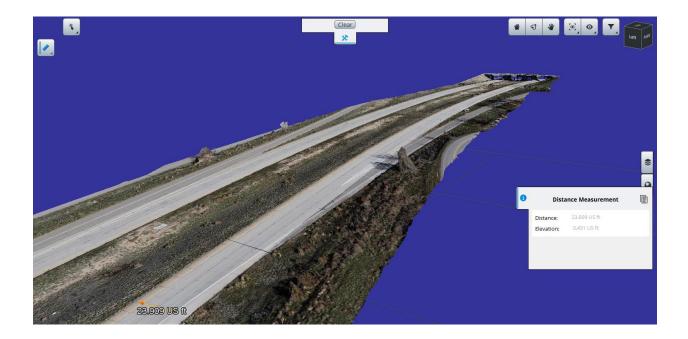
Creating and Aligning ContextCapture Reality model to MicroStation Project Ground Coordinates

Update 19

Many Departments of Transportation, rail or spatial base projects use localized or project specific coordinate systems. These localized systems typically will use a scale and or rotation factor from a known Grid. These coordinate values when used for surveyed ground control provide the positioning constraint for photogrammetric Reality Model in ContextCapture. This document refers only to those systems based on feet or survey feet "Local coordinate system". A "metric" Local coordinate option continues to be available.

This document will supersede any previous workflows for managing ground or cartesian coordinate systems using imperial units (foot, survey feet).

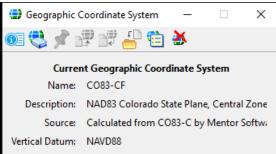
This document will also provide instruction on properly attaching or referencing the localized (English or metric) reality models (3sm and 3mx) to a MicroStation design file (.dgn)



Reviewing the Data

We would like to thank Colorado DOT for providing the dataset including the following.

- Nadir Imagery captured over small portion of project (172 jpg photos)
- Survey ground control EPSG 2232+ 6360 (Referred to as "Grid") csv file
- Same Ground control points converted to "Ground" csv file
- Design dgn including imported "Grid" GCP 2232 w/ state plane coordinate system set



 Design dgn including "Ground" GCP w/ ground coordinates inc "affine" parameters scale and rotation

Coordinate System	
Name	Copy-CO83/2011-CF
Description	NAD83/2011 Colorado State Planes, Cent
Projection	Lambert Conformal Conic with Affine Proc
EPSG Code	0
Source	Derived from CO83-C
Units	US Survey Foot
First Standard Parallel	39°45'00.0000"N
Second Standard Parallel	38°27'00.0000"N
Origin Longitude	105°30'00.0000''W
Origin Latitude	37°50'00.0000"N
False Easting	300000.0000
False Northing	100000.0000
Quadrant	Positive X and Y
Minimum Longitude	110°00'00.0000"W
Maximum Longitude	101°30'00.0000"W
Minimum Latitude	37°15'00.0000''N
Maximum Latitude	40°45'00.0000''N
Affine A0 Parameter	-2100719.7817
Affine B0 Parameter	-1500484.6022
Affine A1 Parameter	1.00029591
Affine A2 Parameter	0.0000000
Affine B1 Parameter	0.00000000
Affine B2 Parameter	1.00029591
Affine B2 Parameter	1.00029591
Datum	
Name	NAD83/2011
Description	NAD 1983/2011 adjustment through US G
Source	NOAA's National Geodetic Survey
Conversion Method	Geocentric Translation
Delta X	0.0000
Delta Y	0.0000
Delta Z	0.0000
Ellipsoid	
Name	GRS1980
Description	Geodetic Reference System of 1980
Equatorial Radius	6378137.0000
Polar Radius	6356752.3141
Eccentricity	0.0818
Source	Stem, L.E., Jan 1989, State Plane Coordin
Coordinate System Modif	iers
Vertical Datum	North American Vertical Datum of 1988 (N
Local Transform Type	No Transform

You can learn more here on how to create a custom Coordinate System in MicroStation

Creating a Reality Model in ContextCapture with survey ft GCP

This section will detail the process of creating the Local coordinate system for survey feet

- 1. Open ContextCapture and create a new project
- 2. Import your photos > adjust the height reference as needed for sea level or ellipsoid as needed
- 3. Import your survey control
- 4. On the Data Properties open the "spatial Reference System dialog (1)
- 5. Scroll down and select Local Coordinate System Arbitrary Units > click Edit (2)
- 6. In the Edit Dialog enter the text *Local:unit=foot_us*
- 7. you can rename the- coordinate display name to "Local Survey ft" Click ok and accept the changes

1	s import wizard Jints from a custom text format made of delimiter-separated-values.	
Input file File format	Data properties Define properties of the imported data	Select a spatial reference system from the database. You can also create your own definition by creating new user defined system.
Data properties	Spatial reference system	Filter
Fields	Spatial reference system Spatial reference system database	Spatial Reference Systems: 5518 items
To find known def Display name Loca	tinitions you can also visit www.spatialreference.org.	Spatial Reference System Definition ^ NAD83 / Pennsylvania South (EPSG:32129) + NAVD88 height (NAD83 / Pennsylvania South (EVS) (EPSG:2272) + NAVD88 height (NAD83 / Pennsylvania South (fUS) (EPSG:2272) + NAVD88 height (NAD83 / Pennsylvania South (fUS) (EPSG:4276) + NAVD88 height (NAD83 / Pennsylvania South (fUS) (EPSG:4505) + NAVD88 height NAD83(2011) / Idaho East (fUS) (EPSG:4505) + NAVD88 NAD83(2011) / Minnesota South (fUS) (EPSG:4505) + NAVD88 NAD83(2011) / Minnesota South (fUS) (EPSG:4505) + NAVD88 NAD83(2011) / Minnesota South (fUS) (EPSG:2886) + NAVD88 NAD83(HARN) / Idaho East (fUS) (EPSG:2886) + NAVD88 WGS 84 (EPSG:4326) WGS 84 - World Geodetic System 1984 (EPSG:4326) + EGM96 g WGS 84 - World Geodetic System 1984 (EPSG:4326) + NAVD88 missouri-east missouri_west_ft Local coordinate system (arbitrary units)
	OK Cancel	Selection Local coordinate system (arbitrary units) Type Use defined systems Definition Locak0 Edit
	SBack Nez	t
	The current block doesn't have ar	ny ph

8. finish importing the GCP by specifying the fields to the cooresponding Name, Y, X and Z

you are now ready to mark the appropriate photos to the correct control point.

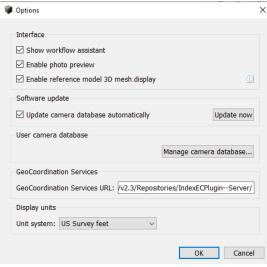
Important- because the image geotags will be using GPS coordinates they will not immediately correlate the local coordinates to the imagery.. marking the GCP in the field with the corresponding point number can save time to set the first couple of points. The software will attempt to locate images for the remaining controls.



9. Submit Aerotriangulation -

Note : the majority of time default settings can be used. This document is meant to guide a user through the process. If you would like more information on GCP settings you can download and review the Bentley learn Documents on <u>working with GCP</u>

- 10. Review the AT results in the 3D view
- 11. Set the measuring options under the tools > Options menu > change the units to "survey feet"



12. Use the measurement command in the 3d View and check a know distance to confirm the scale is accurate



- 13. Create a 3D reconstruction > Note the spatial framework tab No spatial reference system is available as this model is using "Local Coordinates"
- 14. Set the tiling as needed (Adaptive if you are unsure and do not adjust ram usage)
- 15. Create a production "3D Mesh > choose **3mx** > on completion create a second 3D mesh **3sm**

Note: Spatial Reference will be unavailable as this is a "local coordinate system" (meaning it is using a scale factor to adjust for the grids projection)

When the productions complete you will have two Reality models ready to use in your project or cartesian design