1. Technical Analysis

Instructions: Describe a project for which you collected and interpreted or analyzed technical data for development of engineering designs and drawings from concepts and specifications.

[Building Name] is a two four story residential wood complex built on top of a one floor underground parkade and is located in [Location Name]. The time frame for this project was from [Date] to [Date].

Listed below are the competencies required and examples from the aforementioned job:

1.1-I collected the drawings from the architect to determine whether the project would be in CAD or Revit and then visited each drawing to check whether the items I needed where met (example: title block- which would allow me to set up my drawings, the floor structure, etc..) I then made a list to send to the architect of what items I needed to help me finish the project. As for project data, I then created the schedules for the data and notes given by the engineer.

1.2-I spoke with structural engineer that I was going to work with who had project meetings with the architect and he identified the scope of work to me. We had to frame a four-storey wood building above a one-storey parkade and provide the foundation. We had to determine: what joists depth to use, what spacing, how to frame it- whether party wall to party wall or from corridor to exterior walls and as for foundation, what type of foundation should be used: piles, footings, or foundation walls.

1.3-This building had a very complex geometry to its parkade as this parkade had to support 2 L-shaped wood buildings on top and was placed in different angles for the parkade to work. We had to provide the angle dimensions to three decimal places as to ensure the accuracy did not change the building's integrity. Our drawings where done to 1/8" as it is office standards and to ensure to get the most accurate dimensions possible when being constructed. Grid to grid dimensions were whole numbers and all items were tied back to the grid line for ease of construction. For the wood buildings above, the geometry in placing the exterior walls are carefully located to ensure that the building is placed correctly on top of the main floor structural slab.

1.4-Dimensions are checked accordingly to the grid lines, the check allows me to see whether I have dimensioned all the structural items and then go back and see if the accuracy/ measurement of the dimension is correct. This also ensures that all the structural components are placed in the rightful manner.

1.5- Using the geotechnical report provided by the geotechnical consultant, we were able to determine what foundations to use and that the site had a condition where the grade was lower in certain areas. We were then able to provide footings lower than the typical situation for this parkade. Meetings were also held with the client and meeting minutes were brought back to the office so we could incorporate changes that the client wanted to revise on our drawings.

1.6- Drawing measurements are determined by the architectural drawings, whether it is imperial or metric. All structural components should follow this accordingly so the contractors on site are not confused and do not have to convert the measurements twice. The measurements are usually done for: beams, footings, piles, columns, reinforcement, loads, dimensions, etc.

1.7-The quantity of required materials is determined during the shop-drawing phase as this is how we would double check if the components are as follows from the original structural tender or construction set. Crosschecking with the drawings allows changes to be done if items are not available or if the shop-drawing supplier determines or suggests we should use different materials.

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1.8- As for maintaining the records of measurements, calculations, field notes and sketches, these are kept in a location on our server called M-Files; these items are filed accordingly by job numbers for easy access by anyone in the company. It allows you to store the current drawings in a folder which you are able to revise if any changes were done due to site conditions, calculations are filed in file cabinets or scanned onto the server, field notes, submitted drawings and sketches are put in there own drop down folders on m-files.

1.16- Codes, standards and specifications are all determined in what materials were used in building this project from the ground level up. In this instance, we used structural steel, truss joists, concrete foundation and masonry. All the codes, standards and specifications required for the above mentioned are always updated in our office files in regards to all the building codes necessary for each province and is then put into the construction drawings.

1.17- Construction drawings that are used for this building is sent to all the sub-contractors during the tender process. I have a set of the latest drawings kept aside for when someone needs clarifications and RFI's. The drawings are as per office standards in the way that they are set up and any questions regarding the drawings should all be in the submitted set.

1.18- Some mathematical calculations to develop details for this project was trigonometric equations to determine slopes of the slab and roof (to be coordinated with architectural drawings), depth of the footings (step down footings) , steel wood shoes for bearing and revision of concrete beams due to head room in the parkade.

1.19- The architect provided a parapet overhang that did not work structurally in one of their building sections, we notified them immediately, we were able to give a few options to help them maintain the look they were going for, and they were pleased that we were able to provide a solution.

2. Technical Design

Instructions: Describe a project for which you 1) applied engineering to creating, modifying, and maintaining drawings that meet technical specifications, regulations, and client requirements (**Technicians**); or 2) applied engineering knowledge in developing a design and creating drawings that meet technical specifications, regulations, and client requirements (**Technologists**).

[Building Name] is a two storey building built on slab on grade and is located in [Location Name]. The time frame for this project was from [Date] to [Date].

Listed below are the competencies required and examples from the aforementioned job:

2.1- Labelling: put labels accordingly to what the engineer has designed on the drawings. Example, pile loads, column, grade beam and steel beam sizes.
Dimensioning: All structural steel components are dimensioned in this project. All components are tied back to grid lines when dimensioning. I try to go from exterior to exterior to create less human error and tie it back to the grid often.
Orientation: All orientations for columns are determined by the steel stud offsets for this building, if stud walls are rotated or placed diagonal, columns will need to follow suit.
Multi-view projection: used to see different views of the building, this is mostly used when doing steel elevations, as you would need to use the plan view to create them.

2.2- For this job, the client requested all consultants to use the Revit program in creating our structural drawings.

2.3- To create drawings, we use the principles of multi-view to create plans, sections and elevations. The typical notes and details from our office are up to date with all building codes and regulations.

2.4- Using Revit allows you to see what AutoCAD cannot show you, it allows you to cut sections where an area is difficult and allows you to see how an area needs to be framed. An example for this job would be I created a section where it cut through two different leveled roofs, one that was slanted and the other flat, this then allowed me to see that I could use the single steel beam, instead of the two I was showing to frame the sloped slanted roof.

2.5- When using Revit, structural components have constraints in regards to dimensions. When an item moves, the dimensions move accordingly. As for coordinates, you can copy and monitor location of the building, so in cases where the architect shifts the grid lines or the building coordinates, it will alert the user and therefore I would coordinate the location accordingly. Regarding the manipulation of objects, colors, visibility and presentation these are done accordingly to our office standards for both AutoCAD and Revit. Thicker lines, hiding objects, color presentation are easily changed to show what items are structural and what items are to be for “background” only.

2.6- All handwritten design for this project is filed into our file cabinets and scanned electronically and are filed into project folders on our servers. All structural drawings submitted for this job, example, tender, construction, etc. is kept in M-files and any of the staff members are allowed to check them out as they please.

2.7-Revisions usually happen when either the client decides to revise certain features, the price has come back to expensive or site contractors would like to do things differently. As per instructions from the architect or the contractor we would revise our drawings accordingly, create sketches and then would send out the proper documents needed. (Ex. Site instructions, clarifications, PCNs, etc.)

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2.8- At this point in the project, since it is currently in the tender/construction phase, there are no as built drawings done. Eventually, when the structural portion is complete, we will gather all the revisions done on site and will revise our drawings accordingly. All sketches done during the construction phase should already be done in the drawings therefore, we would just need to create As-built PDF's and send the files to the architect.

2.9-As a structural consultant, we list schedules of the structural components and show where they are located. As for quantities, they are determined by the suppliers that the contractor has chosen.

2.10- Structurally, we use the given geodetic elevation given by civil and architect to determine our elevations accordingly, in this case the grades were different in some locations as this project was sitting in an existing lake and we needed to provide deeper foundation in some locations.

2.11- All items are stored in M-files and stored accordingly as per office standards. As for plotting, drawings are sent to our plotter and printed to scale for principal engineers to review and we use email to send all necessary documents to the client unless they request for a different method.

2.13- All structural components are designed as per building specifications, codes and regulations. All items are drawn to scale and if design does not fit the required criteria, we provide a different solution. For this project, the client requested the architect to revise the walls that were masonry to concrete walls, since there was only a few walls; they did not want to hire a masonry- contractor. We revised our structural drawings accordingly and redesigned the walls to concrete and provided the correct reinforcement.

2.14-I consulted with other coworkers on how perimeter steel angles should be placed on the roof, as there are times where the angle protrudes the insulation the architect provided for the building envelope. I also, asked if the structure for the canopy provided by the architect would work with our design, as I was unsure of how the structural components worked to connect back to the building.

2.15- Before I sent my final drawings out, I overlaid the architectural drawings and checked if items have been added or revised, so I could revise my drawings accordingly and if new design was necessary. I also asked for mechanical drawings because they had openings for mechanical RTU's and vents that needed to be framed structurally. There were also some vent openings that protruded through the joists which had to be coordinated and moved accordingly.

2.16 - Drawings are kept in our office for 7 years, and is filed accordingly for ease of access. All documents are saved in M-Files that were sent out to the architect/clients. As for as-build drawings, we get a copy from the site and we would revise our drawings accordingly and if the architect requires a printed or email set, we send it out.

3. Technical Evaluation

Instructions: Describe a project for which you reviewed your own drawings or designs to ensure that they meet technical specifications, regulations, and client requirements.

[Building Name] is a one-story commercial retail unit built on slab on grade in [Location Name]. The project is currently in the construction process.

Listed below are the competencies required and examples from the aforementioned job:

3.6- I reviewed a co-worker's drawings before going to the principal engineer for the final review. I made sure that the drawings were drawn and prepared as per office standards (the way drawings and page numbers were set up, used proper layers, etc.) I made sure to check with the architectural drawings that were provided, to make sure that all items were covered, dimensioned and the design worked accordingly to the building and shown on the structural drawings.

3.7-As per office standards, drawings are checked at 50%, 75% and 100%. I made sure to check if the revisions done by another co-worker prior to me checking were done and highlighted accordingly in the project. If drawings were not revised, I would note on the drawings for the changes to be done prior to submitting it to either the principal engineer or architect.

3.8- As this is still in the construction phase, there is no as-built revisions done to the project. Sketches for revisions on site will be done at the mean time and should be reflected on the as-built drawings.

3.9- By coordinating with the architectural drawings while reviewing the drawings allows you to see the set elevations. From there, you can work out if the elevations done on the project are correct by recalculating the top of piles, underside of steel decks, slope drains and top of slab, to name a few. All items have specifications that need to be followed and are set by either the architect, contractor, consultants and the office standards.

3.10- By reviewing the drawings, you can determine whether the drawings are ready to go for submission (pricing/tender). Design, sketches and calculations are incorporated into the drawings and should be able to create structural drawings accordingly. In this case, the architect gave all missing items/information, after revising the drawings with the information given; we were able to send it out for submission.

4. Project Management

Instructions: Describe a project in which you assisted with the management of the project to ensure high quality of deliverables, client satisfaction, and adherence to schedules and budgets.

[Building Name] is a two storey steel institutional building on slab on grade located in [Location Name]. The time frame for this building was from [Date] and has just currently finished the structural steel construction phase.

Listed below are the competencies required and examples from the aforementioned job:

4.1-As this school was a design build building, the time constraint was tight, as well, the province had given a time structure for all items to be finished by next school year, which is this upcoming September, therefore, once all the design was approved and finished. I was able to create the structural drawings and was able to put all my time into it, so I could finish the drawings in a timely manner.

4.2- I used AutoCAD for this job and was able to coordinate with the architect with items that were missing information/ did not make sense and we were able to resolve it relatively quickly, as I was able to use AutoCAD and show why it did not work.

4.3- Due to a very tight budget, we were able to provide quality work and engineer efficient design for the school for us to come lower than the budget, which everyone appreciated.

4.4 -As the construction phase for structural has finished, as built drawings will soon be provided, all clarifications, site instructions and any site revision sketches have been incorporated into the drawings and are just awaiting for the final set from the contractor.

4.5- The scope of work was predetermined during the start-up meeting. As far as I know, the scope was never changed, if so, the architect and contractor would have been notified accordingly and or vice versa.

4.6 - The value of workplace safety legislation is important as it sets guidelines for all professionals. Without these guidelines, everyone would be doing their own thing and there would not be a standard for buildings (how it is built, constructed, etc.).

4.7- As this is a school, complying with the workplace safety legislation allows parents a sense of relief that this school is built to the government's standards and codes and that it is safe for their children to come to school.

4.10- Materials and quantities for this project are listed and shown on the drawings. As per the total quantity, drawings are sent out to the shop drawing supplier/subcontractors chosen by the contractor involved.

4.11-As this was design build project, constant phone conversations, meetings and emails were done by the architect, structural engineer/technologist, sub consultants and the contractor. Everything went smoothly as everyone was able to provide recommendations and solutions.

5. Professional Accountability
Instructions: Describe a situation or activity in which you applied professional ethics and identify the social, cultural, or environmental impact of this situation or activity as well as how you accepted professional responsibility for the outcome.

5.1- As per office standards, all general notes, details and drawing or book specifications are kept up to date and any revisions to any of the building codes and regulations are revised accordingly.

5.2-Make sure to update the details and notes accordingly, aside from the building code and regulations, to show what was done on site is shown on the drawings to ensure the public that the design works and could be used in future projects.

5.3-Ensure that the current general notes, details and specifications are being used for the current project and not using old project notes since there could have been revisions done after. Remind fellow co-workers to always use the most current notes, details and specifications.

5.4 Ensure that the current drawings are checked by an engineer regarding the general notes, details and specifications for the project. (Example: checking environmental/ geotechnical standards) Make sure that all elevations are correct as per what was given, if not raise the question in a professional manner.

5.5 Ensure that I take full responsibility if an error occurs on any project, instead of blaming other consultants/colleagues and try to provide a solution to avoid any conflict of interest to my employer and to the client.

5.6 Make sure that proper compensation is done for the job required; you have to be able to accept that depending on the compensation you give, the performance will be dependent on that.

5.7- Check out if there is any additional training (Revit/CAD), keep up to date with ASET (check their website, if there are any training opportunities), review of codes and regulations and go to site reviews.

5.8 -Provide compliments and motivation to colleagues, internal and external, when the performance of their work is great and if there are some things that need to be worked on, provide advice and help them revise it for future projects.

5.9- You have to make sure that they have to take responsibility of their actions and have to take the consequences, if anything were to arise due to their own judgment.

5.10-I have never made a claim but I am aware of such instance if it were to arise and who I should contact.

5.11-Ensure that knowledge is up to date according to the building code and regulations and all office standard notes, typical details and specifications so that the public is always informed correctly.

6. Communication
Instructions: Describe a situation or activity in which you listened effectively to others and applied the clear and concise use of language and/or media appropriate to the purpose of communication and target audience.

[Building Name] is a four storey wood building built on slab on grade located in [Location Name]. The time frame for this building is currently in tender phase.

Listed below are the competencies required and examples from the aforementioned job:

6.1- When this project started, I listened attentively to what I had to do as for the scope. I then had to relay the message to my co-worker, as they were going to help me with the project.

6.1.1- When there was something I did not understand, I asked the engineer and/or the architect to help me understand the situation. As they explained it, I listened and then applied it the project to resolve the issue.

6.1.2-Sometimes when the engineer gives design, it can be confusing, therefore I re-state what I think is happening in the design that was given and they make sure I understand it clearly.
As for speaking to the architect, after each conversation on the phone, I send an email to repeat and confirm what was said and if it is through email and I don't understand what they are trying to explain I give them a call so there is no confusion of what should be done.

6.2-Since I needed help for this job, I made sure to indicate to my co-worker when the project was due explained to them what was expected and asked if what I explained to them was clear.

6.3-I provided my co-worker training manuals that I made for the office , as well drew and explained sketches to further their understanding of how a wood building works, what it should look like and how they should do it. I provided guidance when it was required.

6.4-When there was something I did not understand, I spoke with the engineer or the architect. They then explained what I should do and we resolved it accordingly. If it had to do with drafting issues, I would ask a senior technologist not involved with the project and asked for their advice on how I should tackle the situation.

6.5-As I have done various wood buildings in the past, I was able to provide a solution of a connection I thought did not work and provided necessary examples to back up my solution, since it worked previously. I also used information from previous jobs if applicable to this job.

6.6-The person that I worked with on this project had never worked on a wood building before, so I had to make sure that I had to respect their own ideas and make sure they understood what they had to do. As well, since there was a language barrier, I had to make sure that they understood clearly, what I expected from them and if they had any questions, I made sure that I was able to help them.

6.7-If there was a quick question that I needed answered immediately, I would call and see if they were in and if not I would leave a message on their voice mail and follow it with an email.
If there was something that was too hard to explain through phone or email conversations, we would ask for an in person meeting so we can show what we were trying to explain.

6.8-Emails are typically the form of conversation throughout the whole project now a days, they should be well mannered and easy to understand.

6. Communication

Instructions: Describe a situation or activity in which you listened effectively to others and applied the clear and concise use of language and/or media appropriate to the purpose of communication and target audience.

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6.9-An example that happened in this project was when the foundation of the wood stud elevator was not lining up with the foundation for the corridor walls. We emailed the architect and provided a solution, by providing a sketch of what it looked like and what it should look like for ease of construction. We were able to agree on the recommended solution.

6.10- As there are changes done everyday by all the consultants, it could be very hard to keep up with the changes. I would keep a notebook with all the items that I still needed to be coordinated, once they were done, I would cross them off.

6.11- All drawings that are sent out for submission are mostly sent through email and the clients are given the necessary information of what the submission is. Example the structural project number, the name of the project, what the submission is (tender, construction, addendum) and then the date. We then attach PDF and CAD for their records and if they have any questions to give us a call at our office.