Leadership in Sustainable Infrastructure
*Leadership en Infrastructures Durables*

Vancouver, Canada
May 31 – June 3, 2017/ *Mai 31 – Juin 3, 2017*

# EVALUATION OF TALL BUILDING CONSTRUCTION PERMITTING PROCESS IN TORONTO

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**ABSTRACT:**

The City of Toronto is one of the fastest growing municipalities in North America, attracting many developers to invest in its physical growth. As the major employment centre and surrounded by the contiguous cities that comprise the Greater Toronto area, downtown Toronto has no option to grow except upwards in the form of mixed-use tall buildings. The rapid increase in construction of tall buildings all over the city raises concerns among city planners, architects, engineers, and citizens about the way in which the city grows. To prevent undesirable or incompatible developments in the city, there have been numerous policies and regulations imposed. These, coupled with complex processing practices, have resulted in significant and increasing delays in the processing of new applications for the construction of tall buildings. These delays have slowed the supply of new units to the market and resulted in enormous opportunity costs for the City. In this research, detailed information for 174 towers in the City of Toronto are collected and their permitting process evaluated. A number of challenges with the current system are identified and recommendations for improvement are provided. Finally, a Bayesian Network is developed to assess the probability of a new building proposal being rejected at the City Council and having to appeal to Ontario Municipal Board for approval, based on a number of proposal characteristics.

Keywords: Tall Buildings; Construction Permits; Zoning Bylaw; Bayesian Networks; City of Toronto; Ontario Municipal Board

## 1 INTRODUCTION

With growing populations in major cities around the globe, municipalities are implementing new policies to avoid urban dispersion and sprawl. Intensification and gentrification in the form of mixed use tall buildings is the new trend in community transformations all over the world (Rosen 2014; Scott 2011). Mixed use tall buildings in dense urban centers are transit-oriented, providing a promising solution for sustainable development of major urban cores. Compared to the same number of households living in lower density neighbourhoods, high-rise living provides a larger number of households with access to public transit while reducing the cost of municipal services.

City of Toronto is the largest urban centre in Canada, and the fourth largest urban area in North America (Toronto Foundation 2016). Toronto houses 8% of Canada's total population, while 18% of all Canadians live in the Greater Toronto Area (Census Canada 2011). The rate of population growth in the city is on the rise and therefore the demand for housing has consistently increased over the last decade. This has resulted in a very competitive housing market, which has in turn dramatically decreased the affordability of housing across the city (Toronto Real Estate Board 2016). Unique geographic features have further reduced the lands available for new development (Siaz 2010). Although most of the city is covered with low-rise and single family dwelling units (Toronto Official Plan 2002), the densification developments that are needed to accommodate the physical growth of the city face numerous challenges.

This research investigates the challenges that exist at the municipal and provincial levels for issuing building permits, specifically for residential towers within the City of Toronto. For the purposes of this research, a tall building is defined as a building with more than 12 stories, based on definitions offered by Tall Building Design Guidelines (TBDG 2013). In this paper, a summary of the existing permitting process in the City of Toronto is provided, followed by some of the challenges that exist and recommendations to address these challenges. To provide an objective evaluation of the current permitting process, a database was developed and populated with data on 174 residential towers in Toronto. The data include the number of floors, number of units, overall height of each building, submission date for the Official Plan and Zoning Bylaw amendment application, rezoning approval authority (Ontario Municipal Board (OMB) or City Council), the reason for the appeal to OMB (where applicable), the OMB decision date, and, the approval date for the Official Plan and Zoning Bylaw amendment. The name of the developer, architect, the start and completion dates of construction (where applicable), and energy performance category were also collected, but not used in the analysis reported. This paper also presents preliminary results of a Bayesian Network model that was developed to assess the probability that a building permit application would be rejected at the City Council and therefore need to appeal to the Ontario Municipal Board.

## 2 PERMITTING PROCESS IN CITY OF TORONTO

Obtaining necessary permits to construct a residential building in Ontario, and particularly within the limits of the City of Toronto, is a complex undertaking as there are numerous regulations that affect the permitting process. This section provides a brief overview of the permitting process for a building in City of Toronto.

As Figure 1 illustrates, upon the completion of drawings and application forms, the application is reviewed for compliance with the Ontario Municipal Code, Zoning Bylaws, and all other applicable laws. The review of the Zoning Bylaw is one of the challenging aspects of the process, as the Zoning Bylaw map is not updated regularly. Therefore, most of the new proposals are not in compliance with the existing Official Plan and Zoning Bylaws. In these cases, an application for Official Plan and/or Zoning Bylaw amendment needs to be submitted for approval by City Council. A number of other applications including "plan of subdivision", "site plan control" and "part lot control exemption", also known as STAR applications, may be required.

For reviewing the Rezoning applications, a pre-consultation with city planners at one of the four civic centres is strongly advised. After the pre-consultation session, a complete Official Plan and/or Zoning Bylaw amendment application is submitted to the building division. The new proposal is then concurrently circulated to the applicable city departments, to some external agencies, such as school boards and energy providers, as well as the community council to get their feedback. The feedback is returned to the developer, who must then address all of the comments in their design. The application is revised, resubmitted, and re-evaluated at the City. A public meeting is also held at community council before the City Council will make a decision about the proposal.

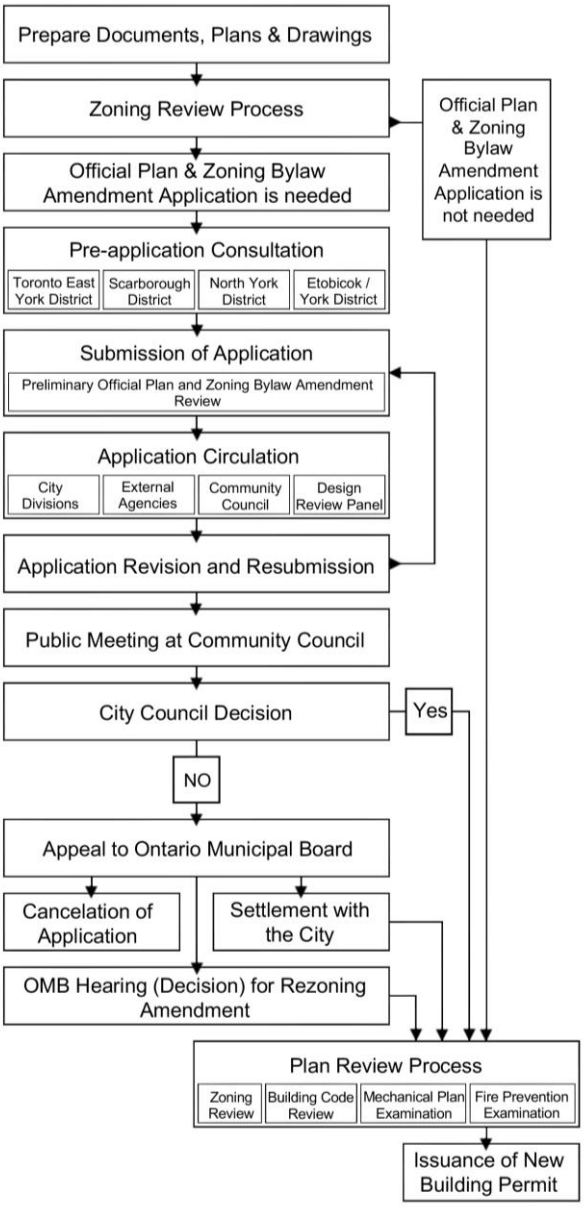


Figure 1: Steps for reviewing of new proposals in City of Toronto

To move forward, each proposal has to get final approval from City Council. The City has nine months to review the applications and provide the applicant with its decision. If the City refuses the application or does not provide a decision within that time frame, the applicant has the right to appeal to the Ontario Municipal Board (OMB) and seek the rezoning approval from this tribunal. The OMB was created in 1906 for the purpose of supervising the rail transportation system and financial affairs of municipalities in Ontario, and in 2005 after the enactment of the Planning and Conservation Land Statute Law Amendment Act (Bill 51 2005), became a provincial planning authority.

The above procedure has a number of challenges, produces conflict, and results in extended delays in the permitting process. The following section highlights some of these challenges and offers recommendations to improve the current practices.

## 3 CHALLENGES WITH CURRENT SYSTEM

The data collected for the 174 towers in the City of Toronto clearly show that the time it takes for applications to receive their Official Plan and/or Zoning Bylaw Amendment approvals has increased substantially over the last decade. Figure 2 shows that the average rezoning approval was less than a year in 2006 but it has gone up to more than three years in 2016. There are a number of factors that have contributed to this tremendous increase in the average approval time, some of which include inconsistent evaluation of proposals at City Council, prescriptive regulations at both the provincial and municipal levels, and inefficiencies in the current processes.

### 3.1 City Council versus Ontario Municipal Board

OMB has long been criticized for overturning the City's decisions and allowing uncontrolled growth within the City (Matlow 2016). The data confirms that the number of successful appeals to OMB are on the rise. As shown in Figure 3, in 2013 only 20% of all successful proposals came from OMB, but in 2016, 70% of all proposals approved in that year came from OMB and only 30% were approved at City Council.

The City, however, published a report in September 2016 that indicated 83 percent of new residential developments are proposed in areas targeted for growth by Toronto's Official Plan (City of Toronto 2016). This means that even though 70% of the successful tall building permits had to appeal to OMB to receive their permit, 83% of all permits were in fact consistent with City's Official Plan.

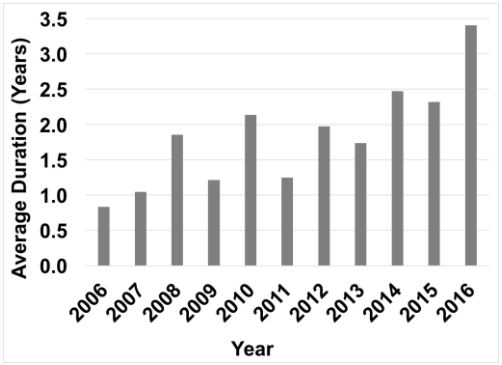


Figure 2: Average Rezoning Duration for Tall Buildings in City of Toronto

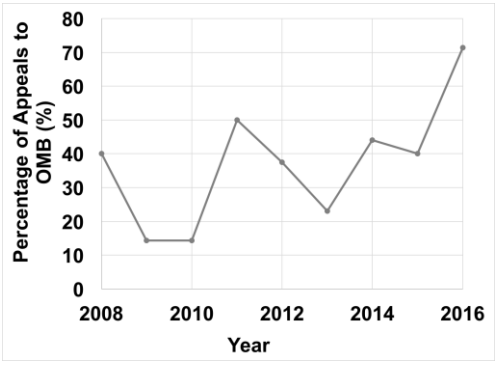


Figure 3: Percent of approvals that came from OMB by year

Further evaluation of the reasons for appeal of each case to OMB showed that 42% of the towers that successfully appealed to OMB indicated that the "failure of the City to announce a decision" was their reason to appeal. Although the City has nine months to respond with rezoning decisions, Figure 2 illustrates that the average rezoning application in 2016 took more than three years. Therefore, a large number of applications would go to OMB, just because the City was not able to respond to their application in time. However, this causes a number of challenges for both the City and the province. First, the City loses its influence to control what will and will not be built. The OMB, which is a provincial entity, needs to step-in and make decisions that the City and its residents would have to live with. This also creates a number of challenges for the developers. The applications that get approved at City Council from 2006 to 2016 take on average just less than two years (1.85 yrs) and those that get approved at OMB take approximately 2.5 years (Figure 4). So, by forcing more applications to go to OMB, the average duration of rezoning applications increases. This observation is consistent with the trend shown in Figure 3, where, as the number of OMB applications have gone up in 2016, so did the average duration of the rezoning applications.

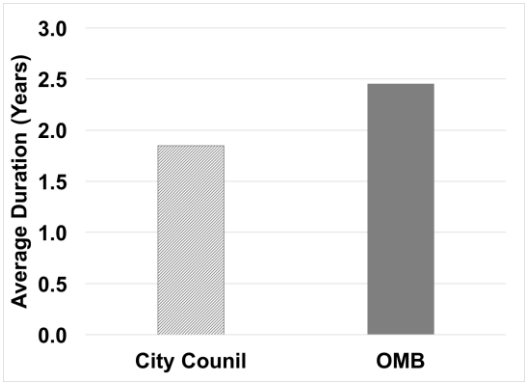


Figure 3: Average Rezoning Duration at City Council vs. OMB from 2006 to 2016

Figure 5 summarizes the breakdown of rezoning application durations for both OMB and City Council between 2006 and 2016. Figure 5.a shows that only 16% of all applications were able to get approved in less than one year, even though the goal of the City Council is to make a decision on all applications within nine months. It also shows that 35% of all applications take more two years. The breakdown in Figure 5.b shows that more than 44% of all applications that go to OMB take more than two years, which is a contributing factor to the total average of rezoning applications having a much longer duration.

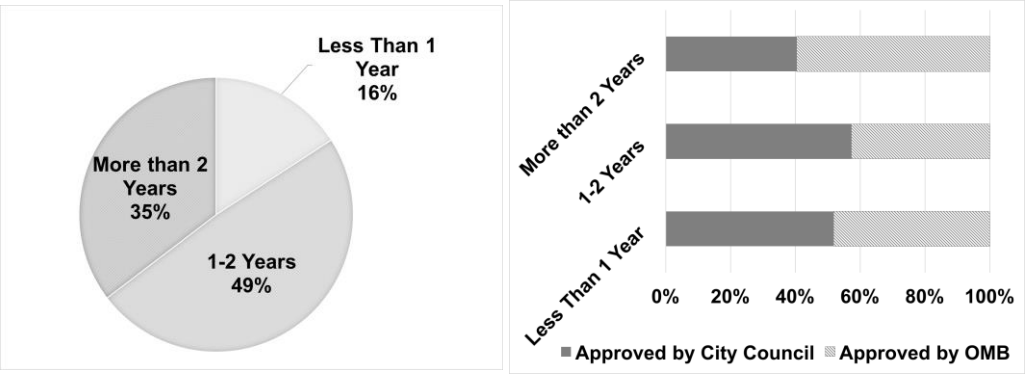


Figure 5: Breakdown of Rezoning Duration: (a) Combined (b) City Council vs. OMB

### 3.2 Prescriptive Regulations at the Provincial and Municipal Levels

To obtain a building permit for a tall building in City of Toronto, the proposed application needs to be in compliance with all Acts, Bylaws and regulations at provincial and municipal levels. Figure 6 illustrates a very limited number of the regulations that directly affect the permitting process and construction of tall buildings at provincial, regional (GTHA: Greater Toronto and Hamilton Area) and municipal levels. The total list of regulations would not be feasible to list in this paper, but each of the Acts listed have a number of regulations within them and many of the regulations have subsections that apply to tall building construction.

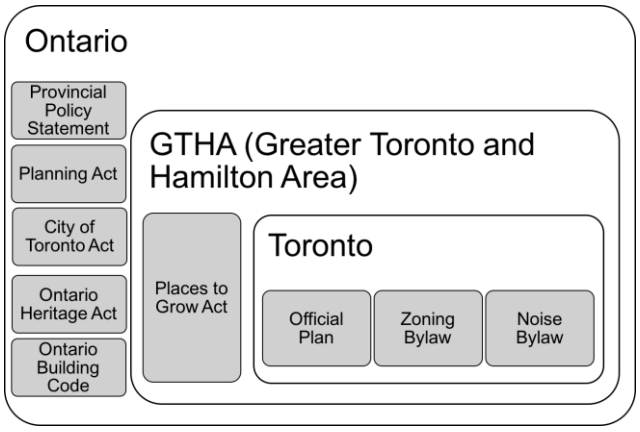


Figure 6: Sample of Acts and Regulations for Tall Building Construction

In addition to Acts, regulations and building Codes, the city has many standards and guidelines that need to be considered in designing new projects. The City has provided comprehensive policies and regulations over the years to guide the developers to accommodate the design requirements in their applications. For example, in 2006 “Design Criteria for the review of tall building proposals” was adopted by City Council, which was later replaced in 2012 by “Downtown Tall buildings vision and Performance Standards design guidelines” for evaluation of tall buildings within downtown boundaries (City of Toronto 2017). Tall building design guidelines (TBDG), which was adopted in 2013, is the latest documentation of all regulations for tall buildings across the entire city. TBDG is a well-organized and informative document that provides all the necessary design requirements by City of Toronto. The initial purpose for preparing this document was to identify the approved location and height ranges for tall buildings as well as to provide building typology studies (City of Toronto 2017). TBDG, however, along with implementing Toronto Official Plan policies for tall buildings, incorporated many more of the City guidelines, including Toronto Green Standards (TGS), Toronto Development Guide, Development Infrastructure Policy and Standards, Accessibility Design guidelines, Urban Design Streetscape Manual, Vibrant Streets, Green Roof Standards, becoming a comprehensive guide on the design of tall buildings for Toronto.

It has been criticized that the prescriptive design restrictions imposed by TBDG and other similar mechanisms stifle the creativity of architects in designing more attractive towers in the city (McPherson 2016). With continuous changes in new technologies and building materials, and the increasing demands of the new generation of condo buyers, it is imperative that the design practices be flexible enough to not only encourage but also empower innovative design solutions and construction practices. Tall buildings are most desirable in vibrant uptown and downtown areas that are close to public transit stations and provide a better access to employment and entertainment areas. However, land is limited for new developments and each site has unique characteristics that affect the design of a tower. With these limitations, it is often difficult or counter-productive to incorporate all of the guidelines.

With the tremendous housing market that exists for tall residential buildings in Ontario, and specifically in Toronto, and with the fast pace of technological advances in the industry, the current prescriptive design methodologies are not keeping pace. There needs to be alternative solutions that provide options outside of the current system, such as performance-based design guidelines. Performance-based guidelines allow designers and builders to implement innovative design solutions and achieve or exceed the minimum guidelines, while having the opportunity to explore the state of the art technological tools and building material advances.

### 3.3 Processing Inefficiencies

After the submission of an application, it is circulated through a large number of city divisions, such as transportation and fire services. It is also shared with external agencies such as school boards, and utility providers for feedback, which is also returned to the applicant for further revisions in the proposal. Unfortunately, feedback is often inconsistent between departments and sometimes provides contradictory recommendations (McPherson 2016). Trying to satisfy all the divisions and agencies, while incorporating all the policies and guidelines is not easily achievable by designers and developers. Any contradiction with these policies may result in rejection of the proposal. This is one of the contributing causes for the increase in percentage of applications that appeal to OMB. As the alternative authority for approving Zoning Amendment applications, OMB does not treat the guidelines the same way it treats laws and policies. Therefore, the developers have more flexibility in satisfying the board members with their design. However, it is still ideal for developers to get their approval during negotiations with the City as it reduces the total process duration.

An alternative approach would be to take advantage of automation in evaluating designs against established codes, regulations, and standards. Currently, many of the sophisticated owners, such as government agencies, require that all the design components reside in a Building Information Model (BIM) and therefore many builders have started using BIM in their design phase, even for residential towers that do not necessarily require it. The move to BIM implementation would allow for e-permitting applications to replace the current complex and time consuming manual review processes. E-permitting is currently being investigated around the world as a more efficient design review mechanism with reported success (Ho et al. 2016). Using automated systems, such as e-permitting, would allow faster and more reliable design review and permitting processes, which would also be more transparent, more reliable, and certainly more efficient. Of course, there will be a cost associated with the implementation of such a system, but as explained in the next section, the opportunity cost that is being imposed on the City with the current system is far greater.

### 3.4 Opportunity Cost of the Current Inefficiencies

The process for rezoning delays the permitting process, which in turn increases housing prices by adding extra costs (Paciorek. 2013). This is true of any delay in the permitting process, including those associated with site plan approval, and any other approvals that are required before construction can begin. Any kind of regulation that delays housing construction adds tens of thousands of dollars to the cost of building a single unit (Paciorek. 2013). However, the true costs may be far greater than those directly associated with the construction process, as explained in this section.

There are a number of reasons why the City should be interested to resolve the issues resulting in long permitting durations. First, the demand for housing in Toronto has continually outpaced supply in recent years, with prices of homes rising between 15-20% annually (Toronto Real Estate Board 2016). This, coupled with increased immigration into the region, has resulted in a significant shortage of housing units, which in turn has fueled the escalation of the housing market. The demand experienced in the housing market and the lack of supply has eroded housing affordability within the City. Therefore, streamlining the permitting process would in turn result in more available units earlier in the market and help with the current shortage of housing units in the region.

Secondly, there is a tremendous tax revenue opportunity that is currently being lost due to the delays in construction of high density buildings. Take for example a typical 50 storey building with 500 units. The average unit is worth $471,256 (Business Canada 2016) and it generates approximately $3,242.11 in property tax for the City (Toronto Property Tax Calculator 2016). That is $1.621million in lost property tax revenues for the City for just one year delay. Therefore, by delaying a project for three years due to the permitting process, the lost income opportunity per tower would be about five million dollars. Compounding this impact over the large number of towers that are delayed at any point in time, one can see the tremendous opportunity cost to the City. Therefore, implementing an e-permitting system that would streamline the permitting process for the entire city would result in significant added revenues for the city.

## 4 MODELLING THE PERMITTING PROCESS USING BAYESIAN NETWORK

This research has shown that on average the duration of the permitting process for a new tall building would be increased substantially if the application was sent on appeal to the Ontario Municipal Board. Therefore, it would be beneficial if a system could be developed to determine, with some certainty, the likelihood of a proposal being rejected by City Council. As discussed, there are many factors that contribute to this event and no single factor can be identified as a deciding factor. Bayesian networks have been used extensively to model the relationships in complex systems for forecasting and diagnosis applications (McCabe et al. 1998). Therefore, a Bayesian network was developed with the aim to model the variables in the permitting process to give an indication if a new tall building proposal would need to be appealed to OMB. Once fully developed and validated, this model could be used to run what-if analysis to decide what combination of factors could be modified to reduce the probability of the proposal being rejected at the City Council, based on historical statistical data.

This model could also be used by the authorities to evaluate their current practices and to streamline the processes both at City Council and at OMB, so that the projects that have a high chance of getting approved at OMB, be given more careful consideration at City Council. The e-permitting process would eliminate the need for a network like this, as the decision and recommendations could be ready available through an online application, shortly after submission of all plans and drawings through a BIM enabled platform. In the meantime, however, this Bayesian network could prove useful. The details of the model development are beyond the scope of this paper, but some of the considerations in the development of the model, as well as some of its validation results are presented next.

### 4.1 Model Development

A total of 120 tall buildings from the 174 towers in the original dataset were used for the analysis. Figure 7 shows the network. The connections between the nodes are based on the applicable Acts and regulations that affect the permitting process for a tall building application. Figure 7 illustrates the Bayesian network which was developed; the node “appeal to the OMB” represents the outcome of the model in which the city refuses a proposal or does not provide applicant with the decision and the applicant would therefore appeal to the Ontario Municipal Board. The other nodes in this model represent the causes that each application may get the refusal by reviewers. The following paragraphs explain key variables in the network.

**Conflict with Official Plan:** This node captures the impact that a noncompliance with OP (Official Plan) has in forcing the developers to seek approval from OMB, due to the refusal by City Council. This node has two states: Conflicts and Complies (with Official Plan). To calculate the probability of this node, the database that was previously collected on tall buildings in City of Toronto were used. Of the 120 buildings, 62 had

conflicts with OP. Therefore, the base probabilities at the node were calculated as 62/120=0.5166 for "Conflicts" and 58/120=0.4834 for "Complies".

**Secondary Plan Exists:** For some of the areas in the City, a secondary plan was defined, which includes additional regulations and definitions that further limit new developments in those areas. According to the database, 43 of the 120 buildings were proposed in a location where a secondary plan existed. Therefore, the base probability of Secondary plan existing was calculated as 43/120=0.3583 and for no secondary plan, the base probability is 1 – 0.3583 = 0.6417.

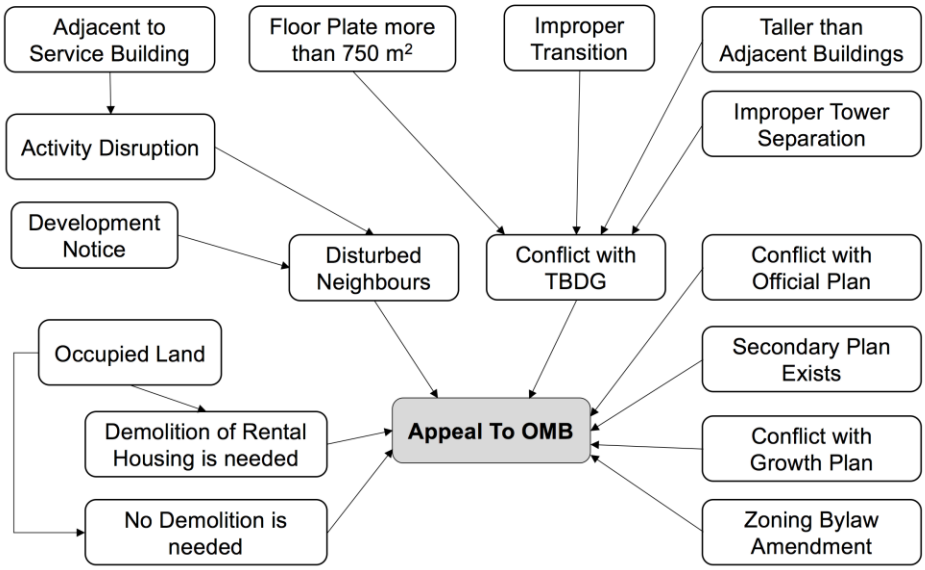


Figure 7: Bayesian Network for Appeal to OMB

**Conflict with TBDG:** Tall building design guidelines (TBDG) have specified regulations for the design of tall buildings in the City of Toronto to implement the design objectives of the Official Plan. There are a number of factors that should be considered in analyzing whether a new development conflicts with Tall building design guidelines. In this network, four of the main factors were considered: Improper Transition, Improper Tower Separation, the building being Taller than Adjacent Buildings, and Floor Plate More than 750 $m^2$, which refers to the requirement that the footprints for buildings should be less than 750 square metres. Gathering specific data for the first three of these four nodes was not feasible, and therefore a nominal base probability of 50/50 was adopted, which can of course be modified in the future. However, sufficient information was available to calculate the probabilities for "Floor Plate more than 750 $m^2$", which resulted in a probability of 0.846 for the floor plate passing the limit, and consequently a probability of 1-0.846 = 0.154 was assigned for a tall building having a smaller floor plate.

Since none of these four factors interacted with each other, the distribution of "Conflict with TBDG" was changed to a Causally Independent distribution and the probabilities were calculated based on data and expert opinion. The expert opinion components will be revisited in the future, but for now, the experience of the first author was used to estimate some of the probabilities where sufficiently varied data were not available.

### 4.2 Model Validation

The model was validated using a number of specific tall building proposals in the City of Toronto. This section includes a number of validation cases, followed by the limitations of the current model.

1. Grid Condos, located at 181 Dundas Street East, was approved by OMB. The input evidence for this building are: 1) it conflicts with Official Plan, 2) a secondary plan exists, and 3) the application for demolition of rental housing is needed.

- The OMB appeal probability calculated by the network is 0.5566, which is slightly above 0.5, indicating that the application was expected to be appealed to OMB.

2. Axiom Tower, which was approved by City Council, is located at 460 Adelaide Street East. Its input evidence are: 1) it conflicts with Official Plan, 2) a secondary plan exists, 3) its floor plate is greater than 750 square metres.

- The OMB appeal probability of Axiom Tower based on the evidence 0.5012. The reason the model predicted over 50% is that it had a floor plate greater than 750 square metres, which is typically a very strong indicator of non-compliance with tall building design guidelines, and often results in the project going to the OMB. However, in this case the builder managed to get the proposal approved at City Council.

3. One Bloor Street East, which was approved by City Council: 1) conflicts with Official Plan, 2) complies with the Growth Plan, 3) has a compliant floor plate, and, 4) requires an application for demolition of rental housing.

- The OMB appeal probability of One Bloor Street East based on the Bayesian network is 0.367. The model performed very well with this particular case. One of the reasons is that there was sufficient input information available about the project, which is essential in calculating reliable probabilities.

These three cases provide support that the model is working, however, there are a number of limitations and concerns that need to be taken into account going forward.

### 4.3 Model Limitations

The main limitation of the Bayesian model is that the probabilities were estimated at several nodes since the 120 building database had considerable discrepancies. To populate a more reliable model, a much larger dataset is required. This could easily be facilitated if City data were more readily available. The underlying problem is the lack of transparency by the City Council and Ontario Municipal Board about the applications. The data used in this research should be available from each governing body, and accessible by the general public. Instead, there are numerous logistical, practical, and organizational barriers to accessing the databases. If the dataset, or at least the meta-data used in this research was provided by OMB and City Council for all building applications, it would allow for a better evaluation of the current system, which in turn would make it possible for improvements to be identified. Therefore, one of the recommendations of this research is to expand the dataset to build a more reliable predictive model.

Another limitation is that all of the data were based on approved projects. In fact, there is no mechanism by which the data for rejected proposals at OMB could be accessed. Therefore, while the number of projects that were approved by OMB is already alarmingly high compared to the ones approved by the City Council, it should be noted that an even larger number of applications have unsuccessfully appealed to OMB. If that dataset was available, the model could have been built more reliably and the probabilities at a number of nodes could be calculated more accurately.

## 5 CONCLUSIONS AND RECOMMENDATIONS

This paper presented an evaluation of the current permitting process for the construction of new tall buildings in the City of Toronto, with an emphasis on Official Plan and Zoning Bylaw amendment approvals. A database of 174 towers in the City of Toronto were gathered and their permitting process was evaluated based on the duration and the authority that provided the approvals. This research identified some of the challenges within the current system, which included inconsistencies between City Council and OMB, over-regulation and prescriptive design guidelines, and issues in processing practices. A number of recommendations were also made, including using e-permitting, implementing performance-based

guidelines to encourage and support innovation, and providing better visibility on the decision making process to the public.

Finally, a Bayesian network was developed to estimate the probability of a proposal for construction of a new tall building in City of Toronto having to go to OMB for approval. This process allowed for the impact of a number of factors to be quantified and carefully analyzed. Most importantly, the resulting network performed well for three validation scenarios, and recommendations were provided to better improve the network by collecting more data and therefore increasing the confidence in the probabilities used at the nodes.

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