Having served in the Army during the tail end of the Korean Conflict, I returned to College and graduated with a BS in Engineering in 1960. At that time I was working for my father’s Civil Engineering firm that specialized in property survey’s, land subdivision, and site design. In fact, I had worked for his firm since I was big enough to hang on to a the tail end of a 300’ chain under a 30 lb. pull. In the field, the tools of the trade were a 20” Berger transit with tripod, a telescoping leveling rod, and a bag containing wooden stakes, chains of 100, 200, and 300’ lengths (both add and cut)), a spring tensioner for the chains, red, yellow, and blue crayons, a star drill, 3 lb. hammer, lead slugs, copper tags, PK nails, tins and assorted other stuff. The crew usually consisted of a chief, who ran the transit and kept notes and gave orders, a head chainman, and a rodman (often times me). Personal tools included a 16 oz. plumb bob, chain tongs,

However, at the time I graduated, I had been promoted to an office position where I had my own drafting table. Here, the tools of the trade included drafting instruments for inking linens, triangles, french curve, t-square, erasing shield, a hand-full of lead pencils from HB to 6H and maybe a drafting machine or an electric eraser if you were lucky. India inked linen drawings were required for subdivision maps, records of survey and any other drawing that would be considered a permanent legal record. Although any draftsman was expected to be able to use ink on linen, oftentimes a particular person in an organization would have outstanding skills in this endeavor and would become the go to person for inking assignments. Making corrections or changes to inked drawings was especially challenging. It took great care to get a clean erasure without rubbing a hole in the linen.

When graphic solutions or different design ideas were to be explored, drafting tissue was the answer. The tissue was overlaid on the base drawing and the unchanging information could be traced onto the tissue. The new design or idea could then be developed on the tissue. This could be repeated as many times as necessary with the final idea then being traced back onto the basic drawing.

Calculations were accomplished by slide rule (I preferred the circular Picket and Eckle), a hand crank or electric Marchant rotary calculator, a book of logarithms and, if fortunate, a book of trigonometric logs (this saved the step of having to calculate the trig function before looking up the log). Areas were commonly measured by the use of a planimeter, as when calculating earth moving volumees. Cross sections were drawn based on original and finished elevation contours, the areas of the cross sections were measured and volumes calculated by multiplying average end areas by the length between sections. Pre printed forms were often used for this and other common computational tasks like closing surveys

Eventually, I left my father’s firm and went to work for the local municipal water department in order to broaden my experience sufficiently to gain my PE license. Here, a mark of seniority was issuance of an electric erasing machine. Later, possession of an HP35 became a badge of distinction. As various hand calculators became more affordable, the chief requirement was that they had to be able to calculate square root. I was instrumental in getting the department to subscribe to GE’s time sharing computing service, and we all marveled at the teletype’s ability to print at 10 characters per second. I was convinced that time sharing computing would be all that the department would require, until I was introduced to Visi Calc on an Apple computer (my first experience with a spread sheet). That led to the eventual termination of the time sharing contract as the department started acquiring PC’s. I retired as head of the department in 1993, at which time PC’s, were common place but Auto Cad had not yet become prevalent.

I recall an experience in college of having to solve an indeterminate structural problem using a Bendix computer that was about 2.5’ wide, 3’ deep and 6’ tall. Input was by punched tape. I don’t recall how many tapes I punched until I got one that was error free. With that accomplished, the machine finally gave me a solution. My expectation was that computers would never catch on! How times have changed.