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Land use planning, zoning, and subdivisions are integrally tied to the land resource. The need for a land surveyor and for statutes which govern his operation when working in these areas is stressed. A brief history of Vermont and Oregon, illustrating the role of land surveys on settlement, is given. Statutes relative to: the registration of land surveyors, Vermont town lines, the Oregon county surveyor, Oregon subdivisions, Vermont land use, and state plane coordinate systems are discussed. Nine recommendations in these areas are made.
Comparison of Vermont and Oregon Statutory Land Surveyor Laws

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I. INTRODUCTION

Land is one of our most valuable resources. Population growth requires more homes, schools, business districts, recreational areas, and industrial complexes. This growth requires the use of more land and the use of more land gives rise to further needs. Some of the needs seen are for transportation, transmission lines and land for more food. It is: paved over for transportation, excavated to set structural foundations, mined to seek mineral resources, drilled for fossil fuels, buried under solid waste, exhausted of nutrients, and polluted with chemicals. However, the land resource is finite in size and fixed in location.

Today an area of study loosely referred to as land use planning has emerged. Zoning and subdivision regulations are other sub-terms that are receiving equal attention. This area of study has come about as a consequence of man's poor use and control of the land resource.

With the increased demand for land comes the inevitable price increase. When the cost of obtaining land rises, the need for knowing more precisely where ownership is located and the acreage involved becomes more important. At this moment, the land resource is thrust into the hands of a licensed land surveyor. The typical question asked is, "How much do I own and where are my boundaries."
The states of Vermont and Oregon are both attempting to answer some of the problems of land use. Vermont was the first state in the United States to enact a statewide land use law. Effective April 4, 1970, the intent was stated as follows:

"...in order to protect and conserve the lands and the environment of the state and to insure that these lands and environment are devoted to uses which are not detrimental to the public welfare and interests, the state shall, in the interest of the public health, safety and welfare, exercise its power by creating a state environmental board and district environmental commissions conferring upon them the power to regulate the use of lands and to establish comprehensive state capability, development and land use plans..." (1)

In addition there is now an attempt to pass legislation on statewide zoning.

Oregon has gone to the concept of "Home Rule" and local land use and zoning bodies are being set up and regulations passed. Benton County's comprehensive plan and zoning ordinance were adopted July 3, 1974. One of the steps in land use planning is to take an inventory of the land in which one determines the size, shape and location of the land. This data is routinely gathered by a licensed land surveyor. The purpose of this thesis is to compare the statutes of Vermont and Oregon that are relevant to the land surveyor, in dealing with land use and subdivisions.

The land surveyor is an expert on measurement regarding land transfer. However, most laws indicate that there is more to land surveying than just the measurement of the land.

The Vermont statutes which set up the registration of land
surveyors defines him as a person with special knowledge of "...the rules of evidence and boundary law..." (2) The Oregon statutes that allow for the registration of land surveyors, say in part "...and the relevant requirements of law for adequate evidence..." (3) For the land surveyor to properly locate the land in question or to establish new land divisions he must in addition to being an expert in measurement also understand the law that is appropriate to this function.

In a currently used text, the following principle is stated:

"The surveyor is presumed to know the law of boundaries and the law of evidence, and, when he agrees to locate a written conveyance on the ground, he agrees to locate it in accordance with the laws governing how written conveyances shall be located." (4)

The knowledge of the relevant law for land surveyors has not been stressed as vigorously as has the science of measurement. When the land surveyor makes a measurement mistake, he has generally violated no statute or law. But if the same land surveyor does not operate within the statutes that govern his profession, then he is in violation of the law. It is understood that ignorance of the law is no excuse. However, it would be better to reduce errors made by lack of knowledge than to let the practice continue. J. Robert Coltharp at the Sixth National Surveying Teachers Conference said:

"We are not professional because we call ourselves professional, or because we pass laws that say we are professional, or because we belong to so-called professional organizations. We are professional because of the individual and collective actions of our entire colleague group, because these actions have earned the respect and trust of the public. We are professional when, and only when, the public bestows that
Therefore the profession as a whole must gain knowledge. In the case of this paper it is the knowledge of the statutes as they apply to land use and subdivisions.

Why compare Vermont survey law with Oregon survey law? The author lives in Vermont and he is currently studying for an advanced surveying degree in Oregon. Vermont and Oregon both recognize the practice of land surveying and their laws are distinct with each having its own advantages and disadvantages. The comparison will show the differences and the advantages of each and will be followed by nine recommendations.

This thesis will generally be limited to the statutes and the appropriate common law court decisions which reinforce the statutes. The decisions relating to law and the interpretation of law will be left for another discussion. This in no way implies that the "common law" is not as important as the "operating statutes". In fact at times it is difficult to separate the two.
II. BRIEF HISTORY OF OREGON

Oregon, "The Beaver State", obtained statehood on February 14, 1859, as the 33rd state. Following the Lewis and Clark expedition of 1804-1806, John Jacob Astor's Pacific Fur Company started a settlement at Astoria in 1811. The southern boundary of 42° north latitude was set in 1819 with a treaty with Spain and in the year 1846 the line between the Oregon country and the British claims was set at 49° north latitude. Oregon became a territory in 1848 and its present boundaries were established in 1853.

The Willamette River valley was prime farming land when Oregon was being settled. Starting in about 1840, and running through 1848 was the period of settlement referred to as the "Oregon Fever". Fertile land for the taking was the primary attraction. The inducement went as high as 1,000 acres for American emigration to the Oregon country to settle and thereby gain control over the British claimed territory. During this period about 10,000 people (6) emigrated to the fertile regions in the Willamette Valley.

A local government was initiated on May 2, 1843, at Champoeg which was on the Willamette River upstream from Oregon City. Two of the 52 men voting for the new government were Vermonter. (6) The lands of Oregon were originally developed by land policies set by the provisional government. One of the prime reasons for the 1843 meeting was to secure land titles. Original policy allowed 640 acres for a claim and a missionary could have a township of six miles
square. In subsequent legislation of 1844 the missionary claim was eliminated.

In 1848 when Oregon became a territory, the land claims to that time were not recognized by the United States Government. September 24, 1850, saw the passage of the "Donation Act" which was: to create the office of surveyor-general for the public lands of the Oregon Territory, to provide for surveys, and to make donations to the settlers of the public lands. The act initially granted 640 acres to a man and wife if they were on the land by December 1, 1850. There were minor changes that followed the initial act. After April, 1855, all other lands not claimed were to be publicly sold. Claims prior to the "Donation Act" were also recognized at this period of time.

The Preemption Act of June, 1834, had to play an important role in the matter of prior claims. This act had allowed prior claims in the areas of Indiana, Illinois and Ohio to be recognized and the pattern had thus been set to allow for prior claims in the Oregon country.

Further settlement in Oregon occurred under the Homestead Act of 1862; various railroad grants, the most notable being the Oregon and California Grant of 1866; wagon road grants; Mineral Laws of 1872; Desert Land Law of 1877; and the Timber and Stone Act of 1878.

The settlement of lands in Oregon was based primarily on the "Public Land Survey". The Public Land Survey which is a rectangular system had its beginning with an act of May 20, 1785. The Public
Land Survey basic unit is a square six miles on a side called a township with the parcel broken into 36 sections with each being approximately one square mile in size. The system uses an initial point, meridians and parallels of latitude. This is a much more formal system than found in Vermont.

The Donation Act and other acts created in Oregon the same problems as in Vermont. Settlement was encouraged faster than the surveys could be run. Monumentation was not prevalent and the monuments used were not adequate for any lengthy period of time. This just added to future conflicts on the location of land boundaries.

The first surveyor-general appointed to the Oregon Territory, as a result of the Donation Act, was John B. Preston who was appointed by President Fillmore. As surveyor-general he set the stake for the Willamette Meridian initial point on June 7, 1851, at a location about three miles west of Portland. The stake was changed to a stone in July of 1885 and since has been referred to as the "Willamette Stone". Through this initial point run the Willamette Meridian and the base parallel. The surveyor-general of Oregon operated under a special set of instructions that was issued by the General Land Office on March 3, 1851. These instructions were amended by further instructions in the form of a manual on February 22, 1855. This was the first of a series of manuals which periodically update instructions to the current times.

Once the lands were laid out it became easier to describe the
location of a particular parcel. This contrasts with the procedure that was followed prior to the Donation Act wherein an individual would describe his own land and file a claim with the provisional government which was located at Oregon City.
III. BRIEF HISTORY OF VERMONT

Vermont, "The Green Mountain State," became the 14th state in the Union when it obtained statehood on March 4, 1791. About this time (1788), in Oregon, Capt. James Cook discovered Cape Foulweather near Yaquina bay and Robert Gray discovered (1792) the Columbia River, which he named for his ship "Columbia". The first European to discover Vermont was Samuel Champlain when on July 4, 1609, he entered the large lake that bears his name. The lake is the largest portion of the state's western boundary. Vermont's first settlement was at Fort Dummer, which is near what is now Brattleboro, in 1724. Vermont is a small state with a land area about one-tenth of that of Oregon and a population of about one-fifth of that of Oregon. It had a distinct place in history in that it had never been a crown colony; in fact, it was an independent republic from 1777 until its admission as a state in 1791.

The origin of Vermont stems from the Royal Province of New Hampshire which was established in 1741 and had as its first Governor, Benning Wentworth. A large portion of Vermont was settled by land grants obtained from Governor Wentworth in his desire to expand the frontiers of civilization for the King of Great Britain. The first such grant was made on January 11, 1749, for a township called, interestingly enough, Bennington. The townships were supposed to be a square six miles on a side. Out of each township, the Governor reserved some land in his own name and it was referred to as the
"Governor's Right". Other shares or rights were established for the First Settled Minister, for a school and for the Church of England. These grants within the area of what is now Vermont were referred to as the New Hampshire Grants.

Governor Wentworth granted 131 townships between 1749 and 1764 with a total of 100 granted in the years 1761 and 1763. Since two shares in each town were normally reserved for the Governor's Right, at this point Governor Wentworth held approximately 65,000 acres.

When New Hampshire started making grants, it appeared lucrative to the New York Colony, so they started making grants of the same land to other individuals. The fight between New Hampshire and New York went on for years, with the settlers of the Vermont territory caught in the middle. Britain was not able to settle the problem, but the Vermonters finally settled the issue themselves when in 1777 they declared their own independence and set up a republic. The new republic was first called New Connecticut, because a large number of settlers had come from that state. In the same year (June 4, 1777) the name was changed to Vermont, which means "Green Mountains" in French. Vermont created its own postal service, set up a mint in Rupert for coinage in 1785, and acted as a republic until admitted to the Union in 1791. An act of the Vermont Legislature on October 28, 1790, simply declared the New York Grants to be null and void, thus solving the land dispute.

After the republic was set up, Vermont started granting its own territory over again and filling in its claimed borders. These new
grants were generally the form of the existing towns that exist today.

Ira Allen, who was appointed the first Surveyor-General and who in his own right was one of the greatest of the early Vermont heroes, was reputed to have surveyed the lines of over 100 towns. He found that there were original errors in the granting and that land was being settled faster than it was being surveyed. In October of 1782, he resigned his office after a three year tenure. Some of his comments, from an address at the time of his resignation, are worthy of mention as they have a way of showing part of the problem that exists in Vermont nearly 200 years later:

"That at several sessions of the assembly I have requested the members to send me the charters of their respective towns for record....to ascertain the vacant lands, to settle some disputes respecting town lines to quiet people in their possession while new, and to prevent future animosities...that the town lines throughout the state should be preambulated...lines should be laid down on a map in black ink...that all such lines should be surveyed...by approved surveyors and chainmen under oath...some of the towns granted by New Hampshire are laid in very bad form...I find two townships granted in one place...that there are partial acts and resolutions...with other embarrassments, renders it impracticable for me to draw bounds for sundry towns with that exactness which I think ought to be both for the interest of the state and grantees...that for want of proper surveys...I was obliged to draw bounds in very abstruse terms and if there is not some directions as to the surveyors of them towns there is danger of mistakes by unexperienced inattention of surveyors that may be in consequence of particular resolves of assembly...the blame will naturally devolve on me...I have thought fit to resign my office of Surveyor-General." (7)

Ira Allen thereafter still did surveying work and makes an
interesting statement in a letter dated July 1786:

"It was necessary that two surveyors should be together, to establish the corners on Onion River, as the stream is exceeding crooked, corners to be made on both sides on different angles and distances, which necessitated many and difficult calculations, as all was done by figures without planning, or at least placing dependance on plans. But few surveyors, in these parts understand the art of surveying sufficient to proceed on this correct method." (7)

There was no uniform method of land division once the proprietors took possession of the land. We find various combinations of lots, ranges, division, rights, shares and what have you superimposed on the already murky situation with the town lines as eluded to by Ira Allen.

It is with this foregoing brief historical sketch of both Oregon and Vermont that modern statutes will be discussed.
IV. REGISTRATION OF LAND SURVEYORS

The first statutes to be considered are those that recognize the land surveyor. The applicable statute for Vermont is 26 VSA Ch. 37 and for Oregon is ORS 672.1

These statutes will be compared by the use of tables which have been divided into convenient size for ease in reading and discussing.

Table I. Registration Board

<table>
<thead>
<tr>
<th>Topic</th>
<th>Vermont</th>
<th>Oregon</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Name of Board</td>
<td>Vermont Board of Registration for Land Surveyors</td>
<td>State Board of Engineering Examiners</td>
</tr>
<tr>
<td>b. Type of Board</td>
<td>Surveyors</td>
<td>Engineers and Surveyors</td>
</tr>
<tr>
<td>c. Board membership and appointment</td>
<td>Five members appointed by Governor</td>
<td>Nine members appointed by Director of Commerce with approval of Governor</td>
</tr>
<tr>
<td>d. Number of Surveyors on Board</td>
<td>All five members shall be registered land surveyors</td>
<td>One member shall be a registered land surveyor</td>
</tr>
</tbody>
</table>

1. The statutes of Vermont are referred to as the Vermont Statutes Annotated. They are listed by title and chapter. For example, Title 26, Chapter 37, deals with Land Surveyors and would be referred to as "26 VSA Ch. 37". A sub-portion of the chapter dealing with revocation of license would refer to the paragraph and would have the full designation 26 VSA 2598. The statutes of Cont. on page 14
A major distinctive difference in the two statutes is that Oregon has a joint state board of engineering examiners to cover both professional engineers and land surveyors. Vermont, on the other hand, has separate boards for the registration of professional engineers and land surveyors. Therefore, Vermont allows land surveys to be accomplished only by registered land surveyors whereas Oregon allows registered engineers and land surveyors to perform surveys.

The decision to have a joint board or a separate board is a point of major discussion today. In a publication from the National Council of Engineering Examiners (NCEE) (8), it is recommended that there be a joint board. However, the NCEE also publishes two separate Model Laws, one for a joint board and another for a separate board. It might be that a single board for registration of professional engineers and land surveyors would be more efficient, but there are arguments against such a procedure. Currently the land surveyors around the United States are striving for more formal recognition of their profession. In the past, surveying has been an element within civil engineering. The more recent civil engineering curriculum changes have discouraged the education of land surveying. Consequently those in the area have desired to get out from under the "dead hand" of civil engineering and stand as their own profession with their own

1. Oregon are referred to as the Oregon Revised Statutes, abbreviated "ORS". The statutes of Oregon are also referred to by title and chapter. For example Title 52, Chapter 672 deals with Professional Engineers and Land Surveyors; however it is customary to refer to this as ORS 672. A sub-portion of the chapter dealing with acts constituting practice of Land Surveying would have the full designation ORS 672.007.
disciplines. Milton O. Schmidt of the University of Illinois in 1962 stated:

"An influence of singular importance tending to reduce instruction in this subject has been the steady decline in the professional esteem with which land surveyors and others participating in surveying activities are regarded by educators in other areas of civil engineering. This degradation of opinion by the more professionally minded, numerically stronger, and more articulate groups has promoted the classless character of surveying in civil engineering schools." (9)

It is not unreasonable to assume that surveying as a science and an art is a distinct discipline. The field of land surveying covers more materials than were in the traditional civil engineering courses of ten or twenty years ago. It is unfortunate that the decline of emphasis on land surveying had to come at the time of the greatest advances within the field. The subject of the decline or stagnation of land surveying has been covered by Milton O. Schmidt (9), John G. McEntyre of Purdue University and Arthur J. McNair of Cornell University in 1963 (10), and Kenneth S. Curtis of Purdue University in 1964. (11) At a time when the inventory and continual updating of the land resource is so important, it is necessary that individuals be trained in areas of surveying.

It was mentioned earlier that Oregon allows registered engineers to practice land surveying. The Oregon statute allows an electrical or mechanical engineer or others to practice land surveying and it can be argued that ethical questions might be raised if this were to happen. The decline of the surveying curriculum within civil engineering caused Curtis to state: "Is land survey-
ing so easy to practice that a structural engineer or highway engineer or forester, with the little surveying instruction he might have had, do a truly professional job for his client." (11) It is also very evident that many individuals do not agree that civil engineers are qualified to practice land surveying. It is no secret that the number of surveying courses taught within the conventional civil engineering program are still on the decline with some programs being totally void of any surveying courses. At Oregon State University, civil engineering students are only required to take one three credit junior level course in surveying. With the continuing controversy between the civil engineer and the land surveyor, it would seem that both professions could best be served in the future by separate boards.

NCEE (8) recommends that the joint board have an "equitable representation" on the board. Equity would seem to be difficult when other fields like electrical, mechanical, or chemical will also be looking for equitable representation. Certainly the Oregon board, which only requires one land surveyor, does not have equitable representation (approximately 5,000 engineers and 1,000 land surveyors) for the land surveyor. The NCEE report just cited lists 49 states (Tennessee not reported); 42 of which have some type of joint board and seven of which have separate boards for land surveyors. The current thrust in New England is to go to separate boards as three of the seven states having separate boards are Maine, New Hampshire and Vermont. The reason for this is that they
were the last states to recognize the practice of land surveying with Vermont's law being effective on January 1, 1969. The other four states having separate boards are Illinois, Nebraska, Texas and West Virginia.

There is also a segment within the American Congress on Surveying and Mapping (ACSM) that is striving for stronger laws in order to upgrade the professional status of the land surveyor. The land surveyor for too long has been in an unfavorable position within the professional ranks. Stricter laws and a higher level of education will help to raise the image of the land surveyor within the professional ranks and at the same time the welfare of the public will be enhanced. The land surveyor should be separated from the civil engineer without conflict, without animosities, and with a desire on the part of both to make two strong professions.
Table 2. Land Surveying Definitions

<table>
<thead>
<tr>
<th>Topic</th>
<th>Vermont</th>
<th>Oregon</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Definition of Land Surveying</td>
<td>Surveying of areas for correct determination, description and conveyancing; establishing corners, line, boundaries and monuments, searching land records, platting of land parcels including the surveying for topography, subdivisions, grading, street layout, minor drainage; defining and locating of corners, lines, boundaries, prepare maps, accurate records and descriptions.</td>
<td>Makes surveys to determine area, topography, establish or reestablish land boundaries, corners or monuments or to subdivide or plot land, establish grades, elevations and estimate quantities.</td>
</tr>
<tr>
<td>b. Definition of Land Surveyor</td>
<td>Special knowledge of the mathematical and physical sciences, process of searching land records, rules of evidence and boundary law, principles and methods of measurement.</td>
<td>Knowledge of mathematics, physical and applied sciences, techniques of measurement necessary to the various surveying branches and the relevant requirements of law for adequate evidence.</td>
</tr>
</tbody>
</table>

The definition of land surveying is generally the same for both states. The exception is that, in Vermont, specific mention is made of searching land records and writing descriptions. In the definition of the land surveyor, Vermont again mentions the searching of land records.
One must realize that the searching of land records is more difficult and time consuming under the system used in Vermont than that used in Oregon. The systems of laying out land are not the same in both states. Vermont attempted to use a town that was a square of six miles on a side, as is found in the Oregon township. However, within the Vermont town the lots were irregular in size and there was no uniform method of plotting the lots. In locating a lot it is much easier to indicate its location when you use the public land survey method. It is no miracle that the early problems of the New England settlers, in locating their claims with respect to each other, precipitated a better system of definition within the townships as seen in Oregon. In Oregon the townships were divided into sections with an area of about one square mile. The general practice was to then quarter the section into lots of about 160 acres and then further subdivide the quarter sections in a regular manner.

Another problem that Vermont has with its system is that in earlier days most deeds were written in the "bounds" form. This form of description generally gives no distances to any boundaries. It uses the name of the abutting owner as the locative call for the location of the boundary. Phrases such as; along the line of Smith; or to the Jones lot; are very common within the descriptions. There were some descriptions that gave distances and magnetic bearings along the boundaries. In Oregon it is easier to specify the NW ¼ of the NE ¼ of section 29 in the U.S. Public Land Survey. Therefore it is necessary to spend more time in searching the Vermont records
in order to find an adequate description of a parcel and sometimes one never does! Because of this problem it is logical for Vermont to stress the importance of searching land records.

Description writing is another point of difference between the statutes. In Item b Vermont says that part of surveying is the preparation of the description. A land surveyor uses monuments to mark the land. He generally renders a map of the same parcel of land showing additional data as a means of further description. A third method possible is to describe the parcel by the use of the written word. It is much easier to mark on the land and to draw a map than it is to reduce the description to the written word. The added emphasis on the part of Vermont seems warranted. The unfortunate part of the added emphasis, however, is that when a Vermont lawyer executes a deed the lawyer has the ultimate responsibility for the preparation of the written description that may go with the deed. This has led to much controversy in Vermont and at times has made for very difficult subsequent attempts at retracing the land surveyors footsteps. The Attorney General of Vermont has ruled that the description in a deed need not be a formal survey description. This opinion was handed down in 1973 in opinion number 38.
Table 3. Registration Requirements

<table>
<thead>
<tr>
<th>Topic</th>
<th>Vermont</th>
<th>Oregon</th>
</tr>
</thead>
</table>
| Requirements for registration | a. Graduation from an approved school of higher education, completed formal instruction in land surveying, 18 months experience in land surveying and searching of Vermont land records, pass a written exam.  
  or  
  b. Three years or more of active practice in land surveying, pass a written exam.  
  or  
  c. none  
  or  
  d. Under appropriate reciprocity and pass a written exam. | a. Graduation in an approved land surveying curriculum of four years or more from a school or college approved by the board, four years or more of active practice in land surveying work, pass a written exam.  
  or  
  b. Eight years or more of active practice in land surveying, pass a written exam.  
  or  
  c. Certification as a land surveyor-in-training, four years of active practice, pass a written exam.  
  or  
  d. Under appropriate reciprocity and pass a written exam on law. |

Notable differences appear above. As one method of registration Oregon requires graduation from a four-year curriculum together with
four years of experience. This is contrasted by the equivalent requirement, in Vermont, of graduation from an approved school of higher education and 18 months of experience. Both states indicate that this education is a fundamental part of the study of land surveying. It is difficult to satisfy this requirement because land surveying curriculums are almost non-existent in the United States. The notable four-year curriculums are at Purdue and California State University at Fresno. There are several two-year technology programs around the United States.

It was indicated earlier that most civil engineering curriculums do not begin to cover enough surveying courses to satisfy a land surveying curriculum requirement. It may be that the law, in calling for land surveying curriculums, is not calling for much at all. The corollary would be that the law is correct in calling for land surveying curriculums, but that the states are really accepting less than the stated law as an expedient means of registering land surveyors.

Registration boards such as Oregon, for example, generally require that engineers graduate from a four-year program in engineering and they generally adhere to this principle rigidly. It is difficult to understand why the same board would allow land surveyors to become registered without graduation from a land surveying program. The board, when allowing such a practice, is stating that the professional requirements for a land surveyor are less than for an engineer. This is not the case and it should not be interpreted in
this fashion. The end result in Oregon is that the statutes allow an engineer to do surveying, but a land surveyor cannot do engineering!

The land surveying profession has obviously got to assert a greater pressure on the registration boards in order to change this image. Such pressure can best be achieved by the coordinated efforts of a state society of professional land surveyors. The professional level of an engineer and a land surveyor are equivalent and the statutes should reflect it.

On the other hand, there are some two-year associate degree programs that cover more surveying courses than the civil engineering curriculums do, and they should be so recognized. Such is the case within Vermont where the Board of Registration for Land Surveyors recognizes a program at Vermont Technical College in Surveying Technology as satisfying the statute regulation for education. If civil engineering curriculums do not adequately cover surveying courses, then it becomes a necessity to turn to the two-year programs where they are covered. This, admittedly, is the wrong direction to go.

At this point, one has to address the question of technology versus engineering and discuss the ideal educational requirements for becoming a registered land surveyor.

It has been stated that there are very few four-year land surveying programs in the United States and that surveying courses within civil engineering curriculums are not at satisfactory levels. At the same time as surveying courses were disappearing from civil
engineering curriculums the need for land surveyors increased. The two-year associate degree granting institutions picked up the surveying courses and established land surveying technology programs.

A technician, by definition, generally works under the guidance of an engineer but we find, as is the case in Vermont, that the technician becomes the professional! In Vermont the technician has filled the engineering void vacated by the civil engineer.

What are the ideal educational requirements? Within the accepted definitions for the words engineering and technology, land surveying is engineering, not technology. Because land surveying is engineering, it would follow that graduation from a four-year degree in land surveying should be the minimum educational requirement. One might add that it is not unreasonable to expect that in the future the fifth year will be required to meet minimum educational requirements for professional land surveying registration.

This in no way should affect the status of the existing two-year associate degree granting programs. It should have the effect of strengthening these programs as technicians are trained in practical rather than theory oriented courses and would be needed to work with the engineer in the true sense of the definition of a technician.

This author does not believe that a two-year associate degree program should be enough to meet the educational requirements for the professional registration of land surveyors.

A better method of satisfying the statute requirement for any state would be to recognize only accepted land surveying programs from
a four-year institution or as an interim measure specify a minimum number of credit hours within fields of surveying from a four year civil engineering curriculum.

The experience requirement for Vermont, within a above, of one and one-half years is by no means adequate. There has been an attempt to raise it to three years, but the General Assembly of Vermont has not seen fit to do so. The apparent reason for this decision, on the part of the legislature, is prompted by what they believe to be a shortage of land surveyors within the state of Vermont. The Model Law of NCEE (12) calls for four years of experience with three years of "responsible charge". The experience requirement (or internship as some refer to it) is most important. The key words responsible charge should not imply a technical skill job on a survey party. In Vermont this is even more critical because of the aspect of searching the land records.

If an individual does not have a formal education, he is not prevented from becoming licensed in either state. In b above Vermont requires three years experience while Oregon requires eight years of experience. Two arguments arise on this point; one, should it be allowed at all and the second is why should it be a set number of years. There are those that argue that in order to achieve professional registration one should first achieve a formal education. The medical profession is often cited as an example. The other side of this argument is that historically land surveying was a self taught profession for many individuals and that this opportunity
should not be lost. There is no doubt that due to the higher level of knowledge required today to effectively serve a client that a formal education in land surveying would be beneficial.

How many years of experience, if no formal education, should be required? Three in Vermont, eight in Oregon, and the Model Law of NCEE has eliminated this means of becoming registered as a professional land surveyor. The key words responsible charge should be the minimum experience requirement. If an individual, through self study, can obtain this goal in less than eight years that individual should be allowed to be registered providing the other requirements are met. It is reasonable to assume that self study would require some period of time and that the individual is not in immediate responsible charge upon employment. However, this requirement may be satisfied in six, seven, eight, or more years. It must be stated again that the most satisfactory method of obtaining registration is by obtaining a formal education. Current statutes that allow for registration without the formal educational requirements should be eliminated.

Oregon also allows for a Land Surveyor-in-Training (LSIT) within its statute. An LSIT certification program is a method whereby an individual has demonstrated to the satisfaction of the registration board that he possesses certain basic facts and skills in the area of land surveying. This is an advantage to the individual in that his certification puts him on a specified level within the professional ranks of land surveying. It also serves
notice on those who are registered that this individual has shown an interest and a knowledge in a specific area. Vermont at the present time has no such statute. The Vermont land surveyors are in the process of drafting such legislation for presentation to the General Assembly and hopes are high for passage next year. Such legislation should be encouraged within all states and with the comity to also carry such a certificate from state to state.

Table 4. Seal and Certification

<table>
<thead>
<tr>
<th>Topic</th>
<th>Vermont</th>
<th>Oregon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal and Certification</td>
<td>Maps, plats, surveys or other documents shall be signed and sealed together with the certification statement. Certification statement shall indicate the basis of the survey and that it is consistent with abstracted deed information or other official records; or evident markers, client information or other.</td>
<td>Every map, drawing and narrative shall be stamped with seal and signed, constituting a certification.</td>
</tr>
</tbody>
</table>

The Vermont statute has an unusually important aspect referred to as a "certification statement". Oregon indicates that a surveyor's "affidavit" is required (ORS 92.070) but this is only an indication that he has performed the work. The Vermont statute provides a means whereby one surveyor can pass on data to another surveyor. Such data
is placed on the plat to be filed. The data may be an aid for a subsequent land surveyor to follow the thinking and to "follow the footsteps" of the first one. In Vermont one can indicate the chain of title on the plat or that he obtained certain information from the client and did not use the land records. It would also aid in solving any legal questions that might arise later in that it shows the basis of thinking behind what the land surveyor did.

Neither Vermont nor Oregon covers continuing education in their statutes applying to registration requirements. The implication is that one becomes registered for life unless the registration board revokes the license. Revocation, of a license to practice, is generally concerned with such items as conviction of a felony, gross negligence and incompetence, or failure to adhere to applicable statutes. The idea of no further education is not consistent with the rapid changes taking place within the field of land surveying. It would be more appropriate to issue a license for a short period, possibly five years, and make renewal contingent upon some form of continuing education.

Continuing education could be accomplished by a point system whereby a land surveyor might receive points for membership in a state society for professional land surveyors; by attendance at educational seminars or forums; by correspondence work; or a period of further formal education at an institution offering advanced degree work in land surveying. One of the best methods to improve the land surveying profession is for the membership to be required to show continuing growth and advancement in the field of land surveying.
methods and material. The public will benefit by the realization that the professional land surveyor is required to stay current in his field and is better able to serve the individual client. It is therefore incumbent upon the registration boards and the land surveying profession to obtain legislation that will require continuing education for the renewal of registration.
V. VERMONT TOWN LINES

Town lines are a problem within the state of Vermont. Historically the town lines were the so-called granted boundaries and some boundaries and grants have been changed. The town is the basic political subdivision within the state of Vermont. The 241 towns within the state are divided into 14 counties. The counties do not exert much of a political influence in Vermont. Cities and villages have their own political boundaries, having been broken away from the original granted towns. The author of this paper lives in the Town of Randolph which has its own political government. The Village of Randolph with separate political boundaries and located entirely within the Town of Randolph has its own political government. Village residents may vote on town matters, but the town members may not vote on village matters. The Town of Randolph is one of many towns located in Orange County.

Many town lines are indeterminant within normal economical means as extensive surveys would be required to satisfy all grants. Some town lines have been sporadically maintained while others probably have not been run since the original grant, if even then, as Ira Allen pointed out in 1782. Because the town lines are not clear, there are many statutes that attempt to clarify procedures to be used when dealing with these boundary lines.

The need for clarifying the location of town lines is even more important as more towns continue to adopt zoning and subdivision
regulations. Zoning and subdivision regulations adopted for a town are only good for that political jurisdiction. Zoning against the use of mobile homes is of little consequence if the town does not know if the mobile home is situated in its town.

At the Supreme Court level (76 Vt 370), it has been ruled that it seems doubtful whether the Legislature can confer upon the judicial branch the power to establish any division line between towns other than the charter line. It would seem that the ultimate jurisdiction of settling a conflict between towns as to the location of line disputes should be much stronger. It is not adequate to answer the question by just ruling on the law or points of law that apply to a specific case where the surveyors have presented conflicting evidence. Vermont towns do not, in most cases, appear concerned about their lines. It would be beneficial if there was a town surveyor. Oregon handles this problem on the county level with a county surveyor.

The statutes outline the legal solution to the town line problem. Selectmen of adjoining towns that are unable to agree on the town line may go through the county court (24 VSA 146) for the appointment of commissioners to locate such line. The court will appoint three

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2 State Supreme Court decisions are referred to as "volume, state, page" and will be cited as follows; 68 Vt 338 or 26 Or 398. U. S. Supreme Court decisions are cited as; 300 S. Ct. 50.
commissioners and one of them has to be a surveyor. 76 Vt 370 says that the above proceeding confines the court to locating and establishing the true division line (charter line) between towns. Under 24 VSA 1462, the commissioners shall hear all interested parties, view the premises and recommend where the line be established. The commissioners recommend how the line shall be marked and they report their findings to the court. The court shall render judgement and order the same to be recorded in each town.

It was mentioned earlier that 76 Vt 370 said the true division line should be established. A more recent 1930 court decision (102 Vt 367) has said that while the original charter line is the one to be located and established, it is not necessarily absolutely and precisely according to charter, but as nearly according to charter as it may be. It appears that the Supreme Court has reinforced the fact that the land surveyor cannot follow the footprints of the original land surveyor. Once the decision is recorded, it is thereafter the town line and shall be used in deeding lands. (24 VSA 1463)

The fact that one of the court appointed commissioners is a land surveyor has led to further rulings. A 1966 case (126 Vt 179) has ruled that it was the intent to have the land surveyor as an expert and use his knowledge to understand the technical problems. However, the land surveyor cannot perform independent inquiry, interview witnesses or examine documents outside the court.

Further amendment of 24 VSA 1462 in 1967 added the following:
"In the absence of a clearly definable charter line, boundaries acquiesced in by towns involved for one hundred years or more shall be deemed to be the charter line."

This would indicate that a statute of limitations of 100 years has been established. The raising of the question of acquiescence has required further court rulings. Acquiescence in a wrong boundary, regardless of the duration, will not change the true line if such can be established. This question has been covered in 126 Vt 179. But 126 Vt 194 went a little further when the court ruled that where the true line is uncertain or obscure, the evidence of historical acquiescence may indicate where the true line might be found. The same case also said that "while acquiescence in a boundary alone can have no prescriptive effect nor transfer any territory, it may have evidentiary value in the search for the location of the true boundary."
VI. OREGON COUNTY SURVEYOR

Oregon is fortunate in having county surveyors. It would be beneficial if every county or town could have a land surveyor's services. As indicated before, Vermont had a Surveyor General but the position was eliminated. Every state today ought to have a Surveyor General to oversee the land surveying profession. Even on the town level in Vermont, a part-time land surveyor would be appropriate. At the state level a Surveyor General would be very valuable in the area of statewide land use planning and subdivision. Policies to follow in the use of a plan could be controlled and monitored by him.

The county surveyor (ORS 204.005) has a great deal of jurisdiction as outlined below:

1. He can appoint deputies (ORS 204.650).
2. He can work for the court of record (ORS 209.020) and must execute any court order to perform a survey.
3. He must perform surveys (ORS 209.050) for private individuals, within ten days, if the individual pays the county surveyor's fees in advance.

The ten day period may be a problem in that a survey may not be completed in that time frame or the county surveyor may have a backlog of work to be accomplished. Another problem is the idea of an advance payment. This seems like an easy way to get most clients to go to a private land surveyor, where the smaller advance may be a "retainer" in the form of a percentage of the job estimate.
4. He has jurisdiction to cross county lines (ORS 209.030 and ORS 209.060) if the parcel being surveyed crosses the county line.

ORS 209.070 stipulates the duties of the county surveyor when performing a survey. The important aspects are that a record of all surveys must be maintained and the surveys must be numbered. The record of the survey must contain a written narrative of the survey as it was performed. This narrative is to indicate available field information as to description of corners, how established, measurements of the survey, and dates. A plat of the survey is also required. An interesting element of the statute is the degree of specification that is used to identify the size and placement of corner monuments. Specifications are written for wood, stone, iron, bearing trees, and what to do if there are no bearing trees. The county surveyor has to perform all surveys in accordance with regulations of the General Land Office now the Bureau of Land Management. He also deals with the corners that were established by the Government Surveys. He should maintain, or re-establish these corners as the need arises. In the counties west of the summit of the Cascade Mountains, the county surveyor may upon court order establish corners where all physical evidence is gone but where the government notes are available. This activity must be recorded.

In ORS 209.100 is a point of law that is extremely critical to effective surveying. It gives the county surveyor the power to take testimony from any individual in order to prove some facts pertinent
to a survey. It would be of great value to the land surveying profession as a whole if all the statutes that allow for registration of land surveyors would give this right to all registered land surveyors.

In the performance of a survey, the county surveyor must work with the true meridian. In order to accomplish this, he must make an observation on the sun and also account for the magnetic variation. In addition, the observation must be tied to an existing corner in a Township and Range. In Vermont all surveys are run at the discretion of the individual land surveyor. There is no Public Land Survey to use as control.

The county surveyor is controlled in his activities (ORS 209.140) when re-establishing section corners. The corners or monuments are protected (ORS 209.150) and cannot be interfered with (ORS 209.140). In the resurvey of prior government-surveyed lands, he is controlled by ORS 209.200.

The power of the county surveyor's office is evident in ORS 41.540 which deals with evidence. It states that "no surveys or resurveys shall be considered as evidence in any court unless attested by two competent surveyors, except surveys made by the county surveyor."
VII. OTHER POLITICAL BOUNDARIES

The problems with the town lines of Vermont and the office of the county surveyor of Oregon have been discussed. The towns of Vermont are not laid out in a uniform manner like that found in the counties of Oregon where the Public Land Survey is used.

Within each state there are other political subdivisions and boundaries. One has to be aware of village and city boundaries. Boundaries are important when establishing regional planning commissions and when laws on land use planning, zoning and subdivisions are enacted. In Vermont several towns may join together for a common purpose of development and control. In some cases the planning commission may not follow the town lines, but follow the traditional river watershed or basin. When this occurs, a new boundary is created which needs to be defined and located.

In addition to political boundaries within a state there are also boundaries due to lands owned by the Federal Government with examples being military bases or national forest lands. These Federal boundaries tend not to follow town or county lines, but must be considered in any planning. Planning units involving several states or the Federal Government should be considered.

Each state has boundaries with other states. These state boundaries lead to occasional disputes and laws have been enacted that have settled some of the lines. An example will be cited from each state that deals with boundaries of a water nature.

Oregon and Washington have a joint boundary in the Columbia River.
Over the years it has led to numerous conflicts. The original description of February 1859, for the state of Oregon stated: "...middle of the north ship channel of the Columbia River; thence easterly, to and up the middle channel of said river, and where divided by islands, up the middle of the widest channel thereof, to a point near Fort Walla Walla." The Washington description of 1889 does not agree with the beginning calls. The case was settled by a U.S. Supreme Court decision in 1908, (13) in favor of Oregon.

The Oregon-Washington line has been further clarified by the Oregon-Washington Columbia River Compact that was ratified by both states and the U.S. Government in 1958.

ORS 186.510 gives the river portion of the boundary as it now exists in terms of a traverse line. The line is controled by latitude and longitude at the various control points.

The Vermont example involves the Vermont-New Hampshire boundary. The Connecticut River is the boundary between New Hampshire and Vermont. The original grants to land along the river were from the "west bank". Subsequent development of the river changed the elevation of the water and consequently the boundary line. In 1 VSA 611 the boundary is covered. The legislation was passed in 1935 as was similar legislation in New Hampshire. It states in the statute:

"The boundary line between the state of New Hampshire and the state of Vermont shall be perambulated and markers and bounds renewed wherever necessary once in every seven years forever by the attorney general of this state in conjunction with the attorney general of New Hampshire or by such person as the Attorney General shall in writing appoint for the purpose."
Because the boundary line is the Connecticut River, the flow of the river is protected and no structure that will affect the flow and make it difficult to ascertain the boundary line is allowed until the states are notified. Inspection, permit and penalty statutes are covered in 1 VSA 616-618.
VIII. OREGON SUBDIVISIONS

In the introduction to this paper the role of the land surveyor in land use planning and subdivision was discussed. It is not possible to make a direct comparison of Vermont and Oregon subdivision law because Vermont has none. Vermont has a land use plan law which has some basic definitions similar to Oregon definitions. The two states approach the problem of land use and subdivision differently. Vermont has a statewide land use plan, and it is working on a statewide zoning plan. Cities and towns have their own zoning regulations. Oregon has allowed for local land use and zoning control. As an example, Benton County's comprehensive plan and zoning ordinances were adopted on July 3, 1974. The Vermont land use statutes are to control development. The Oregon statutes control the subdivisions of land and allow for the county comprehensive plans.

Recently, extensive legislation was passed in Oregon that changed the previous subdivision elements of the Oregon statutes.

The following discussion of the Oregon statutes will be in outline form. The data was taken from Senate Bill 487 of the 1973 Oregon Legislative Assembly. Senate Bill 487 was, in general, a revision of ORS 92.010-92.160.

Definitions: (ORS 92.010)
1. Lot.....unit created by subdivision.
2. Major partition.....partition which includes the creation of a road or street.
3. Map.....diagram, drawing concerning a major partition.
4. Minor partition.....means a partition that does not include the creation of a road or street.
5. Parcel.....unit created by partitioning.
6. Partition.....act of partitioning or tract of land partitioned.
7. Partition land.....to divide an area of land into two or three parcels within a year.
8. Plat.....map of a subdivision.
9. Road or street.....generally a public or private way.
10. Subdivide land.....to divide an area of land into four or more parcels within a year.
11. Subdivision.....act of subdividing or tract subdivided.

Sales of lots in a subdivision before the plat is recorded (ORS 92.025) are prohibited. Upon filing the map, one must apply to the county or city that exercises the jurisdiction (ORS 92.040) to approve the subdivision plan. The jurisdictional limits are defined in ORS 92.042.

Regulations and local ordinances may be established (ORS 92.044) to protect the public welfare. Areas of concern relate to the total environment. Location, surroundings, utilities, streets, lot sizes, fire, flood, pollution, light, air, overcrowding, transportation, water, sewerage, education, and recreation are some of the areas of concern.

The statutes cover specific requirements to be followed in the survey and the platting of the subdivision. ORS 92.050 indicates that all requirements for the survey and plat have to be met. The survey closure error shall not exceed one foot in 4,000 feet. The survey and plat must be done by a legally registered engineer or land surveyor. The plat has to be of sufficient scale to show clearly all details, lot numbers, lengths of boundaries, street numbers, and location and description of all monuments.

The monuments for marking a subdivision and the specifications
for the monuments (ORS 92.060) receive special attention. The initial point of the subdivision must be monumented and referenced to a known corner of the U.S. Public Land Survey. All points on the subdivision exterior where there is a change in direction, must be monumented as well as all the street intersections. All lot corners must be monumented. The monuments themselves should be so marked that any measurement to the monument can be made within one-tenth of a foot. An important revision of this statute allows the interior monuments to be placed after the subdivision plat has been recorded. The delayed staking of the interior monuments is an important time element, however the surveyor has to post a bond to guarantee that the work will be accomplished by a certain date.

The subdivision plat must also include an affidavit (ORS 92.070) on the part of the surveyor.

The preparation of the plat itself (ORS 92.080) covers size requirements, what is to appear on the face of the document, and what may appear on the reverse side.

Other segments of the statutes give additional requisites needed to get approval (ORS 92.090) and approving authority and procedures (ORS 92.100, ORS 92.110). The plat shall be filed with the county (ORS 92.120) and indexed (ORS 92.140).

ORS 92.090 has the important revisions that reference these statutes to the local comprehensive plan and zoning ordinances. The plat must comply with the local zoning and planning regulations. The plat or map must include a donation of all public improvements and no plat of
a subdivision will be approved without adequate water and sewage facilities.

The previous statutes have many important aspects. Noteworthy are: the concern for the environment, prior approval of plat before sales, the degree of concern for monumentation, and the need for local approval.

The concern for the environment is a paramount concern to many individuals today. It is important that the impact of new growth on the environment be considered. New growth should correct our past mistakes rather than continue our present poor practices. Generally, this initially means adequate water supply and adequate sewage facilities. Requirements of states and local jurisdictions are getting stricter with respect to water and sewage as well as other elements of the environment. Planning becomes more difficult as the urban areas spread out. The creation of a subdivision can overload the existing support facilities. A subdivision generally adds a large number of people in a short period of time. Prior planning on the part of a community may not have considered such possibilities.

Prior approval of the subdivision before sales is a benefit to the public. A benefit in that individuals buying the lots are assured that they will be supplied with some public facilities and that zoning restrictions have been met. If lots were sold prior to approval, the individual might find that he could not construct a home on the lot obtained. This has happened in Vermont. The ultimate delays and court battles are costly to the individual and to the public.
The concern for monumentation is another benefit to the public. When an individual buys a lot, he likes to know the boundaries. Proper monumentation has in general been ignored by land surveyors. The client is not adequately served if the land surveyor uses poor monumentation in the marking of the land. Monumentation must last for years and must be capable of being reconstructed by means of measurements and notes of the previous land surveyor. Monuments that are of a permanent type material set in an adequate manner will aid in future land conveyancing.

The need for local approval is a sound political decision. A major complaint on the part of the populace of Vermont is that the state has too much control in the area of land use planning. State governments occasionally have the appearance of being very distant from the people. People generally feel that answers from the state are difficult to obtain. Complaints of too much "red tape" are common in Vermont. The state of Oregon has made a sound decision in allowing "Home Rule". All areas of a given state do not have the same problem priorities. State control versus local control is a difficult problem. A beneficial solution would seem to be state guidance with local control.

This author would have to state that the Oregon statutes just discussed as a subdivision law and the reference to the local land use and zoning ordinances will ultimately serve the people better than the Vermont approach to the problem.
IX. VERMONT LAND USE

Vermont enacted a state land use plan in 1969 that became effective on April 4, 1970. The statute is 10 VSA Ch. 151 and is referred to in Vermont as "Act 250".

The intent of the statute was quoted earlier on page 2 but briefly restated the intent is to protect and conserve the lands and the environment of the state of Vermont. Land use in Vermont is further defined as follows: "...the only usages which will be permitted are not unduly detrimental to the environment, will promote the general welfare through orderly growth and development and are suitable to the demands and needs of the people of this state."

The essence of this legislation is that it controls the development within the state. It is not a subdivision law, although its main initial thrust is in the control of the creation of subdivisions.

Within Vermont prior to the passage of this legislation, the development of the land was not controlled in many towns. Undesirable developments sprang up in heavy tourist areas. These tended to be very large, which in effect carved up the land in an uncontrolled manner and attempted in no way to take care of any form of environmental pollution. The consequence, of a few of these developments, was the passage of Act 250 which has had the effect of virtually stopping development.

The basic elements of 10 VSA Ch. 151 are:

Definitions: (10 VSA 6001)
1. Development.....construction on a tract involving more than ten acres, for commercial or industrial purposes,
on more than on acre within a municipality that has no zoning or subdivision law, construction of housing or mobile homes with more than ten units; construction above 2,500 feet elevation; construction on more than ten acres for municipal or state purposes.

2. Lot.....any undivided interest in land less than ten acres.

3. Plat.....map of subdivision with surveyed lot lines.

4. Subdivision.....a tract of land partitioned into ten or more lots within a continuous ten year period.

10 VSA 6021 creates an environmental board. The board can make rules to carry out the statutes. (10 VSA 6025) The heart of the legislation is found in 10 VSA 6081. It states; "No person shall sell... any interest in any subdivision or development...without a permit."

Some of the conditions to be met before a permit is granted are covered under 10 VSA 6086. Stated as follows the permittee:

1. Will not allow undue water or air pollution.
2. Has sufficient water available for needs of the subdivision.
3. Will not cause an unreasonable burden on existing water supplies if they are to be used.
4. Will not cause unreasonable soil erosion.
5. Will not cause unreasonable highway congestion.
6. Will not cause unreasonable burden on local educational services.
7. Will not cause an unreasonable burden on municipal or governmental services.
8. Will not cause any adverse effect on scenic, natural, aesthetic, historic sites or rare and irreplacable natural areas.
9. Is in conformance with the land use plan.
10. Is in conformance with any regional or local plan.

10 VSA 6087 states that a permit cannot be denied based on just elements 5,6,7.

The Environmental Board created by the statutes has tremendous powers. It controls just about every type of construction within the state. It has passed subsequent articles clarifying their role and
ability to operate.

Currently a permit is required for additional areas not delineated in the original statutes. These include:

1. Any substantial change in an existing development or subdivision.
2. The division of a tract whereby a parcel of less than ten acres is created.
3. Construction or modification of all buildings, except unoccupied warehouses, single family residences and duplex homes with separate sewage disposal facilities.
4. The design, layout, modification or use of land to accommodate two or more mobile homes.
5. The expansion, creation or alteration of a travel trailer, camp or tent site. (14)

The rules as established by the Environmental Board are very lengthy.

All permit applications require a plan and specifications. In addition, applicants for a permit may need substantial data and information in the areas of transportation, outdoor lighting and signing, landscaping, handling of refuse, and surface and subsurface drainage. Adequate additional data may be required on sewage disposal, water supply, public buildings and air pollution control.

The plan for the permit application is almost a complete topographic plan combined with a construction plan. It must show all existing facilities such as roads, parks, water services, culverts, etc; changes proposed in contours; soil borings; and percolation tests. The plan is all inclusive!

In Vermont the individual private practice land surveyor generally is not involved in Act 250 with development or subdivisions because of the need for such a comprehensive plan. The total land inventory is the land surveyor's responsibility, while the land alteration is normally held to be an engineering function. A land surveyor
can run the boundary lines and render a plat, but he cannot take per-
colation tests. That function requires an engineer. As a consequence
most of the large subdivision and development work is accomplished
by large engineering consulting firms. These firms employ engineers
and land surveyors and are able to do the whole plan. It would appear
that in land subdivision all elements of concern could best be handled
jointly by the engineer and the land surveyor. Large scale compre-
hensive development plans today require a team composed of engineers,
land surveyors, planners and architects. Each is presumed to have his
own area of expertise.

Vermont's land use statutes are far reaching. The Environmental
Board currently rules on the construction of highways and the con-
struction of generation stations for electric power. It has been
stated in Vermont that there will be controlled development for the
public good.

The weaknesses, as compared to Oregon, are that there is too
much control at the state level and there is no detail to the sub-
division portion of Vermont's land use statutes. In the previous
section on Oregon subdivisions it was pointed out that local control
was more desirable than state control. Recent attempts to pass state-
wide zoning for Vermont have failed on this very issue.

The advantages of a definitive subdivision law were mentioned in
the previous section. Monumentation is a key. Land boundary disputes
decrease as monumentation becomes more adequate. Permanent markers
today may not be adequate for tomorrow.
Earlier the statement was made that state guidance with local control is probably the desirable method. In Vermont we generally see state guidance with state control.
X. VERMONT and OREGON COORDINATE SYSTEMS

Monumentation is a very valuable tool in perpetuating subdivision boundaries. It is therefore relevant to discuss the state plane coordinate systems of Vermont and Oregon.

Table 5. State Plane Coordinate Systems

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<thead>
<tr>
<th>Topic</th>
<th>Vermont</th>
<th>Oregon</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Source</td>
<td>VSA 671</td>
<td>ORS 93.320</td>
</tr>
<tr>
<td>b. Name</td>
<td>Vermont Coordinate System</td>
<td>Oregon Coordinate System</td>
</tr>
<tr>
<td>c. Type of Projection</td>
<td>Transverse Mercator Projection</td>
<td>Two zones of a Lambert Conformal Projection</td>
</tr>
<tr>
<td>d. Basis of system</td>
<td>Clarke Spheroid of 1866</td>
<td>Clarke Spheroid of 1866</td>
</tr>
<tr>
<td>e. Use of coordinates</td>
<td>In any public land records or deed records to points within a reasonable distance, is considered complete, legal and a satisfactory description.</td>
<td>Within one-half mile limit of monumentation established using second order standards or better.</td>
</tr>
</tbody>
</table>

A comparison of the two coordinate systems indicates a single advantage to the Vermont system and a restraint to the Oregon system.

The difference in using given control (e) is significant. Vermont says "within a reasonable distance" whereas Oregon says "one-half mile." The current use of electromagnetic distance measuring (EDM) equipment certainly stretches out the term "reasonable distance."
Due to the fact that in Vermont a majority of the land surveyors do not use EDM the distance factor has not been lengthened at this time. In Vermont the lack of control monumentation and the fact that the majority of land surveyors have not seen the benefits of EDM has caused the lack of usage.

In Oregon the opposite is the case. More use is made of EDM equipment and as a result there is a demand on the part of the Oregon land surveyor to extend the range of one-half mile so that adequate monumentation can be utilized.

The advantage to Vermont, as stated, is that coordinates can be used as a legal description. This was set forth in 1 VSA 676. The restraint on the part of Oregon is that "Public Lands" descriptions prevail over those of coordinates.

Both the advantage to Vermont and the restraint on Oregon are due to the historical development of the states. You will recall that Oregon is basically a "Public Lands Survey" state, whereas Vermont is not. United States Public Land Monuments usually prevail in disputes involving boundaries and later coordinates are considered of secondary importance.

Why would a land surveyor want to use coordinates? The chairman of the Vermont Board of Registration for Land Surveyors stated; "Unfortunately very few monuments last forever. Most eventually decompose or become lost due to vandalism, neglect, or due to the changing earth itself. Eventually, a land owner in the chain of title will want to know for certain where his boundary is." (15)
A method that would allow for more certainty would be the use of the state plane coordinate system. But, there are some inherent problems when one mentions coordinates.

One finds a wide range of skill level within the land surveying profession. Some land surveyors naturally will avoid what appears to be difficult and is unknown. This then becomes an educational problem on the part of the professional societies. The societies should encourage individual members to use the coordinate systems and supply educational forums for those that feel they have a need for further education. The idea of avoiding the system is much more prevalent in Vermont than in Oregon. In Oregon we find, as mentioned earlier, that coordinates are popular, but that limited control monumentation tends to put a restraint on the use of coordinates.

This author finds that in Vermont the educational process will be lengthy. How is one going to argue for the use of coordinates with the integrated use of EDM equipment on the one hand while on the other hand he must still argue for the abandonment of "compass" surveys with survey error of closures of one foot in 300 feet. A requirement for working within state plane coordinate systems is going to require the typical Vermont land surveyor to upgrade his methods and his equipment.

The professional land surveying societies must instigate the need for a greater density of control points in the survey network. States and the Federal Government must seek to rapidly extend the control monumentation and to institute a better maintainance and protection plan.
Another attendant problem is that coordinates are usually held as being low in the so-called priority lists of order of evidence (16). Increased usage and time should overcome this problem and it would be hoped that coordinates would move up the ladder of priority. In creating a new division of land, this author feels that coordinates in general would be preferred and should prevail over calls for distance, direction, and acreage.

In the text, "Boundary Controls and Legal Principles", it is stated: "...coordinates cannot be presumed to rank higher than the method used to determine them." It is further stated that "coordinates are an informational aid to assist in replacing a lost monument, not a means to determine where a found undisturbed monument should have been." (16) These statements reflect the current practice with the land surveying profession but not the thought of all land surveyors.

Monumentation, over the years, has achieved a level of omnipotence and this image should be changed when dealing with coordinates. Of all the "original" monuments set, a very small percentage are in existence today. The land surveyor attempts to be a land monument detective, but the original monuments have more often than not disappeared.

Instead of setting a new concrete or iron monument, set a "coordinate" marker. A "new" monument of concrete cannot be set any more accurately than a coordinate monument, but the coordinate will last longer than the concrete.

If the land surveyor will search for the original monument and state that he has done so on the plat; this should be sufficient to
allow for any type of new monumentation whether it be mathematical or iron. If the land surveyor will stipulate, certify or make an affidavit to the affect that he has used all available evidence in attempting to find the monument, then it would seem that a new type of monument such as a coordinate can be set in the place of a lost monument as easily as we set another iron pipe.

One will not argue that the original monument controls, but it must be found in order to control.

There is no question that the property owner is going to desire a real monument and not an abstract mathematical point as he views it. A set iron pipe or concrete post can then be a locative device for the landowner for finding the approximate location of the true coordinates.

Imagine the ease with which one can describe a third floor apartment in a condominium where the owner in affect owns in fee simple title an element in space. How much simpler it is to use coordinates and add the third dimension as an elevation. This then is a simple system for use in recording deeds and in the collection of data for a computerized land records system.

The development of land title and records systems requiring a simple form of description or identification are rapidly approaching and the coordinates seem to be the piece of data that is easily handled. Coordinates fit into a mathematical model whereas bearings, distances, and phrases are much more difficult to handle within data banks.

It can be seen that in Vermont with a statewide land use program that data banks will be geared for coordinates in order to control the
use of an individual parcel.

Land use planning, zoning, and subdivision work would all be simplified if coordinates were more readily used than monuments in systems adaptations. Robert T. Howe of the University of Cincinnati, states;

"If legal descriptions of land parcels are ever to be modernized and made inherently accurate, the surveying and legal professions are going to have to throw off their age-old devotion to monuments, and accept theoretical coordinate descriptions of points as correct." (17)

The land surveying profession has to take the lead and advocate the benefits of a coordinate system.
XI. SUMMARY and CONCLUSIONS

Vermont and Oregon land surveyors law has been studied and it can be seen that land use planning and subdivision are partially dependent on the professional land surveyor.

An initial objective in land use planning is an inventory of available resources. The land surveyor is capable of supplying this inventory. He is also capable of working with the engineer or planning team to bring about a plan that will satisfy the needs of the developer, the people, and the state. A subdivision would not exist unless the services of a land surveyor were utilized to run the boundaries and set monumentation.

Man has relied on the land surveyor for centuries to help him locate his boundaries. He will continue to need his services as the demand for the land resource continues to increase. The boundary has to become more precise than a call for yonder hill. The rectangular system was an attempt to make easier the task of land location. The use of Township and Range or bearings and distances in our fast moving computerized society is becoming outmoded. A newer system has to be developed. The first form of that new system will involve monumentation by coordinates.

Historically a quick look was taken at Oregon and Vermont. This was to show the difference in how the land was developed. In Vermont one finds that grants of an entire township were made. Once people had taken up the land it was democratically divided. In Oregon the
settlers were encouraged to emigrate for free land. There an individual laid claim to a parcel of land. Subsequent legislation such as the Donation Act and the Homestead Act further developed the lands of Oregon which is under the Public Land System.

The knowledge of the law in regard to surveying is important. It was with this thought that the statutes of Vermont and Oregon that affect the role of the land surveyor were compared. The statutes compared were those that recognize professional land surveyors and those that relate to the idea of land use and subdivision. There are many other areas of comparison possible, outside the scope of this thesis, such as adverse possession or navigability.

As the study was first approached the following question was asked. Would the fact that Oregon which is approximately 100 years younger than Vermont imply that Oregon should have better laws as a result? Stated another way; would a western state benefit from the earlier mistakes of an eastern state. The comparison shows that each state now has some advantages. Each state can currently stand to learn from the other.

One benefit that was handed to Oregon was the rectangular system of Public Lands. As Thomas Jefferson foresaw, it was a better system than generally found in New England. A land surveyor can appreciate the difference.

This past spring Governor Thomas Salmon of Vermont was accused of trying to emulate the state of Oregon and Governor Tom McCall. The accusations arose over the continuing battles on the "bottle ban" and
development. Oregon was the first state to institute the so-called bottle ban law and Vermont followed. Recently Vermont has been looking to Oregon to see how it keeps out unwanted development. It would seem that each state could do more looking.

Some recommendations will be made based on the comparison of the statutes.

RECOMMENDATION 1. Oregon should establish a separate board for the registration of land surveyors.

This recommendation is made in the hope that the civil engineers and land surveyors will jointly work to upgrade the land surveying profession. The land surveying profession is rallying around a new spirit of individualism and separate boards will be a clear need in the future.

RECOMMENDATION 2. Vermont and Oregon should continue to update and clarify registration requirements relative to education and experience.

The requirements in both states do not recognize the lack of land surveying curriculums or lack of surveying courses within existing programs of civil engineering. Stricter requirements based on actual credits obtained in surveying courses should be the guideline. Vermont needs to increase its period of required experience.

RECOMMENDATION 3. Vermont and Oregon should recognize, with legislation, the need for continuing education in order to maintain a valid registration.

Neither state has approached this topic. The lack of any
legislation to compare shows that it is not being accomplished. Although no comparison was made, continuing education is a necessity. Additional updating is required of any profession.


The need for a LSIT program within land surveying is similar to the need for an EIT within engineering. Complete reciprocity should also go with any LSIT program instituted. Reciprocity can be achieved by a high quality national exam.

RECOMMENDATION 5. Vermont and Oregon should introduce legislation to recreate the job of Surveyor General.

There ought to be state guidance in the field of land surveying to a greater extent than now exists. More uniform systems and methods of surveying can be instituted from the state level. The office of the Surveyor General could resolve questions and police the technical standards of the land surveying profession. Most registration boards do not have the time or have sufficient funds to adequately investigate complaints.

RECOMMENDATION 6. Vermont should introduce legislation for a county or town surveyor.

A county land surveyor would be most desirable. In Vermont the county is not a viable entity. It exists, but it is not a seat of power. A town surveyor would be more beneficial, but the number of towns creates a monetary constraint. Smaller or poorer towns could possibly share a town land surveyor.
RECOMMENDATION 7. Vermont needs an immediate definitive sub-
division law.

It is most important that standard methods of subdividing the
land be accomplished. Monumentation is the important factor and uni-
form monumentation is long overdue in Vermont.

RECOMMENDATION 8. The land surveyor should work more closely
with the state and local government on the
development of legislation with regard to land
use and subdivision.

If more land surveyors become involved, there would be less prob-
lems for the land surveyor. All too often the legislative body has
good intent, but the enactment becomes difficult to manage.

RECOMMENDATION 9. The land surveyor should recognize the growing
importance of coordinates and encourage the
use of coordinates and land records systems.

In a statewide or National land inventory data bank the coordinate
is the key piece of data.

Land surveyors must begin to work in the system and states have
to provide additional legislative guidance.

A comparison of Vermont and Oregon statutory land surveyor laws
shows that each state can stand to improve. Each can learn from the
other with the benefit being for the public good and the welfare of
the people.
XII. BIBLIOGRAPHY

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