2017 Ohio Valley Student Conference

Thursday, April 6, 2017 through Saturday, April 8, 2017

Surveying Competition Rules

Overview

The surveying competition will consist of 5 separate projects (events), each involving 3 team members to demonstrate the ability to apply the techniques of practical surveying. It is to be assumed that the project is an active construction site; hence, safety practices (personal safety gear) are required.

Participation in this event is limited to one (1) team per college/university. Each team may consist of 6 to 12 students. One member of the team may only perform a maximum of two (2) projects (events). Crew Members for each project (event) will be randomly chosen by lottery on the day of the competition.

The five projects (events) will be as follows:
1. Pacing
2. Differential Leveling
3. Building Layout (Staking)
4. Cut Sheet Preparation for a Storm Sewer
5. Coordinate Calculation by Resection

Scoring Breakdown

For each task, each team will be evaluated according to the parameters provided within the description of each project (event). The team with the best overall numerical score by a summation of points earned in all five (5) projects (events) will be the overall winner. The Scoring Summary Sheet outlining the detailed scoring breakdown will be posted by January 1, 2017. The maximum number of points per project (event) will be apportioned upon the difficulty of the project. Specifically, projects requiring more time and complex calculations will have a greater maximum point value than those requiring lesser effort.

Materials

This is a project-oriented problem; therefore, the field methods may vary amongst the teams. The use of traditional surveying equipment (transits/theodolites/total stations, tapes, prisms, prism poles, conventional optical levels, level rods), is recommended. Please refer to each project description for a description of allowable equipment. Proper construction site safety equipment is required. Examples of appropriate safety equipment include eye protection for the staking crew, safety vests, and protective head and foot-ware. Digital levels, robotic total stations, GPS – RTK receivers, data collectors, survey controllers, laptop computers, tablet type computers and programmable calculators, are NOT permitted. For guidance regarding calculators; you are directed to the NCEES Calculator Policy for permissible calculators for the Fundamentals of Engineering Examinations.

Judging

The maximum number of points for all five projects is 1000 points. A breakdown of the point system per project (event) will be given on the aforementioned Scoring Summary Sheet. The decision of the judges is final. The top three teams

with the highest overall score will be awarded.

Coaches

Coaches are encouraged to accompany their teams to the competition site and attend the team captain's meeting. However, all communications will be through the team captains. Once the competition commences, coaches are permitted to observe the competition; but, may have no communication or contact with the crews while the crew is engaged in the particular project (event). If a question or situation arises during an event; communication is through the Crew Chief to the Team Captain to the Judge to the Coach. The only exception to this rule is personal injury of a crew member or an emergency involving a crew member.

Event Descriptions

#1 Pacing and Area Determination

Crews will consist of three members. At the project site, there will be two triangular tracts of land denoted by lath and colored ribbon at the vertex of each triangle. Crews will be given a randomly chosen tract. Each crew member will start at a different vertex of their given triangle. Each crew will be timed. Once the signal has been given to begin, each member will pace the perimeter of the triangle in a clockwise fashion, returning to the point at which they began. Each crew member may pace the perimeter of the triangle up to 3 times. The perimeter distance (in U.S. Survey Feet) of the triangle and the enclosed area will be recorded Project Submission Form given to the Crew Captain and submitted to the Event at the Judge's Stand. The final perimeter distance is to be determined by the average of the perimeter distance observed and recorded by each crew member; the enclosed are is to be determined using Heron's Formula and the average (each crew member's observation) of each distance of each leg of the triangular area. All linear measurements will be in U.S. Survey Feet and area measurements in square feet converted to acres. Safety equipment is required. No other surveying equipment is required. Crews are encouraged to perform their calibration prior on their own time prior to the project (event).

#2 Differential Leveling

Crews will consist of three members. At the site, each crew will be required to start from a benchmark of known elevation and perform differential leveling operations to establish the elevations of two new benchmarks. The elevations (in U.S. Survey Feet) will be recorded with the official at the final benchmark. Time will be used a tie-breaker. Only automatic levels (self-adjusting) and level rod (and rod level) is permitted. The only exception to the equipment requirement is the use of a dumpy or a builder's level.

#3 Building Layout

Crews will consist of three members. Using radial stakeout using conventional Transit, Digital Theodolite, or Total Station and Tape techniques, teams will be asked to lay out (construction stake) a proposed building with appropriate offsets to accommodate foundation excavation. Field calculations will be required; the proposed building plans will be given to the crew 30 minutes prior to the start of the project. All measurements will be in U.S. Survey Feet. The crew report to the project site at a specified time and will be given sixty (60) minutes to complete staking the project. Start times will be determined by lottery on the morning of the competition. Crews will be judged on their accuracy with a precision in 0.01 ft. increments for point to point distance and

angular precision. Time will be the tie-breaker. Total Stations are permitted; but, no prism or reflectors (i.e. electronic distance measurement) will be allowed.)

#4 Storm Sewer Cut Sheet Preparation
Crews will consist of three members. At the site, crews will find staked the centerline and offset stakes for a proposed storm sewer line. On the day of the competition, each crew will be given a set of incomplete plans with the invert of the existing pipe where the proposed sewer line will connect. The plans will also have the slope and size of the proposed sewer line. Crews will have to determine the station location and the depth of cut at each station location and the elevation of the invert at the opposite end of the proposed sewer line. Station numbers will be supplied on the at each offset stake location. Calculations will be recorded by each crew in the field and appended to the construction plans to be submitted to the Judge once the task has been completed. Crews will be given sixty (60) minutes to complete this task. The precision of the cut (cumulative total) will be judged. Time will be the tie-breaker. Teams may use digital transit, tape, automatic level and level rod, and / or total station & prisms and prism poles.
#5 Coordinate determination of point by Resection Crews will consist of three members. Two points with known (given) coordinates (Northing, Easting and Elevation) will be occupied with Tripods and Prisms (30mm offset) and adaptors Prism heights will be given. Crews may use their own prisms (0 mm or -34 mm offset) if so inclined; but, must be compatible with the tribach adaptors provided by the host. Each crew, using total stations will measure and compute the coordinates (Northing, Easting and Elevation) of third point which they occupy with their total station. Digital Transits and Tapes are permitted in lieu of Total Stations. All measurements will be in U.S. Survey Feet. Only non-programmable hand-held scientific calculators as permitted on the NCEES Fundamentals of Engineering Tests (No Data Collectors nor Programmable Calculators allowed) will be permitted. Crews are encouraged to visit the NCEES Website to familiarize themselves with the calculator requirements. Cumulative error totals (Northing, Easting and Elevation) will be judged, with time used as a tie breaker.