



Making / Designing Buildings: From the Rustic Hut to the 21st Century

Arch 172: Building Construction 1



How do I become an Architect?

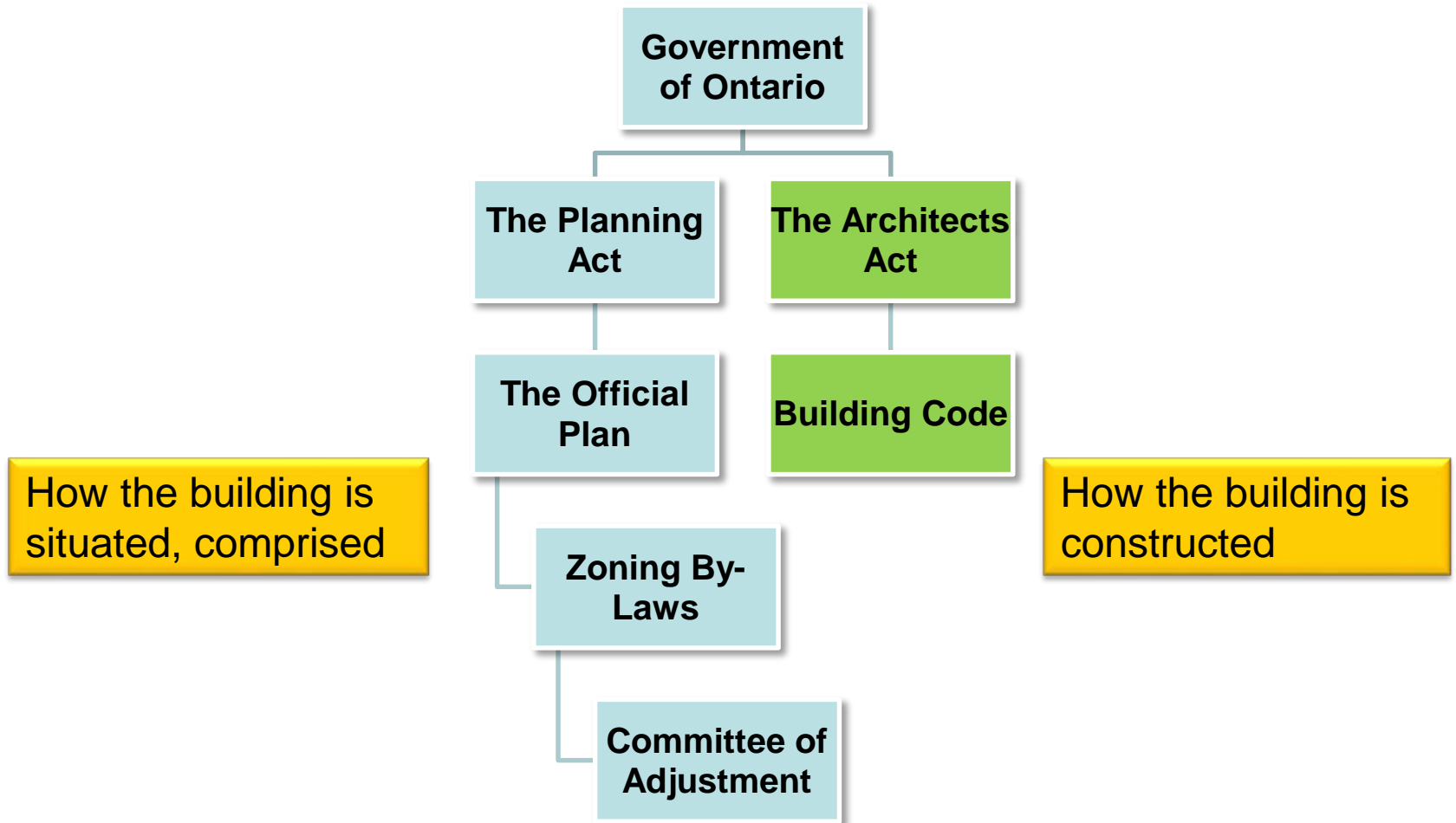
- Obtain professional degree in architecture
 - 4 year Pre-Professional BAS +
 - Professional Master of Architecture degrees
- Register with the Ontario Association of Architects so that you can “log time”
- Pass NCARB registration exams + OAA exams
- Log approximately 2 years of “work experience” in specific categories

What laws govern us?

- Architect's Act (anything under 600m² or 4 storeys does not require our input)
- An Architect must be registered and carry liability insurance to be able to practice
- Our governing body is the Ontario Association of Architects
- Each political area (province, state, country) has their own local authority that prevents “others” from outside from practicing without liaising with a local firm



What laws govern our buildings?



The Official Plan:

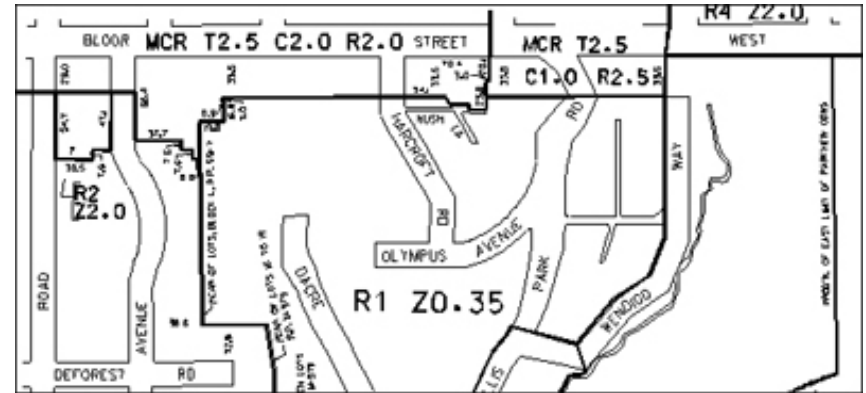
- This document sets out high level ideals of what the city should “be”
- Defines areas of use and relationships
- Dedicates certain zones of the city for parks, ravines, recreation, business or residential use
- Comprised of texts, maps and pictures
- “overrules” the Zoning By-law



The Zoning By-Law

- Takes the general issues as set out by the Official Plan and gives them more specifically
- A zoning bylaw contains provisions that regulate the
 - use,
 - size,
 - height,
 - density and
 - location of buildings on properties within the City.

The basic purpose of a zoning bylaw is to regulate what you can build and how big the building can be on a property. A typical zoning bylaw maps out the zones which show how the property can be used. That is, the property can be used for various land uses that range from residential to commercial to industrial and a whole host of other land uses.



This typical zoning map shows the zoning for property. The zone with symbols R1 Z0.35, indicate that the property is zoned Residential District (R1) at a density ratio of Z0.35 (floor area divided by lot area)

Zoning By-Law Details:

Zoning bylaws have 3 basic components:

- **maps:** number of storeys or metres are the most common feature of any zoning bylaw since they indicate where particular standards apply
- **words:** which form a kind of "language" unique to each bylaw
- **numbers:** can establish;
 - the size of a building, often expressed in floor area or density ratio such as the Floor Space Index
 - the height of the building in storeys or metres
 - the setbacks determine how far back the building must be from the front, side and back of the property line
 - the amount of parking spaces or landscaped space to be provided

Toronto Zoning By-law

- Likely one of the most comprehensive in Southern Ontario – contentious due to the amalgamation of the boroughs into one mega city.
- <http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=2a8a036318061410VgnVCM10000071d60f89RCRD>
- Big step forward putting all of the info online with an interactive map

Search by Name, Address, or Intersection

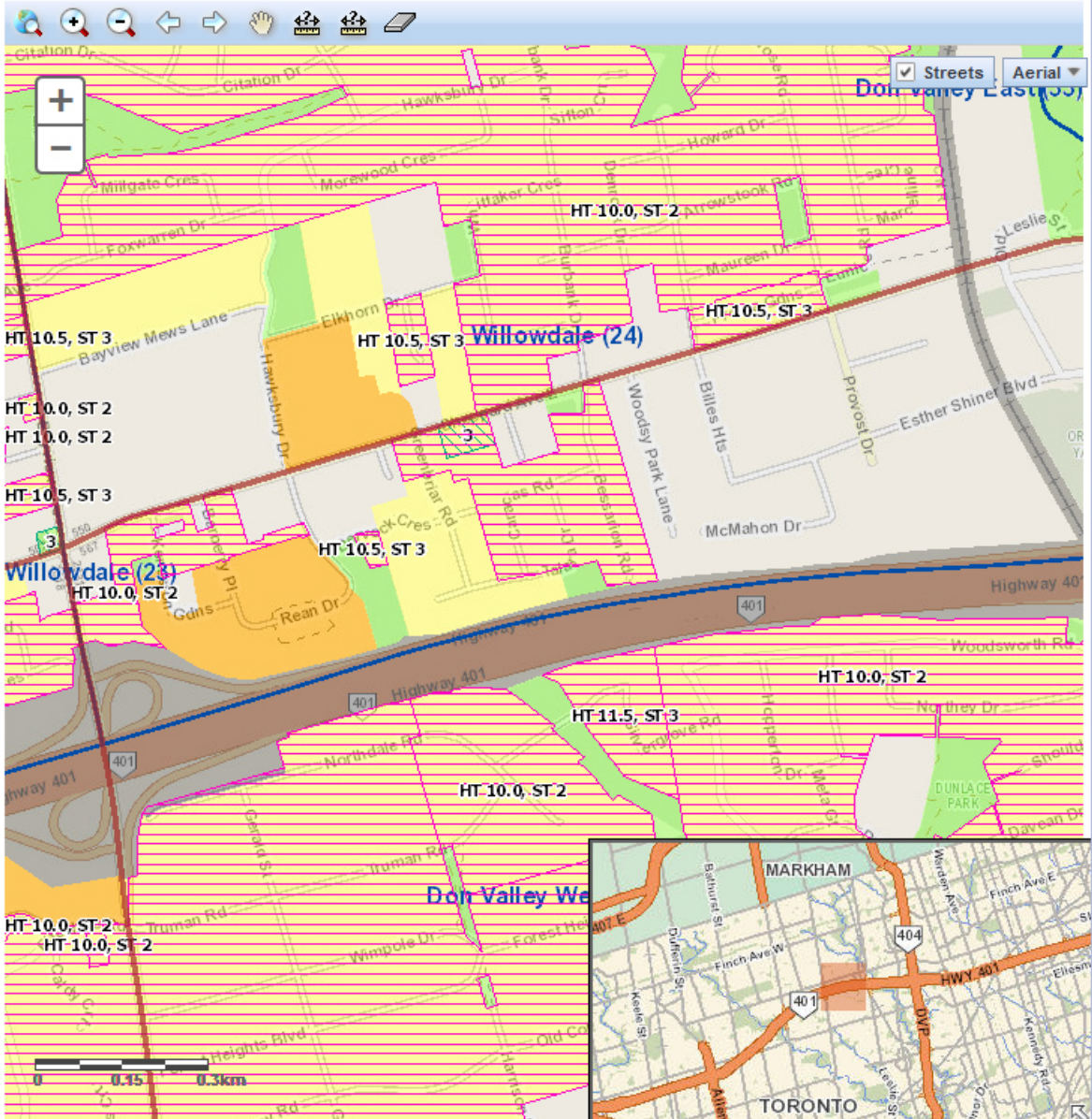
Legend

Zoning Map

Click once on property for zoning information

- City Ward
- Zone Categories
- Overlay Layers
 - For best results, uncheck Zone Categories layer and only check one overlay layer at a time.
 - Height
 - Lot Coverage
 - Policy Area
 - Rooming House - See Chapter 150.25
 - Major Street

Zoning Map



Aesthetic issues with height: Look at limits –
 10.0m 2 storey
 10.5m 3 storey
 11.5m 3 storey
 What does this do to the shape of a building with increased floor to floor heights?

The unintended consequences of zoning regulations



New house with taller floor to floor heights

Older house with less pretentious floor to floor heights





Square watermelon house results when floor to floor heights push to the limit of the legal height allowed by old laws that have not adapted to new desires.

Committee of Adjustment:

- If your proposal for building slightly exceeds or does not follow the requirements of the Zoning By-law, you can apply to this committee for a variation to the law
- Will only approve variations if minor
- Neighbours can voice their opinions for or against the proposal
- Can take several months to process
- Cannot get a Building Permit until Zoning requirements for a project are satisfied

Ontario Municipal Board:

- If proposal is rejected by the Committee of Adjustment you can appeal to this Board for the variance
- Can take a long time...
- Would seem to be more rejected than accepted applications
- Beyond this, an Act of Parliament is necessary to permit the building/variation (last resort...)



Original Proposal: 3 towers



Revised Proposal: 2 towers

Gehry Towers in Toronto, long haul, many changes to get design approved:

"Today's decision by Council was obviously a necessary step in this lengthy process," says Mirvish Enterprises' David Mirvish. "While we believe today's vote was first and foremost an endorsement of our vision for the site, lead by our architect [Frank Gehry](#), we also believe that it is a clear endorsement of the city's development process and staff's demand for consultation and collaboration among the stakeholders. Through an iterative process, a myriad of ideas were considered leading to a better project, and we are pleased that today, City Council agreed."

<http://www.theglobeandmail.com/life/home-and-garden/architecture/with-forced-mirvish-gehy-rejig-toronto-squanders-a-rare-opportunity/article19000701/>

Ontario Building Code:

- This legal document primarily addresses life safety and structural safety issues
- It is a set of **MINIMUM** standards for building performance
- No variations are permitted
- Looks at materials, exiting, energy efficiency, occupancy, space/room standards, ventilation, insulation



What does an Architect do?

- Potentially a wide variety of activities as a function of the economy
- Design buildings
- Build buildings
- Green building consultation
- Create larger “developments”
- Master planning
- Interior design



Daniel Libeskind, Design Architect of the ROM

What are the “tasks”?

- Conducting background research
- Verify that the project adheres to “the rules”
- Creating design sketches
- Creating formal design drawings
- Rendering of perspectives and views, model making
- Creation of contract drawings (for construction)
- Writing of specifications
- Attend meetings
- Construction review



The Parts of an Architectural Project:

- Initial feasibility study (not always)
- Preliminary design (sketch phase)
 - Check Official Plan
 - Check Zoning By-law
 - Check Building Code
- Design development (detailed development of proposal – more material and dimensionally specific)

...Parts of an Architectural Project

- Contract documents
 - Construction drawings (these include materials, dimensions, notes to allow someone to build the building); including plans, sections, elevations, enlarged details
 - Specifications (these are the written supplement to the drawings and are very specific with respect to performance of materials)

...Parts of an Architectural Project

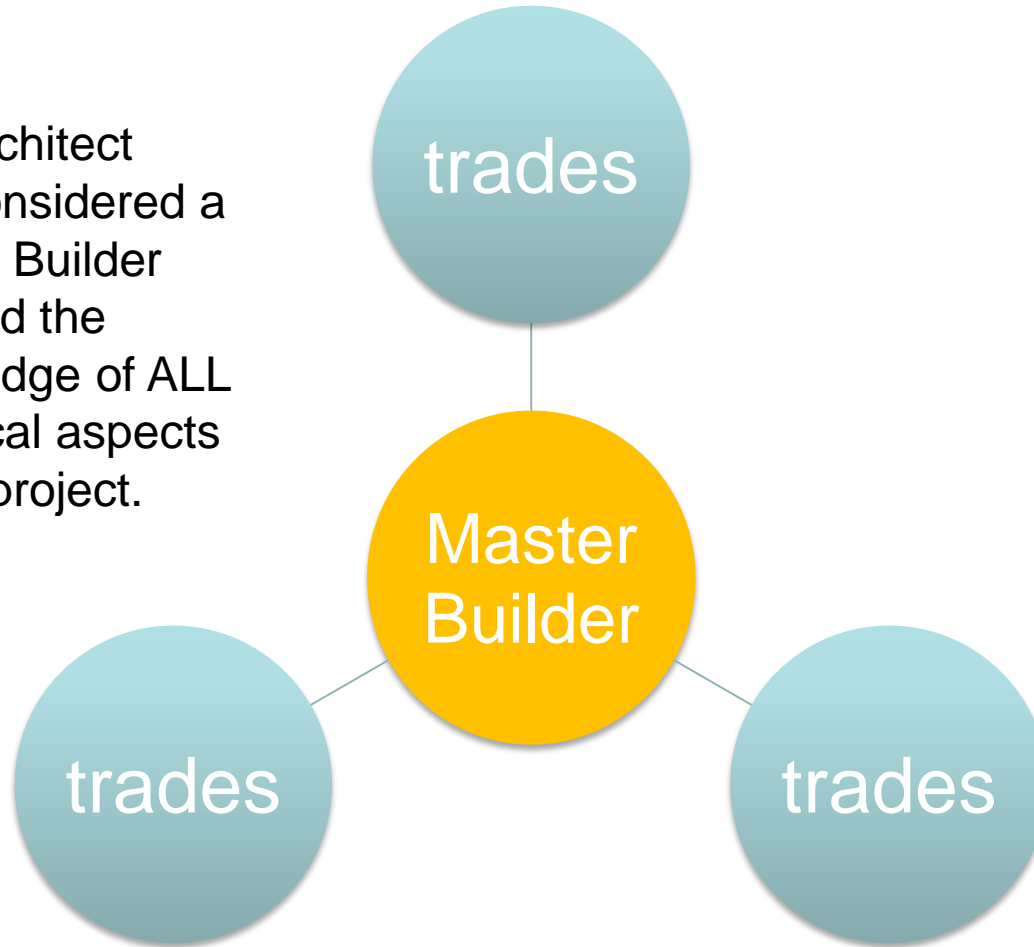
- Bid or Tender Process (getting prices for the job)
- Award of the Contract
- Construction/Contract Administration
 - This will include regular meetings and on site review of the progress of the project
 - Modifications and change orders
 - A lot of paperwork
 - Final review of the project before occupancy

How is the fee divided?

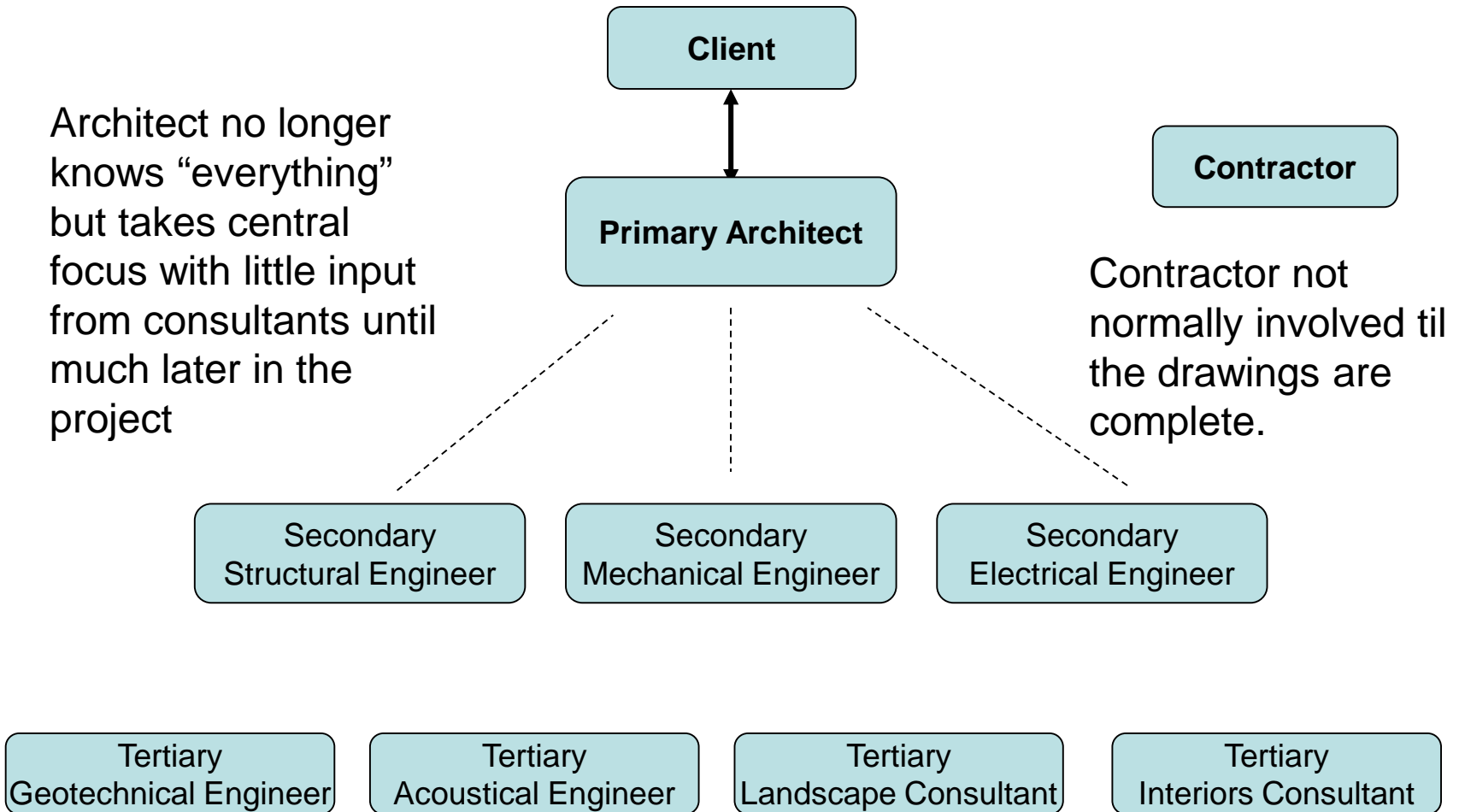
- Pre-Design (approx. 10%)
 - Design Development (approx. 25%)
 - Contract Drawings (approx. 40%)
 - Construction Administration (approx. 25%)
-
- This would be considered “ideal” – most projects use more than the allotted 25% in the “Design” phase
 - The fee must pay the Architect and all involved in the creation of the contract documents for the building
 - Normally a percentage of the cost of construction

Pre-Industrial Era Design Process:

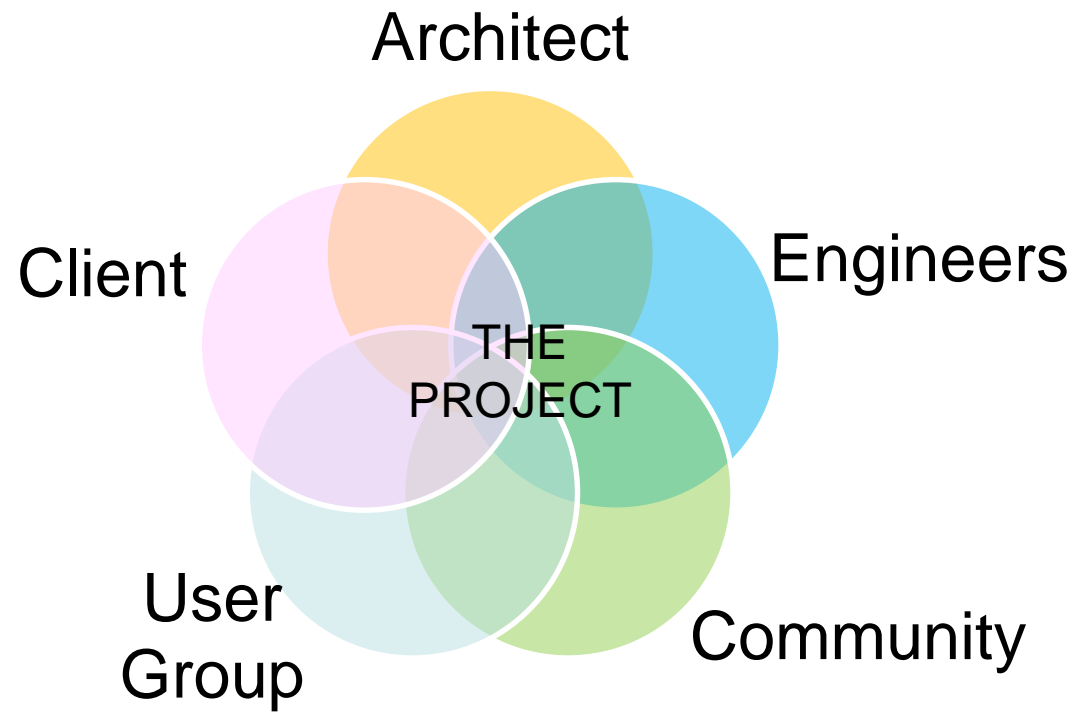
The Architect was considered a Master Builder and had the knowledge of ALL technical aspects of the project.



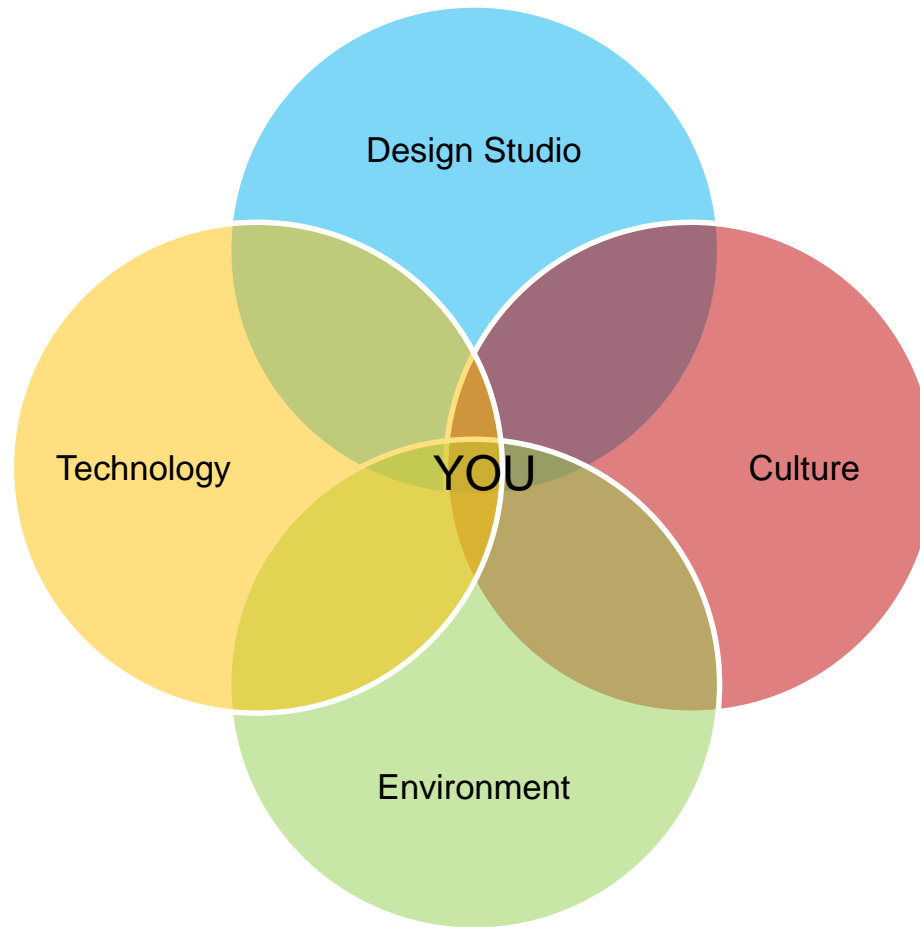
Traditional Modern Design Process:



Integrated Design Process Structure:



UWSA Curriculum



Communication:

- There are different types of methods of communication that are suited to different phases of the development of the ideas and the project
 - Drawings – by hand or by computer
 - Models – by hand or by computer
 - Words – letters, specifications, reports

Drawings: Sketches

Sketches are quick hand drawings to convey the “concept”.

Roughly to scale.

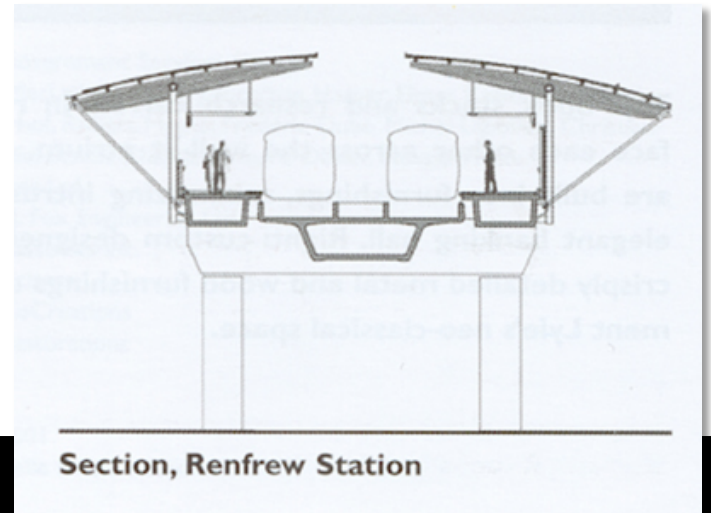
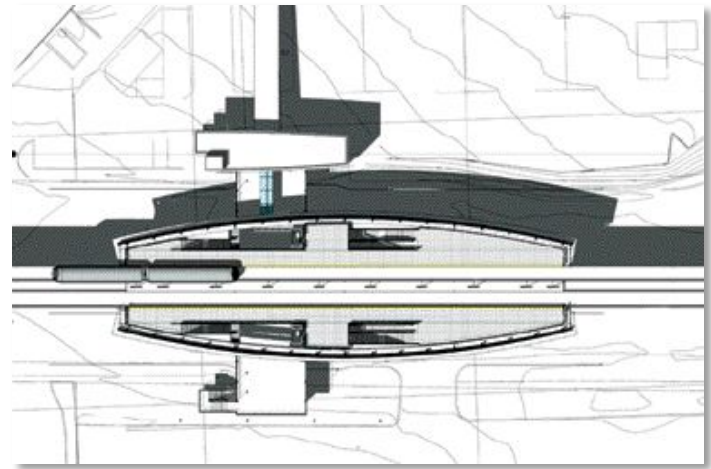
Daniel Libeskind’s *classic* Napkin Sketch for the Addition to the Royal Ontario Museum in Toronto.



Design Drawings

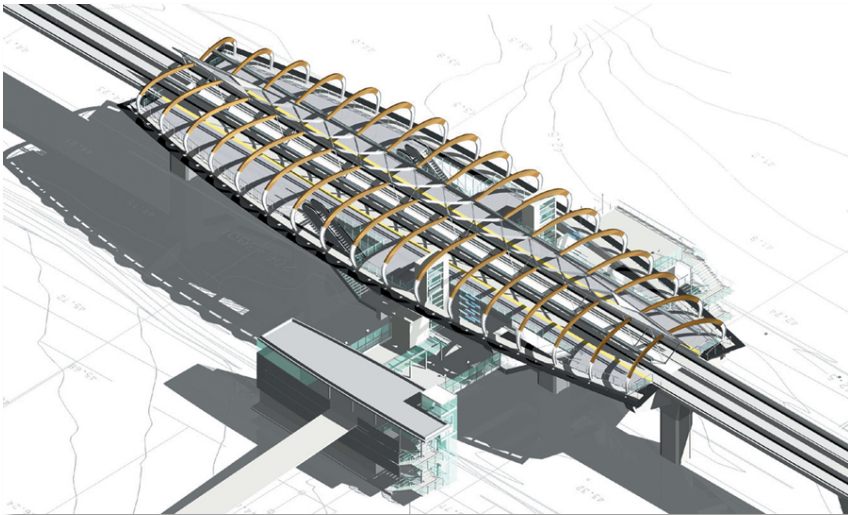
Design drawings show the building in more detail, with accurate sizes, but with minimal technical information.

They usually have a sense of materiality and reflect the actual scale and physical location of the project.

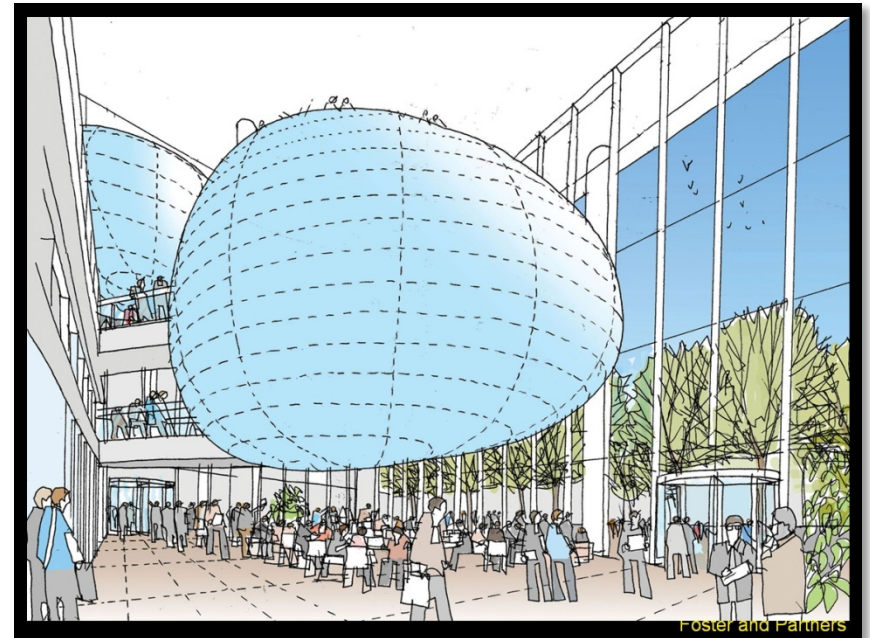


Renderings:

Renderings whether done by computer or by hand give us a 3-D feel of the finished building.



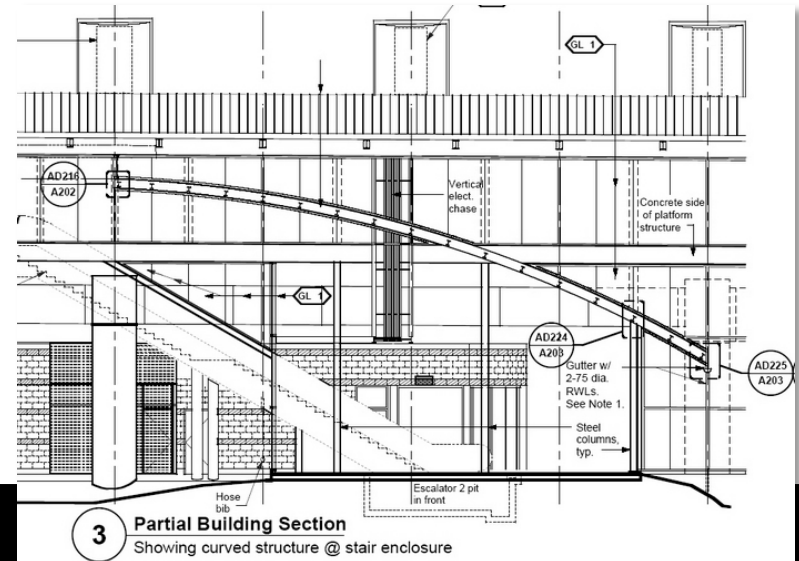
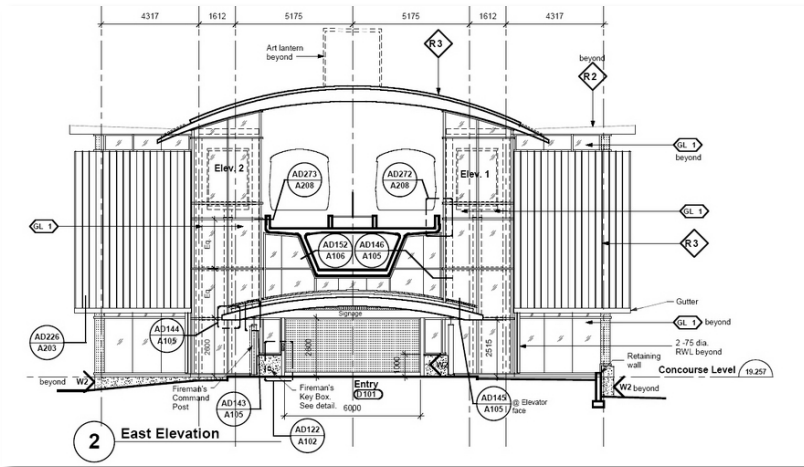
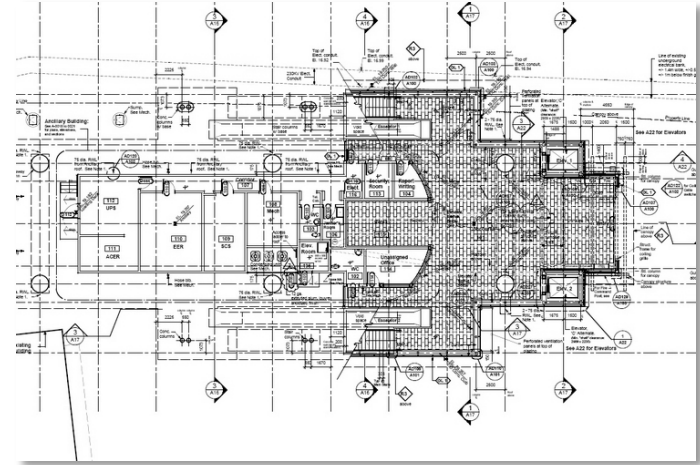
Brentwood Skytrain Station: Busby



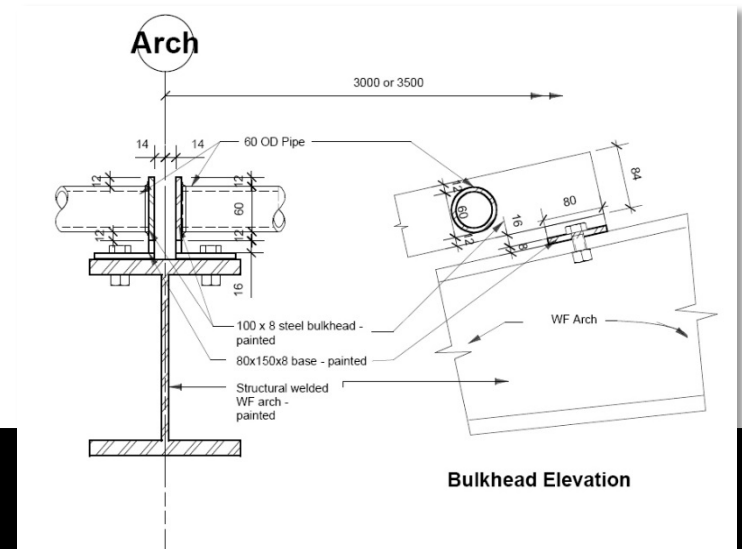
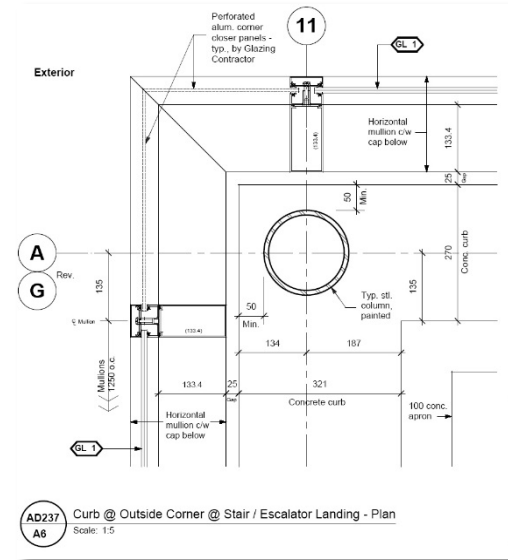
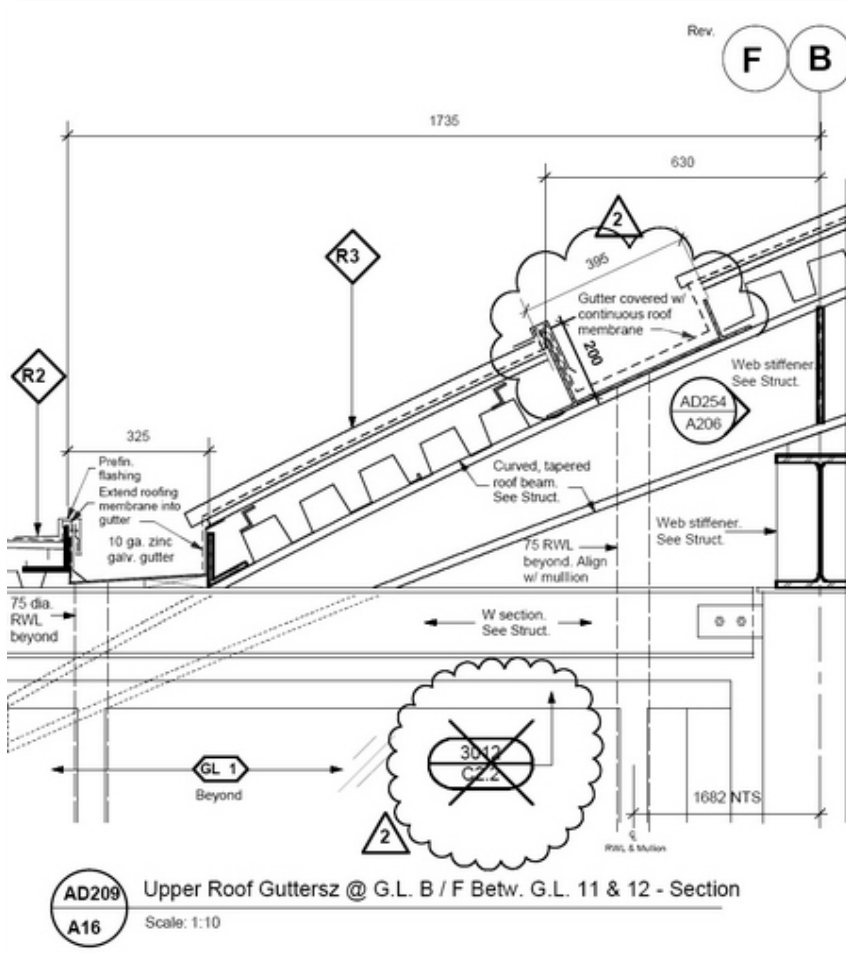
Leslie Dan Pharmacy Building: Foster

Contract Drawings:

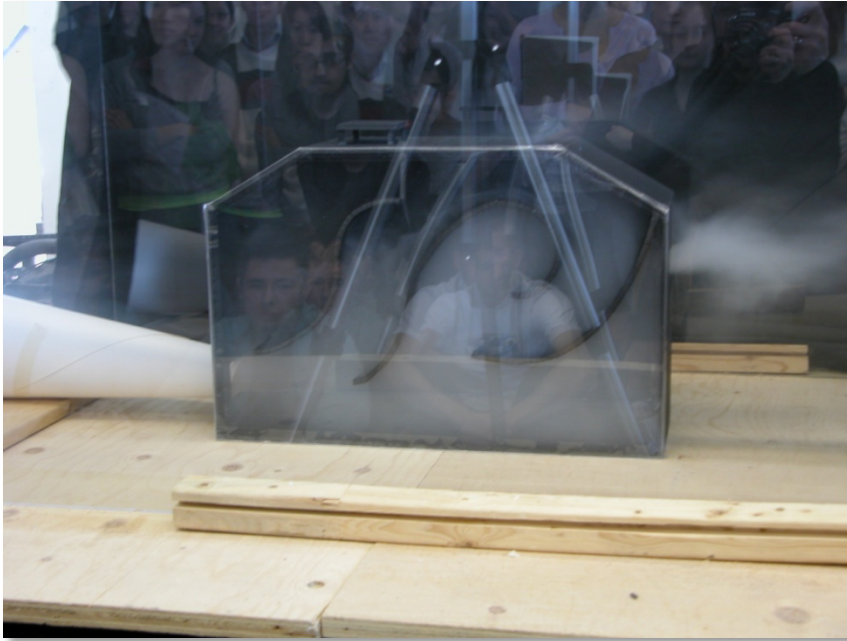
As these form the legal agreement to construct, they are loaded with technical information.



Construction Details:



Rough / test models:



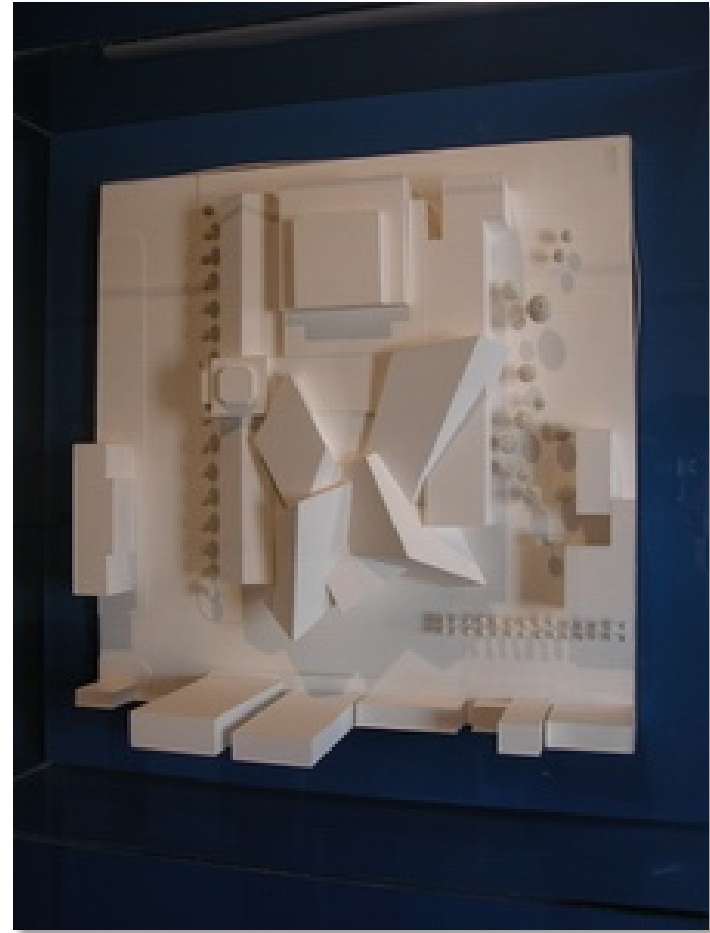
We can make models to understand how a building works for wind and sunlight, or simply to establish “massing”.



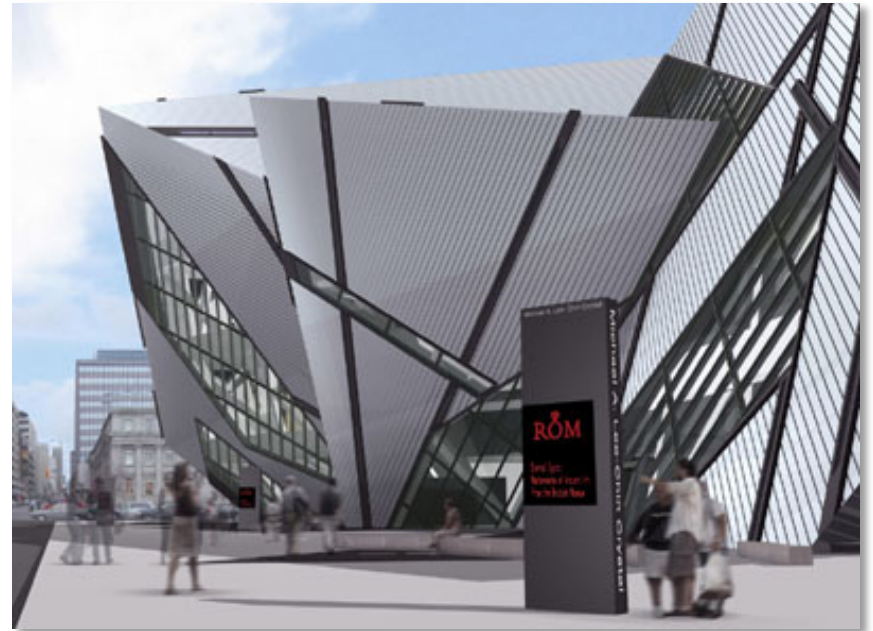
Massing Models:

These models are used to see how the general shape of the building works; orientation, sun access, relationships

Massing model of the ROM showing its relationship to the original building

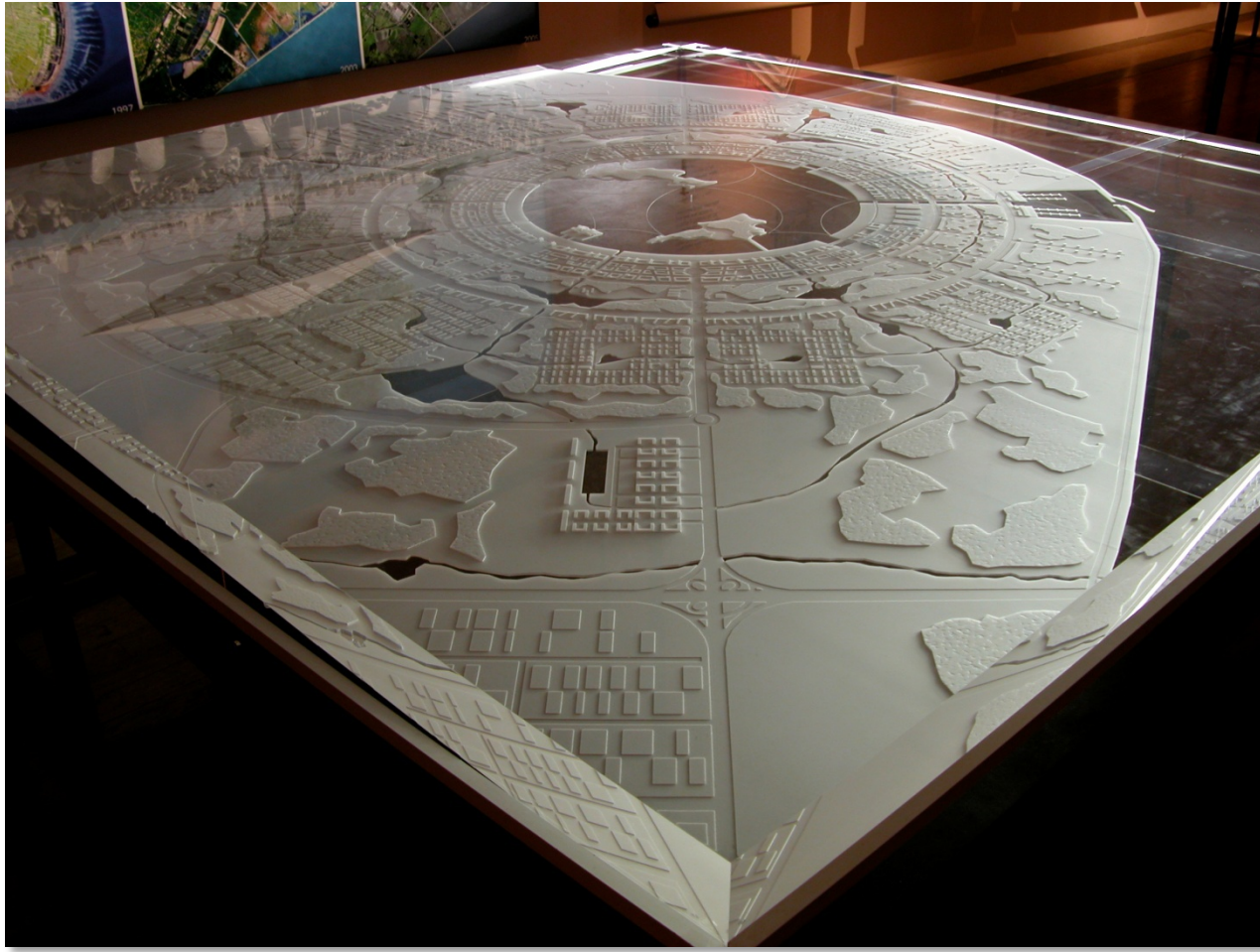


Detailed models



The architect might also supply detailed models that can give the client or user group a better feel for the finished building. These can be physical or computer created.

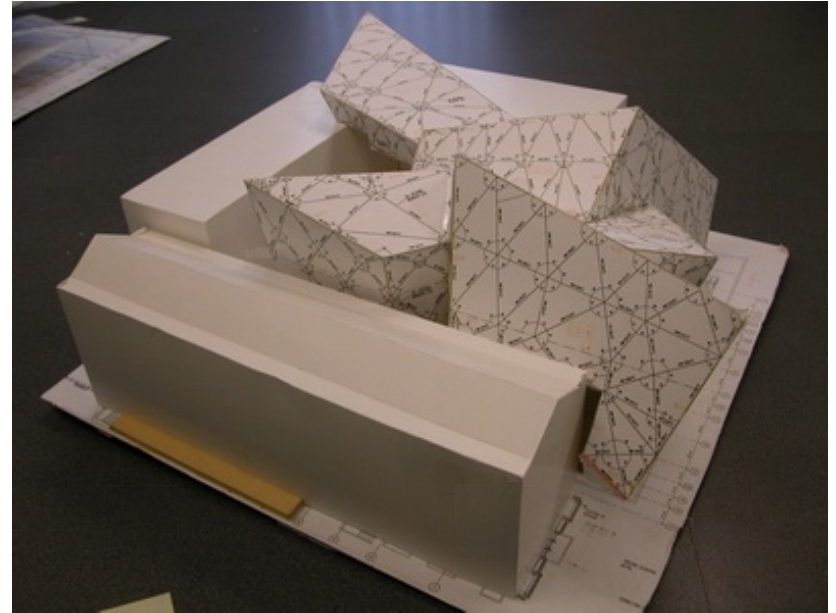
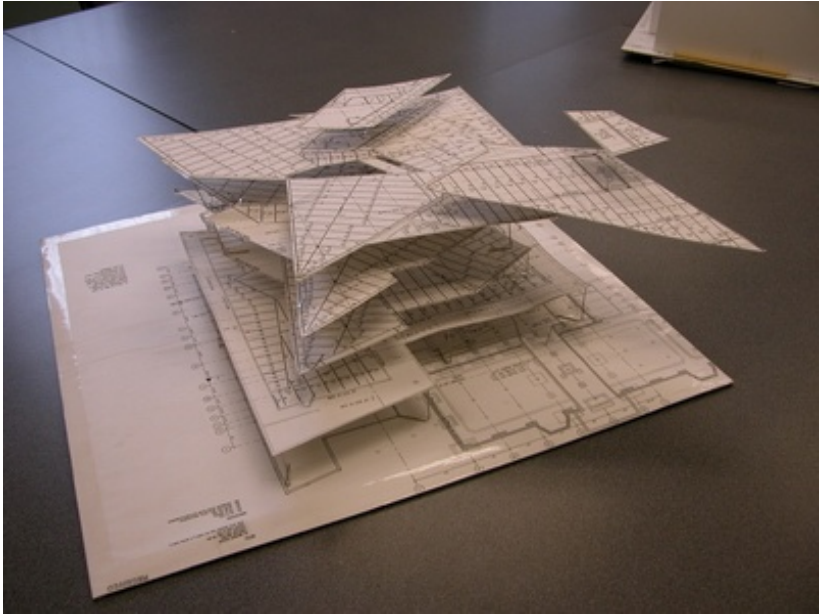
Urban scale model:



Multi-media presentations:

Computers can allow us to create experiential sequences to enable the visualization of the completed work.

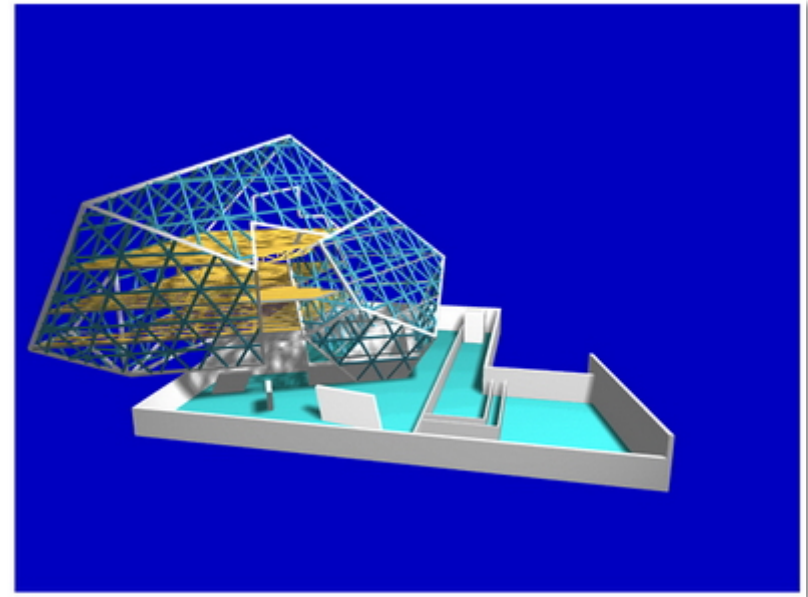
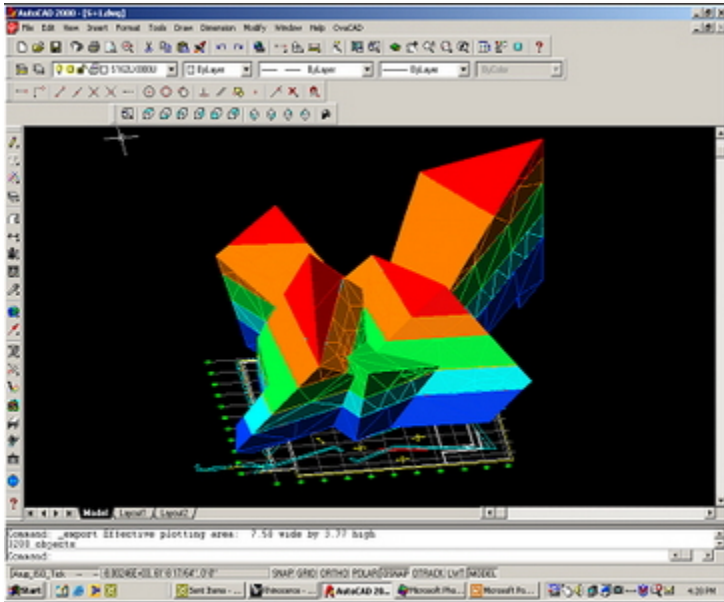
Structural Models:



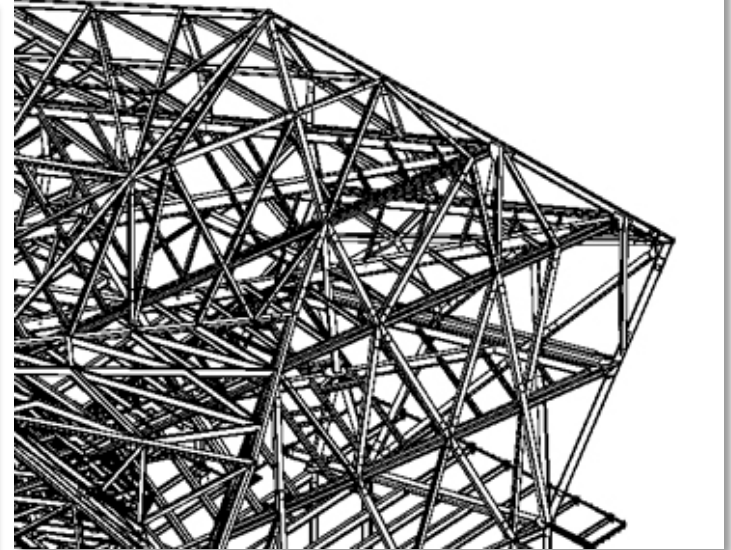
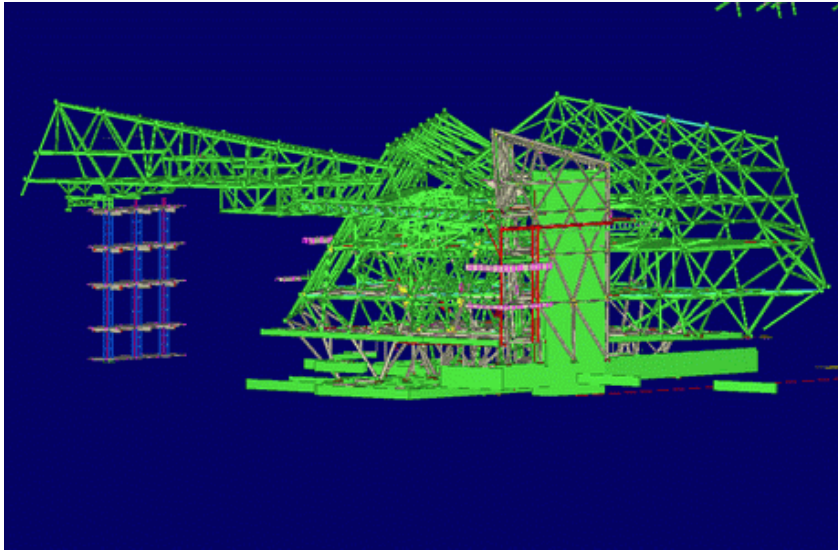
The engineers and fabricators might also make rough models to see how things like the framing are working. The steel diagrid used in the ROM required many different ways to understand its 3-D nature and construction detailing.

Structural computer models

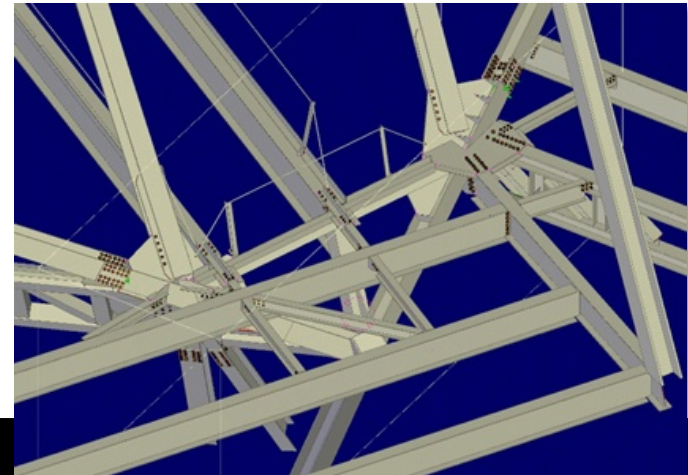
These were done by the structural engineers to look at the relationships of the ROM crystals.

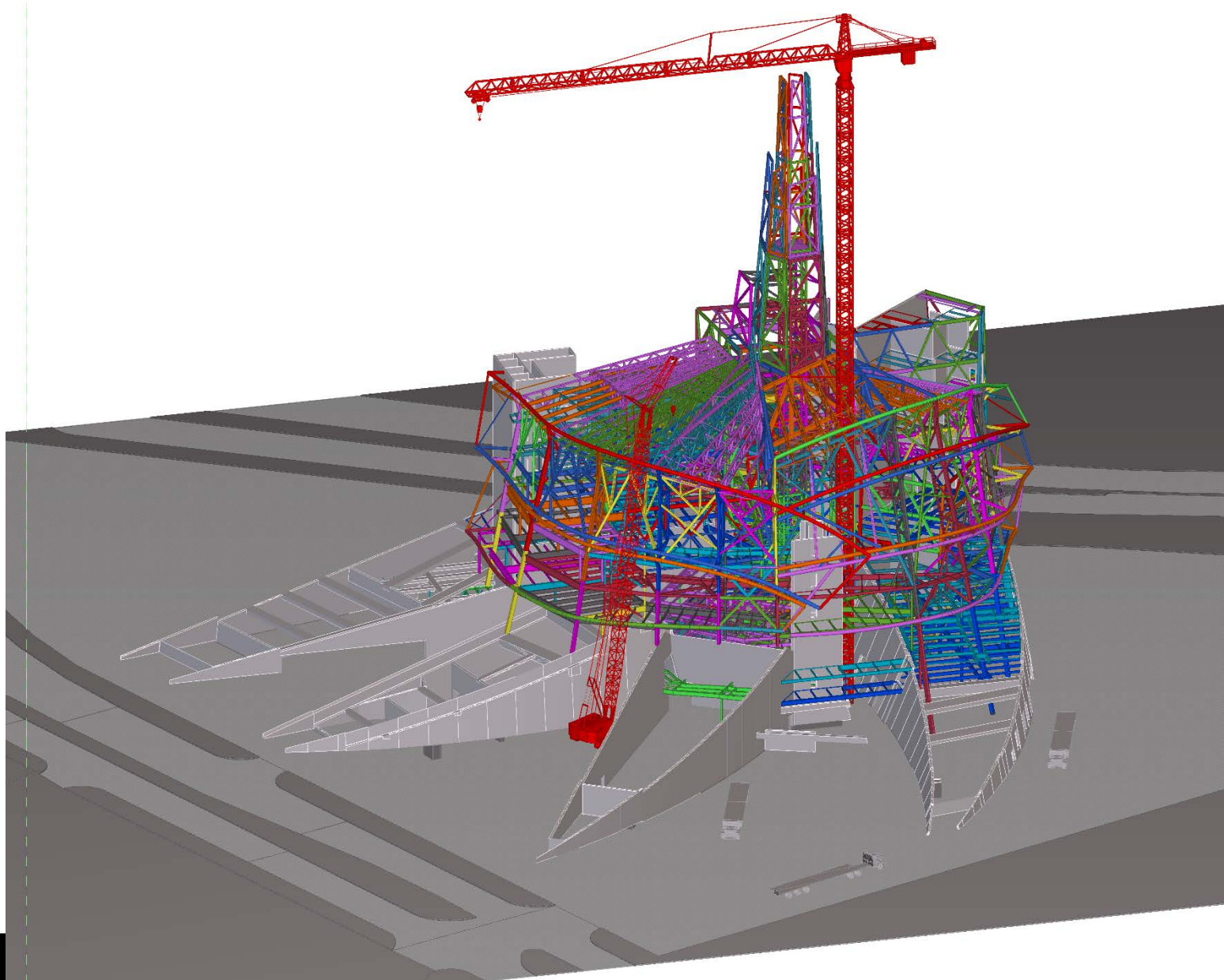


Fabrication modelling:



If the project has a complex structure, the fabricators of various components might also need to be more involved in the design and detailing process.





- Not all projects are developed to the same level of detail, nor use all types of communication methods.
- The scale / size / scope of the project will greatly affect what methods are used, as will the cost and the amount of fees paid to the design team.
- The region / location / history and local practices of the project will greatly affect the way work is carried out.