

# SURVEY CONSTRUCTION: DO MORE WITH LESS

## Introduction

Spatial integrity and positional accuracy are paramount to risk mitigation practices associated with coordinate related datasets. Over the years, we have found that some project data is passed along or shared with other groups or partners with little or no support information provided with this transfer. In most cases, the position of the provided data is accepted since little could be done to confirm the positional accuracy of the data.

Advancements in technology, in conjunction with the wealth and diversity of survey expertise at Divestco, has enabled us to expand our services to quantify existing seismic survey data with no basic survey data (raw data) to complete a full “audit”.

Though an “audit” may not be an option, reconstructing survey might be. Divestco has developed processes that capitalize on digital elevation models for horizontal positioning along with available satellite imagery and client provided data, including support documentation such as: field survey or chainage notes, sketches, observer reports, SEGY data, current workstation project information and project reports.

The objectives of Survey Construction are:

- To correctly position existing seismic survey data (coordinates provided, and
- To construct seismic survey locations (no coordinates provided) based on support documentations.

The scope of Survey Construction provides:

- Datum and projection validation through coordinate pairings,
- Positional validation through imagery and Digital Elevation Models,
- Survey integrity analysis (spreads, profiles, missing stations, intersections),
- Datum transformations to meet client requirements,
- Final report on discovery and ,
- SEGP1 of validated seismic data.

It is important to note that the quality of work and final spatial accuracy is dependent on the support data available for validation.

To assist in the understanding of the Survey Construction philosophy, we have compiled visuals that show how the combination of imagery, DEM and support documents can validate, rectify or create data locations.

## Example 1: Seismic Data Coordinates Available

The project depended on the seismic data and the use of a satellite image base with available DEM data only (no support documents). In this case, the undulating terrain and obvious physical features in the project area were used for positioning.

To confirm the horizontal component, we perform an elevation analysis where seismic lines can be moved by a set amount, typically a bin size, and compared to a DEM. Statistical analysis of the resulting elevation differences between provided elevations and the DEM is completed to confirm the best fit.

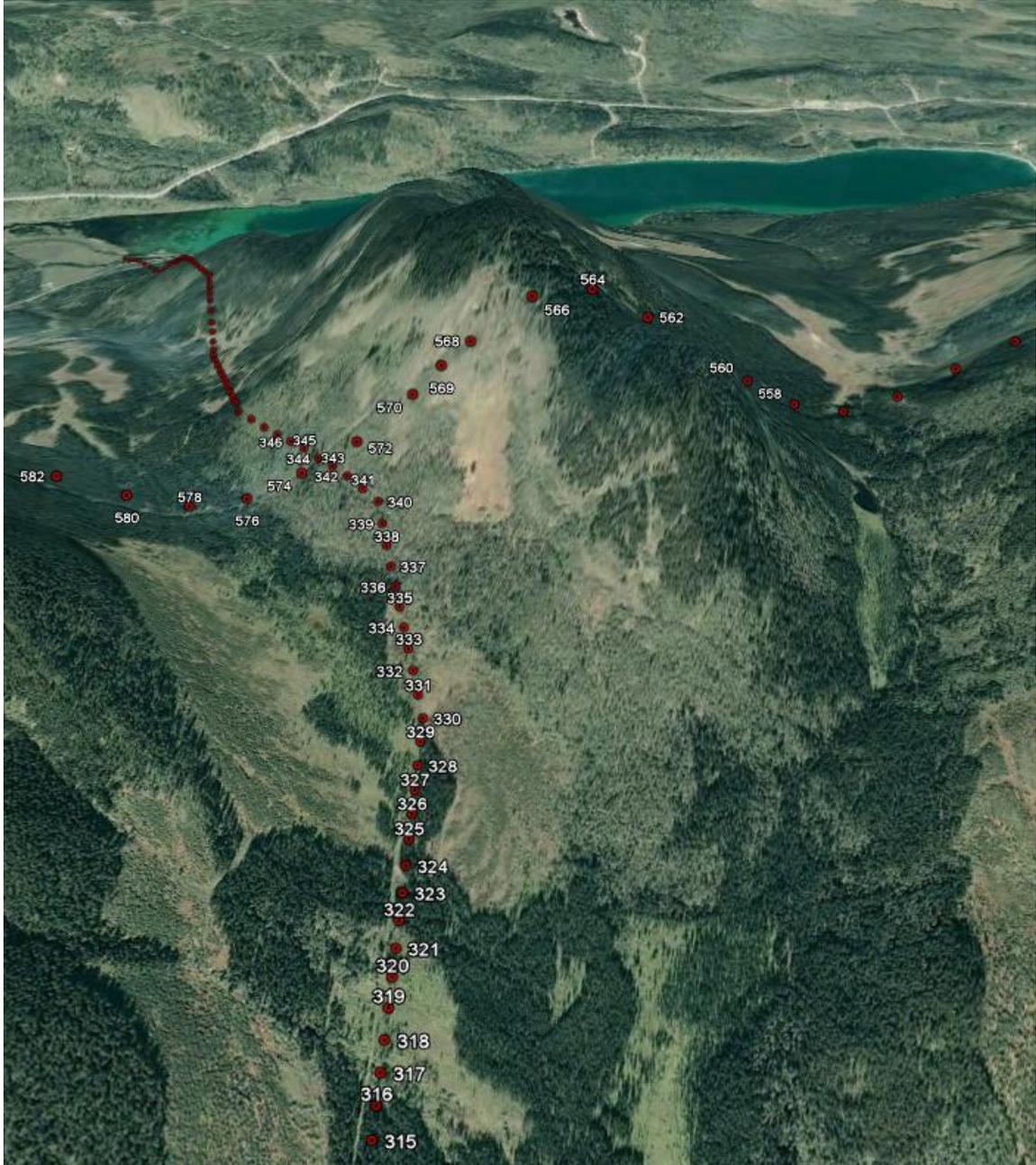
	Existing	50 m N	50 m E
<b>Avg</b>	<b>2.3</b>	<b>3.8</b>	<b>4.8</b>
<b>Stddev</b>	<b>3.2</b>	<b>6.8</b>	<b>10.5</b>
<b>Max</b>	<b>5.3</b>	<b>31.2</b>	<b>38.3</b>
<b>Min</b>	<b>-13.0</b>	<b>-23.6</b>	<b>-48.0</b>

The following screen shots are proof of concept showing various sections of the project where the seismic data and culture were used for validation.

The image below clearly shows a cut line where the N/S seismic survey belongs and can be adjusted in Easting to fit the line. The inline, or N/S direction, can be adjusted using the E/W line.



As shown below (rotated view, looking west), any movement to fit the cutline, clearly visible at the bottom, will dramatically impact the location of station 564 on top of the mountain.



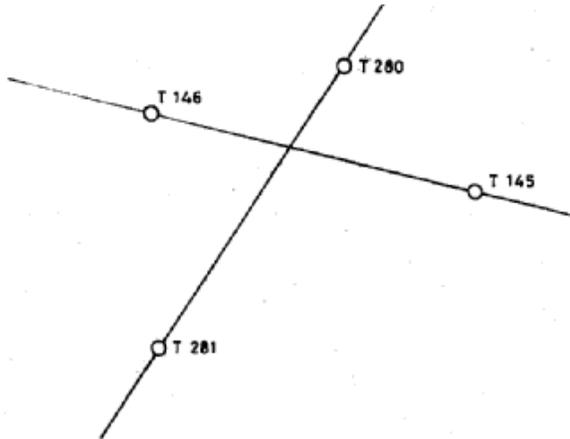
This type of example is very useful for analysis as any horizontal movement would introduce significant elevation differences.

**Example 2: Seismic Data Coordinates Not Available**

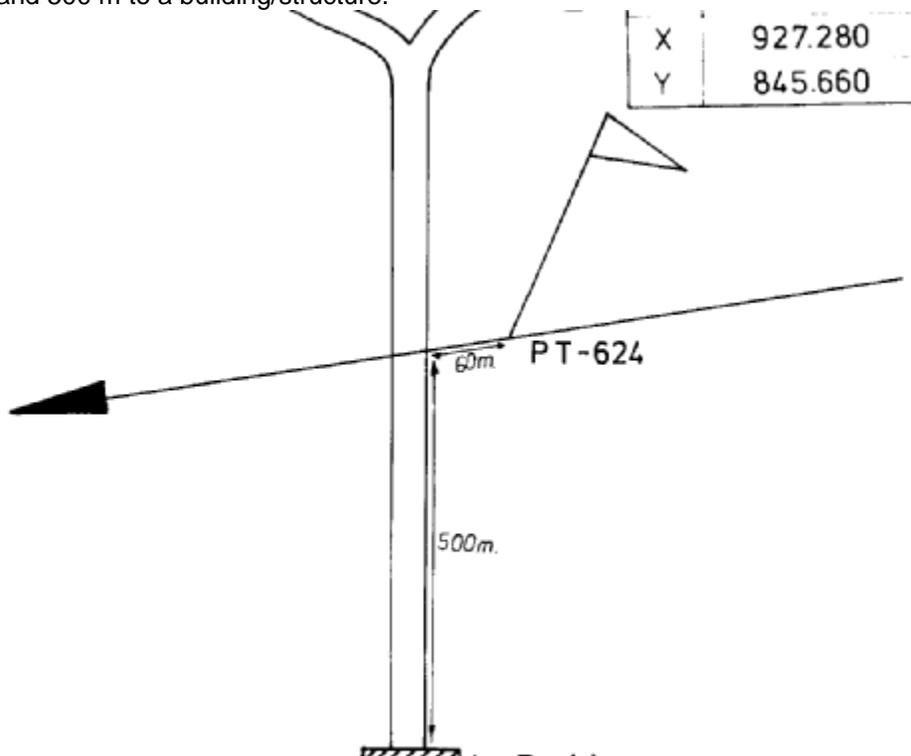
This truly is a classic example of “Do more with less”. You have obtained, or inherited, a project where no coordinates are available for seismic survey data. However, you have obtained digitized and scanned maps or screen captures of seismic data that require coordinates.

In this case, the support documentation becomes the critical data to create the survey locations. The image below identifies the relationship between two lines. Though no distances are available,

the station interval is typically available from the seismic processing and will be used with imagery to identify any scarring at the point of intersection.



The station numbers can be established through reverse engineering using other similar notes and sketches, such as the one below which shows ties to physical locations (60 m from the road and 500 m to a building/structure).



Should elevations be available, but no horizontal coordinates, this can be leveraged with available DEM data to confirm the horizontal position.

### Conclusion

Even though no raw data is available to complete an "Audit", we can provide data quality and positional accuracy of data previously deemed "unknown" or "inadequate". This also applies to

data with unknown or incorrect datum/projection information, which can be identified and rectified through ancillary datasets and support documentation.

**Contact Divestco for more information:**

[sales@divestco.com](mailto:sales@divestco.com)

| 587 952 8000

or [visit us online](#) to learn more about Geomatics Services