Establishing Dynamic Relations Between Nodes, Points, Lines, and Polygons

Dynamically-updated virtual fields (Computed and String Expression fields) in vector databases can now access and use attributes of other element types in the same vector object. For example, you can construct line element virtual fields that access attributes of the start and end node of each line or the polygons to the left and right of each line. In the example illustrated below, line elements in a vector object represent a network of sewer pipes. The SewerLineData table consists of virtual fields that access the horizontal length of each line (from the standard LINESTATS table) and the Z-value (elevation above sea level) for the start and end nodes for each line (from the Internal nodes table) as well as virtual fields that use these values to compute the vertical drop and slope for each line element.

The Insert Field window (Insert / Field from the Query Editor window) now has an Element menu that allows you to automatically insert both conventional and cross-element database references into the expressions you use to define virtual fields. The Element menu lets you choose to insert references from the current element database, from the database for a topologically related element (such as start node and end node for lines), or references to attributes for specific elements by element number. The references for current element and for topologically related elements are complete and useable as inserted. References to specific elements must be edited manually to specify the element number.

Virtual fields can reference values in linked external database tables that might be revised at any time. But since virtual fields are dynamically updated, any such revisions are automatically shown in your virtual fields and can be used to control the display of elements on screen. For example, a vector object could represent a network of gas or fluid pipelines, with current pressure recorded for each node in a constantly-updated database. A virtual field for lines could compute the current pressure drop for each pipeline segment and styling by script or by theme based on that field could be used to highlight segments with anomalous values.

Sewer lines table with virtual fields from line and node attributes

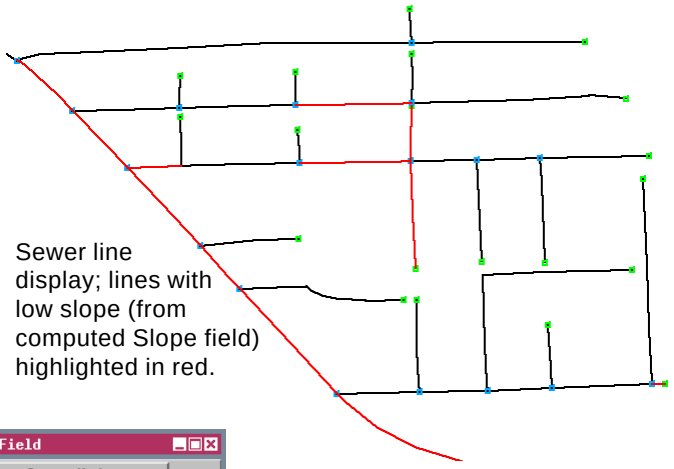
Values from line tables Values from Internal Node table Values computed from node and line attribute values

SewerLines6 / LineDatabase / SewerLineData

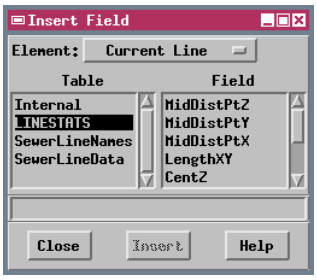
Table Edit Record Field Help

LineName	LengthXY	StartNode	EndNode	StartElev	EndElev	Drop	Slope
Normal Blvd Main	229.4	1	7	1207.0	1203.2	3.8	0.01650
Normal Blvd Main	249.7	3	13	1192.5	1189.2	3.3	0.01334
South Street 5	427.7	4	29	1209.0	1208.5	0.5	0.00113
Normal Blvd Main	138.4	5	9	1184.2	1181.6	2.6	0.01874
Sumner Street 7	417.3	6	35	1223.0	1207.9	15.1	0.03609
Normal Blvd Main	634.7	7	3	1203.2	1192.5	10.7	0.01687
Cottner Street	110.0	8	7	1208.0	1203.2	4.8	0.04350
Normal Blvd Main	129.8	9	19	1181.6	1181.0	0.6	0.00469
Garfield Street 4	375.1	10	26	1222.0	1201.0	21.0	0.05590
South Street 5	146.0	11	3	1198.2	1192.5	5.7	0.03893
40th Street 1	160.4	12	11	1205.0	1198.2	6.8	0.04245

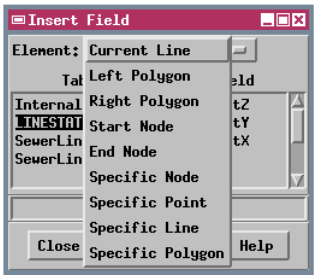
42 of 42 records shown



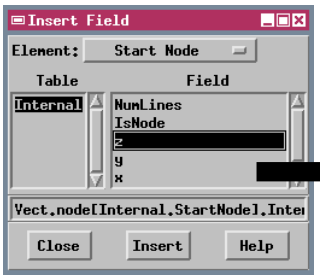
Sewer line display; lines with low slope (from computed Slope field) highlighted in red.



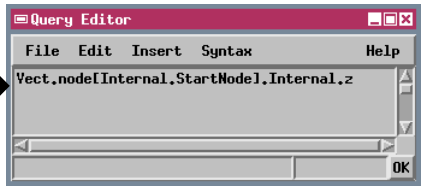
When creating a virtual field in a Line table, use the Current Line entry on the Element menu to access other tables in the Line database.



The Element menu also provides access to topologically-related elements or to specific elements that you must reference by element number.



Selecting the Z field from the Internal table for the Start Node of the current line.



Complete cross-element database references are inserted for topologically-related elements. References to specific elements require you to add an element number.

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