

Pattern Lines for DTM Surveys (3-1-2011)

Up until 2008, Roadway Design took the x-sections delivered with the survey and placed Proposed X-Sections on these. In the early part of 2009 a Design memo was issued which stated that x-sections should be cut at Critical Design locations (i.e. superelevation break points, begin/end of tapers, PC's/PT's, etc.) when a DTM Survey (Spot Shot/Breakline) was performed on a project. This was done to take advantage of the way existing ground is being submitted for the majority of surveys (DTM's instead of traditional 90 degree x-sections). Without causing the designer a lot of extra work, this:

1. Improves Earthwork estimates.
2. Provides the Districts/Contractors x-sections at the critical points needed for construction staking.

Steps for placing Pattern Lines at Critical Design Locations are described below.

Critical Design Points

The following are locations in which X-Sections need to be created for each alignment.

- 1) Critical Superelevation Break Points.
- 2) At points of non-tangency or geometric change of element type along proposed edges of pavement, shoulders, alignments, and profiles. (i.e. Begin/End of tapers, shoulder widening, etc.).
- 3) At locations required by abrupt changes in the digital terrain model. (i.e. Top/Bottom of streams, ditches, hills, etc.)
- 4) At any other locations that are needed to provide a maximum distance between cross sections of 100-ft for rural projects and 50-ft for urban projects.
- 5) Driveway Locations.
- 6) Drainage Structure Locations. These can be skewed but they must not be included in EW computations and they should be clearly labeled as skewed and at what angle.

Cross Sections should be 90 degrees to the design alignment unless otherwise noted above. Where there are multiple non-parallel roadways shown on one set of cross sections, the following applies:

- Bridge Replacement (Detour Roads) – Sections should be cut along and at the critical design location of the permanent alignment.
- Non-parallel 4-Lane Roadways – Critical Stations do not have to be identified for the non-parallel roadway in non-parallel areas.

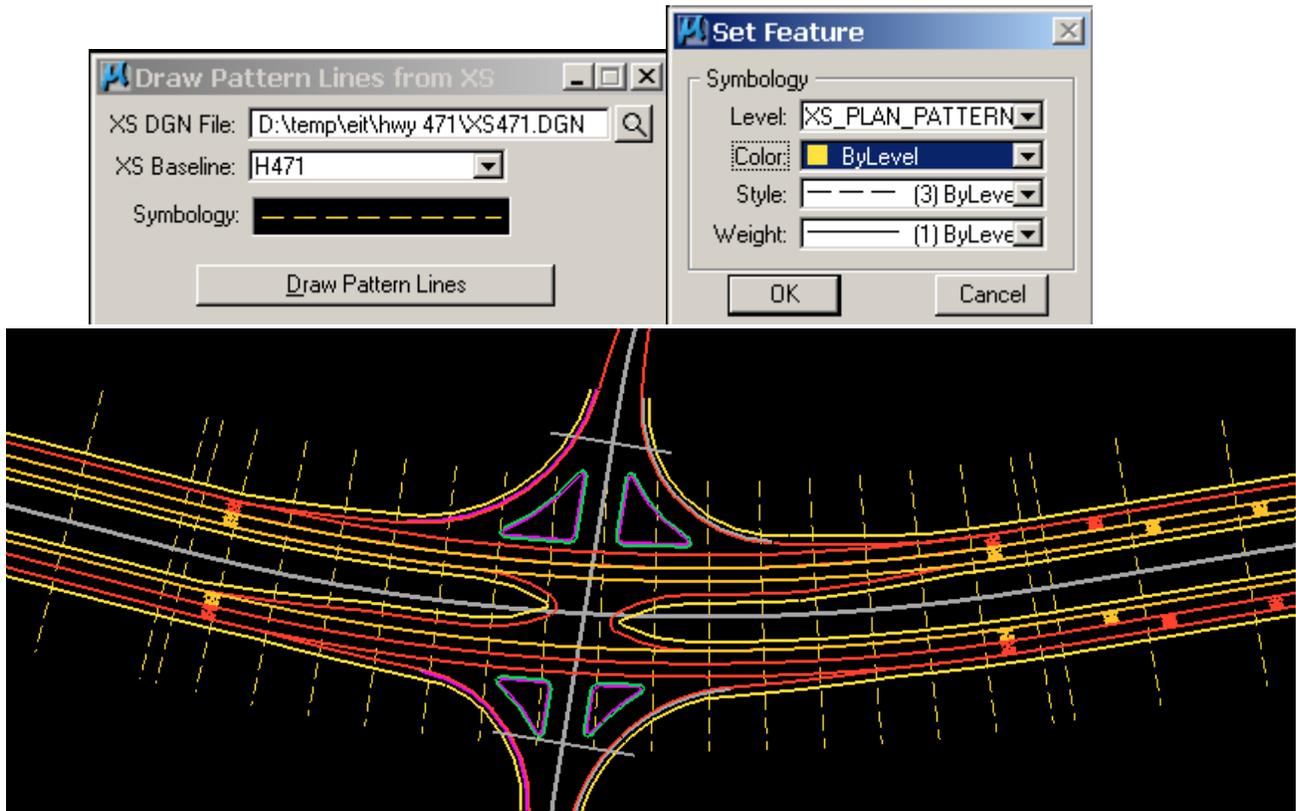
Prerequisites

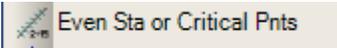
The following should be complete prior to creating these x-sections:

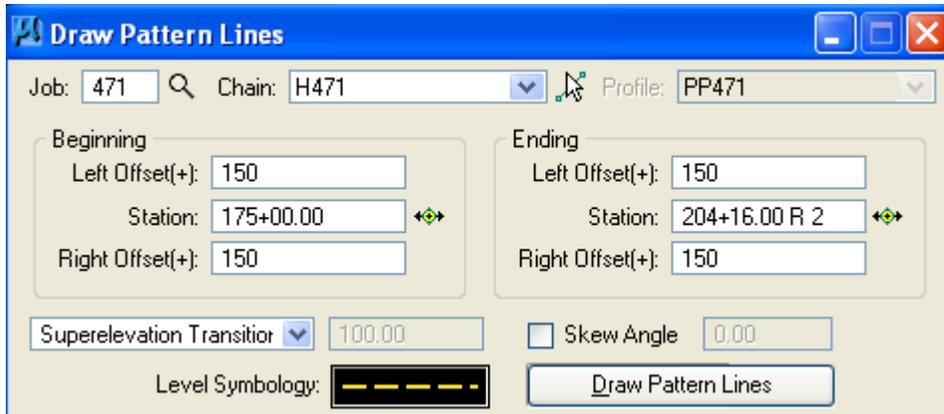
- 1) Superelevation must be calculated
- 2) Plan View elements such as EP, Shoulder, and Bridges must be drawn.
- 3) You must have a TIN file created from a 3D/Spot shot breakline.

Steps

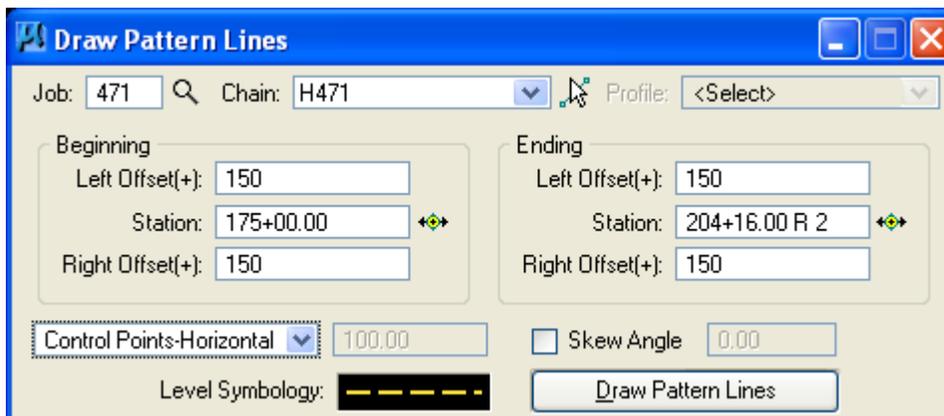
1. Create your Pattern DGN file reference in your EP/Shoulder and reference in your shapes or superelevation.
2. Use GeoPak's **Draw Patterns from XS** to draw Pattern Lines from x-sections submitted with the survey.



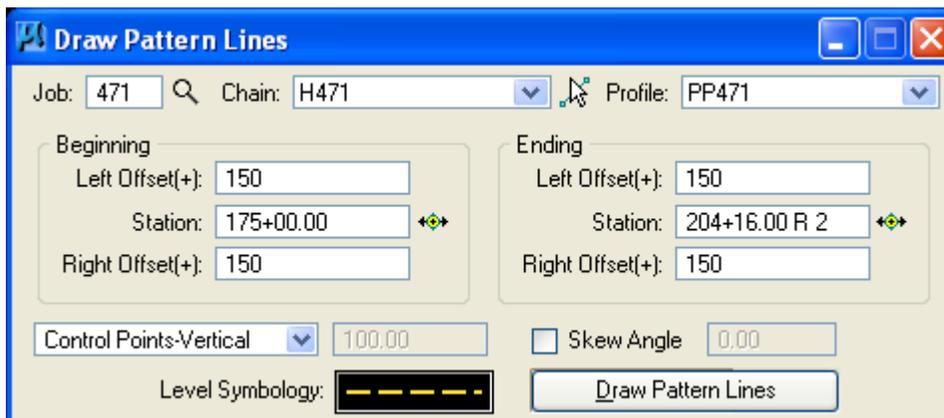
3. Delete all the even stationed pattern lines. Leave the ones at oddball stations because these represent critical breaks in the existing ground or driveways.
4. Invoke GeoPak's **Draw Patterns by Station Range**  and:
 - a) **Draw Patterns at Superelevation Transition Points. (See Blue Patterns below).**



b) Draw Patterns at Horizontal Break Points. (See Red Lines below). This places Pattern Lines at each PC/PT or kink of the Horizontal Alignment.



c) Draw Patterns at Vertical Break Points. (You'll have to choose your Proposed Profile.) This places Pattern Lines at each VPC/VPT or kink of the Horizontal Alignment.



5. Draw Patterns at EP & Shoulder Tapers dp At DP (3PC) This places Pattern Lines at each DP with the intended DP's the Beginning and End of Tapers for Shoulders & EP's.

6. **Draw Pattern Lines at Driveways**  At Drives (SSet Drives) **(3PC, Select Prop. Driveway lines)**. This places pattern lines at all drives although this may have been performed by the Survey personnel and if so, can be skipped.

7. **Add Supplements**  Add Supplements (SSet Patterns)) - Fills in gaps at even 100' or 50' intervals in areas where spacing is too far apart.

8. **Delete Duplicates**  Delete Duplicates - delete duplicate elements to delete any duplicate pattern lines.