## LAB 18 - Horizontal Regression Analysis

Regression analysis can be used to facilitate the development of horizontal alignments by creating a 'best-fit' alignment through defined points.

## **Chapter Objectives:**

• Setup horizontal regression analysis project parameters

Regression analysis setup.

- 1. Create a horizontal alignment to store the results in.
- 2. Select **Tools > Application Add-ins** to enable the command.

E Application Add-ins		- • •
Available:		OK
VI of Lavout Add-In	*	
Multiple Horizontal Element Regression Analysis Add-In		Cancel
		Help
Rises Call / Plack Add In	-	<u> </u>
Description		
The Multiple Horizontal Element Regression Analysis Add-In provides commands for creation and editing with the inclusion of regression by least squares analysis.	r horizoni	tal alignment

3. Select Geometry > Horizontal Regression > Add Regression Point The Add Horizontal Regression Points dialog will appear.

🔣 Add Horizontal R	egression Points	- • • ×
Main Advanced		
Source:    Points		Filter
Alignn	nents	Help
Include:		
Selected		<u>+</u>
Name	Description	Style
First Point:	Ŧ	-
Second Point:	Ŧ	- <del>ф</del> -
Apply	Preferences	. Close

4. **<D>** in the *Include* field so the **Filter** button becomes activated.

	Regression Points	
lain Advance	d	
Source: 🔘 Po	ints	Filter
Ali	gnments	Help
Include:		Trop
Ι		+
Selected:		
Name	Description	Style
First Point:		+

5. **<D>** the **Filter** button. The *Geometry Selection Filter* dialog will appear.

Name:	Included	•			ОК
Description:	Included	•			Cancel
Style:	Included	•			Preferences
Fence Mode:	Ignore	T			
Available:				Selected:	Help
Name	Description	Style	Add ->	Name Description	on Style
105 100 3878_1 1095_2 1097_2 1096_2 1091_2 1091_2 ↓	Section Comer Section Comer Property Pin Property Pin Property Pin Property Pin Property Pin III	T_Section Cor T_Section Cor T_Property Pin T_Property Pin T_Property Pin T_Property Pin T_Property Pin	<- Remove <- Swap -> All None	) ) )	

6. Create a selection of centerline points to be used for analysis.

Name:	Included	•	•				ОК
Description:	Included	•	•				Cancel
Style:	Included	•	T_Traffic*				Preferences
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				<- Remove	5008	Traffic Control Sin	n T_Traffic Singl
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				All	5072	Traffic Control Sin	T Traffic Singl
				None	5090	Traffic Control Sin	T Traffic Singl
					5103	Traffic Control Sin	T_Traffic Singl
					5120	Traffic Control Sin	T Traffic Singl

- Add Horizontal Regression Points Main Advanced Source: 
   Points Filte Alignments Help Include ÷ Selected Name Style Description 5008 Traffic Control Singl... T\_Traffic Single 5026 Traffic Control Singl... T\_Traffic Single 5039 Traffic Control Singl... T\_Traffic Single Traffic Control Singl... T\_Traffic Single 5056 Traffic Control Singl... T\_Traffic Single 5072 EUOU First Point: 5104 - + Second Point: 5119 • + Close Apply Preferences...
- 7. **<D>** the **OK** button in the *Geometry Selection Filter* dialog.

8. **<D>** the **selection** button. Use the combination box or graphically define the first and second points to define initial point and direction for evaluation.



- 9. **<D>** the first point in the MicroStation view and **<D>** second point in the view to define the *direction of the analysis*.
- 10. **<D>** the **Apply** & **Close** buttons.

11. Select Geometry > Horizontal Regression > Edit/Review Regression Points. The Edit / Review Horizontal Regression Points dialog will appear.

Regression	Points:							_	Close
Name	Northing	Easting	Style	Include in	Status	Offset	Weight	-	Colort Only
5104	1556584.8.		T_Traffic	No	Normal	0.00	0.01		Select Only
5119	1556570.3.		T_Traffic	No	Normal	0.00	0.01		Select & Regress
5135	1556556.0.		T_Traffic	No	Normal	0.00	0.01		
5152	1556541.3.		T_Traffic	No	Normal	0.00	0.01		Quick
5153	1556534.4.		T_Traffic	No	Normal	0.00	0.01		Benort
5169	1556526.1.		.T_Traffic	No	Normal	0.00	0.01		
5184	1556511.4.		.T_Traffic	No	Normal	0.00	0.01	-	Help

- 12. Refine the selection of points to be used for analysis by using the Ctrl and Shift keys or using the Select button to define a selection area. Alternatively a fence can be placed around the points to be included in the regression. If a fence is used, a <Shift> <D> on the Select Only button will include fenced points in the regression analysis.
  - **Note:** Additional information can be access by selecting the Help button found in all dialogs.

Regression	n Points:							Close
Name	Northing	Easting	Style	Include in Analysis	Status	Offset	W ^	Select Only
5104	1556584.8.	.3278013.6.	.T_Traffic	Yes	Nomal	0.00	0.0	Select Only
5119	1556570.3.	.3278068.2.	.T_Traffic	Yes	Normal		0.0	Select & Regress
5135	1556556.0.	.3278120.1.	.T_Traffic	Yes	Nomal		0.0	0:1
	1556541.3.		.T_Traffic	Yes	Normal		0.0	QUICK
	1556534.4.		.T_Traffic	Yes	Nomal		0.0	Report
	1556526.1.	.3278227.5.	.T_Traffic	Yes	Normal	0.00	0.0	
5184	1556511.4.	.3278280.9.	.T_Traffic	Yes	Normal	0.00	0.0 🔻	Help
•			III				•	

- 13. <**R**> on points and select **Edit** from the fly-out menu to edit. The **Edit Horizontal Regression Point** dialog will appear.
- 14. **<D>** the radio button **Yes** to **Include in Analysis**.

🔣 Edit Horizoi	ntal Regression Point	- • 💌
Include in Analy	sis: 💿 Yes 💿 No	Apply
Status:	Fixed	Close
	Normal	Help
	Ignored	
Offset:	0.00	+
Weight:	0.01	
First	< Previous Next	> Last

- 15. **<D> Apply** to effect any changes then **Close**.
  - **Note:** The Offset value show above regresses through a point at the defined offset from the selected point. To define a regression bandwidth, select the Quick button on the Edit/Review dialog. Tolerance defines only points that are offset less than or equal to the tolerance defined.

- 16. Select Geometry > Horizontal Regression > Single Element Regression Analysis The Single Horizontal Element dialog will appear.
- 17. Select **Geometry > Horizontal Regression > View Regression Point** to display symbology for the selected points.

ata:			1	L.		Apply	
Object	Prefix	Suffix	Precision	Name			
Fixed Symbol				Default		Close	
Fixed Text				Default		Preferences	
Normal Symbol						Therefore the state	
Normal Text						Help	
Ignored Symbol							
Ignored Text							
Other Symbol							
Other Text							$ \sim $
Unacceptable Symbol							
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Slew Indicator							
cceptable Slew: 0.2	5		Annotate a	as: () Single () Multiple	Line e Lines		
Mirror Right to Left			Annotate i	n: East		_	

18. Select Element Type: Linear or Circle

Single Horizontal Eleme	
Element Type	Compute
	Close
Save Order	Save
After Selected Element	Report
Iast Element	Help
Results	
Least Squares Error:	
Standard Deviation:	
Maximum Offset	

19. **<D> Compute** to view the results in the MicroStation view.



- 20. **<D> Save** to create the alignment element.
- 21. **<D>** the **Report** button to view a summary.

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22. Review the results.

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**Note:** Additional curves and tangents would have to be regressed to complete the alignment. Once created, regressed elements could be managed using the advanced geometry Horizontal Element commands.