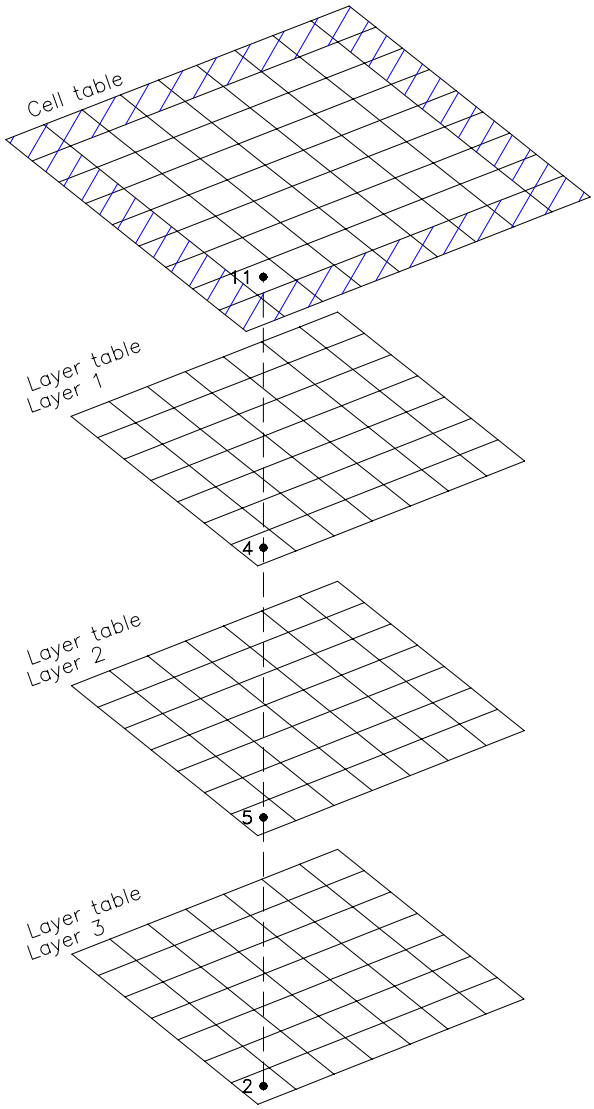
One common requirement in using LAYER and BLOCK tables is to total the values for all layers or levels at each location. In other words, to take the stack of values at that location and sum them. The sum might be reported directly, posted on a map, or contoured. In the following example, a LAYER table will be used, but the procedure is the same for BLOCK tables.

Procedure: **Create a CELL table:**

If no CELL table exists, one must be created. This table does not need the same number of rows or columns as the LAYER table, but it **must** conform to the same cell centers. For example, if your LAYER table starts at an origin 0,0 and has column and row sizes of 10, the CELL table may start at 0,10 and cell centers will still line up with one another. The CELL table may cover an area larger or smaller than the LAYER table, but of course the summation will be valid only for the area in common.

The figure below shows a three-layer LAYER table and a CELL table which is larger than the LAYER table. The shaded area of the CELL table does not cover the same area as the LAYER table, therefore, no sums will be calculated in these cells.



Create a field in the CELL table:
Only one new field is needed in the cell table, *layer_sum*, which is a REAL, ACTUAL field. This field will be used to store the sum of the field, and *layer_field* in the LAYER table.

Join the LAYER table to the CELL table:
Before the calculation can be executed, the LAYER table must be joined to the CELL table. When creating the JOIN table a many to one relationship is used, therefore a LAYER or BLOCK table is always joined to a CELL table. Logically, each LAYER table record will be related to the CELL record sharing the same cell center location.

> **Note:** The JOIN of a LAYER table to a CELL table was made possible in TECHBASE Version 2.2, using the cell center coordinates as the join key. This technique is not possible with earlier versions of TECHBASE.

Sum the LAYERs:
The following equation should be used in the *TBCALC* program each time the summation needs to be rerun. This erases any values left in the summation field from the previous calculation:

null = layer_sum

The following equation is used in the *TBCALC* program to perform the summation of the LAYER values into the CELL table:

layer_field layer_sum +& = layer_sum

When the calculation is complete, the *layer_sum* field will contain the total of the *layer_field* values at that location. If no valid LAYER records are present for the CELL, a null value will result.

Other options:
Filters:
By setting a filter for specific values in the LAYER table, the calculated summation will reflect only those LAYER records passing the filter.

Averaging:
To get the average value for the layers, two more fields need to be added to the CELL table: *layer_count* is an integer, actual and *layer_average* is a real, calculated: *layer_sum layer_count /*

The equations used to calculate the layer count is:

layer_count 1 +& = layer_count

This equation should be done at the same time as the *layer_sum* is performed.

For more information on creating CELL, LAYER, BLOCK and JOIN tables see **"Define - Create databases, tables, and fields" on page tb-3**. For more information on calculations, see **"tbCalc - Database calculator" on page tb-55**

