#### ROUGH GUIDES

# Changing The Model To Match A Volume



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### Introduction

In this rough guide we are going to look at the method of adjusting a model to match a required volume.

For this exercise we will have simple Design and Restoration models.

The OGL looks like this...



And the Design model looks like this...



Here is a quick "Query / Section" through the two models...

Query Section									×
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Datum 103.07	7 (m) Locate	🗌 V. exagg. : < 👖	> Background	I					
			E	Back Next	Cancel Help				

The current volume between these models is 41,475.499m<sup>3</sup>

plume to Surv	vey							
			Send report to : C:\SUF	RVEYS\RESTORATION	RESTORATION.TXT			
McCarthy	Taylor Systems Ltd.			LSS			Page : 001	
LSS v10.	01.24 / 100.27		RESTORATION -	ExampleRestorati	on	2.03	23.12.19 10:10	
			AREA AND VOLUN	E CALCULATION				
	Volume between curre and oth	ent survey : RESTON Mer survey : DESIGN	RATION - Example N - Example exca	Restoration avation design				
	Volumes by surface f	eature in the cur	rent survey :					
Surface	Description	Cut area (m <sup>c</sup> )	Cut volume (m <sup>3</sup> )	Fill area (m²)	Fill volume (m³)	Total area (m²)	Net volume (m <sup>3</sup> )	
None	(Undetermined :	0.012	0.000	8678.128	41475.499	8678.139 0.017	41475.499 n/a)	
Grand	total : (Undetermined :	0.012	0.000	8678.128	41475.499	8678.139 0.017	41475.499 n/a)	
	Note	: "FILL" when the	CURRENT survey is	above the OTHER	. All areas are pl	an areas.		
		*** WARNING ***	no volume determi	ined for the foll	owing areas :			
		Current :	survey valid, outs	side other :	0.017			
		Other su	rvey outside curre	ent :	0.021			
			Bac	ск ОК С	ancel Help			

However, for this exercise we need to achieve a volume of 50,000.000m<sup>3</sup>. So we need to amend the levels of the Restoration model accordingly.

The following methods will demonstrate how to add the required volume of material to the Restoration model in a controlled manner.

### Step 1 – Designing the addition.

We first need to open the Restoration model.



Now we need to design the shape of the additional material. TO do this we need to go to the command "Output / Design Digitise – Contour string". We will call the new file "ADDITION.001"

Design / Digitise		×
Create file : ADDITION.001		Browse Edit Next
Design Parallel Variable offset Longitudinal Gradient Sidewall Template	First point number : 126 Cogo 2 Distances Line and Offset Bearing and Distance Arc - centre Arc - 2 points Arc - 3 points Steps / stairways	Digitise Contour string 3-D string Other General text
Back	Undo last option	Help

We will begin by outlining the extent of the addition, where there will be no change to the existing Restoration...

Digitise - Contour String ×
Level
O Contour: 0
◯ 2-D
- Feature
O Point feature : PASP Select Locate
O Link feature : C Select Locate
Options Create rectangle - 3rd point controls width
Back OK Cancel Help



... and close the loop after hitting Escape when done.

Digitise - Contour String	x
Options	ī
O Link feature to next point : C Select Locate	
<ul> <li>End feature - open ended</li> <li>End current feature - as closed loop</li> <li>End string (multiple features) - as closed loop</li> </ul>	
Back OK Cancel Help	

We now need to continue with a series of concentric 1m, 2m and 3m contours for the addition.



Once done, we Finish the digitising and continue through Save & Load to create the new Addition model.



This ADDITION.LSS DTM with the outer contour set at 0 m, can be regarded as equivalent to the level difference model used in the pre-settlement Rough Guide.

We need to compute the volume of the Addition survey. This will be used as part of the addition shape calculating when merging the landform later on in this guide.

Here we need to use the command "Report / Volume to Datum", where the Datum will be a value of zero.

Device :	HPBFFC45	(HP PageWide	e Pro 477dw MF	on NeO2:		Select		
) Adobe Acrobat :	ADDITION.	PDF :	:A4:PT:Close		Configur	ne		
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The resultant volume of the Addition is 10,472.579m<sup>3</sup>, this will be used in the calculation for the addition in the next step.

## Step 2 – Add the shape of the addition to the Restoration model.

We now need to go back to the Restoration model.



The first thing we need to do here is go to the command "File / Save As", to copy the Restoration model as "RESTORATION PLUS.LSS"

File Save As		×
New Survey :	RESTORATION PLUS	Browse
Survey title :	Restoration plus addition	
	Continue processing Current Survey New Survey, ie close current, open new New Survey, ie close and save current, open new Back OK Cancel Help	

We now need to use the command "Input / Merge – Landform" and select ADDITION.LSS.

Input Merge	x
From survey : ADDITION.LSS	Browse
Data Legend Stations Survey Survey at new location General text Landform Positions / settings	
Mode       Add only       Replace (as well as Add)       Back     Next       Cancel     Help	

We need to increase the Restoration by an additional 8524.501m<sup>3</sup>. However, rather than simply adding the Addition survey shape we will multiply the Addition levels by a factor.

This factor is calculated by dividing the required increase in volume of fill by the volume found in the Addition model above datum 0.

i.e. 8524.501 (Required increase) / 10,472.579 (Addition volume) = 0.813982

Merge Landform ×
Add the height of the other Terrain onto the current Terrain or replace with the height of the other Terrain or multiply the height of the current Terrain by the height of the other Terrain.
Non-terrain data is ignored by this command.
Other survey : C:\SURVEYS\RESTORATION\ADDITION.LSS
Title : ADDITION
Settings         Add Terrain levels         Replace by other Terrain level         Replace where other Terrain higher than current Terrain         Replace where other Terrain lower than current Terrain         Multiply Terrain levels         Level assumed where outside other Terrain :         Multiply the other Terrain level by :
Add observations from other Terrain into current survey
Back OK Cancel Help

We are restricted to5 decimal places, so LSS will round accordingly...

Merge Landform - Input error	x
0.813982 has more than 5 decimal places	
Vertical multiplication factor : 0.81398	
Back OK Cancel Help	

LSS will update the model and refresh the screen, which shows the results of the Landform merge

As you can see. the displayed contours have moved away from the original digitised lines.

You should save your model at this stage.



Now if we calculate the volume between this model and the design...

Indextry Taylor Systems Ltd.     LS     Page : 001       SS v10.01.34 / 100.27     RESTORATION FLUS - Restoration plus Addition     2023.12.19 14:27       RESTORATION FLUS - Restoration plus Addition       AREA AND VOLME CALCULATION       Volume between current survey : RESTORATION PLUS - Restoration plus Addition and other survey : RESTORATION PLUS - Restoration design       Volumes by surface feature in the current survey :       burface Description     Cut area Cut volume Fill area Fill volume Total area Net volume (m <sup>4</sup> )       None     0.011     0.000     8678.128     51173.676     0.017     n/s)       Grand total :     0.011     0.000     8678.128     \$1173.676     0.017     n/s)       Grand total :     0.011     0.000     8678.128     \$1173.676     0.017     n/s)       Modetermined :     Current survey is above the OTHER. All areas are plan areas.       Current survey valid, outside other :     0.017       Other survey outside current :     0.021	fcCarthy SS v10.				RVETSIRESTORATION	NRESTORATION PLUS.1.	XI.	
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Other survey outside current : 0.021			Current	survey valid, out	side other :	0.017		
			Other su	rvey outside curre	ent :	0.021		

...we now have a volume of 51173.676m<sup>3</sup>.

Note that we have not quite arrived at the desired volume on this first attempt. We missed the mark by 1,172.676m<sup>3</sup>.

A repeat of the exercise, WITH possibly changing how the ADDITION model is formed etc... could result in a closer resultant volume.

Here is a quick "Query / Section" between "RESTORSTION PLUS", "RESTORATION" and "DESIGN" to see how the additional volume looks.



If you need further Technical Support, or you wish to attend any training courses please contact us...

#### McCarthy Taylor Systems Ltd

Aerial View Acorn House Shab Hill Birdlip Gloucestershire GL4 8JX Tel 01452 864244

support@dtmsoftware.com www.dtmsoftware.com