ELLIOT LAKE COMMISSION OF INQUIRY

DAY 2

March 05, 2013

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ELLIOT LAKE COMMISSION OF INQUIRY

--- This is Day 2 in the Inquiry proceedings held before the Honourable Justice P.R. Bélanger Commissioner, at the White Mountain Academy of the Arts, 99 Spine Road, Elliot Lake, Ontario, on the 5th day of March, 2013, commencing at 9:30 a.m.

REPORTED BY: Helen Martineau
Certified Shorthand Reporter

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I N D E X

E X H I B I T S

--- Upon commencing at 9:30 a.m. on Tuesday, March 5th, 2013.

THE COMMISSIONER: Morning, everybody. Mr. Carr-Harris, are you prepared to proceed this morning?

MR. CARR-HARRIS: I am. Thank you, your Honour.

THE COMMISSIONER: Thank you, Mr. Clerk.

MR. CARR-HARRIS: Mr. Commissioner, our first witness is Dale Craig sitting on your right. Mr. Craig is a highly experienced and --

THE COMMISSIONER: We'll have him sworn in.

DALE CRAIG, sworn.

EXAMINATION-IN-CHIEF BY MR. CARR-HARRIS:

THE COMMISSIONER: Good morning, Mr. Craig. I'm sorry I interrupted you, Mr. Carr-Harris.

BY MR. CARR-HARRIS:

1 Q. Good morning, Mr. Craig.

A. Good morning.

2 Q. Thank you for being here.

MR. CARR-HARRIS: Mr. Craig is a highly experienced and highly respected professional engineer that the Commission has retained to

assist them in their task.

His purpose here today, as we previously indicated, is to provide an overview of the design and build process in a large construction project. The idea of Mr. Craig testifying here is to give you -- the public and the lawyers, if they need it, a primer in the issues and concepts that we'll be dealing with over the days, weeks and months of this Inquiry.

Although Mr. Craig is not being qualified as an expert today, he is an expert. And he will be dealing with, as I say, what is essentially an educational exercise for those who are watching this Inquiry and will need some assistance with some of the terms and some of the processes that will underlie much of the evidence. Mr. Craig will not respond to questions which deal with issues arising in this Inquiry. He is here simply to provide background information. His evidence today is not contentious and is not intended to be contentious, but intended to be helpful.

Let me briefly describe Mr. Craig's professional background. He graduated from Carleton University in Engineering in 1970 with

distinction. He shortly thereafter joined J.L. Richards Professional Engineering Firm with offices in several locations, including Sudbury, and he has worked there solidly since for over 40 years.

For 20 of those 40 years, he practiced as a structural engineer, then was chief structural engineer. And he is now essentially, for the last 20 years, been involved in project management of major projects and multidisciplinary construction projects.

The exhibits we'll be referring to, just for your own edification, for the members here and for others, he will begin by giving us a slide presentation which deals with key aspects of the overview you already have, and key terms, and concepts.

That is Exhibit NO. 01891. That's the slide presentation.

EXHIBIT NO. 01891: Report on building and designing a large construction project presentation.

MR. CARR-HARRIS: Second, he will show an interactive structural slide presentation to show you some of the key elements of the structure,

structural design, that's Exhibit NO. 01892.

EXHIBIT NO. 01892: Structural components.

MR. CARR-HARRIS: He will then in the process show you a model of a connection, which is what is known as the construction that connects the beams to the columns. That will be Exhibit NO. 01894.

MR. CARR-HARRIS: He will also show you a graphic illustration of the relative sizes of those -- of the actual relative sizes of the beams and the columns typically used in this type of construction. That is Exhibit NO. 01893.

EXHIBIT NO. 01893: Member compare.

MR. CARR-HARRIS: And then lastly he will describe the -- what he understands is the Peterson Roofing System that, as we all know, was used on this roof, but simply in a non-contentious way in order to describe some of the terms that are used continuously while discussing the roofing system.

BY MR. CARR-HARRIS:

3 Q. So, Mr. Craig, do you care to begin, sir?

A. Thank you very much, Mr. Carr-Harris. Yes, today I would like to lead you

through a presentation which portrays the traditional design, bid, build arrangement for project delivery, that's as opposed to some other modifications of project delivery mannerisms which could be construction management, or fast track design, build, and other things.

This particular project was done under that traditional mode of delivery. And my presentation is essentially a condensation of the information presented in Exhibit NO. 6.

This is a depiction of the arrangement between the various parties on a construction project. We have at the center of everything is the owner. This is the person that wishes to construct a project and has his own financing in place to build it.

He will consult with the municipality through the chief building officials and the Building Controls Department to make sure that the zoning and the site plan control, and building permit aspects of his application are in order and in compliance with the Ontario Building Code.

The owner will usually, in a project of this nature, contract with an architect, an engineer, or a group of engineers, to prepare

construction documents consisting of drawings and specifications to describe how the building needs to be built, and the various qualities and installation methods for the materials.

The architect traditionally has been the prime consultant in this arrangement and responsible for the architectural design and co-ordination of the other engineering consultants, and surveyors, and planners that might be needed on a project.

Architects are expected to operate in accordance with the guidelines and practices dictated by the Ontario Association of Architects and engineers practice under the regulations and guidelines provide by the Professional Engineers of Ontario.

Once the drawings, set of drawings or contract documents, as they are referred to, are completed, the owner will then take those, or the architect on his behalf will advertise for tenders from general contractors, or they will invite tenders from selected contractors who they are happy with and who come recommended to them.

After the bidding process and selection is done, the general contractor will then sign a

contract with the owner to construct a project in accordance with the plans and specifications and the Health and Safety Laws and Regulations. And he will often engage subcontractors for a number of different aspects of the project, among them masonry and concrete, painting, all of the various pieces that go into a project.

Next slide please. I should, sorry, go back. I should mention that there is a direct contractual relationship between the owner and the contractor, and as well between the owner and the architect and the architect's engineers. But there is no contractual relationship between the architect and the contractor.

4 Q. I know what it says there, Mr. Craig. It looks like a general review line between the --

A. That's correct.

5 Q. -- between the architect, the engineer and the contractor.

A. Yes. During the construction, the interface between the engineers, the architect and the contractors is one of general review of construction progress and the quality to make sure that it's in general conformance with the documents that they produced.

6 Q. And typically who does that general review?

A. Well, it would be either be the designers themselves or appropriate professionals or technical specialists that they would designate to act on their behalf to act essentially as their eyes and ears.

7 Q. Thank you.

A. This is a bit of a replay of these. The owner is ultimately responsible to make sure that the building is structurally sound. He will engage professionals to assist him in this.

Again the architect is a licensed professional, design professional. He is responsible for the esthetics, the building appearance, the functionality, how the space is relayed, how people function in the building, including general Code compliance as well as occupant safety.

Architects are regulated by the OAA and they usually are retained as a prime consultant. There is no definition that requires this to be so, but it's been traditional practice and it was very much in vogue at the time of -- in the 1970s and '80s.

And also the architect is responsible for the co-ordination and design of aspects, important aspects such as the building envelope. The engineers, the various disciplines of engineering involved in any given project. The extent and detail depends on the nature of the project.

There's a structural engineer who designs the structural elements, defines the construction materials and procedures, and ensures that it meets the Code.

He would retain a geotechnical engineer usually on a project to define where rock might be, or what the founding conditions might be at the proposed foundation elevation; the defined bearing pressures; provide lateral soil pressure factors; and, important factors relative to seismic design. And usually this involves drilling or test pits to actually physically sample the soil.

They will also be usually required to do some quality assurance, quality control, which is the acronym QAQC, testing on various elements during the construction process.

You have mechanical engineers

responsible for the heating, ventilating and air conditioning systems. The fire protection, plumbing, building controls, you have electrical engineers for the power, lighting data, fire alarm systems.

Civil engineers who will design the water and sewer services to the building, design the drainage systems and the site grading, and the roads, and access to the local streets.

And all of these professionals, if they are professional engineers, are regulated by the Professional Engineers of Ontario. Next please. Moving to the contractor. The contractor is, in this case in the traditional sense, a general contractor who undertakes the construction in accordance with the plans, the specifications, and other contract documents that he has actually signed a physical contract with the owner to perform.

He will usually subcontract a great number of components of the building process to subtrades or suppliers and is responsible essentially to act as co-ordinator or integrator of all of these trades and suppliers into a whole complete working process, a working building. And it's very much the responsibility of the

contractor, the general contractor, to ensure that the work is carried out in accordance with Health and Safety Regulations.

And his subcontractors, as I mentioned, can vary probably 15 or 16 different subcontractors on a large project varying from painting, drywall, masonry, concrete, concrete forming, reinforcing steel placement, structural steel, supply and fabrication.

THE COURT REPORTER: I'm sorry, slow down please, sir.

THE WITNESS: Oh, I'm sorry. I got carried away.

THE COMMISSIONER: Mr. Craig, bear in mind we have not only live transcription, but live translation. And you're in an area that is very technical and I think you would be doing both these ladies a favour by just slowing down a bit.

THE WITNESS: Various subtrades, such as concrete, reinforcing steel, structural steel, supply, fabrication, erection, masonry, painting, roofing and waterproofing, electrical and mechanical. Just all of the various pieces of a building that require specialty subtrades.

Next please.

BY MR. CARR-HARRIS:

8 Q. The role of the municipality.

A. Yes. The municipality plays a regulatory role under the Ontario Building Code. They ensure that the local zoning requirements and the building codes are met through the site plan control and building permit application process.

The Building Controls Department usually relies quite heavily on the architects and the engineers who stamp their drawings and design and take professional responsibility for them meeting the applicable Code.

The chief building official will review reports and certificates of general conformity which are provided by the professionals at the end of construction.

And one thing to note is that the chief building official's qualifications may vary based on the size and the location of a municipality. It's not unusual for smaller or more remote municipalities to find it difficult to afford and attract professional engineers or architects to act in that capacity on their behalf and, hence, they often don't have registered professionals on staff.

In that case, they then decide on their

own whether they have the appropriate qualifications and feel comfortable with reviewing and approving the drawings or engaging other professionals to assist them. Next please. The construction project itself begins with the choice of a site. It all comes down to location.

An owner may have a piece of land that he wishes to develop a particular building on for whatever purpose, or he may have an idea for a building, or a process that he wants to construct, and he will search for several sites. So it comes down to location.

The size of the site will have a bearing on what sort of building is on it, and the access to the various services, and roads and transportation networks if there's a product involved or deliveries to and from it.

Each site has to be analyzed to determine what its zoning is, what the required setbacks are, the amount of parking that's required, the amount of green space, and the various things that are set out usually in the municipality ordinances and zoning by-laws.

Next please.

Once the site is chosen the next phase

in the construction process is the site investigation. Usually it involves a legal survey to determine property boundaries, and any impediments to that, any encroachments or liens on the property that could render it unsuitable for the proposed construction project.

Then you would get into a topographical survey which would define the various elevations and features on the site. So that you can -- the designers can appropriately provide grading, drainage, and foundation elevations suitable, and set and establish the floor elevations to suit the purpose of the building.

Then you would move on to geotechnical studies to determine what the -- where the founding elements will bear, whether it's on soil or on rock. And if it's -- if the rock varies, what the depth of the rock is.

And it would work in consultation with the structural engineer to determine the structural engineer's preferred system of foundation. And the various parameters such as allowable bearing capacity or depth of pyles in that instance to found the building on.

Sometimes you engage in hydrogeological

studies to determine what the water ground levels are, whether there is any contaminant transport underground in the water table, or other various features that you might engage a hydrogeological consultant to do.

Next please. We come back to the triangle with the architect acting as prime consultant.

In this instance, the architect would engage what we term now as building science designers. The three major disciplines are structural, mechanical and electrical.

A structural engineer for the building frame and how the loads are carried and the building is structured. Mechanical and electrical, as I described for the HVAC, plumbing systems and the various electrical and power and lighting systems.

On the site side, the site development and the planning would -- might involve civil engineers, civil, or municipal sometimes they are referred to as, geotechnical engineers, surveyors and planner.

This is just a graphical representation of the Codes. The one on the right is the Ontario

Building Code from 1975. I did a little measurement. It's about one quarter of the thickness of the 2006 Code and the pages are half the size. So it's about one eighth of the volume of printed material as compared to that that is in effect today.

It's just an indication really of the increased complexity of the building process, the greater selection of materials, the greater recognition of the regulations which need to go into the building regulation process.

Next please.

THE COMMISSIONER: I take it, Mr. Craig, in relation to the previous slide, the Code we have seen is the one in existence at the time when the Algo Mall was constructed?

THE WITNESS: Yes, the one on the right is an old copy we have in the office of the 1975 Ontario Building Code. And, yes, it was in force at the time.

The design process begins with what we term in the industry the "conceptual design". The architect comes up with a programming and functional layout for the building; a design concept with which he will select and recommend to

the owner various materials, massing of the building, heights floor-to-floor; the actual dimensions of the building and the orientation of it on the site.

This will be discussed in detail with the owner and preliminary budget estimates made. Usually there is one or two, maybe even more, concepts that are developed at this stage. They might include a model of the building or a 3-D rendering.

In the older days back in the '70s and '80s, it would probably be a hand drawn perspective of the building from various orientation points.

BY MR. CARR-HARRIS:

9 Q. So this is the first phase and the conceptual design. You now have the team together and they are to come up with a conceptual design?

A. That's right.

10 Q. And there is one shown on the right side of this page. What is that?

A. Those are -- since we had them handy, those are some conceptual drawings and model of the Living with Lakes Building that our firm did in Sudbury at Laurentian University.

11 Q. It's beautiful.

A. Thank you. It was an award-winning project, so I'm proud of it.

12 Q. And moving on to site planning and approval.

A. Yes, please. The site planning and approval process involves making sure that the building -- that a site plan drawing is prepared which shows the building placement, parking, access, drainage, site services.

Site plan application to the Building Controls Department is made on behalf of the owner and with the owner's full knowledge. And it's reviewed for compliance with the zoning by-laws and the standards in effect at the time. And if -- as the Building Controls Department finds differences from what they expect to see in it and their local by-laws, or the Building Code, they will mention these to the design team and there will be appropriate revisions to it.

And on the right, it's just a typical building site plan control checklist from a municipality. That indicates the various aspects of the site plan control agreement that need to be ensured as being submitted and meeting the

requirements.

13 Q. So once you've arrived at the concept design, what's the next phase then for site approval?

A. We've done the site plan design, submitted for site plan approval and now you move into the detailed design.

The detailed design would involve the municipal and civil engineering for the site plan and services, as I mentioned before.

The roads, the grading, parking, and storm water management, which is certainly an important aspect these days.

The engineers and architect would design their various systems. The architect all of the building finishes, the building envelope, materials, and selection systems.

Structural engineers would address the structure itself and the mechanical and electrical design for the various systems that I described earlier.

In the instance of the structural engineer, they have to pay attention to various prescribed load combinations for the dead load, the live load and the related climatic conditions

and geographical location which are described in the Code.

14 Q. And loads will be a subject we'll be hearing evidence about through the course of this.

A. Yes.

15 Q. And you have, I think, a drawing to illustrate that?

A. Yes. This is just a pictorial illustration some of the nature of some of the loads. We have dead loads from the walls, the floors and the roof of the building itself. You also have permanent partitions and fixtures, and services that are embedded or attached to the -- permanently attached to the structure.

And the structural engineer will estimate the amount of that weight or load on the structure.

You have permanent equipment that will exert heavier loads in certain areas that have to be taken into account.

At the foundation level, you will have soil and hydraulic loads, water pressure on basement walls if they are not drained, or you can't drain them effectively, and the soil itself exerts a lateral pressure on the wall.

In terms of live loads, you have those such as snow, which we -- which in the northern Ontario area we know all about. Live loads from the wind exerting lateral pressure on the walls and roof and uplift in some cases, depending on the nature of the wind.

You might have loads for collected water, unintentional collected water on a roof or swimming pool that is built in there.

And the one -- and you have lateral loads related to earthquakes. Although in northern Ontario, in general, that's of a lesser concern because it's a lower seismic activity area.

And then you have live loads from the people and moveable furniture.

16 Q. Forgive me again for interrupting, by what magical route do you arrive what the wind loads and snow loads are? Where do you get that information?

A. The Ontario Building Code is very good in both 1975 and 2006. There is a complete list of climatic conditions and wind pressures, earthquakes, seismic factors, ground snow loads. And then the design portion of the Code, section 4, dictates to the structural engineer how he uses those loads and

the factors that he works into his load combinations.

Q. And are these loads particular or specific to each community?

A. Yes. There is a large list of loads for particular communities. And it is interesting to note that neither edition of the Code has Elliot Lake factors.

Q. Whereas Sudbury would be there?

A. Sudbury's there, Espanola's there, Sault Ste. Marie's there, Timmins is there. It's a factor of the available data that was there and used.

And a designer in that instance where there is a particular municipality of the building that he is designing is not -- does not have specific factors would try and triangulate and assess that location's uniqueness perhaps, if there's anything that is known to be unusual there in terms of the climatic conditions.

If not, you would actually take the surrounding municipalities and engage which of those factors you would use.

You might take a look at Sudbury's snow load, Espanola's snow load, Sault Ste. Marie's

snow load and say, okay, I would say that Elliot Lake should have this. You make a professional judgment on it.

Q. Thank you.

A. At the end of detail design process there's a building permit application and review by the Building Controls Department of the municipality.

That review may be internal or may be assisted by a third party retained to assist the Building Controls Department.

Generally that application is -- it's desirable to have the application done towards the end of the design process, before tender, so that the results of the building permit review are known and incorporated into the contract documents before you do a tender.

It's not always the case in a fast-track or a rushed situation. You might take the chance that you will incorporate the changes later and negotiate any change in cost with the contractor. Following the -- generally following the building permit application, you would then go to tender or bidding to the general contractors, review those bids, receive and award a contract to the selected

contractor.

And that's just a copy of a typical building permit notice that's posted on the site.

Once the contractor has been engaged, awarded the contract, and has mobilized and started to assemble and construct the process -- the construction progress requires clarification and instructions from the professionals as to the design intent.

No set of documents is perfect, but it's expected that any imperfections, or clarifications, or unintentional -- how do I put it? Unintentional blunders are clarified to the builder in site instructions, and clarifications through sketches, if necessary, to make sure that it's clear to the builder what's required to build the building in accordance with the documents and the intent of the design.

And as well there is general site review by the -- by the professional team, or agents of theirs that they have selected or approved to act on their behalf, to make sure that the general progress of construction is proceeding in accordance with the documents, and that the quality of the materials being supplied on the

project is as specified.

And they will also engage a testing team to do quality assurance, quality control testing.

20 Q. And typically is the -- I meant to ask you this earlier. The review by the designers, does it have to be a professional, an architect or an engineer?

A. It doesn't have to be. The designers ultimately have to take professional responsibility for whatever review is done. They could assign agents. In fact if they were in another city far from the site, it's not uncommon, in the past especially, to hire a local inspection firm or testing firm, or another local consulting firm to act on their behalf and do the inspections, give them written reports. And I would expect that occasionally the original designers would visit the site.

During the contract administration, as I mentioned, there is review of the quality assurance and quality control by the design team either through an agent or personally.

There would be a testing program for various materials, concrete, sometimes sections of structural steel are tested to make sure they have

the proper yield strength.

You might have an inspection of the roofing process to make sure that it's applied correctly. It's a unique science in many respects.

And so the designers would set out in their specifications which materials need testing, the nature of the testing, and the codes to which the tests must comply.

And there is a professional obligation to ensure that there is general compliance or conformity with the design documents. And this general review process is required by the Ontario Building Code.

As you move towards the end of the construction process, you move into what we term as the commissioning phase. It's generally -- it's generally focused to a large extent on the review of the mechanical and electrical systems and their controls to make sure they're operating correctly and will provide power, heat, light and comfort to the occupants.

Usually the commissioning process involves owner staff training and a provision of operations and maintenance manuals to guide future

maintenance of the buildings.

And there is particular attention paid to fire and life safety and egress systems at this time.

21 Q. Is the commissioning done before or after substantial completion?

A. It's usually done just before substantial completion. It's usually one of the elements that the designer would want to have in his pocket to make sure that the air systems are balanced properly, that all of the equipment is working. Because one of the tenets of substantial performance is that the building is suitable for its intended use and purpose.

So it's most designers' position that unless all of the life, safety and occupant comfort systems are working properly, it's not ready for its intended use.

22 Q. Thank you.

A. At the substantial completion or substantial performance, as it is now referred to, the design team will inspect the building thoroughly to determine what deficiencies there are or how much is left to be done and make a determination -- their professional determination as to whether the

building is ready to be accepted as substantially performed.

If it is, there is a requirement in the Construction Lien Act to advertise this substantial performance in the daily commercial news so that any suppliers or subcontractors who might have lien rights know when they expire and that they have to get their claims in before the expiry of that date.

Following that, the Building Controls Department or the chief building official and the fire department would be notified that the building is ready for occupancy, in the opinion of the contractor and the professionals.

And they would inspect the facility, determine whether it meets the requirements that they've laid out. And if it does, they will issue an occupancy permit. If it doesn't, corrective measures are taken.

23 Q. Thank you. On the right is a Certificate of Substantial Completion that you mention should be published.

A. Yes.

24 Q. And Quinn Construction was not part of any construction of the mall.

A. Yes.

25 Q. This is typical --

A. It's public record that we just pulled from the daily commercial news, it just happened to be this one is Elliot Lake.

26 Q. Thank you.

A. That signifies really the end of the building construction and commissioning and the turnover process. The owner now takes responsibility for the building and for its ongoing maintenance and review.

There is normal maintenance required on all building systems. Some are more cogent than others. The architectural and structural systems, in my opinion, their maintenance, although it's important, is often ignored until problems occur.

You don't pay attention to your roof until it leaks. You don't think about the caulking until you have seepage around the window. You don't think about a structural problem until something deflects, or breaks, or moves, or you feel some vibration and some undue stress. So it's just -- it's the old adage of out of sight out of mind in many respects.

There's a note here that major

renovations require upgrading to current Codes. If there is a significant renovation to an existing building that was designed under a previous Code, that portion, or if it's extensive enough, all of the building must be upgraded to current Code requirements.

But the big reason that mechanical and electrical systems receive most of the maintenance and repair attention are simply because they affect users, they are obvious to the building users. If you don't have enough heat, or if you've got no power, or a toilet doesn't flush, somebody gets upset, there is a complaint, and usually the building maintenance is taken care of.

This is the final slide. It just is a typical excerpt of some of the major codes and standards and organizations that are involved in both the setting of standards and establishing regulations to which the buildings must be designed and various agencies that designers will refer to for the guidance.

27 Q. Thank you. I understand now you have an interactive display of structural components you'd like to show us?

A. Yes, I do. I think we have to take a

small break to get the board up though.

THE COMMISSIONER: Let's do that. Is it your intention, Mr. Carr-Harris to file Mr. Craig's CV? What is your intention?

MR. CARR-HARRIS: It wasn't my plan. But if it's your wish, I'm happy to circulate it. We're certainly not hiding it.

THE COMMISSIONER: No, and this is not meant to be a criticism, but you were rather cursory in explaining Mr. Craig's experience. But I know that he has had major responsibilities with major professional organizations, perhaps this ought to be known to everyone.

MR. CARR-HARRIS: Well, then, we can mark it.

THE COMMISSIONER: Sir, I'm sure you have one.

THE WITNESS: Yes.

MR. CARR-HARRIS: Yes, we provided it. Unfortunately it's fairly immodest in terms of what's in it, so I have taken sort of the main threads.

THE COMMISSIONER: The highlights.

MR. CARR-HARRIS: But we'd be happy to file a full CV with all your organizations.

THE COMMISSIONER: Is that possible, Mr. Craig?

THE WITNESS: Yes.

THE COMMISSIONER: That would be of service to everyone.

MR. CARR-HARRIS: Should we take a break then?

THE COMMISSIONER: We'll take five minutes and it will give Madam Stenographer and the interpreter a minute or two to relax. Let's take five then.

--- Break taken at 10:10 a.m.

--- Upon resuming at 10:15

MR. CARR-HARRIS: Mr. Commissioner, Mr. Craig is now set up to show the structural elements and the graphic.

THE COMMISSIONER: Thank you.

THE WITNESS: Am I live here?

This is an interactive graphic model that we have prepared just to illustrate the different components of a typical structural steel frame construction. It's not the Algo Centre Mall by any means, but I will go through and show you some of the various terminology and members that we use in the structural engineering profession.

This is, in its entirety, a structural steel frame. These are reinforced concrete piers with spread footings.

We have many components in a structural system. The vertical load carrying members are called columns. The area where they connect to one another is a connection.

Some of the horizontal load carrying members, they're secondary members, can be open-web, steel joists which are lighter, more slender members, similar to the wood joists in a floor which span between major walls or beams. And they consist of a top and bottom chord, interconnected by a steel rod, sloped series of web members.

Secondary load carrying members can also be lighter steel beams and spanning to other beams or, in this case, directly to a column.

This beam is what we call a cantilevered beam. It extends across its support at the column and cantilevers out so it doesn't need other exterior support because it's stabilized by the weight and connection of the beam in the main span.

This is a depiction of hollow core,

pre-stress concrete slabs. See if I can rotate it a bit. You can see the ends of the slabs are -- actually -- they come in four foot sections. And they are any given length, and the depth of them in some instances goes 8, 10 or 12 inches in depth sometimes even more.

BY MR. CARR-HARRIS:

28 Q. And the significance of those? There is no dispute.

A. These slabs were used at the Algo Centre Mall and they constituted the platform on which well, the platform that sat on the structural steel frame at the roof parking level. And those are manufactured off site. Those are manufactured in a pre-stress concrete manufacturing plant and prepared and delivered to the site and erected.

Sometimes joists will support a thin concrete slab that's placed on a form, or a V-pan we call it. And a two and a half or three-inch or more topping of concrete, with some welded wire fabric, which is light reinforcing in a square pattern, is installed in the slab.

These diagonal members are typical crossed bracing to prevent the frame from swaying

under lateral load wind or earthquake.
This is an infill wall, you will hear referred to. And those, I guess, are the various significant elements of a steel frame.

29 Q. Now, I think you have a mock-up of the -- of an example of a connection.

A. Yes, I do.

30 Q. I wonder if we start off by saying it's not to scale. It is only for illustrative purposes?

A. No. We couldn't have lifted anything of this nature if it was done in structural steel. We used fibre reinforced plastic members, and they aren't to the scale, that we've referred to in this project.
This is a column, again a vertical member supporting load. This is a column web, a central part, and it has two flanges.

This is a beam that's connected to the column through two clip angles. And the beam has a web again and a top. This is the beam top flange, the beam bottom flange, just by virtue of its orientation.

It's very common that the columns are prepared well, all of the members are fabricated

in a shop to a set of shop drawings that are based on the design drawings that the structural engineer prepares.

And the connection design in this case consists of a pair of clip angles that are -- in the case of the Algo Centre Mall were welded in certain instances, welded to the face of the column flange. These are out of scale. They would terminate here and have a weld running the length of them and up and across the top and front. And a pair of angles would be on the column when it's erected on the site. And this beam would be brought in, dropped in place between the angles, and bolted in place with high strength bolts.

31 Q. And that's what transferred the load on the beam to the column?

A. That's correct.

32 Q. That connection.

A. Any loads that happen on this span such as this, the load from the slabs of the joists is carried by the beam to the column and transferred into the column through this connection.

33 Q. Can you read that exhibit number for me?

A. Yes, NO. 01894.

34 Q. Thank you, Exhibit NO. 01894.

EXHIBIT NO. 01894: Structural steel frame.

BY MR. CARR-HARRIS:

35 Q. Now, you mentioned in your description that these are not to actual size, but I understand that you have a graphic illustration of their relative sizes versus the beam?

A. Typical beams in the floor or in the roof framing of the Algo Centre Mall were wide flange -- 24-inch deep, wide flange. This is to scale. This is 24 inches deep and it's 12 inches wide, or the width of the flange is 12 inches. This is the actual size of the column it was connected to. It's called a W10 by 49. It's 10 inches deep, just under 10 inches deep, and 10 inches wide across the flange. It is virtually a square section.

These are all hot rolled, structural sections that are produced in a structural steel mill.

36 Q. So that gives you the sense, Mr. Commissioner, of the actual size and why we didn't carry them in here.

A. This column here would have been 10

inches this way and 10 inches that way. And this beam would have been 24 inches. So it would have been this high if it was sitting on the desk.

37 Q. Okay.

THE COMMISSIONER: Was that made an exhibit?

MR. CARR-HARRIS: I believe it's Exhibit No. 01893.

THE COMMISSIONER: Thank you.

BY MR. CARR-HARRIS:

38 Q. Now, could we bring up Exhibit NO. 14? What we're look at there is the roofing system, so-called Peterson Roofing System, which is alleged to have been installed on the roof of the building. I don't think there's much doubt about that at this point.

But to avoid any contentious points, all we'd like you to do, Mr. Craig, is simply translate for the public, and for the lawyers, what the roof system consisted of. This is what was we understand there when the building was built in 1979, '80.

A. This is a sketch from the Peterson proposal to the owner indicating what is believed to have been the system as it was installed.

It consists in the middle of the eight-inch, hollow core pre-stress hollow score slabs. On the underside it's three-inch thick, thermafibre insulation with a foil facing.

39 Q. So the wavy line at the bottom is --

A. This is insulation here. That's the indication across here. And it looks like they are indicating mechanical attachment of the insulation to the underside of the concrete slabs. These are the grouted joints at longitudinal joints between adjacent four-foot wide panels.

And this is a concrete -- it's indicated as a three-inch durable concrete composite wearing slab, which is concrete placed on top of the hollow core slabs and intended to be bonded to them.

And the dotted line with the X's indicates what's again termed as welded wire fabric, which is a light drawn steel, square grid of reinforcing --

THE COMMISSIONER: That was poured concrete?

THE WITNESS: This is placed on site. The slabs would have been in place, prepared as needed to ensure that you got the bond of the concrete topping to them.

And then this concrete would have been placed. And it was a variable thickness, according to what I've been advised, to provide some drainage at the top surface. This is indicated as a barrier penetrating concrete sealant.

This is an Iso-Flex sealant in the crack control system. These were intended to be tooled joints in the concrete just before it hardens to try and encourage cracking in a controlled pattern along these joints and then filled with a sealant later. And as I mentioned, the barrier sealant was to be put on top.

And this is simply a section at an expansion joint with another Iso-Flex pre-molded expansion joint seal in here. And the expansion joints are intended or designed to allow for building expansion and contraction in a controlled nature so it doesn't induce needless stress on the building.

BY MR. CARR-HARRIS:

40 Q. Okay. And I understand that there's some evidence that the strip that's described as item one there may have been a plug later on by some kind of change, but other than that?

A. It's possible, but we have no evidence that we've seen.

THE COMMISSIONER: You mentioned bonding between the core slab and the upper layer. How is that bonding achieved, sir?

THE WITNESS: There are various ways to do it. I don't know what the specification was, Mr. Commissioner. Sometimes you would brush the slab, clean the base slab well. If it was properly roughened, we would dampen it to make sure it didn't suck the water out of the fresh concrete too quickly and impair the bond.

And you can use a mortar slurry of paste to brush into the slab to help bond the new concrete to it. Or there are various chemical products such as latex additive or epoxy bonding agents. I don't know what was intended or used here.

But there's a definite process to make sure that you get a proper bond to the fresh concrete, to this hardened, preplaced concrete.

THE COMMISSIONER: And the lower third, which is the insulation material, is that added on after?

THE WITNESS: Yes.

THE COMMISSIONER: Is that sprayed on?

THE WITNESS: No. This apparently is a rigid foil-faced insulation board, three inches thick that would be like -- it would appear to be rigid fiberglass or something like that. I honestly don't know what this thermafibre is, but it sounds like a fiber product that has a glossy foil facing, probably intended to act both as a vapour barrier and as heat rejection to help its heat properties.

And that would be actually cut and fit to the underside and attached.

THE COMMISSIONER: After the core slab has been installed.

THE WITNESS: That's correct. And usually welded down in the process once the building is completely water proofed and sealed because you don't want unintentional leakage getting through and damaging the insulation.

THE COMMISSIONER: Thank you.

BY MR. CARR-HARRIS:

41 Q. Thank you, Mr. Craig. Subject to your wishes, Mr. Commissioner, those are my questions. And there may be some questions from the floor.

THE COMMISSIONER: All right. Anybody

have any questions of Mr. Craig? Would you like me to take a short break as you consider whether or not or how to formulate your questions? Mr. Longo, you're indicating yes?

MR. LONGO: Yes, I would like that.

THE COMMISSIONER: Let's take the morning break at this point and we'll hear from you after that.

--- Morning break taken at 10:32 a.m.

--- Upon resuming at 10:50 a.m.

MR. CARR-HARRIS: I understand there are a number of questions, Mr. Commissioner.

THE COMMISSIONER: All right.

CROSS-EXAMINATION BY MR. BISCEGLIA:

42 Q. Good morning, Mr. Craig. My name is Joe Bisceglia and I'm Mr. Saunder's lawyer. Thank you for your help this morning.

I just want to clear up one matter you touched on. It's my appreciation that as general protocol within an engineering firm, or a project, there are technicians or individuals who obtain information or raw data and provide that even to the architect or the engineer for his or her opinion. Is that fair?

A. That's correct.

43 Q. And that applies not only with respect to new construction, but also doing inspections of existing buildings.

An engineer may have staff members or technicians attend there, take the raw data or information, provide that information and then the engineer exercises his or her opinion with respect to that information. Is that fair?

A. That's fair.

44 Q. And that provision is provided for in the regulation 260/08 of the Professional Engineers Act, and the document number is OR_E000000004. If we could have that brought up, please? The attachment is part of that overview report. It's part of the regulation. It's page 62 if I understand my printout correctly. The last numbers are .62.

Yes, thank you. Section 1 indicates the duties and responsibilities. And then subsection 2 of that regulation states that,

"The professional engineer may delegate one or more of the functions or requirements described in paragraph 1 to another person if it is consistent with prudent engineering practice to do so..."

and so forth. Is that fair?

A. I don't see that on the screen. I just want to --

45 Q. Oh.

A. Oh, okay. There we go. Okay. And does the sentence finish on the next page?

46 Q. Yes.

A. I would agree with that.

47 Q. Thank you very much, sir.

A. Thank you.

48 Q. Those are all my questions.

MR. MACRAE: I wonder if I might go next, Mr. Commissioner?

THE COMMISSIONER: Yes, Mr. MacRae.

CROSS-EXAMINATION BY MR. MACRAE:

49 Q. Good morning, my name is Bob MacRae and I am here as a representative of Mr. Bob Wood. As Mr. Bisceglia indicated, thank you very much for the information you provided. I have a couple of questions with respect to the information.

MR. MACRAE: Mr. Commissioner, I understand that from speaking with Mr. Carr-Harris that there may be a number of technical questions that wouldn't necessary -- this wouldn't necessarily be the time to ask those questions today.

And just for the purpose of a clear understanding, Mr. Carr-Harris has indicated that if the questions are not fully answered by the professionals or the witnesses that attend, that we'd be in a position to recall the witness. And we could put those questions to him by way possibly in advance of written interrogatories so that questions could be answered.

THE COMMISSIONER: That is what Mr. Doody indicated yesterday. That for our purposes today, Mr. Craig's evidence is restricted to generalities, if I can use that expression, rather than specifics. But if that is of concern, certainly you can re-apply to me and I would most likely be favourably disposed to allow the recall of the witness.

MR. MACRAE: Thank you very much, Mr. Commissioner.

BY MR. MACRAE:

50 Q. You gave evidence with respect to a roofing structure, the Peterson Roofing Structure. I wonder if we could bring that slide up, Ms. Kuka?

THE COMMISSIONER: Is that the one?

MR. MACRAE: Yes, I thought it would be appearing there.

BY MR. MACRAE:

51 Q. Are you able to see it, Mr. Craig?

A. Yes, I have my cheaters on now.

52 Q. Okay, great. You talked about the insulation being that's detail number three reflected in the bottom of each of the cross-sections as the insulation being installed below the precast concrete?

A. That's what this section indicates, yes.

53 Q. Okay. Is that a common -- within the building industry, is that a common procedure to install the insulation on the underside of precast?

A. It would be up to the professional who designed the system to consider the various influences and the conditions to which he is prepared to make sure that the system works overall. It's a matter of building science.

54 Q. And as part of that building science, then, would it be a calculation to determine thermal expansion and how that would be impacted?

MR. CARR-HARRIS: Forgive me, Mr. MacRae, for interrupting.

Mr. Commissioner, I think that my friend is getting into areas that may be contentious in the ultimate evidence. And I want to make it

clear to all that the witness, as you have said, is not here to deal with contentious issues, but simply as a background.

He has described what the roofing system consisted of, which is our purpose today, and not to have a discussion with others about what is an appropriate element and what isn't.

MR. MACRAE: May I respond, Mr. Commissioner?

THE COMMISSIONER: Yes.

MR. MACRAE: Mr. Carr-Harris is referring to this as a roofing system and in my submission that's to be determined at some point this time.

I didn't understand it to be contentious with respect to thermal expansion whether the insulation -- whether this witness was able to indicate if it's insulated from the inside whether that would have an impact on the thermal expansion of the precast concrete that would be then exposed to the elements and not subject to the protection of the insulation.

THE COMMISSIONER: My view at this point is that this is sufficiently general, Mr. Carr-Harris, that the question can be allowed

and that can be explored if the witness can answer.

THE WITNESS: I can give you a general answer in principles. If the insulation is applied to the inside of the structure, the structure is then subjected to greater thermal expansion and contraction. If the insulation is applied above or outside the structure, then the structure is protected and has a less likelihood of large thermal expansion and contraction under climatic conditions.

BY MR. MACRAE:

55 Q. Thank you very much. Then with respect to core slab, and you spoke about core slab and the bonding of a concrete, if we can call it a screen or topping on top of the core slab. Am I correct that there are two designs of a Coreslab -- one being a smooth finish that is intended to accept carpet or something of that nature, and the other a raked finish that is designed specifically to receive a topping?

A. That's correct.

56 Q. And a raked finish, is that applied at the company or rather at the factory?

A. I believe it is, yes.

57 Q. And would you be -- are you able to

provide any evidence today with respect to the ability of the contractor to utilize a smooth surface precast, the top side, in order to properly bond a topping mixture to that?

A. It's more difficult to get a complete and thorough mechanical bond to a smooth surface than to a rough surface. If the slab is smooth, it requires more preparation to obtain a suitable bond.

58 Q. Fair enough. And that, as I understand it, that's why from the factory a precast that is intended to have a topping bond to it actually has a very course raked finish?

A. Usually.

59 Q. Okay. Thank you. And with respect to core slabs and the installation of core slabs, are you aware of any requirements or design -- a design issue with respect to where the core slabs join together, the use of reinforcing bars in order to create a certain redundancy?

A. The best reference to that would be the manufacturer's recommended installation details. And that's what -- that's what you would refer to to see what -- what they recommend for their system in place and its complete installation methodology. And that's what you would normally specify to be

done.

I can't state for sure because I don't have the Coreslab literature with me whether they were recommending installation of steel or whatever. So I -- without that to refer to I would be speculating.

THE COMMISSIONER: We'll have someone from Coreslab, Mr. Carr-Harris, is that correct?

MR. CARR-HARRIS: That's correct.

THE COMMISSIONER: That question would probably be better put to the individuals who make the material.

MR. MACRAE: Certainly, Mr. Commissioner, thank you.

BY MR. MACRAE:

60 Q. Then my last question deals with how you would properly -- as an engineer how you would properly describe the structure in the Algo Mall is in. In some of the documents it's referred to as a parking structure. Some documents refer to it as an overhead parking structure. Is there a formal engineering designation with respect to the distinction between a parking structure and, say, a ceiling over a mercantile area?

A. I think this is an adaptation of a

building form -- of building forms. You have a parking deck over top of an occupied space. So the deck itself has to now serve two functions. It has to serve a function for carrying the load of the vehicles and the conditions to which that is -- are going to impose on the structure. And it also has to function as a roof over the occupied spaces to keep the elements out.

61 Q. Thank you. Then with respect to that, how is that distinction actually carried out as part of the planning process? Does it then have to conform or would it then have to conform to two different sections of a Building Code?

A. You would have to look at all of the conditions that it was subject to, and I think as a prudent designer take into account the worst of either condition.

You say, what are the conditions imposed in its function as a parking deck? And what do I have to ensure is done to make sure that it can function effectively that way and to carry the loads, et cetera.

And what -- as a building enclosure, what do I have to put in place in my design to ensure that it functions effectively that way?

62 Q. Okay. And one final question. When you talked about there being a requirement to essentially deal with designs or issues that may arise as a result of the construction, could you provide me an explanation of how that information would normally flow with respect to -- let's say, by way of example, there is an issue with a foundation, there is an issue with being able to fit a foundation into a certain area, but that's just hypothetical.

How does that flow back to the person in a normal construction process who would then be able to make a final decision in respect of modifying that?

A. If you're indicating that the question is related to a contractor discovering that he can't do what is shown on the drawings. I can't -- I can't physically accommodate this, what you have shown, in the space you have shown or whatever.

He would then contact -- the traditional process would be request a request for information. We are more formally referring to them as RFI's today, request for information. And he would communicate, depending on the urgency would dictate the type of communication, communicate

with the architect or engineer, whoever is in charge of the project, his question and say, This is the problem. This is what the drawings show or what they don't show. How should I proceed? I need some information to allow me to construct this.

The professional would then, in whatever discipline this affects, would review the request for information and as promptly as possible consider all of the factors, give a clarification or instruction if it meant changing from what was shown on the drawings.

63 Q. When you say clarification or instructions, would that be done formally normally?

A. Usually. It should be done in writing if you want to ensure that everybody understands everything. And all of the appropriate parties should be included in that correspondence.

And if it affects -- if the instruction or clarification, in the contractor's opinion, affects his timing of progress, or the cost, or difficulty, he would then most likely submit a change order, or a request for additional compensation in whatever form he termed it and/or an extension.

And then there would be another

judgment, usually in consultation with the owner, with the architect or engineer, the consulting team, to see whether this would be accepted and how it would be paid for.

64 Q. All right. And then say that that modification required a change or a modification to a drawing, a structural drawing or an architectural drawing, how does that change get incorporated into the drawing?

A. Well, usually if there is to be a change to a document prepared by a professional, they should prepare a sketch or a written notification as to what the change is, how it affects the contract documents they prepared, and it should be in writing and communicated to everybody.

65 Q. When you say how it affects, how does someone determine, an example, where the contractor comes back to the general contractor and says, I just can't do that and I need a change and that change is accepted?

Who would be responsible for ensuring that all of the design -- the individuals who are involved in the design of a building would be notified of that change so they could determine whether it impacted their design?

A. Well, at the beginning of a job you should set up lines of communication between the contractor and the design team, the design and contract administration team, to determine how this information would be transferred. Whether there is a single person point-to-point, whether the project manager for the architect, or whoever is the prime consultant, is the single distributor -- receiver and distributor of information both ways, taking it in, getting an answer and getting it back. Or some other process that was put in place at the beginning of the job.

66 Q. And that would be designed to ensure that all of the parties that needed to be made aware of that would in fact be made aware of that?

A. That's the intent. That's the purpose of doing it that way.

67 Q. Thank you very much.

A. Thank you.

MR. MACRAE: Thank you very much, Mr. Commissioner.

THE COMMISSIONER: Thank you, Mr. MacRae.

CROSS-EXAMINATION BY MR. LONGO:

68 Q. Good morning, sir. I introduced

myself before the session. I am Leo Longo and represent the Ontario Building Officials. There were three areas I wanted to briefly address with you.

The first dealt with prime consultant. In your own words, how would you describe the role, the responsibilities and the obligations of a prime consultant?

A. Well, very briefly, the prime consultant is the owner's prime contact for his design and contract administration process. It's the entity who will lead that process on his behalf and subcontract with others or co-ordinate with others.

If the owner has specific preferences and decides to contract directly with other sub-consultants, he should still choose one of his consultants, and it is usually the architect, to be the prime consultant who is responsible for his discipline, and co-ordination of the other disciplines, to provide a complete co-ordinated package.

69 Q. Is the name indicative of the significance of the role? Prime consultant.

A. I don't know what you're getting at to

tell you the truth. It's the -- the primary consultant, if you wish to call it that. The lead consultant. That's how I would determine it. So in a pecking order, they would be the leader and the rest of the disciplines supporting process would be the followers, working cooperatively to produce a co-ordinated set of documents.

70 Q. Now, in your overview statement and in your presentation this morning, you indicated that architects are usually the prime consultant, or can be the prime consultant, is that correct?

A. That's correct.

71 Q. And with your permission, Mr. Commissioner, I just have an extract of the Architects Act. Just so that the record would indicate that the Architects Act actually makes provision for an architect being a prime consultant.

That's section 11, sub 4, paragraph 8 of the Architects Act. Are you familiar with that or understand that --

A. I understand what it's saying.

72 Q. Thank you. And just so the record is clear, if I could remove that and place this on the screen. You'll see the prime consultant is also addressed just a little lower, Ms. Kuka, if you can

bring it down? No, the other way.

So the Professional Engineers Act section 12, sub 6, paragraph 8 has a mirror image of the same clause, that an engineer as well as an architect can be a prime consultant?

A. That's correct.

73 Q. Sir, I've checked both Acts, and apart from this reference that I have just taken you to, I see nothing in either the Engineers Act or the Architects Act that actually describes what the role and the responsibilities are of a prime consultant. Do you agree with that?

A. I'm not sure if it's in the Acts themselves because I haven't reviewed the Act for those wordings.

74 Q. Okay. If you notice on the screen that is in front of you is an extract of Exhibit No.6-1, which is your Professional Engineers Guideline dealing with structural engineer services and it gives a definition of prime consultant. Is that, in your view, an accurate description of a prime consultant?

A. I believe that's the role I was describing to you, yes.

75 Q. Thank you. And if I could go back to

the first sheet. I take it, sir, in your experience you've had to deal with the Building Code and the Building Code Act?

A. Yes, I have.

76 Q. Would you agree with me that the term "prime consultant" is not found in either the Building Code Act or the Building Code itself?

A. Without doing a complete search of the Act, I would not want to make that statement.

77 Q. All right. Would it be fair to say, in your experience, if one were to try to find what the role and responsibility of a prime consultant, if they looked in the Building Code Act in the Building Code, they'd come up short? Or that might not be --

A. I don't know if that would be the case.

78 Q. All right. Thank you. And I appreciate that.

In your view, I know you haven't been qualified as an expert yet, but Mr. Carr said you are highly qualified so I'll ask.

Would you agree that those very two thick volumes of the Building Code 2006 that you have on the bookshelf there, that amongst its

terms it might be useful if somewhere in the Code a description was given of a prime consultant and perhaps described the duties and obligations and role of such a person? If that definition isn't there now.

A. I think it would be useful, yes, in my opinion.

79 Q. Thank you. Secondly, I would like to turn to maintenance of buildings. And if I can ask Ms. Kuka to turn up Exhibit NO.6?

THE COMMISSIONER: Shall we make those documents you provided, Mr. Longo, exhibits?

MR. LONGO: Would you like to mark them?

THE COMMISSIONER: Yes, we might as well mark them for completeness. What numbers should we assign to them, Ms. Kuka?

MS. KUKA: NO. 01896 and NO. 01897.

EXHIBIT NO. 1896: Prime Consultant, LFL Briefing note.

EXHIBIT NO. 1897: Professional Engineers Act, R.S.O., 1990 c. P. 28.

BY MR. LONGO:

80 Q. If I can ask for Exhibit No.6, paragraph 68 of the overviews.

Mr. Craig, in there you indicate that,

"Under the Ontario Building Code Act and the Ontario Building Code, once a building like a shopping mall has been completed and an occupancy permit is issued, ongoing inspections by the municipalities of the structural elements of the building are not required."

Inspections normally occur on specific complaints, is that correct?

A. That's our opinion as to the process.

81 Q. And just to confirm, it's the Ontario Building Code, it's not the Ontario Maintenance Code, is it?

A. That's correct.

82 Q. All right. And, sir, I have an extract from the Building Code Act which isn't part of Exhibit No. 6.

You're familiar with section 34, sub 1 of the Building Code is the regulation power for the Building Code itself and explains all the things that can be in a code.

What I'm showing on the screen is exhibit -- is section 34, sub 2 of the Building Code which was only introduced in 1992 with the new Building Code. And that section says,

"The lieutenant governor and council may make regulations to establish standards that existing buildings must meet even though no construction is proposed, including regulations sub B, establishing standards for maintenance, occupancy and repair."

And, sir, you will see in sub-clause 3 that it says, "A regulation made under this Act can apply to buildings whether erected before or after the coming into force of this Act."

And then you see the purpose of the regulation under subsection 5.

Sir, to my knowledge the province has never exercised its power and actually made a regulation under subsection 34(2) dealing with the maintenance of buildings. Is that your understanding as well?

A. That would be my understanding. I could not state for certain because I'm not aware, but that would be my understanding.

83 Q. And, sir, in your practice over the years, have you ever mused as to whether it would be useful if there was a building maintenance standard that had been issued by the province?

A. Well, generally we've experienced the situation where the municipality itself has enacted property standards which deal with the maintenance and safety of buildings and maintaining the conditions of buildings.

So we really don't postulate as to whether the province should get into that process or not. So I can't -- I can't give you a definitive answer on that.

84 Q. With respect to this issue of property standards you've mentioned and municipal by-laws, you will agree with me that those are discretionary and not required of a municipality to enact?

A. That's correct.

85 Q. Thank you.

MR. LONGO: Mr. Commissioner, is it your wish that that should be marked?

THE COMMISSIONER: Yes.

EXHIBIT NO. 1898: Maintenance of Buildings, LFL Briefing Note.

BY MR. LONGO:

86 Q. And the final area I wanted to explore with you was site plan control, just two very brief questions arising from that.

I started practicing in the late '70s.

And my recollection is that that is about the time that site plan control was first introduced in the Planning Act.

Sir, is it your understanding or will you confirm for me that it's fair to say that site plan control was a discretionary power that municipalities had as an extra layer of approval, but it was not a required power that they must exercise?

A. That's my understanding, Mr. Longo, but I couldn't confirm that for sure. We have planners on staff that make sure we understand that afterwards.

87 Q. And secondly, I take it that in providing your overview, you're not in any way suggesting that Elliot Lake had site plan control at the time of the construction of this mall?

A. No. This is a general description of the process as it exists primarily today.

88 Q. Thank you very much, Mr. Craig. Thank you, sir.

THE COMMISSIONER: Thank you.

MS. RITACCA: Good morning.

CROSS-EXAMINATION BY MS. RITACCA:

89 Q. Q. Good morning, Mr. Commissioner.

Mr. Craig, I introduced myself to you on the break. My name is Luisa Ritacca. I'm counsel for PEO.

If I could have Exhibit No. 0189 brought up, should be Mr. Craig's PowerPoint. If we could have the third page in? So the title page, the first page and the second page.

Do you have that up on your screen?

A. Yes.

90 Q. I have just one question or two for you, sir. In the last bullet point you describe in the usual course the architect being retained as the prime consultant, and Mr. Longo talked to you about that a few moments ago.

And you said that the architect as prime consultant usually has responsibility for overall design and co-ordination including the building envelope. Can you describe what you mean by the building envelope, sir?

A. The building envelope are the walls and roof of a building which separate the interior from the exterior. That is the envelope which encloses the building.

91 Q. Great. And in your experience, would waterproofing be included in the building envelope over which the architect would be responsible?

A. In our experience, yes.

92 Q. Thank you, sir.

MS. RITACCA: Thank you, Mr. Commissioner.

THE COMMISSIONER: Thank you. Mr. Kearns.

CROSS-EXAMINATION BY MR. KEARNS:

93 Q. Good morning, Mr. Craig. My name is Doug Kearns and I'm the lawyer for -- one of the lawyers of the building in the course of its history. I have a couple of questions for you.

The first is, in your overview you indicate that one of the options available to the chief building official when they're presented with plans is to ask the PEO to review them. Was that option available in 1978 to your knowledge?

A. I don't know that I actually said that to tell you the truth.

94 Q. Oh.

A. I think the chief building official has the option of retaining other assistance, but I don't know that I said that.

THE COMMISSIONER: I didn't recall him saying that, referring specifically to PEO.

THE WITNESS: In reviewing plans and specifications for a building permit?

BY MR. KEARNS:

95 Q. Yes.

A. I don't believe I said that.

96 Q. Okay. Let's just have a look then. You, I think, prepared the overview report talking about designing and building a large construction project? Is that you? Did you prepare --

A. Yes. I and my staff, yes.

97 Q. Okay. On page 10 of that --

A. What page?

98 Q. Page 10 of the overview report, paragraph 43. This is under the section for building permits

A. Oh. They have the discretion if they wish to do that, yes.

99 Q. Sorry?

A. I didn't say that in my presentation. I thought that's what you were saying. I didn't allude to that in my presentation. It's not in our experience a likely thing for them to do, unless they have a question as to the professionalism of the design that is presented to them.

100 Q. Okay. And that's really my question. Is that something that's done from time-to-time in your experience, or is that an option that's there

that is almost never used?

A. I believe it is occasionally used. And I think only the PEO can comment on the frequency with which it happens, but it's an option that the CBO does have.

101 Q. Okay. The next question I had has to do with a statement that you made which was no set of plans is perfect.

A. That's correct.

102 Q. Okay. Tell me what are the reasons for that? What imperfections ought we expect to find in a set of plans?

A. Well, a -- that's a broad question. You can have -- people are human. Humans make errors. Professionals still maker errors. It's about keeping the errors to a small and manageable amount and making sure they're not serious errors. That's what a professional's job is.

So you might have a discrepancy between one drawing on the architectural drawings and a dimension that is given there, and a discrepancy between the similar dimension on a structural set of drawings, or something, so that there was -- there is a clarification required.

Where if the contractor just built it

according to the one set of drawings, the architectural drawings, he would maybe miss something that the structural engineer should have known about.

So there's co-ordination that can be overlooked, or missed, or a mistake made. Those are the types of errors that are common.

You know, it's usually related to dimensions or some other misunderstanding of a detail or something shown inappropriately that requires correlation and was missed.

103 Q. So these plans could often be living documents. They need to be changed and amended and varied from time-to-time?

A. That's correct. But if they're properly prepared in the first place, they are a complete, coherent set which require minor clarifications and tweaking.

104 Q. Thank you. The next question has to do with bonding. Mr. MacRae asked you a bit about bonding and the Commissioner as well asked you about bonding.

What's the purpose of bonding the concrete topping to the precast slabs?

A. Well Coreslab, or the manufacturer of

these precast slabs, would be the ones who were recommending that it be a bonded topping. That's what they wished to have as part of their performance.

105 Q. But as an engineer, is there --

A. Well, there are times when you are looking for what we term "composite action" between the topping and the main body of the concrete, to act -- to help give it additional design strength where you really rely on that bond, but that I do not believe is the case in this instance. So it was a desire to have a tight, uninterrupted adhesion between the new concrete and the existing -- and the concrete core slabs.

106 Q. As an engineer you're not a hundred per cent certain why that would be wanted in these circumstances?

A. I think it's the preference of -- you can design an unbonded topping that still functions correctly. And you have to -- you have to take into account the different factors that would be involved because it's now not expected to be bonded to the top of the slab. So you have to increase the structural capacity of the slab because it might be thicker.

But it's not innately required unless the designer of the system, Coreslab in this instance, said that any topping should be bonded.

107 Q. Okay. And the last thing is if I could have Ms. Kuka pull up Exhibit No.14. Do you have that, Mr. Craig?

A. Yes.

108 Q. It's just not clear to me in this picture. I see the top layer is the topping, the middle layer is the concrete slab, the bottom wavy layer is the insulation?

A. That's correct.

109 Q. Where's the beam that would be --

A. It's not shown.

110 Q. Is it going to be -- whereabouts should it be?

A. Well, it would be somewhere either in the distance beyond where this section is cut or this side of it. You just don't see the beam. The beam -- the top of the beam or the top of the slab -- of the flange, if you see the top of that, would be behind this. It would interrupt the insulation of course because the beam would be spanning this way.

And the slabs -- you'll see the cores in

the slabs are indicating that the slabs are spanning perpendicular to the page.

So that model that I showed indicated that the slabs are supported on one end by a beam and on another end by a beam, and this is a section cut through that slab system in between that location.

111 Q. Thank you very much, that explains it exactly. Thank you, those are my questions.

THE COMMISSIONER: Thank you, Mr. Kearns.

MS. CARR: Good morning, Mr. Commissioner, Mr. Craig.

THE COMMISSIONER: Ms. Carr.

CROSS-EXAMINATION BY MS. CARR:

112 Q. Mr. Craig, my name is Alexandra Carr. I represent two community groups, ELMAC and SAGE in this Inquiry.

And I have one question. If Ms. Kuka could pull up Exhibit No.14 again that we were just on?

Mr. Craig, would you be able to describe -- we were talking earlier about the Peterson waterproofing system. And I'm wondering if you can describe the difference between this system

and a conventional waterproofing system? If there is such a thing as a conventional waterproofing system.

A. Yeah, that's a -- this system by its design relies on the integrity of the topping and the joint system, and the water proofing sealer on the surface to prevent water ingress into the slabs and hence into the structure.

A conventional system would incorporate a waterproofing membrane somewhere in this assembly, either on top of the -- directly on top of the structural slab.

And then you would build up from there with protection layers, or drainage layers, and the surfacing. And that water proofing membrane would serve the function of protecting against water ingress into the structure and into the inside of the occupancy.

113 Q. Thank you.

THE COMMISSIONER: You've used the expression Peterson System. There are other systems obviously. Can you give us a couple of examples?

THE WITNESS: As far as I know this was a relatively unique system that came into -- that was being promoted at the time -- around this time

and previous for toppings on parking garages. And I believe that this system was proposed for this situation which enclosed an occupied structure and probably was getting to its limits, or testing its ability in a more serious situation because now you have any leakage that's unintended gets right through it.

But I do not know of other systems that were intended to rely on the concrete topping and a jointing system with sealant in the joints, and a sealer on the surface, to act as the waterproofing system over an occupied area. I don't know of any others.

THE COMMISSIONER: What would you see today?

THE WITNESS: What I just described. I would expect that you would have a sound sloped structural system that was clearly sloped to drains; a water proofing membrane with appropriate flashings for any penetration curbs, etc; something to protect the waterproofing membrane from physical damage during construction; and then drainage, and insulation, and a wear course that again was sloped to the drains.

And you would expect drains that drained

at the surface and at the membrane level to ensure that water on the surface, the bulk of the water, would be deflected to drains and run off.

And any water that got through the wear course or topping system would get into a drainage layer and then be able to find its way into a drainage system and protect against unintentional penetration.

THE COMMISSIONER: And is there a name to that?

THE WITNESS: No. There are numerous compounds that can be used for the waterproofing membrane.

In fact in a pure garage where you don't require insulation, often you've got what they're now calling traffic bearing systems, which are layers of urethane coating, or other elastomeric material with a wear core, a wearing surface on the top of them that are applied directly to the sloped concrete structure. And it simply protects it against penetration of chlorides and water through to the cars and other areas of the garage.

If that's over top of a lived-in area, it becomes more problematic because now you don't have insulation, so you then have to go to

something like I described where a system is built up.

THE COMMISSIONER: I suppose by -- the only reason for my question is you're describing a Peterson System. Is there another system that has a name that is in common use? For instance, is there a Bélanger System?

THE WITNESS: No, not that I'm aware. This was the only one I've come across in my experience.

THE COMMISSIONER: All right, thank you. Anyone else have questions of Mr. Craig? Mr. Carr-Harris, in reply?

MR. CARR-HARRIS: No further follow-up questions.

THE COMMISSIONER: Thank you very much, Mr. Craig. We may see you later on.

THE WITNESS: Thank you.

THE COMMISSIONER: Mr. Carr-Harris.

MR. CARR-HARRIS: Mr. Commissioner, Mr. Craig is our last witness of the day.

THE COMMISSIONER: We will rise until 9:30 tomorrow morning.

--- Whereupon the Inquiry proceedings adjourned for the day at 11:35 a.m.

REPORTER'S CERTIFICATE

I, HELEN MARTINEAU, CSR, Certified Shorthand Reporter, certify;

That the foregoing proceedings were taken before me at the time and place therein set forth;

That the testimony of the witness and all objections made at the time of the examination were recorded stenographically by me and were thereafter transcribed;

That the foregoing is a true and accurate transcript of my shorthand notes so taken.

Dated this 10th day of March 2013.

Helen Martineau

PER: Helen Martineau

Certified Shorthand Reporter

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