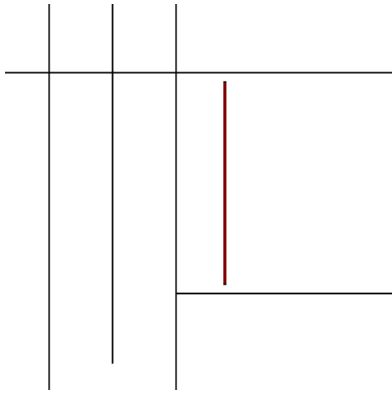


5. *View Control bar > Detail Level > Medium*.
6. *View > Graphics > Visibility/Graphics*.
7. Dialoogis *Visibility/Graphics > Model Categories > Object Styles*.
8. Dialoogis *Object Styles > Model Objects*:
 - Leida rida *Structural Rebar*.
 - Muuda *Rebar 8* osas värvitooni: *RGB 128-000-000*



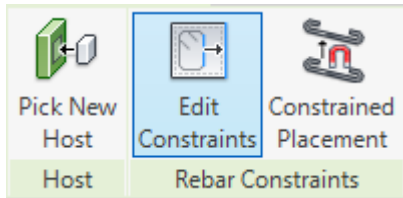
Category	Line Weight		Line Color	Line Pattern
	Projection	Cut		
Structural Fabric Reinforce...	1	1	Black	Solid
Structural Foundations	2	4	Black	Solid
Structural Framing	1	4	Black	Solid
Structural Path Reinforce...	1	1	Black	Solid
Structural Rebar	1	1	Black	Solid
6	1	1	Yellow	Solid
8	1	1	RGB 128-000-000	Solid
10	2	1	RGB 255-128-064	Solid
12	2	1	Green	Solid

- Kliki OK, et väljuda dialoogidest. Sarrus kuvatakse nüüd uues värvitoonis.



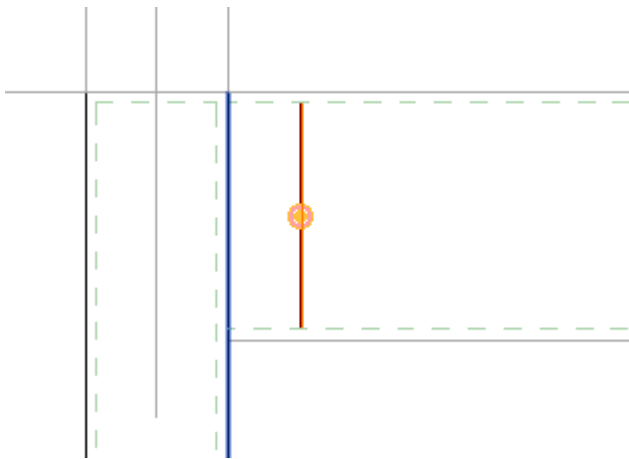
Armatuuri gruppide loomine

1. Joonise alas vali sarrus.
2. Fikseerime selle paigutuse tala otsast kui 20 mm. Kliki riba paanil *Modify | Structural Rebar > Rebar Constraints > Edit Constraints*.

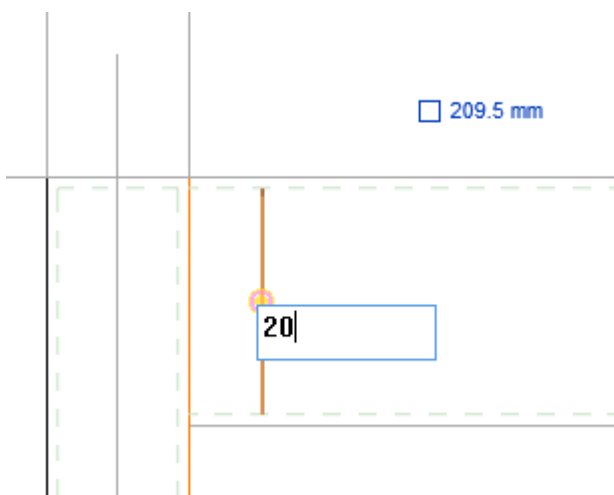


Märkus: Sulge veateade, mis ütleb, et sarrusel pole hetkel ühtegi piirangut.

3. Kliki sarrusest vasakule poole jääva posti esitahul (tähistatud sinise joonega).

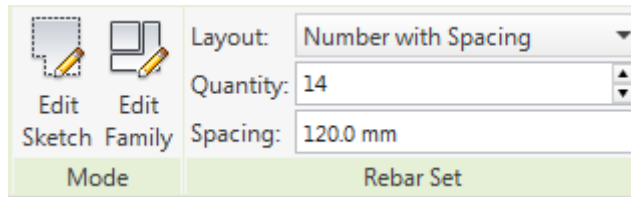


4. Kliki sinisel arvul ning sisesta kui 20 mm.

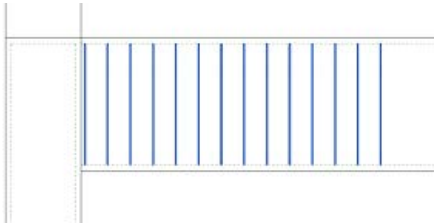


5. Kliki riba paanil *Modify | Structural Rebar > Multiple > Finish*.
6. Vali uuesti viimati valitud armatuuri element.
7. Paanil *Modify | Structural Rebar > Rebar Set*:
 - *Layout = Number with Spacing*
 - *Quantity = 14*.

- Spacing = 120 mm.

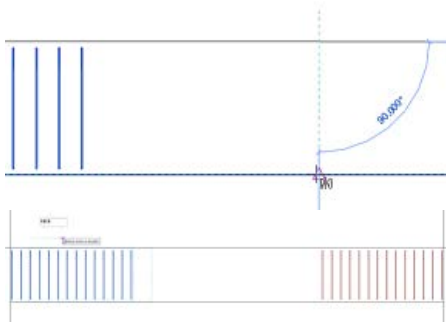


Märkus: Armatuuri grupp on sellega lisatud.

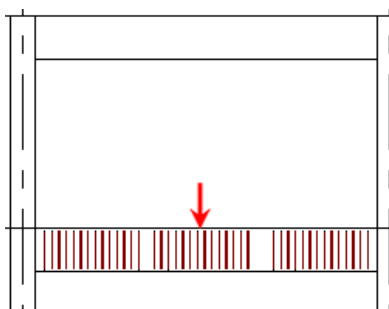


Märkus: Sul on võimalik see sama seadistus teha ka koheselt kui alustad üksiku armatuuri elemendi lisamist.

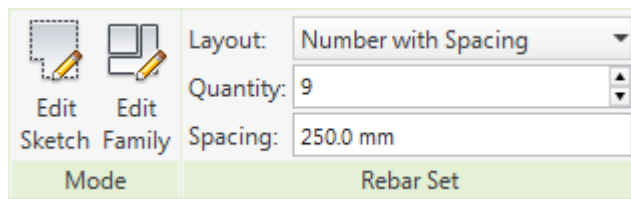
8. Kasutades töövahendit *Mirror – Draw Axis*, peegelda armatuuri nii nagu näidatud pildil.



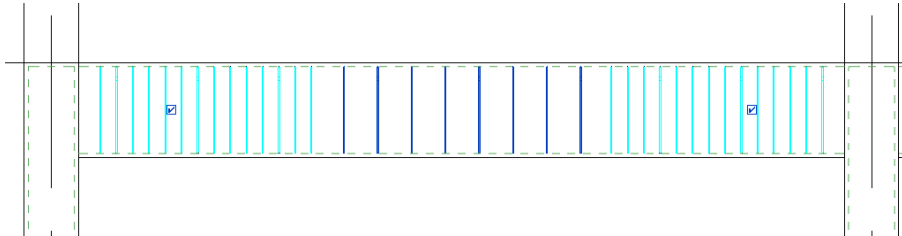
9. Kasutades *Copy* töövahendit, tee esimesest grupist koopia ja nihuta 1800 mm võrra.



10. Vali viimati lisatud armatuuri grupp.
11. Paanil *Modify | Structural Rebar > Rebar Set*:
 - Layout = Number with Spacing.
 - Quantity = 9.
 - Spacing = 250 mm.

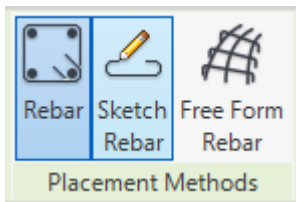


Märkus: Keskmise armatuuri grupp uueneb.

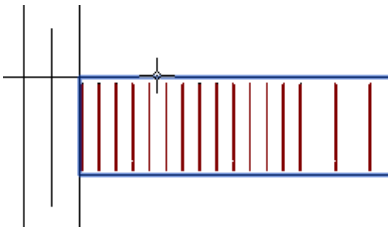


Armatuuri skitseerimine

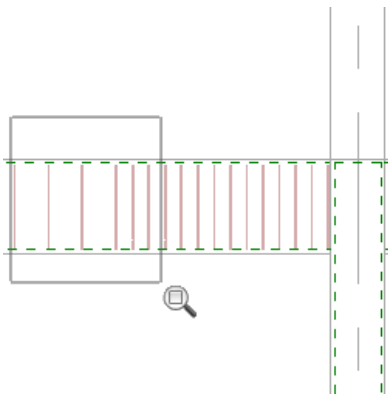
1. Paanil *Structure > Reinforcement > Rebar*.
2. Paanil *Placement Methods > Sketch Rebar*.



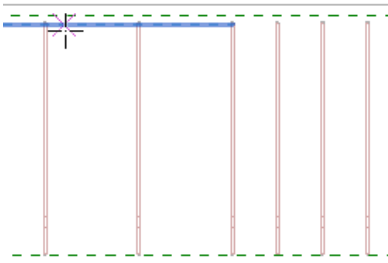
3. Määramaks sihtobjekti (*host*) vali tala.



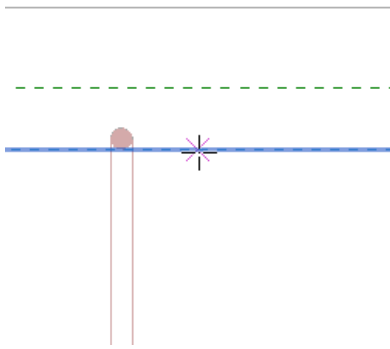
4. Suurenda pildil näidatud osasse.



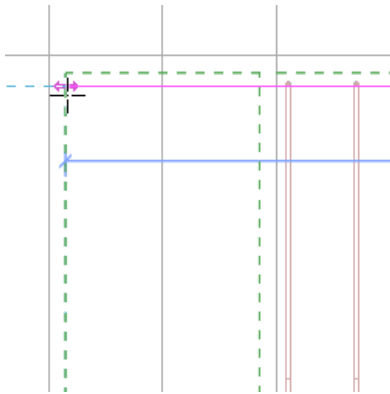
5. Liigu kursoriga ülemisele armatuuri servale (vt pilti).



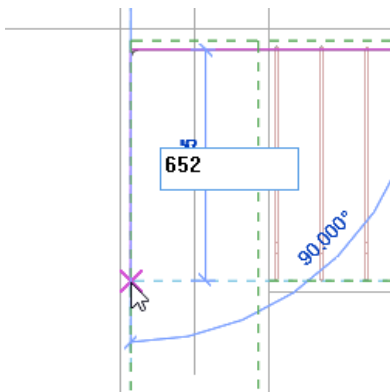
6. Vajuta TAB klahvi, et näha erinevaid paigutuse viise. Kliki punktis nii nagu näidatud pildil.



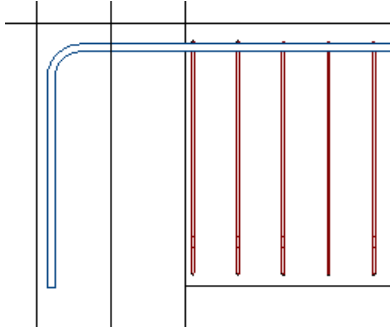
7. Määramaks lõpp-punkti, vali punkt vasakult postilt (vt pilti).



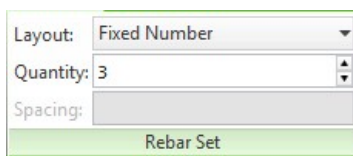
8. Liiguta kursorit allapoole. Sisesta **662**.



9. Vajuta ESC klahvi, et lõpetada käsk.
10. Paletil *Properties* > *Type* > *Rebar Bar* > *H20*.
11. Paanil *Modify | Create Rebar Sketch* > *Mode* > *Finish*.

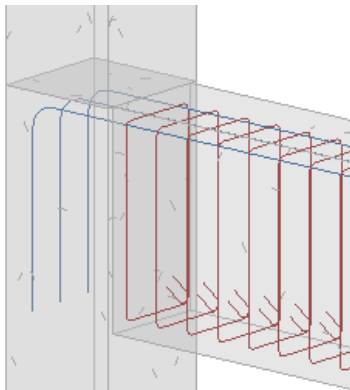


12. Joonise alas vali viimati lisatud armatuur.
13. Paanil *Modify | Structural Rebar > Rebar Set*:
 - *Layout = Fixed Number*.
 - *Quantity = 3*.

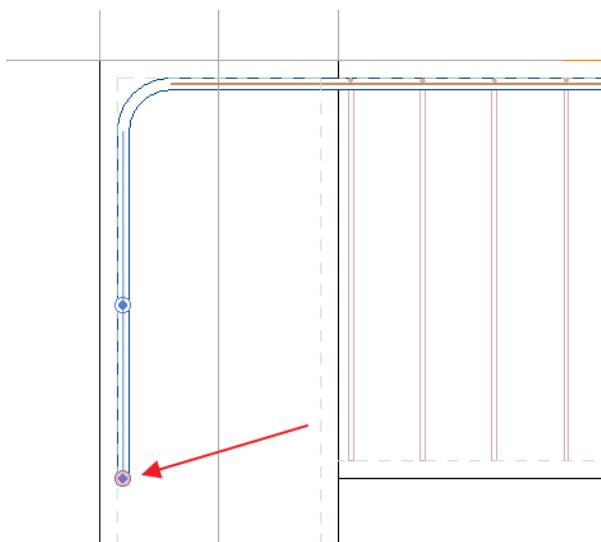


14. Vajuta ESC klahvi, et tühistada valik.
15. Aktiveeri vaade *Reinforcement 1* (3D vaade).

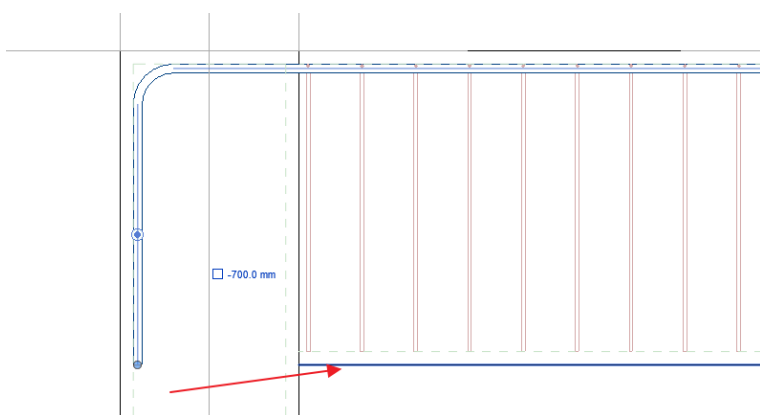
Märkus: Pööratud armatuur on lisatud.



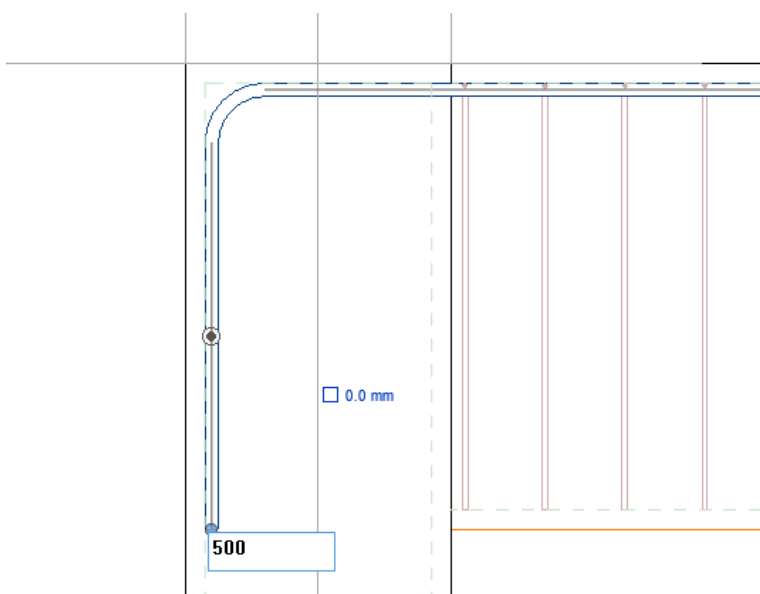
16. Sulge *Reinforcement 1* vaade.
17. Tagasi vaatel *Section 1*, vali pööratud armatuur uuesti.
18. Paanil *Rebar Constraints > Edit Constraints*.
19. Kliki viimati lisatud armatuuri lõpp-punktis.



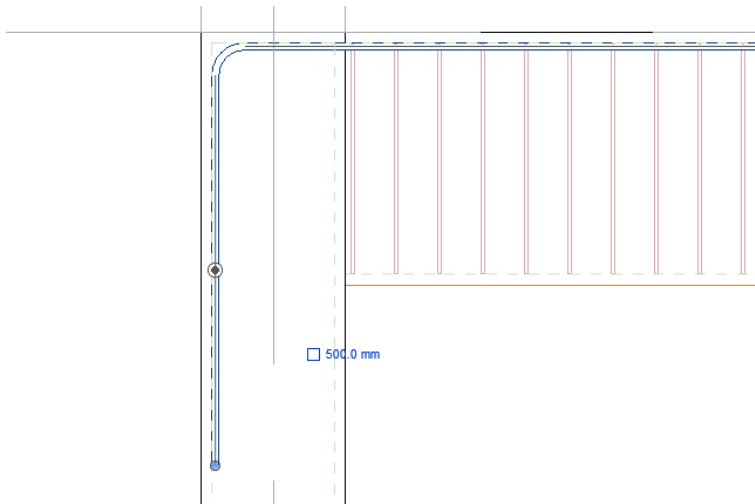
20. Kliki nüüd tala alumisel serval, et märkida see kui 'mille-suhtes'.



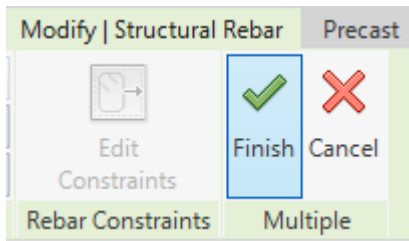
21. Kliki numbri väärtusel ja sisesta 500 mm. Vajuta ENTER.



Märkus: Armatuuri pikendatakse 500 mm võrra tala alumisest servast.

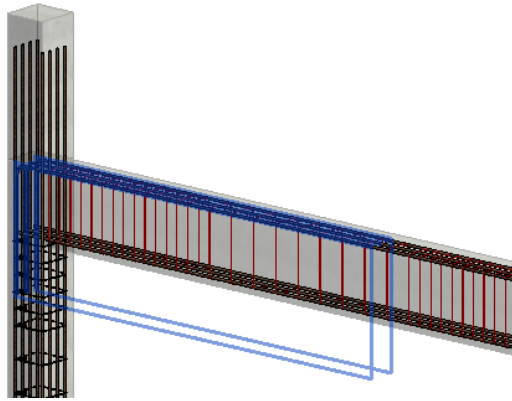


22. Kliki *Modify | Structural Rebar > Multiple > Finish*.



Elementide liigenduste lisamine

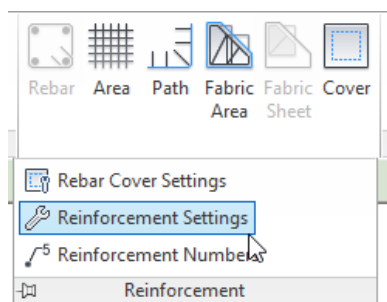
1. Ava projekt: *Reinforcement.rvt*.
2. Joonise alas vali pildil näidatud armatuur.



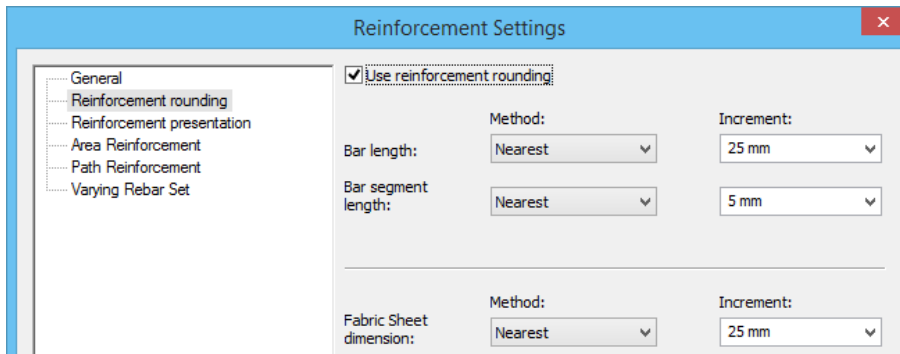
3. Paletil *Properties > Dimensions >* kontrolli väärtuseid *Bar Length* ning *Total Bar Length*.

Graphics	
View Visibility States	Edit...
Text	
Rev	
Structural	
Reinforcement Vol...	4801.73 cm ³
Dimensions	
Bar Length	5094.8 mm
Total Bar Length	15284.4 mm
A	1162.0 mm
B	2087.1 mm

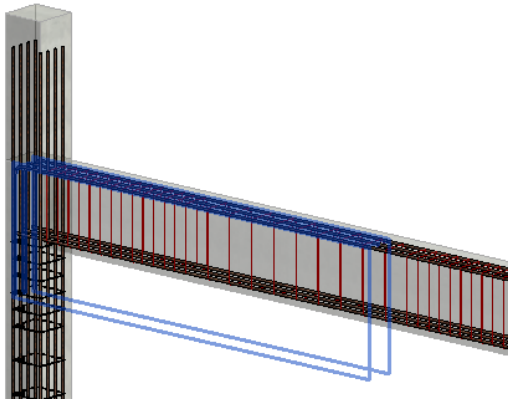
4. Paanil *Structure > Reinforcement > Reinforcement Settings*.



5. Dialoogis *Reinforcement Settings*:
 - Vasakul paanil vali *Reinforcement Rounding*.
 - Paremal paanil vali *Use Reinforcement Rounding*.
 - *Bar Length = 25mm*.
 - *Bar Segment Length = 5mm*.
 - *Fabric Sheet Dimension = 25mm*.
 - Kliki OK.



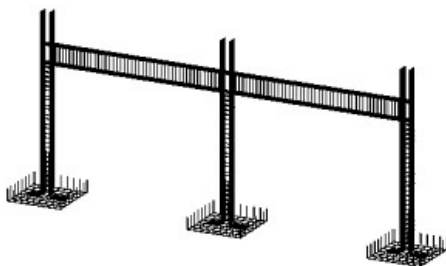
6. Joonise alas vali sama armatuur uuesti.



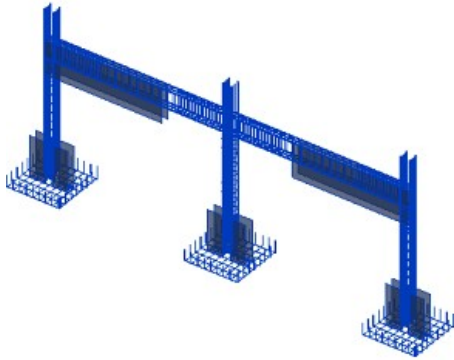
7. Paletil *Properties > Dimensions* > kontrolli väärtuseid *Bar Length* ning *Total Bar Length*.

Structural	
Reinforcement V...	4806.64 cm ³
Dimensions	
Bar Length	5094.8 mm (5100 mm)
Total Bar Length	15300 mm
A	1162.0 mm (1160 mm)
B	3987.1 mm (3985 mm)
C	0.0 mm (0 mm)
D	0.0 mm (0 mm)

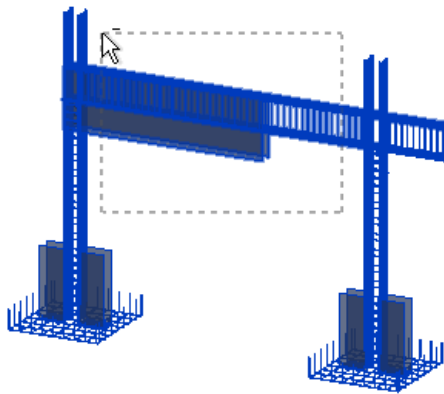
8. Vajuta ESC klahvi, et tühistada valik.
9. Aktiveeri vaade *Reinforcement 2*.
10. *ViewCube* > pööra vaadet enam vähem alloleva pildi järgi.



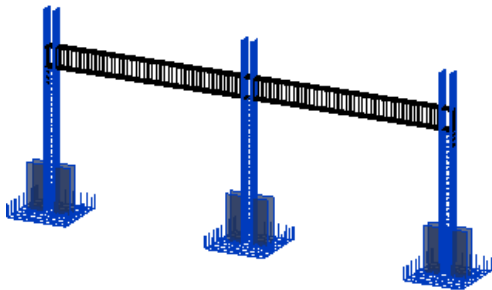
11. Kasutades aknaga valikut vali vaates olevad elemendid.



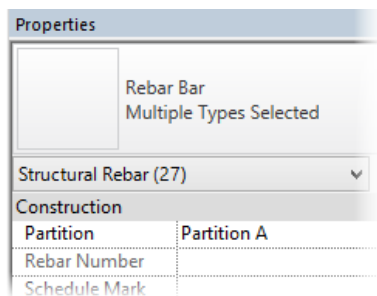
12. Hoia all SHIFT klahvi ning paremalt vasakule aknaga valikut, et eemaldada pildil näidatud armatuur ning tala.



13. Korda sama, et eemaldada ka paremal pool olev armatuur ning tala.

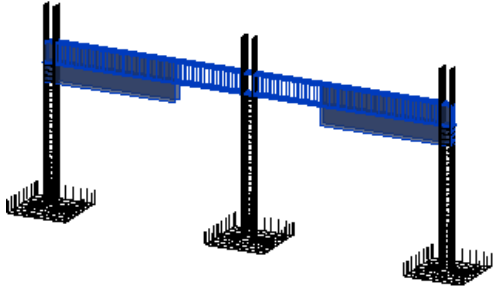


14. Paletil *Properties* > *Construction* > *Partition* = **Partition A**.



15. Vajuta ESC klahvi, et tühistada valik.

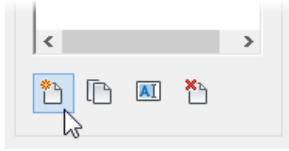
16. Joonise alas, CTRL+ ning vali pildil näidatud elemendid.



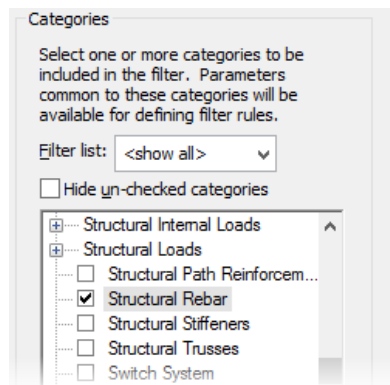
17. Paletil Properties > Construction > Partition = **Partition B**.

Vaate filtrite rakendamine

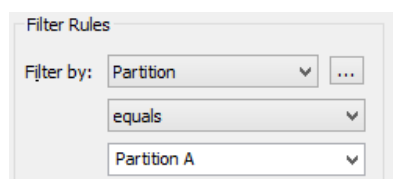
1. Paanil *View > Graphics > Visibility/Graphics*.
2. Dialoogis *Visibility/Graphics > Filters > Add*.
3. Dialoogis *Add Filters > Edit/New*.
4. Dialoogis *Filters > Filters > New*.



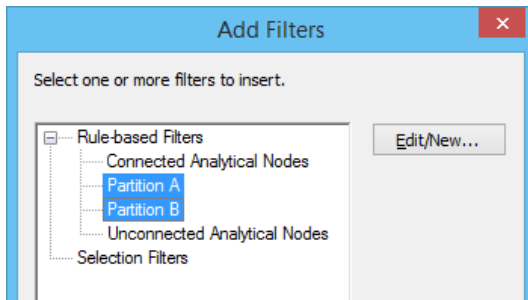
5. Dialoogis *Filter Name*:
 - Name = **Partition A**.
 - Vali *Define rules*.
 - Kliki OK.
6. Dialoogis *Filters*:
 - *Categories > Structural Rebar*.



- *Filter Rules > lisa nii nagu pildil.*



- Kliki *Apply*.
7. Korda samu samme, et lisada filter *Partition B* osas.
 8. Kliki OK, et väljuda *Filters* dialoogist.
 9. Dialoogis *Add Filters > CTRL+ Partition A* ning *Partition B*. Kliki OK.

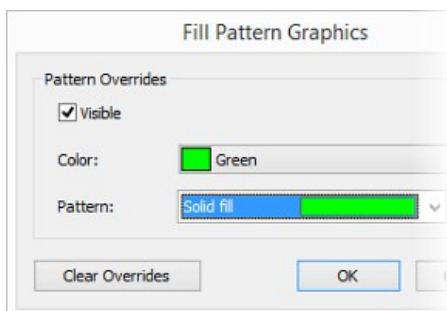


10. Dialogis *Visibility/Graphics > Filters > Partition A > Patterns > Override.*

Name	Vis...	Projection/Surface		
		Lines	Patterns	Tr
Partition A	<input checked="" type="checkbox"/>	Override..	Override..	C
Partition B	<input checked="" type="checkbox"/>			

11. Dialogis *Fill Pattern Graphics:*

- *Color = Green.*
- *Patter = Solid fill.*
- Kliqui OK.



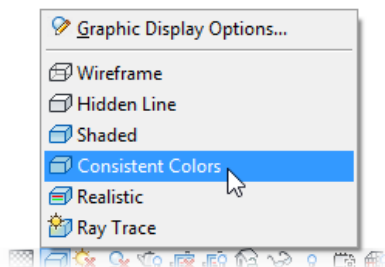
12. Dialogis *Visibility/Graphics > Filters > Partition B > Patterns > Override.*

13. Dialogis *Fill Pattern Graphics:*

- *Color = Orange.*
- *Patter = Solid fill.*
- Kliqui OK.

14. Dialogis *Visibility/Graphics > Apply.* Kliqui OK.

15. *View Control bar > Visual Style > Consistent Colors.*

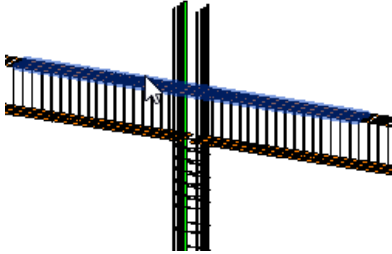


Märkus: Elemendid vaates kuvatakse nüüd lähtuvalt armatuuri jagamise grupist.

Numbrite järjestus

Juhul kui armatuuri nummerdamises esineb vahelejäänud numbreid, siis kasuta järgnevat protseduuri.

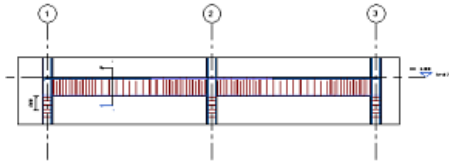
1. Joonise alas vali pildil näidatud armatuur.



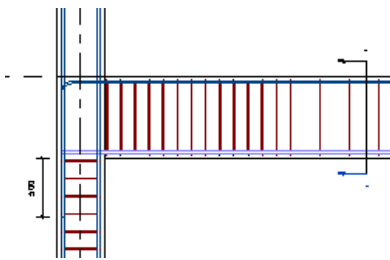
2. Paletil *Properties* > *Construction* > veendu, et selle > *Rebar Number* = 09.
3. Paanil *Structure* > *Reinforcement* > *Reinforcement Numbers*.
4. Dialoogis *Reinforcement Numbers*:
 - *In Use* > *Partition B* = 01-09 *.
 - *Partition B*, vali *Remove Gaps*. Kliki *Apply*.
 - *In Use* > *Partition B* = 01-04.
 - Kliki OK.
5. Armatuur on endiselt valitud, kontrolli, et *Properties* > *Construction* > *Rebar Number* = 04.

Tähistamine

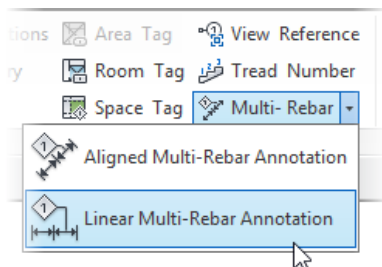
1. Paetil *Project Browser > Sections > parem klikk vaatel Section 1 > Duplicate View > Duplicate with Detailing*
2. Nimeta see kui **Beam**.
3. Redigeeri lõike perimeetrit nii nagu näidatud pildil.



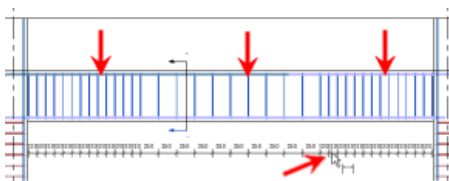
4. Muuda skaala kui 1 : 25.



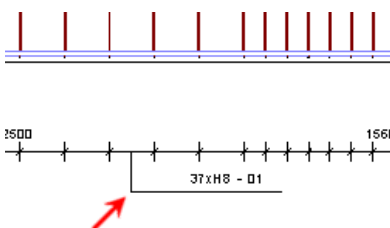
5. Paanil *Annotate > Tag > Multi-Rebar > Linear Multi-Rebar Annotation*.



6. Joonise alas vali pildil märgitud kolm armatuuri gruppi (vasakpoolsel talal). Seejärel näita mõõdu lisamise asukoht.

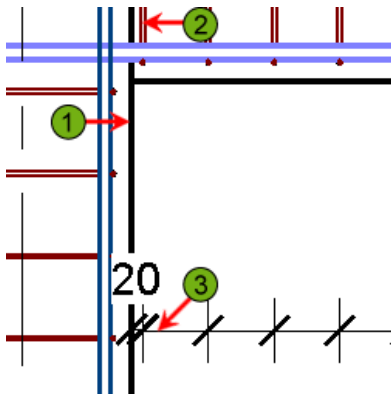


7. Vali punkt, et lisada tähis ning viitjoon.

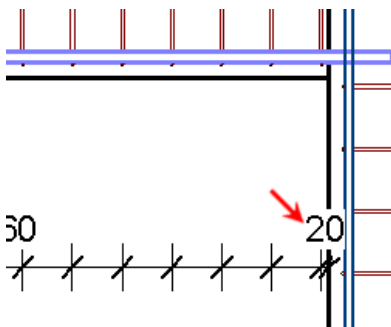


8. Suurenda mõõdu juurde.

9. Lisa *Aligned* mõõt (3), et mõõdistada posti servast (1) kuni armatuurini (2).



10. Paiguta sarnaselt mõõt ka vastasservale.



11. Vali vasakpoolne mõõt, mis kuvab väärtust 20.

12. Paletil *Properties > Edit Type*.

13. Dialoogis *Type Properties*:

- Loo koopia, *Duplicate*.
- Sektsioonis *Other > Equality Formula > Total Length*.

14. Dialoogis *Dimension Equality Formula*:

- Lisa parameetrid *Length of Segment* ning *Number of Segments*.
- Järjest nii nagu alloleval pildil.
- Kliki OK.

	Parameter Name	Spaces	Prefix	Suffix
1	Number of Segment	1		x
2	Length of Segment	0		=
3	Total Length	0		

15. Kliki OK, et väljuda dialoogist *Type Properties*.

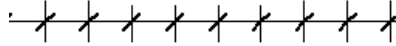
16. Joonise alas vali keskmine mõõt.

17. Paletil *Properties > Edit Type*.

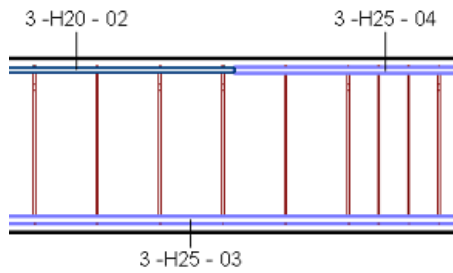
18. Dialoogis *Type Properties > Graphics > Dimension Style > Linear Dimension Style: MRA Diagonal 2mm Arial 2*. Kliki OK.

19. Vajuta ESC klahvi, et tühistada valik.

Märkus: Pane tähele, et mõõt sisaldab nüüd ka arvu.

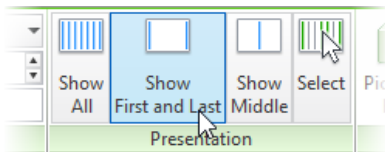
$$13 \times 120 = 1560$$


20. Paanil *Annotate* > *Tag* > *Tag by Category*.
21. *Options bar* > *Tags*.
22. Dialoogis *Loaded Tags And Symbols* > *Structural Rebar* > *M_Rebar Tag : Quantity Type & Number*. Kliki OK.
23. Joonise alas lisa tähised ülemisele ning alumisele armatuurile.

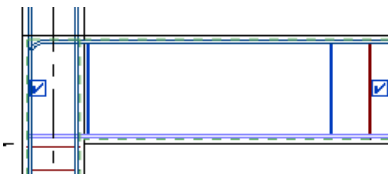


Esitus

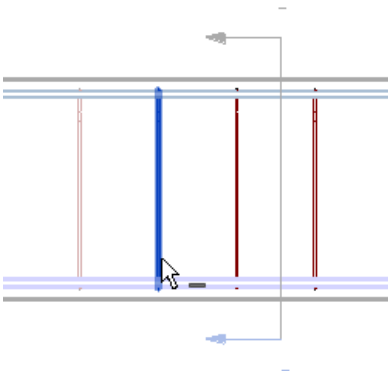
1. Joonise alas vali vasakpoolne armatuuri grupp.
2. Paanil *Modify | Structural Rebar > Presentation > Show First and Last*.



Märkus: Nüüd kuvatakse grupi esimene ning viimane osa.

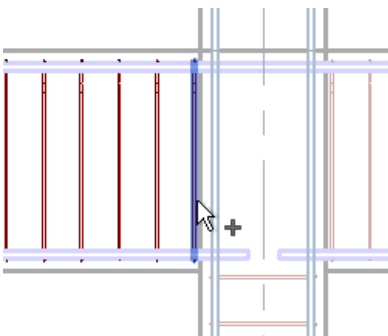


3. Vali keskmine armatuuri grupp.
4. Paanil *Modify | Structural Rebar > Presentation > Show First and Last*. Kliki *Select*.
5. Vali esimese elementina pildil näidatud.



Märkus: Antud element eemaldatakse valikust.

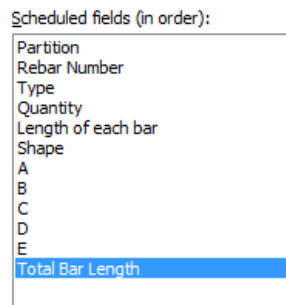
6. Paanil *Edit Rebar Presentation > Finish*.
7. Vali viimane armatuuri grupp.
8. Paanil *Modify | Structural Rebar > Presentation > Select*.
9. Paanil *Edit Rebar Presentation > Select None*.
10. Joonise alas vali armatuuri grupi viimane element.



11. Paanil *Edit Rebar Presentation > Finish*.

Spetsifikatsioonid

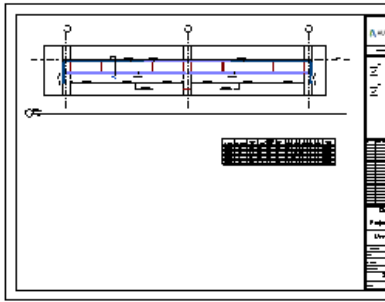
1. Aktiveeri vaade *Rebar Schedule*.
2. Paletil *Properties > Fields > Edit*.
3. Dialoogis *Schedule Properties > Fields*:
 - Lisa väljad *Partition* ning *Rebar Number*.
 - Nihuta need ülesse poole.
 - Eemalda väljad *Schedule Mark* ning *Rev*.
 - Lisa *Total Bar Length*.



4. Paanil *Sorting/Grouping*:
 - *Sort by > Partition*.
 - *Then by > Rebar Number*.
 - Tühista *Itemize Every Instance*.



5. Paanil *Formatting*:
 - *Partition, Rebar Number* ning *Total Bar Length* – vali *Alignment = Center*.
 - *Total Bar Length* osas vali *Calculate Totals*.
6. Kliki OK, et sulgeda dialoog.
7. Redigeeri veergude laiuseid ning pealkirjasid nii, et need oleksid loetavad.
8. Loo uus leht kasutades malli *A1 metric*.
9. Tiri *Beam* lõike vaade ning *Rebar Schedule* antud lehele.



See lõpetab käesoleva näite. Sulge failid.