



CEE 5190/6190: GIS for Civil Engineers

Instructor: Jeffery Horsburgh

Assignment 5 GPS and GIS

Submitted by
Niranjan Poudel
Niranjan111@hotmail.com
3/19/2019

Initially the data was collected in the field using cell phone GPS and ESRI collector App to get location data. Three categories of data were collected in the field. 1) Campus Artwork 2) Campus Sidewalks 3) Parking Lots. Five artworks, five sidewalks and two parking lot data were collected. The data were exported to a set of shapefiles from ArcGIS online along with the data collected by the instructors.

New ArcMap document was created and three new empty shapefiles were created and added to the map along with ESRI Imagery Basemap. Using ESRI Imagery basemap as a reference, the features collected in the field were also digitize and saved.

Figure 1 shows a map of subset of USU's campus showing the features digitized collected with cell phone GPS. Figure 2 shows the comparison between the GPS location collected using cell phone and GPS location collected by instructor using mapping grade GPs. Figure 3 shows the comparison between the digitized map and the data provided by the instructor. Figure 4 provides the zoomed view of comparison between three parking lots collected by different methods and figure 5 provided the comparison of sidewalks and sculptures collected by three different methods. Figure 6 shows the online ArcMap showing all three data.

Sculptures, Sidewalks and Parking Lots in USU



Figure 1: Map showing some features like artworks, sidewalks and parking lots collected by cell phone GPS.

Sculptures, Sidewalk and Parking lots in USU

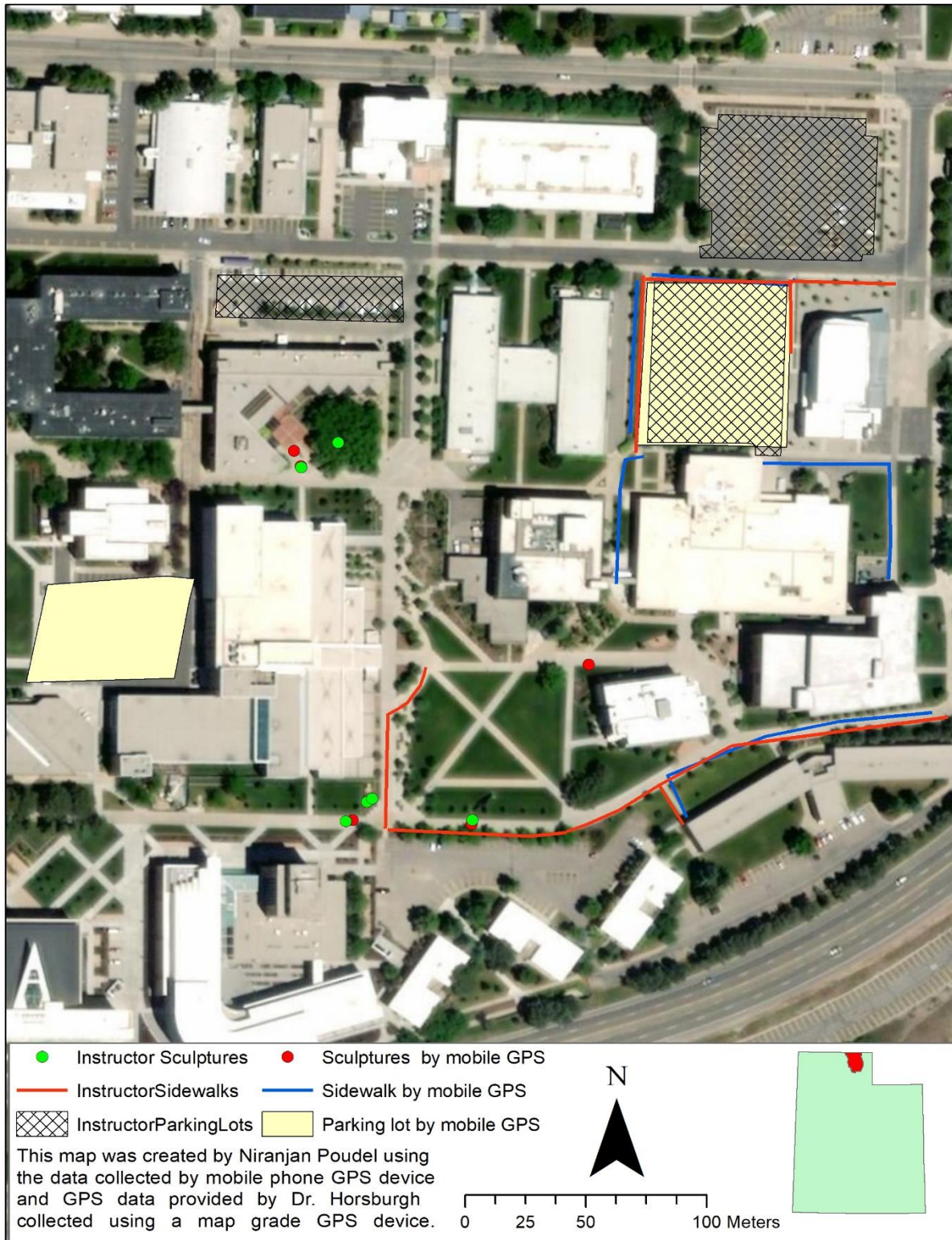


Fig 2: Map of USU showing comparison between the GPS data collected by mobile and collected by instructor

Sculptures, Sidewalk and Parking lots in USU

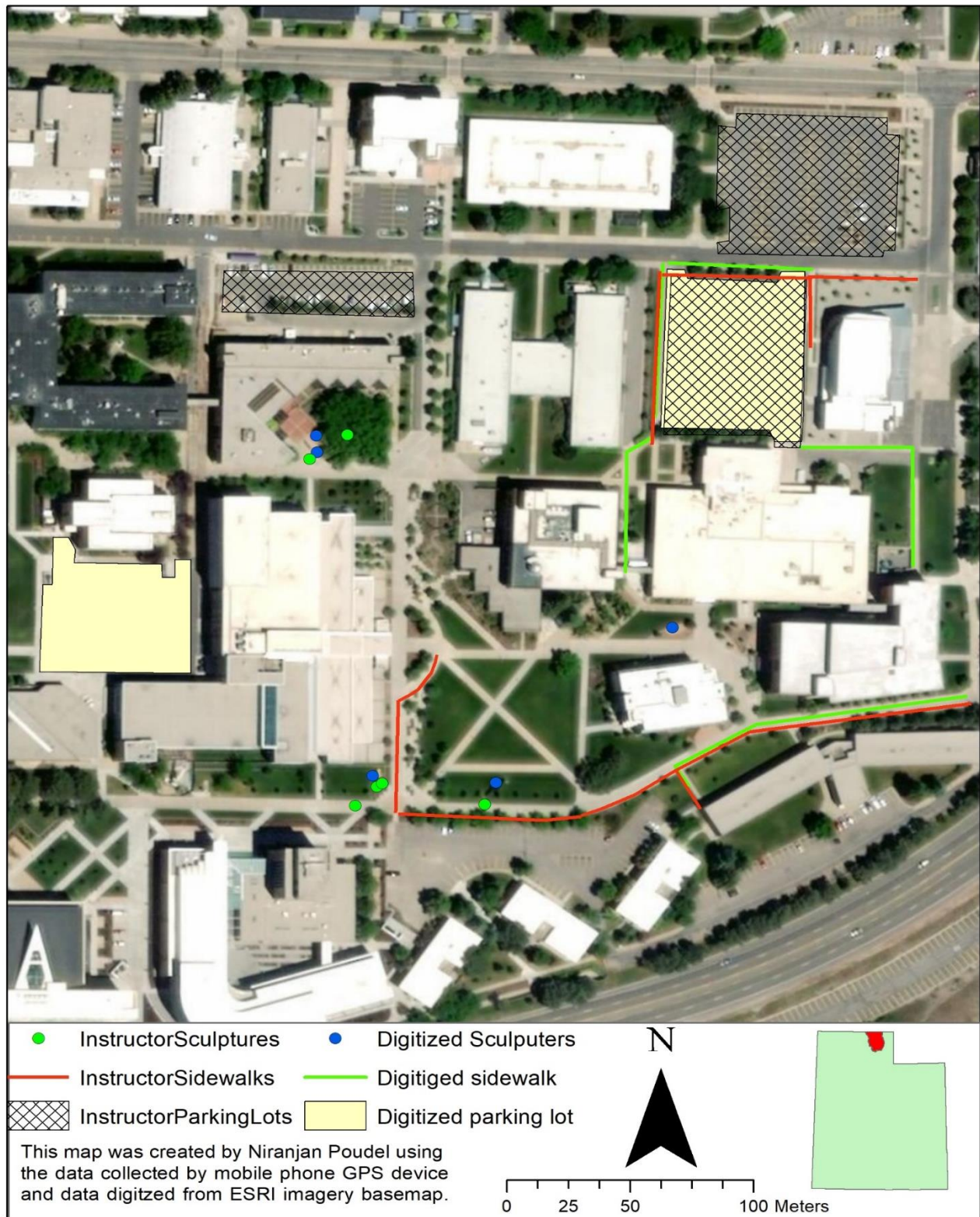


Fig 3: Map of USU comparing the GPS data collected by instructor and digitized data using ESRI Imagery basemap.

Comparison of Sidewalks in USU collected differently.

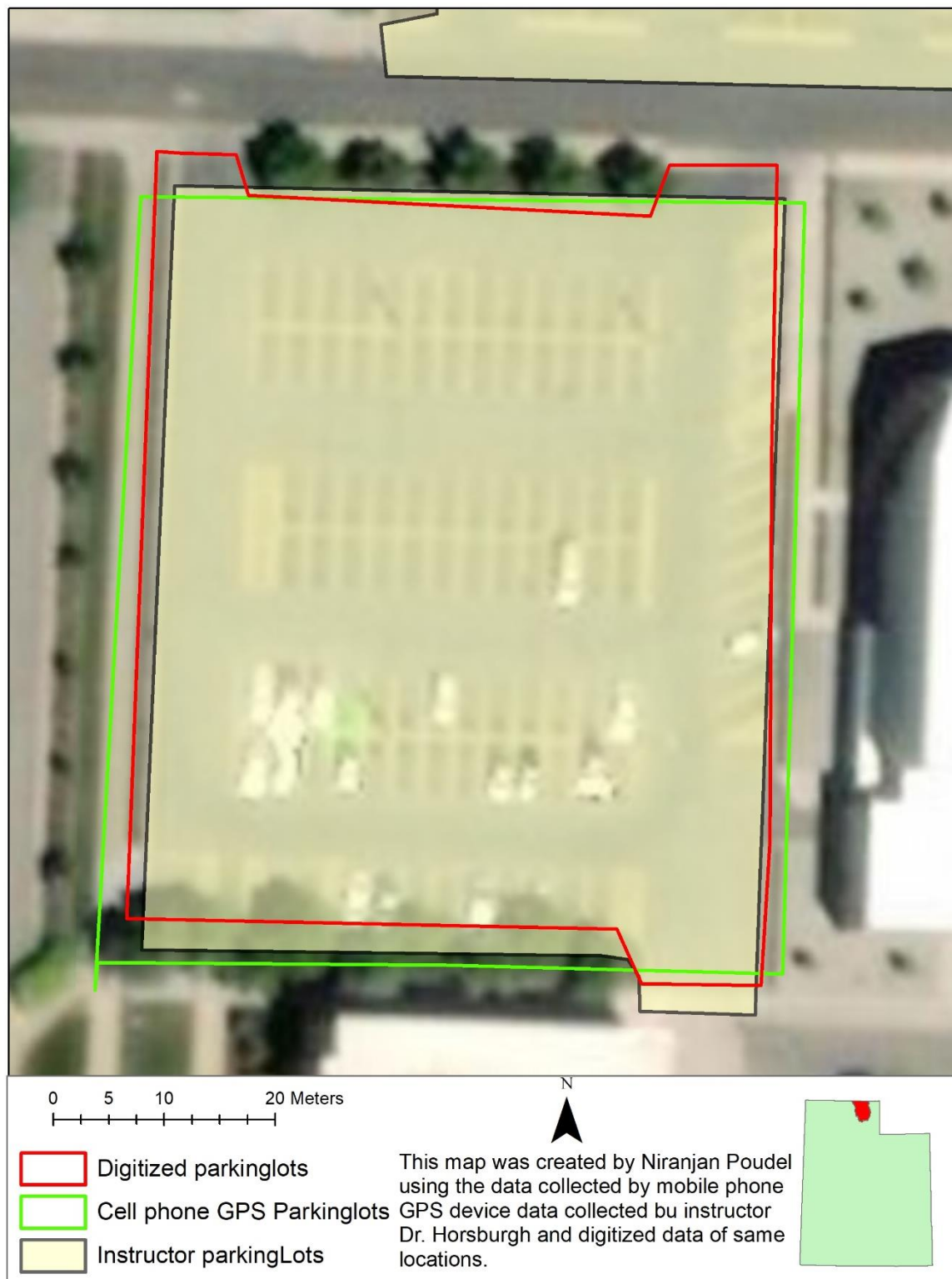


Fig 4: Zoomed in map to show the comparison of the data collected by instructor, cell phone and digitized data for parking lot.

Comparison of Sidewalks in USU collected differently.

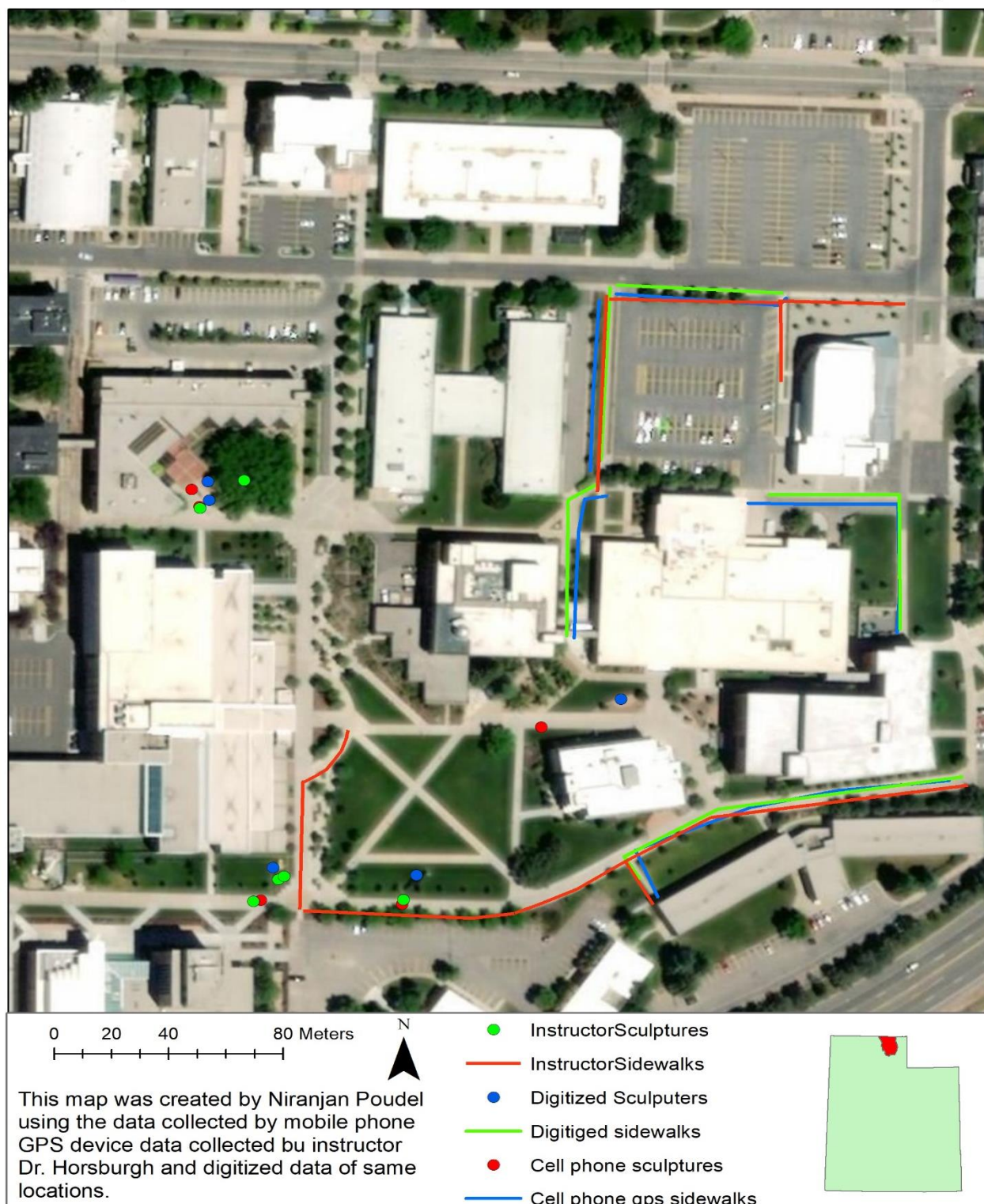


Fig 5: Map showing the comparison between the GPS data collected by cell phone, instructor and digitized data for sidewalks and artworks.

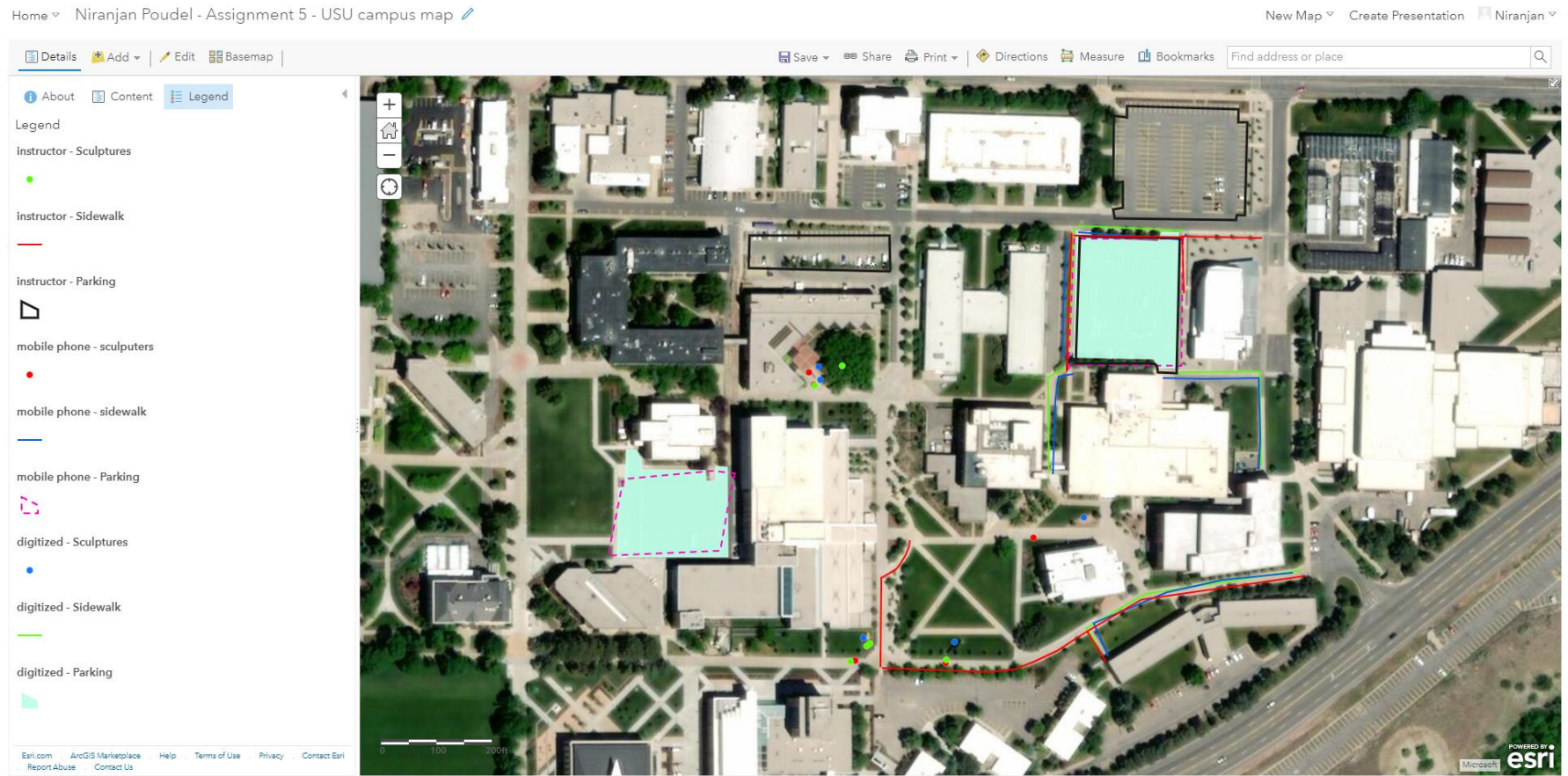


Figure 6: Screenshot showing the ArcGIS Online map containing the data collected by GPS of cellphone, collected by instructor and digitized map.

We can see in the above maps the differences between the GPS location data collected by cell phone device, GPS location data collected using mapping grade GPS by instructors and the map with digitized data, in my point of view following are some reasons for this difference.

1. Sometime buildings and trees located nearby the site location will obstruct the satellites signals which may create a possible variation in the location data. This distortion may accumulate along with some human errors and efficiency to cause the difference.
2. While digitizing the data using the base map there are some part of the base map which are not clearly visible due to the presence of the shades or trees and low resolution images due to which it is difficult to locate the exact location of the artworks and the boundary for parking and sidewalks.
3. The main reason is the location accuracy provided by the mobile device. The GPS location accuracy provided by my mobile is far less than the accuracy of the mapping grade GPS device. This creates the difference in the map features.

There are some ways to improve the GPS location data collected in the field some of which are mentioned below.

1. Use of the GPS device with high accuracy which are designated for the collection of the GPS locations rather than cell phone GPS, and while using the cell phone waiting for long period of time so that the device would get enough satellite signals.
2. One other method is collecting the data more than one time at a certain location which means collecting more than one coordinate for the certain point and then averaging the data collected to get the coordinate of the point. We can also use two or more receivers at a point and get the average data or we can compare with the data collected by other person in the same locations.
3. Comparing with some preexisting basemap also can help to improve the collected data. Furthermore, selection of the sites should be done in open spaces where there seems to be less number of obstructions, if possible to get the signals from the satellite properly.

CEE 5190 / 6190
Assignment 5. GPS and GIS – Using GPS for Campus Mapping

Item	Standard	Points Available	Points Awarded
Formatting	Submission conforms to formatting requirements in the Syllabus, including title page.	5	
1	A map of USU's campus showing the features that you digitized along with an appropriate base map and appropriate layout elements.	20	
2	One or more maps comparing location data collected by you or other students (i.e., sculpture points, sidewalk lines, parking lot polygons), versus location data collected by the instructors, versus location data digitized from base map data. Use clear symbology to distinguish data from the three sources for comparison.	30	
3	Create a map in ArcGIS Online showing USU's campus and the layers you used to complete numbers 1 and 2. Name your map "Student Name – Assignment 5 – USU Campus Map" and share it with the "CEE 5190 / 6190 GIS for Civil Engineers" Group in ArcGIS Online. Include a screenshot of the browser window showing your map in your homework solution.	25	
4	<p>Include a write-up with answers to the following questions:</p> <p>a. Describe <u>three</u> reasons why there are differences between the GPS location data collected by you or other students, those collected by the instructors using a mapping grade GPS, and those that you digitized from the ESRI Imagery base map data.</p> <p>b. List <u>three</u> ways the GPS locational data you collected in the field could be improved.</p>	20	
Total		100	