

## **Residential Land Values, Zoning, and the Producer-Protection Hypothesis\***

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The recent growing interest in zoning regulation in the economic literature has focused largely on the debate about the justification for the existence of such regulation.<sup>1</sup> But despite the many alternatives to current zoning regulations suggested,<sup>2</sup> zoning ordinances continue to persist, and there are no signs that these regulations will be altered dramatically in the near future. In fact, regulations restricting land use are found in almost all of the major metropolitan areas of North America. These regulations can be conceptualized as an administrative contract stipulating rules that govern the kinds of activities that may be undertaken on a given parcel of land. Policing and amending these regulations are the responsibilities of the individual municipalities, and, as Muller (1972) has asserted, the importance of this responsi-

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<sup>1</sup>For example, empirical studies conducted by Crecine et al. (1967), Maser et al. (1977), and others could not find supporting evidence that lower-status land uses produce negative externalities. Stull's (1975) work, however, disputes these conclusions. Hirsch (1979) and Goldberg and Horwood (1980) discuss the components of this debate in greater detail.

<sup>2</sup>See Auld (1982) and Ervin et al. (1977) for examples of suggested alternative land-use policies.

bility cannot be overstated: "The most valuable and probably most controversial implicit grant by the public sector is based on the legal power of county or municipal government to approve a change of land use" (227).

Perhaps, as Ervin et al. (1977) have implied, the importance of such responsibilities is inherent in the continual conflict between contrasting social values: the rights of the many against the rights of the few. The right and the social need for community economic growth and development often clash with the liberty, security, and aesthetic value associated with an individual's property and its specified use.

This paper will analyze the performance of a land-use regulating regime with the goal of better understanding the land-use regulatory process. The first section sets out the framework within which regulatory decisions about land are made and considers the elements of the implicit efficiency/equity trade-off that the regulating regime must take into account when making zoning decisions. It also demonstrates how the various political instruments designed to reveal public preference are built into the decision-making process. Evidence, based on general observations, that zoning regulations are a vehicle for individuals with higher socio-economic status to protect and enhance their financial well-being is presented as well. In the second section a binary choice analysis is developed of the actual decisions on upzoning residential land rendered by a typical small, economically diversified North American city. Using this methodology, it is determined how the characteristics of the specific application influence the regulating board's behaviour. The third section is a summary and conclusion.

### Regulatory Framework for Zoning

It is generally argued and widely accepted in the economic profession that the rationale for externality zoning is the protection of property values from the erosion caused by the externalities associated with non-conforming land use. Externality zoning ensures that homogeneous or conforming land-use activities are located together in designated areas (for example, residential uses are separated from industrial uses). It is argued that through this process it is possible to bring social costs and benefits closer together and maintain the maximum marginal value of a parcel of land (Hirsch 1979).

According to Otto Davis (1963: 375),

the desire for zoning restrictions arises because of the presence of external effects in the urban property market. . . . All zoning restrictions--use, height, area, and density regulations--can be viewed as an effort to eliminate possible external diseconomies which the construction of

"undesirable" property features might impose upon other properties in any given district.

This assertion suggests that a demand exists for zoning and implies that zoning regulations may be designed for the protection of the property owner. Zoning thus ultimately serves as a vehicle to protect the interests of the owner.

Property owners benefit from zoning regulations because property values are augmented and protected by regulation. These regulations may be an application of the producer-protection hypothesis developed by George Stigler (1971). According to Stigler, regulation is sought, designed, and operated for the benefit of the producer or, in the case of zoning, the property owner. Thus, as Goetz and Wofford (1979) and others have concluded, the zoning regulatory process may be an exercise created to protect the interests of property owners.

When the regulating board appraises the merits of a proposal, it must establish, first, whether the proposal represents a more efficient allocation of society's resources and, second, whether the redistributive effects are acceptable. Theoretically, it should be possible to obtain a Pareto optimal solution, but, in reality, in a complex urban centre it would be extremely difficult to even identify such a solution. Policy makers will agree, however, that some proposals could increase society's overall welfare.

If the proposed policy is not a Pareto improvement, then at least one member of society will lose utility as a result of the land-use change. Thus, the question of what is an equitable solution becomes of great importance to policy makers. Although social values and norms ultimately determine what is "fair"—thereby turning the definition of "fairness" or "equity" into a philosophical question—equity issues must be evaluated by the regulatory board. For example, equity concerns may arise from the decision-making process itself (so-called natural justice): Were all neighbours adequately notified of the proposal? Did all participants have a "fair" opportunity to outline their defence at a series of hearings? Is there an appeal mechanism? Equity issues also concern how "fairly" society's resources have been distributed. This concern is usually associated with individuals or groups of individuals who may have been dealt a loss in utility as a result of the policy.<sup>3</sup> Breton (1974), Ervin et al. (1977), and others have contended that unorganized neighbours may be the "losers" in a redistribution of the city's resources<sup>4</sup> since the introduction of a non-

<sup>3</sup>Traditionally, such disadvantaged groups as the poor, blacks, or unorganized neighbourhood groups have been the subjects of this attention.

<sup>4</sup>Goetz and Wofford [1979] argued that because zoning regulations are a vehicle capable of redistributing wealth, any analysis of zoning should describe the regulation as a process and not as a situation. They based this contention on the fact

conformity may cause surrounding property values to change and thus produce income redistribution (often called the "direct" effect). More general or second-round redistributive effects may result from the new urban environment. For example, the demand for some types of properties may change (depreciating or appreciating the value of the property) or the sales revenue of local retail merchants may fluctuate.

In very simple terms, the regulating regime weighs the arguments and implicitly evaluates the trade-off between the efficiency of a proposed zoning change and the inequities of redistributing utility among the populace.<sup>5</sup> Furthermore, from the definition of externality zoning comes the reality that property owners implicitly associate zoning with the guarantee that the neighbourhood will not be subjected to random introductions of non-conforming land uses. Naive and unorganized property owners depend on the regulating regime to police the zoning regulations and guard them against an organized "developer" making gains at their expense. To act in the public interest, the zoning board must weigh the components of the efficiency/equity trade-off with full knowledge of public opinion. Thus, political participation must be representative. Such instruments as elections, public hearings, advisory committees, and surveys will help ensure that public preferences are elicited.

Breton (1974) and others have argued that the extent to which an individual participates depends on the degree to which a specific proposal will alter his or her present utility stream. Referring to the inequality between the  $j^{\text{th}}$  individual's desired marginal rate of substitution and its value in the proposed state, Breton suggested that "the greater the difference between the two magnitudes the larger the degree of coercion and hence the larger the extent of political participation" (76). Consequently, the regulating board can gauge the potential impact of a proposal on an individual by evaluating the intensity of his or her participation. Clearly, many factors must be considered in such an evaluation, but one element central to all preference-displaying instruments is the costs incurred by the individual in the course of his or her participation.<sup>6</sup>

that wealth redistribution and partial capitalization make conventional comparative static analysis unrealistic.

<sup>5</sup>Ervin et al. (1977: 35) argue that traditional welfare economics may not be of paramount concern to the regulating board when it makes this evaluation because "when rights are in dispute, as they almost always are, the concept of social efficiency provides little assistance in predicting how a political system resolves land use disputes". For a further discussion of the equity/efficiency conflict, see Auld (1982).

<sup>6</sup>Riker and Ordeshook (1968) developed an elaborate model of the individual's participation in collective decision making. The model demonstrates why participation occurs and why some socio-economic groups become more involved than others.

Because zoning by-law decisions distribute rewards and deprivation locally, it seems fitting that these decisions are made by the local government since both the "neighbourhood group" and the "developer" could potentially harm the council. Participants in the rezoning process supply politicians with votes and money, the two essential resources in maintaining power. It is therefore important to the decision maker that the outcome satisfy as many individuals as possible. If the regulating process appears legitimate, many participants will be content with the decision. A member of society who "loses" will accept the decision more readily if that member believes that all efficiency and equity factors were fully considered. Thus, it becomes essential that the regulating regime take advantage of all available facilities and produce a legitimate regulating process aimed at determining which solution is in the best interests of the city. It is advisable that the instruments of determining public preference, the comments of professional committees, and all institutional factors are fully considered during the decision-making process.

Any board or commission hearing an application for a zoning change must follow the steps necessary to ensure procedural equity (natural justice). In Guelph, Ontario, the city chosen for the empirical analysis in the next section, citizens have an opportunity to make their preferences known, professional studies are undertaken to identify the best interests of the city, the surrounding property owners are given ample notification of the proposed change, and an appeal mechanism is in place.<sup>7</sup> The equity issues resulting from the redistribution of social welfare are not as obviously distinguished. Henderson (1977) has contended that the major problem with zoning by-laws is that the regulating process "can easily be misused by special interests groups to improve their well-being at the expense of the general populace" (38). Ervin et al. (1977) observed that zoning land-use hearings have

<sup>7</sup>In the city of Guelph, decisions on zoning change proposals are rendered after completion of a complex regulating process. All applications are reviewed in light of an official plan for the city, even though this plan does not outline precisely the criteria on which a decision must be based. With the exception of some obvious health and safety constraints, regulations specified for urban planning do not follow well-defined guidelines. The regulating process itself consists of four basic steps. First, the application is submitted to the city planning department where it is examined by numerous professional committees. A letter of notification is sent to all residents within 400 feet of the property to be altered, and a notice of the proposal is published in the local newspaper. If the proposal attracts a great deal of public interest, a separate public meeting may be called to better identify public concerns. Second, all comments, correspondence, and recommendations are taken to the planning board meeting. The board then makes a recommendation to the city council. Third, the city council approves or rejects the proposal. Fourth, the Ontario Municipal Board (OMB) has the final decision unless an appeal is made to the Ontario cabinet.

apparently served certain values and interests of citizens of above average SES (socioeconomic status) well. The "quality" of their neighbourhoods has been protected from invasion by undesirable citizens, land uses, and low-cost or multiple dwelling units. Property values have not only been protected but have risen. Variance procedures have been sufficiently responsive to block undesired development in their neighbourhood but permit higher SES citizens to profit from speculation and development. (54)

### Binary Choice Analysis

In this section the decisions of a specific land-use regulating regime are analyzed using an econometric binary choice model. The objective is to determine what socio-economic, demographic, and administrative factors influence a regulating committee's decisions on upzoning applications in residential districts of the city. Thus, the hypothesis that the probability of a successful application depends on the various factors discussed above and defined below is tested.

For this analysis information was collected on 43 representative applications for zoning changes between the years 1977 and 1983 in the city of Guelph, Ontario.<sup>8</sup> All affected properties were in the low-density, residentially zoned regions of the city, and the applications called for upzoning (see Table 1). The proposed changes could therefore potentially introduce negative externality into the neighbourhood since property owners generally prefer similarly zoned properties in their immediate vicinities.

Ultimately, the regulating board permits the applicant to adopt a new land use for the property in question or it does not. Thus, the dependent variable of our econometric model is binary and lends itself to probit analysis. In the probit model the probability of a successful application,  $PZ_i$ , has a cumulative standard normal distribution

$$PZ_i = \int_{-\infty}^{\beta'Z_i} (2\pi)^{-1/2} e^{-s^2/2} ds = \Phi(\beta'Z_i) \quad (1)$$

where  $Z_i$  is a vector of factors hypothesized to influence the outcome and  $\beta$  is a vector of unknown coefficients to be determined. If the sample consists of  $n$  observations from which  $m$  observations are accepted, the log-likelihood function is

<sup>8</sup>Guelph, a city of 80,000, has a diversified economic base comprised of light and heavy manufacturing, commerce, and post-secondary education. Demographic and income statistics are representative of the urban population in Canada.

Although there was no significant difference in representation on the city council during the study period, the time period encompassed two city council terms. The membership of the city planning board changed slightly on an annual basis.

**Table 1**  
**ZONING CHANGE CLASSIFICATION OF APPLICATIONS SUBMITTED TO THE CITY OF GUELPH'S PLANNING DEPARTMENT, 1977-1983**

Original Use	Proposed Use	Number	Relative Frequency
Single-family dwelling	Single family (commercial use)	2	0.047
Single-family dwelling	Single family (group living)	6	0.140
Single-family dwelling	Duplex or semi-detached	11	0.256
Single-family dwelling	Multi-family	1	0.023
Single-family dwelling	Multi-family	8	0.186
Single-family dwelling	Commercial	9	0.209
Single-family dwelling	Service station	1	0.023
Single-family dwelling	Industrial	2	0.047
Other		3	0.070
Total		43	1.000

$$L = \sum_{i=1}^m \log \Phi(\beta'Z_i) + \sum_{i=m+1}^n \log [1 - \Phi(\beta'Z_i)] \quad (2)$$

When a numerical method of solving this function is applied, the unknown coefficients in vector  $\beta$  can be estimated.<sup>9</sup>

The earlier discussion suggests that the following variables are likely to influence the outcome of the rezoning application:

1. APPEAR = number of individuals from the surrounding community speaking against the proposed change at the planning board meeting minus the number speaking favourably.
2. LETTERS = number of letters received objecting to the proposal minus the number of favourable letters.
3. PETITION = number of signatures from the community appearing on a petition objecting to the change minus the number of signatures on a petition favouring the proposed change.

Variables 1-3 indicate the neighbourhood groups' responses to the proposal and are proxy measures of the potential cost to property owners if the application is accepted. Consequently, these variables demonstrate the inequities associated with the proposal. One would expect APPEAR, LETTERS, and PETITION to have a negative correlation with the probability of a successful outcome. Furthermore, it follows that more expensive protest actions are proportional to greater

<sup>9</sup>This study used the Newton Raphson logarithm technique.

expected losses in utility. If an individual's opportunity cost in time alone is considered, it is expected that the regulating body would accord more weight to protest actions that require more of the participant's time since those actions reflect a greater potential loss to the individual. Consequently, the coefficient associated with the PETITION variable would be smaller in absolute terms than the coefficients associated with the LETTERS and APPEAR variables since the act of signing a petition takes only a few seconds. Similarly, preparing the necessary arguments and attending a planning board meeting may take longer than simply writing a letter of objection. Thus, the variable APPEAR would have a greater influence on the committee's decision than the variables PETITION and LETTERS.

4. ORG = 1 if a petition against the proposal was submitted by the surrounding property owners; 0 otherwise.

This variable indicates whether or not the community was organized in a homogeneous group. Breton (1974) has contended that the protest actions of a homogeneous group generally have a more substantial impact on a political board than the objections of individuals. A negative relationship between ORG and the probability of a successful application is expected.

The first four explanatory variables illustrate the preferences of surrounding property owners. If these variables help explain significantly whether or not an application is successful, then it would appear that the opinions of the neighbourhood group do influence the board's decisions. Consequently, such results would support Stigler's (1971) producer-protection hypothesis.

5. AMEND = 1 if the application was amended; 0 otherwise.

This dummy variable measures the willingness of the applicant to accept the suggestions of other participants in the regulating process such as the various professional committees or the neighbourhood group. A simple amendment may satisfy objections to the proposal and thus increase the probability that the application will be successful.

6. BLD = 1 if the application calls for the construction of a building; 0 otherwise.

This variable indicates whether the appearance of the community is expected to change significantly and indicates as well the board's attitude toward growth and development. The expected sign of the variable BLD is somewhat ambiguous, however. On the one hand, a positive relationship may exist if the board believes the new structure improves the overall appearance of the community's environment or if

the board heavily endorses growth and development in the city. On the other hand, a negative relationship may result if the committee is opposed to growth and development. Proposals that simply call for the assignment of a different use to an existing building may go almost unnoticed. Thus, there would be little reason to reject them.

7. REPORT = 1 if there is a negative report objecting to the proposal submitted by a professional committee ; 0 otherwise.

The recommendations of the local professional organizations serve as instruments of the regulatory board for eliciting opinions about what is in the best interests of the city. Thus, if a professional committee recommends rejection of a proposal, the probability of it being accepted would decrease.

8. DIST = distance (in meters) to a similar non-conformity.

DIST measures precedence. If a similar land-use change already has been accepted by the community, one would expect the regulating board to allow a similar non-conformity to exist in the area. Therefore it can be argued that the relationship between this variable and the probability of a successful application would be negative. A positive relationship may occur, however, because urban policy often allows only a limited number of one type of non-conformity to prevail in any particular region of a city.

9. CBD = the distance (in meters) by roadway to the central business district.

Most large cities have a well-defined downtown core, but in the perimeter regions of the city, where development occurs continually, the specifications of land-use activities may not be well defined. Thus, the coefficient attached to the CBD variable should have a positive sign.

10. INCOME = per capita income earnings of the appropriate enumeration area.

This variable measures the wealth in the neighbourhood of the property to be altered. A negative relationship with the probability of a successful application would indicate that the board is influenced by the income levels or financial well-being of the neighbourhood.

All the data required to calculate the above variables were obtained from the planning board's file of proposed zoning changes, with the exception of INCOME, the data for which were obtained from Statistics Canada's 1981 Census. The means and standard deviations of the variables are shown in Table 2.

Table 2  
MEANS AND STANDARD DEVIATIONS OF THE  
VARIABLES USED IN THE PROBIT ANALYSIS

Variable	Mean	Standard Deviation
Dependent variable	0.6512	0.4822
APPEAR	0.8372	1.214
LETTERS	1.349	2.894
PETITION	26.84	126.9
ORG	0.2093	0.4116
AMEND	0.1860	0.3937
BLD	0.6279	0.4891
REPORT	0.2791	0.4539
DIST	96.32	131.5
CBD	6.551	5.094
INCOME (WEALTH)	9122.9	2239.5

Use of the above independent variables<sup>10</sup> led to the coefficient estimates and associated asymptotic t-statistics tabulated in Table 3.<sup>11</sup> Generally, the coefficients possess the anticipated signs. Consider first the variables that measure participation from the neighbourhood group. In equation 1 (Table 3), the variables APPEAR, LETTERS, and PETITION are included in the analysis, but only the coefficients associated with the first two are negative. These coefficients are significantly different from zero based on a one-tailed t-test with a significance level of 5 per cent.<sup>12</sup> The variable PETITION, however, apparently does not help explain the board's decision. Indeed, it has a very small coefficient, which is not significantly different from zero. It is interesting to observe that the size of the coefficients associated with APPEAR are always greater in absolute value than the coefficients attached to LETTERS.<sup>13</sup> This indicates, as expected, that a personal appearance at the planning board hearing carries more weight than one more letter submitted to the board protesting the

<sup>10</sup>Dummy variables indicating the classification of the specific application, as described in Table 1, were included in earlier versions of the regression analysis. None of these variables were significantly different from zero, and thus we concluded that the data set was indeed homogeneous. In the subsequent analysis these variables were dropped to increase the degrees of freedom. The values for the likelihood ratio test statistics and the likelihood ratio indices, used to evaluate the overall goodness-of-fit, are available from the authors.

<sup>11</sup>In the probit model a linear function of the explanatory variables is equivalent to the logarithms of the ratios of the probabilities of granting or not granting an application. For a description of this model, see Kennedy (1985).

<sup>12</sup>Recall that public choice theory outlines the relationship that most variables are expected to have with the probability of a successful application. Thus, it is necessary to complete only a one-tailed hypothesis test for a positive relationship on these coefficients.

<sup>13</sup>At a 5 per cent confidence level, the hypothesis that these two coefficients are equal is accepted.

Table 3  
PROBIT ANALYSIS OF GUELPH'S LAND-USE REGULATING REGIME  
DECISIONS ON PROPOSED CHANGES TO RESIDENTIAL PROPERTIES

Variable	Equation					
	1	2	3	4	5	6
Intercept	2.834 (1.68)	5.856 (1.46)	1.739 (3.12)	1.401 (3.20)	2.007 (3.11)	2.485 (2.80)
APPEAR	-0.796 (-2.18)		-0.738 (-2.59)		-0.636 (-2.02)	
LETTERS	-0.456 (-2.06)	-0.626 (-1.91)		-0.385 (-2.50)	-0.374 (-1.90)	-0.376 (-1.82)
PETITION (x 10 <sup>-2</sup> )	0.260 (0.88)	0.681 (0.68)				
ORG		-3.880 (-2.04)				-2.220 (-2.76)
AMEND	2.777 (1.78)	1.880 (1.33)	1.009 (1.52)	2.343 (2.21)	2.529 (2.04)	1.841 (1.52)
BLD	-0.430 (-0.54)	-0.992 (-1.00)				
REPORT	-2.935 (-2.71)	-4.375 (-2.20)	-1.895 (-2.93)	-2.135 (-3.35)	-2.409 (-3.10)	-2.929 (-3.22)
DIST (x 10 <sup>-2</sup> )	-0.466 (-1.56)	-0.606 (-1.30)	-0.394 (-1.50)	-0.291 (-1.30)	-0.408 (-1.50)	-0.421 (-1.37)
CBD	0.053 (0.83)	0.064 (0.87)				
INCOME (x 10 <sup>-4</sup> )	-0.753 (-0.51)	-2.202 (-0.79)				

Number of observations = 43

Note: Critical values: two-tailed test (5% confidence level)  $t_{37} = 2.035$ ; one-tailed test (5% confidence level)  $t_{37} = 1.687$ . The values in parentheses are t-statistics.

proposal. The variable ORG also measures neighbourhood response to the proposed zoning change. When ORG is included in the analysis (see equations 2 and 6), the coefficient attached to it is significantly less than zero and has a relatively large impact on the board's decision.<sup>14, 15</sup> Since the variables APPEAR, LETTERS, and ORG are all statistically significant, one can conclude that the preferences of the neighbourhood group influence the regulating regime's decisions. These results support the producer (property owner)-protection hypothesis.

<sup>14</sup>The variable ORG will likely be correlated with the variable APPEAR because when a petition is organized, one of the organizers almost always delivers it personally at the planning board hearing. Thus, a multicollinearity problem may exist if both variables are included in the same equation.

<sup>15</sup>The results of equation 6 suggest, for example, that a proposal to rezone property 70 meters away would have a 0.99 probability of being accepted if there were no objecting letters, no petitions, no negative report, and no amendment. If, however, there was a neighbourhood protest and five letters of opposition, the probability would decline to 0.03.

If one of the many professional organizations consulted recommends rejection of the proposal, the probability of a successful application is reduced. This is shown by the negative value (in all equations) of the coefficient associated with the variable REPORT, which is significantly different from zero at the 5 per cent level. Thus, so-called public interest does enter into the board's decision since these reports serve to distinguish this interest for the regulating committee. The variable AMEND also possesses the hypothesized relationship with the dependent variable, and in equations 1, 4, and 5 in Table 3 is significantly different from zero based on a one-tailed t-test. Thus, the application has a greater chance of success if it is amended.

The data do not support the proposition that zoning is wealth-protecting and -enhancing regulation. Although the variable INCOME, which measures the financial well-being of the surrounding neighbours, has the anticipated relationship with the dependent variable, it is very small, and the null hypothesis that this coefficient is not significantly different from zero is accepted. Consequently, the data suggest that the wealth of the neighbourhood group does not carry a great deal of weight with the regulating regime when it is rendering its decisions on upzoning proposals. The other variables—DIST, CBD, and BLD—all have explainable relationships with the probability of a successful application (see equations 1 and 2). The weak t-statistics, however, suggest they are not important variables in the explanation of the board's behaviour.

### Summary

Between the initial application for rezoning and the final decision by the regulatory agency, a set of complex and interrelated steps occurs. In this paper we have modelled those steps in the context of a binary decision-making framework. The model reflects the preferences of property owners living adjacent to the parcel of land to be rezoned, the willingness of the applicant to respond to neighbourhood concerns, professional opinion, the proximity of nearby non-conformities, and the wealth/income of those living adjacent to the area to be rezoned.

The empirical results confirm several hypotheses. First, the more forceful the opposition to a rezoning proposal, reflecting the strength of personal preferences, the less is the probability that the rezoning application will be accepted. Second, the number of names on a petition will have some bearing on the outcome. Third, flexibility on the part of the applicant in response to the concerns of neighbours improves the chances that rezoning will be granted. Fourth, the level of income in the area adjacent to the land to be rezoned does not appear to influence the final decision.

An application for rezoning is made because it will likely enhance private profit, wealth, or utility. It may have a negative impact, however, on the profit, wealth, or utility of others. The data show that the regulatory board in Guelph, Ontario, appears to be concerned with what might best be termed the public interest. Our model and its results confirm previously untested hypotheses regarding the rezoning application process and its outcome.<sup>16</sup>

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<sup>16</sup>Some of the people and committees consulted were the city's Engineering Department, Planning Advisory Committee, zoning administrator, director of education, Department of Recreation and Parks Development, conservation authorities, medical officer, Police Department, and fire chief, as well as Bell Canada, Hydro, and Ontario land surveyors.