

## The Three C's of Construction Layout (not just Check, Check, Check)

Submitted on behalf of the Insurance Advisory Committee by Paul J. Gregoire, OLS, CLS, Chair of the Committee

One of the functions of the AOLS members who serve on the Insurance Advisory Committee is to assist the insurance adjuster in survey matters relating to an insurance claim or a potential claim made by a policyholder. On most occasions the events or survey activity giving rise to the claim are fairly straightforward, on other occasions a more detailed review of the project activity is required.

A review of a number of the claims made over the past few years would reveal that there are numerous ways (some would say an endless number) in which the surveyor finds himself party to a claim. Some claims do not result in damages and are reported due to an over abundance of caution, other claims can be resolved by mutual agreement between all of the parties involved, and still others lead to litigation and result in payment of damages.

The following article attempts to outline some of the survey practices, which if followed, may help reduce the surveyor's exposure to risk and potential liability claims. A majority of these best practices are most relevant to our field staff, who are the eyes and ears of the surveyor on each project. Some of the practices are relevant to the computations staff or the project manager and/ or the project surveyor. The survey practices are grouped into one of three categories. A detailed look at each of these categories will help the surveyor identify the scope of work that is to be contracted. It will help to identify potential risks and will assist in preparing a successful plan to complete the work in an efficient and cost effective manner.

- Communication issues
- Contractual issues
- Computations issues

### (1) Communication Issues

- What are the client's requirements and specifications/tolerances, i.e. building corners, gridlines, offsets, temporary benchmark locations?
- What are the client's critical timelines for project start-up?
- What are the existing site conditions, i.e. can a crew work safely on site or is there construction activity ongoing, such as earthworks or the installation of services that will affect your work? Familiarity with the site prior to providing a written quotation is essential - don't take the word of someone who may not have personally been on the site or who provides

general information, which you rely on to make assumptions. Go visit the site prior to preparing a fee estimate.

- Determine what the future work schedule is going to be – can a crew lay out all key points in one or two days or do they need to return to the site twice a week for the next month as excavation progresses, i.e. caisson layout. (This has a big impact on pricing the work).
- Has the client provided a set of drawings that are stamped "Issued for Construction" and has the client provided you with a clear understanding of his expectations on which you are to base the fee estimate.
- Ensure that you understand the work schedule so that you have enough time to prepare for upcoming project requirements and are not rushed into providing layout before all the initial prep work has been completed.

When issuing survey returns to the client (or third parties), which include data derived from other sources, be sure to include a disclaimer note on the plan indicating the source of the data and that you provide no assurances as to its correctness and accept no responsibility for its use. Provide a similar disclaimer for topographic surveys conducted during winter conditions.

### (2) Contractual Issues

- Provide a written estimate or quote so that you can obtain proper work authorization for the survey layout work to be undertaken. This can be in the form of a sign back, a purchase order, etc. Include a defined scope of work, an identified work schedule and an agreed upon compensation (lump sum or hourly rates) prior to commencing work. It's a good idea to specify that you require advanced notice prior to sending a crew to the site, you may not always be able to prevent rush requests for urgent layout but it gives you an out if you need some lead time prior to attending on site.
- Obtain written authorization for additional survey work, i.e. a sign back letter of authorization or client purchase order. Ensure that the party chief does not undertake work that was not scheduled or approved for layout that day, i.e. don't let the site super redirect the crew's activity to do extras that were not planned nor approved.
- Identify who is responsible for work that has to be

redone due to design changes or construction activity. This can be minimized by ensuring that you only work from drawings that have been “issued for construction.”

- Document each survey milestone as well as each change order including telephone/fax/Email correspondence with the client, the site superintendent and each of the other consultants from whom you have received data or who have issued instructions to you.

### (3) Computations Issues

- Review the approved site drawing to ensure that building and site dimensions work, i.e. that the building closes and the site dimensions agree with the boundary survey.
- Pre-compute site boundary geometry and position the building to ensure setbacks comply with minimum requirements and the approved site plan.
- Compute grid line positions relative to the building face and position caisson locations relative to grid intersections.

- Establish horizontal and vertical control stations on site and reference these points for future re-establishment. Level loops are to be closed, reduced and double-checked at the time of field observation.
- Integrate cadastral fabric to horizontal control if applicable.
- Compute layout data for the field crew by preparing a coordinate list and/or polar layout for all points from each control station.
- Upon completion of layout, the field crew must provide confirmation of what was laid out by preparing a sketch for the site supervisor. The sketch must clearly indicate offsets used and illustrate the location of the site's temporary benchmark(s).
- Complete an office review of all layout performed by the field crew after each field trip. Check the notes to ensure that redundant measurements have been taken and that closures have been calculated and checked by the crew while on site (i.e. level loops).

## General Do's & Don'ts

- Do not accept a digital file from the client or his consultant for layout purposes without getting the hardcopy version of the site plan marked “Issued for Construction.”
- Do not accept a site benchmark from another source without first verifying the elevation by levelling to an independent municipal benchmark.
- Do not accept the contractor's layout points for layout without proper verification.
- Do not accept revised site drawings for layout purposes without first verifying in the office that all new values work.
- Do not work from a set of drawings that are only available in the site trailer.
- Do not issue or provide benchmark information to a third party in the field.
- Use published dimensions only – do not scale drawings or interrogate digital files for dimensions without proper checks.
- Issue a sketch illustrating the building, gridlines, property boundaries, etc. with final computed dimensions to the architect to get confirmation that the siting is

correct prior to field layout.

- Ensure all points that are laid out have redundant ties or check measurements to eliminate blunders.
- Elevations for temporary benchmarks must be derived from at least two municipal benchmarks.
- Confirm the source of the vertical datum of the drawings and establish a minimum of **two** temporary benchmarks (TBM) in close proximity to the site.
- Run a level loop through the site control (turning on each control point) and close on to a second municipal benchmark (ensures an independent, redundant check).
- Do not establish temporary benchmarks on objects that can move (including survey monuments, fire hydrants, utility pads, posts and poles) but instead use things that are stable, i.e. the finished floor slab of an adjoining building, a spike in a tree that is outside the construction area.
- Finally, review all of the layout prior to allowing the contractor to use it – it's your last chance to check, check, check.

The points raised in this article will hopefully serve as a reminder to all survey staff about the importance of proper planning and field procedures as well as the need to institute proper quality control and quality assurance in our daily survey practices. By following these good practice guidelines, our clients will be well served and the chances of being involved in an insurance claim will be minimized.

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