

Bright Angel Trailhead Topographic Survey

October 2008

A Partnership Project of
Grand Canyon National Park
Ecological Monitoring & Assessment Program, Northern Arizona University
In collaboration with the Arizona Water Institute

William Nau, Civil and Environmental Engineering, NAU
Charles Schlinger, PhD, Civil and Environmental Engineering, NAU, Faculty Advisor



December 10, 2008

Michael Terzich
National Park Service
823 N. San Francisco, Suite A
Flagstaff, AZ 86001

Re: Bright Angel Trailhead Topographic Survey

Dear Michael,

This transmittal is intended to provide for you and the National Park Service (NPS) with a written record of topographic survey work that we at Northern Arizona University (NAU) recently completed on your behalf.

The geographic extents of the survey and features of interest were established in meetings with you during April-June in 2008 and are documented in our proposal to the NPS.

Fieldwork for our topographic survey of the Bright Angel Trailhead area was conducted on July 10th and 11th, and August 7th, 8th & 9th. We conducted a limited search of the immediate area for control, but only one point was found. Hence, we decided to use a local coordinate system, with Control Point (CP) 1 established with E, N, Z coordinates 5000, 5000, 5000 U.S. Survey ft and a backsight on Control Point 2 defining local north. A #3 rebar, pounded flush with the ground was used to mark the location of both points. A Topcon GTS-236W Total Station was used for the survey, together with a TDS Recon data collector. The field crew consisted of myself and Will Nau, a Civil Engineering undergraduate at Northern Arizona University.

In mid-August of 2008, raw and coordinate data files were exported from the data collector using Microsoft ActiveSync software. TDS Foresight DXM software was used to review and edit the point data, and then the points were exported to a text file. Autodesk Civil 3D 2009 software was used to prepare an Autodesk dwg-format file with all of the points, which were organized into point groups and corresponding layers to facilitate ease of data management in the drawing. Breaklines were created for those limited locations that had abrupt change in slope, such as top front of wall, front base of wall, etc. A Triangular Irregular Network (TIN) was built using the points and breaklines and this TIN served as the basis for automatic generation of contours.

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Building outlines, which consist of 2D linework with no associated elevations, were imported from a drawing provided by DHM Design. Point markers were assigned to each point group as appropriate. Drawing development continued into mid- to late-November of 2008, as I responded to your review comments on interim submittals provided to you by email. In late November I delivered the final edition of the drawing, in several formats (identified below), via email. At that time, you and I agreed that a final transmittal was in order.

Enclosed please find a compact disk with the following:

- text file with surveyed points in comma-separated format;
- drawing in Adobe pdf-format;
- drawing in Autodesk Release 2000 dwg-format;
- drawing in Autodesk Civil 3D 2009 dwg-format.

I would like to thank you and Steve Homan at NPS, and Will Nau, Shawn Newell and Pat Ponce at NAU for all of your contributions to this project.

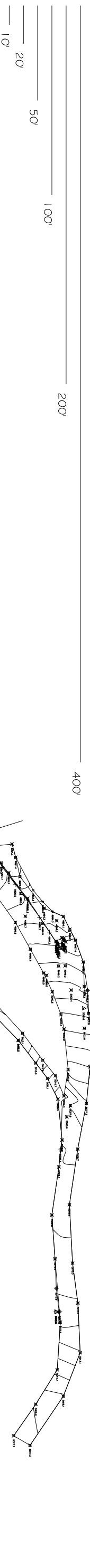
Please let me know if there is additional clarification or information that I can provide.

It has been a pleasure to serve you and the National Park Service on this assignment.

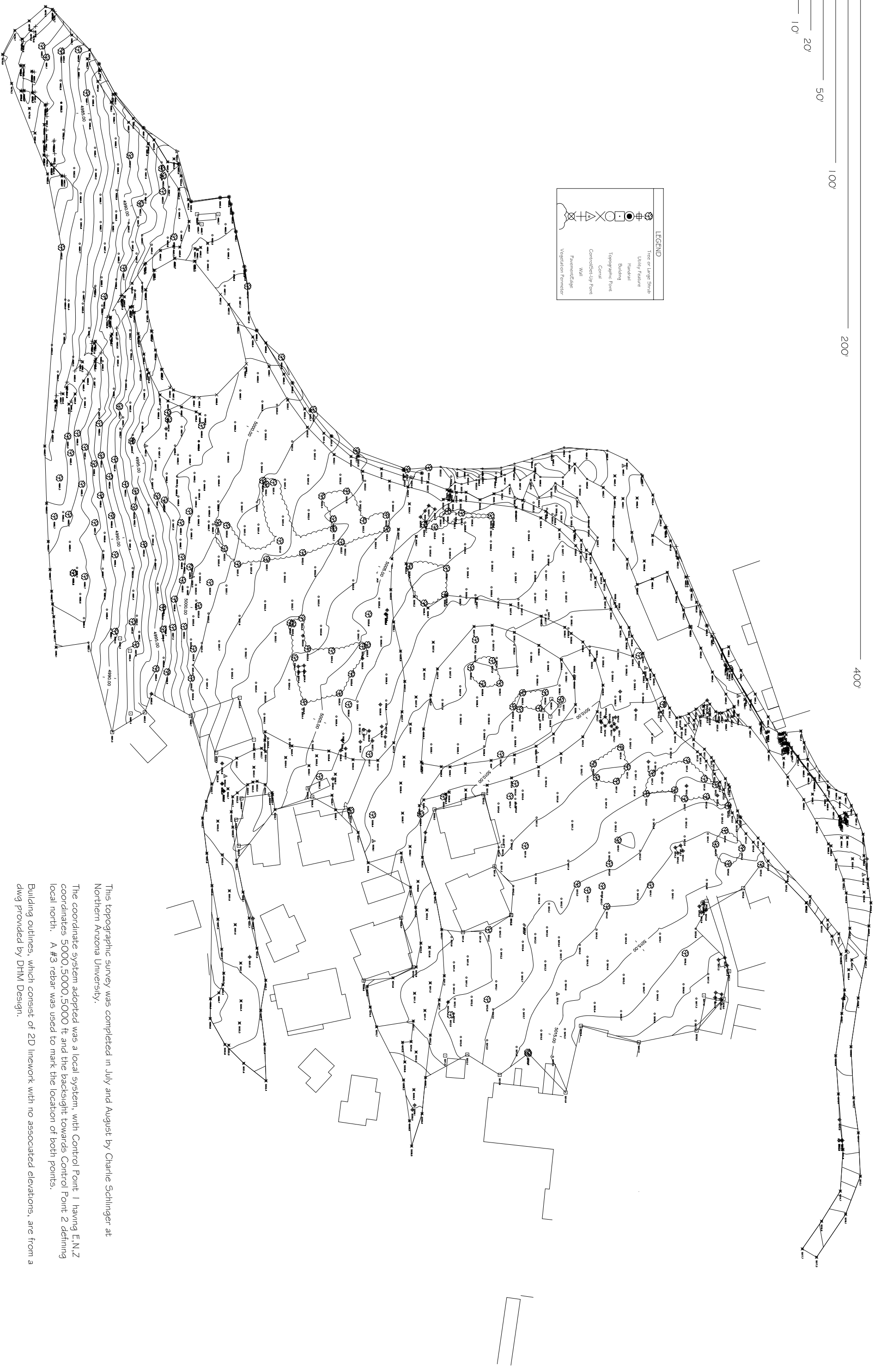
Sincerely,

Charlie Schlinger, Ph.D., P.E.
Associate Professor

cc w/encl.: Shawn Newell, NAU



LEGEND	
	Tree or Large Shrub
	Utility Feature
	Handrail
	Building
	Topographic Point
	Control
	Control-Slip Point
	Wall
	Pavement/Edge
	Vegetation Fernleaf



This topographic survey was completed in July and August by Charlie Schlinger at Northern Arizona University.

The coordinate system adopted was a local system, with Control Point 1 having E,N,Z coordinates 5000,5000,5000 ft and the backsight towards Control Point 2 defining local north. A #3 rebar was used to mark the location of both points.

Building outlines, which consist of 2D linework with no associated elevations, are from a dwg provided by DHM Design.