

HOOSIER SURVEYOR



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INDIANA SOCIETY OF
PROFESSIONAL LAND SURVEYORS, INC.

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AFFILIATED WITH THE
AMERICAN CONGRESS ON
SURVEYING & MAPPING



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INDIANA SURVEY STANDARDS

STANDARDS OF PRACTICE
OF
THE INDIANA SOCIETY
OF
PROFESSIONAL LAND SURVEYORS

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EDITOR'S NOTE

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Gary Kent
Editor

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EDITOR'S NOTES

The direction that your Society is taking in 1986 is clearly defined in the Committee Charges published in this issue. The ISPLS Board of Directors and President Patrick N. Cunningham produced these charges in an effort to provide the Society's committees with goals for this year's activities. Emphasis has been placed on those issues which you the membership has indicated you feel we as a society and a profession should be concentrating on.

Those sitting back and watching the rest of us will see substantial progress this year in the areas of Public Relations, Chapters, Membership, Governmental Affairs, Standards, Scholarships and coordination with the Purdue and Vincennes Surveying programs. There is an issue near and dear to the heart of every member in at least one of the ISPLS committees — contact the Committee Chair, a Board member, your President or Peggy at Headquarters to volunteer your time and/or efforts. The more members we have working toward our goals, the more we will accomplish.

This issue also contains the product of months upon months of work by the ISPLS Standards Committee. The Indiana Survey Standards were approved by the ISPLS Board of Directors and presented for adoption by the membership at the Annual Meeting in Evansville. After a lengthy discussion, the standards were adopted by an overwhelming — if not unanimous — majority of the members. The Committee is charged with presenting these standards to the Board of Registration for consideration. It behooves us all to study, understand, and practice these standards. Those areas that need polishing will be carefully reviewed based on your comments. The Continuing Education Committee is planning a series of workshops this year aimed at applying the standards to our everyday work. Watch for announcements and ATTEND! Don't make the mistake of sitting back and letting the profession pass you by.

Future issues of the Hoosier Surveyor will contain numerous new features and items of interest. We will also be getting back on publishing schedule after a year of struggling to manage the 1985 ACSM-ASPRS Fall Convention in addition to the numerous other society activities. ISPLS has an exciting year ahead, but don't just watch — jump in!! (or at least get your feet wet!)

1986 ISPLS COMMITTEE CHARGES FROM ISPLS PRESIDENT PATRICK N. CUNNINGHAM

AS PRESIDENT OF THIS SOCIETY, I CHARGE ALL COMMITTEES AS FOLLOWS:

- (1) TO REVIEW AND TAKE ACTION AS DIRECTED ON MATTERS REFERRED TO THEM BY THE PRESIDENT.
- (2) TO MAKE TIMELY WRITTEN REPORTS OF COMMITTEE COMMITTEE ACTIVITIES TO THE BOARD OF DIRECTORS VIA THE PRESIDENT. SAID WRITTEN REPORTS ARE TO BE SUBMITTED WITHIN 10 DAYS FOLLOWING EACH COMMITTEE MEETING, WITH A MINIMUM OF ONE REPORT PER QUARTER.
- (3) TO PREPARE AND SUBMIT THE COMMITTEE ANNUAL REPORT BY DECEMBER 31, 1986.

IN ADDITION, THE FOLLOWING COMMITTEES ARE INITIALLY SPECIFICALLY CHARGED AS FOLLOWS:

BYLAWS COMMITTEE

- (1) TO STUDY ANY BYLAW CHANGE PROPOSALS FROM THE MEMBERSHIP AND TO MAKE RECOMMENDATIONS TO THE BOARD OF DIRECTORS FOR ANY NEEDED REVISIONS.
- (2) STUDY A PROPOSED AMENDMENT WHICH DETAILS THE PROCEDURES TO BE USED IN THE EVENT OF A VOTE BY THE MEMBERSHIP RESULTING IN A TIE DURING THE ELECTION OF A PRESIDENT OR DIRECTORS AND MAKE RECOMMENDATIONS TO THE BOARD ON OR BEFORE SEPTEMBER 19, 1986.
- (3) STUDY A PROPOSED AMENDMENT WHICH WOULD ALLOW STUDENTS OTHER THAN COLLEGE STUDENTS TO BECOME STUDENT MEMBERS AND MAKE RECOMMENDATIONS TO THE BOARD ON OR BEFORE SEPTEMBER 19, 1986.

CHAPTERS COMMITTEE

- (1) TO MONITOR THE ACTIVITIES OF EACH EXISTING CHAPTER THRU MEETINGS WITH REPRESENTATIVES OF EACH CHAPTER.
- (2) TO MAKE QUARTERLY REPORTS TO THE BOARD OF DIRECTORS AND TO FORWARD WRITTEN SUMMARIES OF SAID REPORTS TO THE HOOSIER SURVEYOR EDITOR.
- (3) TO PROVIDE EACH CHAPTER WITH A REPORT OF BOARD OF DIRECTOR ACTIONS BY MEANS OF THE CHAPTERS COMMITTEE REPRESENTATIVE RECEIVING BOARD MINUTES AND REPORTING ON SAME TO HIS CHAPTER.

CHAPTERS COMMITTEE (CONTINUED)

- (4) TO ACTIVELY ENCOURAGE AND ASSIST THOSE MEMBERS LIVING IN AREAS OF THE STATE NOT REPRESENTED BY CHAPTERS OR REPRESENTED BY NONFUNCTIONAL CHAPTERS TO FORM OR REACTIVATE SAID CHAPTERS.

CONTINUING EDUCATION COMMITTEE

- (1) TO PLAN AND CONDUCT SPRING AND FALL WORKSHOPS WITH SPECIAL EMPHASIS ON THE APPLICATION OF THE NEW SURVEYOR'S STANDARDS.
- (2) TO RECOMMEND TO THE BOARD OF DIRECTORS ANY FURTHER WORKSHOPS THAT THE COMMITTEE FEELS WOULD BE USEFUL.
- (3) TO PROVIDE A LIST OF POSSIBLE FUTURE WORKSHOPS FOR THE FOLLOWING YEAR'S COMMITTEE TO CONSIDER.
- (4) RESERVE SPACE AT A STATE PARK FOR A FUTURE WORKSHOP.
- (5) AWARD CONTINUING EDUCATION UNITS TO WORKSHOP PARTICIPANTS.

CONVENTION COORDINATING COMMITTEE

- (1) TO MEET WITH AND ADVISE THE INDIVIDUAL CONVENTION SUBCOMMITTEES AND TO MONITOR CONVENTION BUDGETS AND PREPARATION SCHEDULES TO ENSURE RESPONSIBLE AND TIMELY PROGRESS.
- (2) TO REPORT SAID PROGRESS TO THE BOARD OF DIRECTORS.
- (3) TO PREPARE A CONVENTION PLANNING TIME TABLE AND CONVENTION BUDGETARY PROCEDURES AS GUIDELINES FOR FUTURE SUBCOMMITTEES.
- (4) SELECT POSSIBLE LOCATIONS AND DATES OF FUTURE ANNUAL CONVENTIONS AND MAKE RECOMMENDATIONS TO THE BOARD.
- (5) SELECT POSSIBLE INDIVIDUALS, GROUPS OR CHAPTERS WILLING TO WORK ON CONVENTION SUBCOMMITTEES AND MAKE RECOMMENDATIONS TO THE BOARD.

CONVENTION SUBCOMMITTEES

- (1) TO PLAN AND CONDUCT THE VARIOUS ASSIGNED CONVENTIONS, MAKING TIMELY AND FREQUENT REPORTS TO THE BOARD OF DIRECTORS VIA THE CONVENTION COORDINATING COMMITTEE.
- (2) TO OBTAIN BOARD APPROVAL OF ALL BUDGETS AND PRIMARY CONTRACTS BEFORE COMMITTING THE SOCIETY TO CONVENTION EXPENSES.

Committee Charges (continued on page 5A)

INDIANA SURVEY STANDARDS

STANDARDS OF PRACTICE OF THE INDIANA SOCIETY OF PROFESSIONAL LAND SURVEYORS

Adopted January 15, 1986.

INDIANA SURVEY STANDARDS

Adopted Jan. 15, 1986

The following standards are a point of beginning towards competent surveying work. A professional surveyor should never use them as a substitute for the exercise of his individual skill, discretion, and/or judgment in each surveying task he or she performs.

These standards are not a panacea and do not pretend to tell a practitioner "how to survey". They do itemize some of the procedural steps and considerations that might be used in the preparation for, conduct of, and disposition of a survey. Surveying projects might call for one or more, or all, of these steps. The final extent to which these operations are performed must be a function of the professional's judgment. These standards are intended to outline some of the minimal operations that are required for competent performance of a surveying project.

The standards incorporate the following sections:

Section I - Negotiation deals with the steps which should be taken prior to, and during, the agreement with a client to perform surveying services.

Section II - Retracement Surveys and Record Document Surveys covers that area of surveying having to do with resurveys and surveys based on documents of record.

Section II - A covers Indiana Land Title Surveys

Section II - B covers Surveyor Location Reports

Section III - Original Surveys covers those surveys that create new land boundaries.

Section IV - Data Accumulation Surveys covers topographic surveys, volumetric surveys and the other specialized information gathering services or surveys that surveyors provide.

Section V - Construction Layout Surveys deals with surveys for location control and construction layout.

Section VI - Survey Data covers the use and preservation of survey records and data.

SECTION I

NEGOTIATION

This section applies to all surveys conducted under the following Sections II, III, IV and V.

I-1 Procedural Outline

A. APPRAISE THE "PROBLEM"

1. Determine the Scope of the Work

Surveys should be conducted only after an agreement is reached between the client and surveyor. The client should tell the surveyor what objectives he hopes to reach through or with the survey. The surveyor should question the client in sufficient detail to obtain a thorough understanding of the client's objectives and needs. The surveyor should appraise the problem and the data, and then advise the client of what must properly be done by both parties to reach those objectives. Only after these steps are completed can a just agreement be reached between surveyor and client.

If the client cannot immediately supply all of the necessary information, the surveyor should advise the client that such information must be obtained prior to the surveyor's final project appraisal and the execution of the agreement.

The surveyor should serve the client and his interests faithfully, but must not violate the profession's rules of ethics, his duty to the public, adjoining, interested parties, or to his fellow practitioners.

2. Ascertain the Difficulties

The surveyor must make his own determination of the difficulties involved in accomplishing the survey. He should thoroughly understand the known factors and anticipate and allow for the unknown factors that will affect the work.

3. Determine the Schedule

The surveyor should thoroughly understand the client's time requirements for the project and should consider the effects other factors will cause in the surveyor being able to meet those requirements.

B. EVALUATE THE CAPABILITIES

It is the surveyor's responsibility to determine whether he has the proper knowledge, experience, personnel, equipment, and financial resources available to undertake, and complete on schedule, the contemplated commission. If he is lacking any of these, the surveyor should resolve the shortcoming(s) with the client or withdraw.

C. ESTABLISH A SOLUTION

Having appraised the problem and evaluated his capabilities, the surveyor should plan a method of accomplishing the work that will carry it to a successful completion. If unable to establish a solution, the surveyor should withdraw.

D. DETERMINE THE COST

It is usually advisable for the surveyor to inform the client of the estimated cost of the survey. The estimate should be as accurate as possible and be given in advance of entering into the agreement with the client. This may be unnecessary in the case of regular clients unless it is apparent that the cost will, on a particular job, exceed the normal.

E. ACCEPTANCE OF THE COMMISSION

1. The surveyor should advise the client as to what steps he deems necessary to meet the objectives of the project and at the same time satisfy the surveyor's legal and ethical responsibilities to the public. If the client insists on less from the surveyor, then the surveyor should withdraw.

2. The surveyor should advise the client as to the appropriate theoretical uncertainty (tu) for the project. The surveyor and client should reach an agreement as to the theoretical uncertainty required for the project.

3. The surveyor will advise the client of any known difficulties, uncertainties, or contingencies that might affect the correctness, accuracy, schedule for completion, or cost of the work.

4. The surveyor should establish with the client the extent of any limitations to the surveyor's responsibility. No warranties should go with the surveyor's performance of the work except that he will perform it in a manner usual to his profession.

5. The surveyor should advise the client of his method of charging for the survey and the terms for payment.

6. For the mutual protection of both the client and surveyor, the surveyor should prepare and supply the client with a memorandum, letter, confirmation of work ordered, or contract which covers the above points and terms of the agreement. In the event a third party, such as an agent or counsel enters into the agreement on behalf of the client, then the client should be notified of the agreement.

7. When all matters have been resolved to the satisfaction of the surveyor and client, and when there is a meeting of the minds concerning the contractual obligations and limitations of the survey, the surveyor may proceed with the commission.

SECTION II

RETRACEMENT SURVEYS AND RECORD DOCUMENT SURVEYS

(Section I applies)

II-1 Procedural Standards

A. PRELIMINARY RESEARCH AND INVESTIGATION

The surveyor should:

1. Obtain from the client, or other appropriate sources, the record description of the subject parcel(s) as well as the record description of the adjoining properties.
2. Obtain from the County Recorder's Office copies of any plats that relate to the survey.
3. Obtain from other public offices copies of any maps, documents, and field notes that relate to the survey.
4. Obtain copies of data that relate to the survey that are available from known private sources.

B. ANALYSIS OF RESEARCH AND PRELIMINARY CONCLUSIONS

The surveyor should:

1. Examine, probe and analyze data.
2. Test the consistency of data.
3. Form the preliminary conclusions.
4. Plan the necessary methods and procedures for conducting the field survey.

C. FIELD INVESTIGATION

The surveyor should:

1. Search for controlling physical monuments and, when found, weigh their reliability.
2. Search for and locate monuments that:
 - a. reference missing control monuments,
 - b. substantiate control monuments that have been obliterated.
3. Search for and locate other monuments and real evidence which relate to the survey.

C. FIELD INVESTIGATION (Continued)

4. Investigate possible parole evidence supporting the positions of obliterated control monuments and obtain the necessary affidavit(s) from individuals involved.
5. Obtain necessary measurements to correlate all found evidence.
6. Obtain sufficient check measurements to satisfactorily verify the work.
7. Locate lines of possession between adjoiners; make comments on possible age of possession; verify age by parole evidence if possible.
8. Record all information in an appropriate field note form.

D. CONCLUSIONS

The surveyor should:

1. Make computations to verify the correctness of measurements obtained.
2. Make computations to determine and verify the position of the monuments and other parole evidence.
3. Evaluate the evidence.
4. In the event of the discovery of a material disagreement with the work of another surveyor, contact the other surveyor and investigate the disagreement.
5. Apply the proper theory of location in accordance with law or a precedent, and finalize the establishment of the survey corners.
6. Set any final monuments required.

E. PUBLICATION OF RESULTS

The surveyor should:

1. Furnish the client with copies of the plat(s) that show the results of the survey.
2. Furnish the client with a written Surveyor's Report which in addition to other pertinent data gives the Surveyor's professional opinion of the amount of theoretical uncertainty (tu) in the lines and corners used in the Survey because of each of the following:
 - a. Availability and condition of referenced monuments.
 - b. Clarity or ambiguity of the record description used and/or adjoiner's descriptions.

And effective June 1, 1989:

- c. Random error in measurements, both linear and angular.

E. PUBLICATION OF RESULTS (Continued)

3. File the plat, when appropriate, in the permanent files of the County Surveyor's Office [or equivalent].

II-2 Technical Minimums

A. MEASUREMENTS

1. Measurements should be obtained with a precision compatible with the particular problem involved, and with the size and shape of the parcel involved.
2. Measurements should be taken with a precision that is consistent with that required by the agreement with the client.
3. Measurements should be recorded and shown on the plat with a number of significant figures representative of the precision of the work.
4. Effective June 1, 1989, the following measurement specifications (Reference: Brown, Curtis M., Robillard, Walter G., Wilson, Donald A., "Evidence and Procedures for Boundary Location", 2nd Edition, John Wiley & Sons, Inc., 1981) will apply for all Retracement Surveys, surveys based on record documents, and land title surveys.

No quantity can be measured to the absolute true value, and each stated measurement has some inherent doubt. It is essential that each measurement be accompanied with statement of its reliability.

The theoretical uncertainty (tu) is a value derived from the theory of probability and the propagation of accidental errors that will provide an indication of the reliability of the position.

[See Appendix "A" for methods for calculating the measurement theoretical uncertainty.]

a. Specifications for the Location of Property Boundaries.

Class of Survey	Theoretical Uncertainty (tu)
A	+/- 0.10'
B	+/- 0.25'
C	+/- 0.50'
D	+/- 1.00'

b. Size of Properties for Each Class.

Assuming that each property will be located with equal diligence and care, irrespective of the value of the land, the listed classes of surveys will fall into the following sizes:

- Class A -- Small area wherein dense monument controls exist, as in a downtown commercial area. Lots 50' x 100'.
- Class B -- Longest side under 250 feet.
- Class C -- Longest side from 250 feet to 2,500 feet and no side under 100 feet unless the periphery exceeds 500 feet.
- Class D -- All sides 1,000 feet or larger, and those having a periphery of 5,000 feet or more.

c. Required Procedures.

The foregoing specifications, based upon uncertainties, are sufficient to define accuracies desired. The surveyor will need to decide on the necessary procedure to attain such accuracy, and it will vary somewhat depending upon the type of equipment used. Techniques used when measuring with an electronic measuring device certainly differ from those used when measuring with a tape.

Assuming that equal care will be used for all sizes of surveys and assuming taping and angular measurements will be made with usual instruments, the following procedures will ordinarily come within the limiting uncertainty for the sizes listed above:

1. Taping

- a. The length of the tape under the prevailing conditions must be known according to the U. S. Standard of length, and appropriate correction must be made. Length must be known to plus or minus 0.005 feet.
- b. The temperature must be observed and proper correction made. The field temperature must be correct to the nearest 5 degrees F. for steel tapes and can be neglected for invar tapes.
- c. The pull exerted on the tape must be gauged by some device such as a spring balance. Standard pull for fully supported tapes is 10 pounds. The pull for end-supported tapes must be sufficient to allow the tape to clear the ground. This pull for 100-foot tapes must be observed to the nearest 5 pounds when fully supported and to the nearest 3 pounds when the tape is end-suspended. The proper corrections for pull and sag must be made in each case.
- d. The weight of the tape between the end supports must be known to the nearest 0.1 pound.
- e. The tape must be aligned so that it is never off line either vertically or horizontally by a distance exceeding 0.5 feet.
- f. The ends of the tape and the fractions should be set in the ground with steel taping arrows or other devices that will adequately mark the distance within plus or minus 0.005 feet at each end.

2. Directions

- a. Directions should be observed with sufficient precision that an uncertainty in the last place will contribute no more than 65 percent of the limiting tu.
- b. Targets or range poles must be centered on the stations within 0.01 percent of the distance being sighted.
- c. The instruments must be centered within 0.005 feet on the station occupied.

2. Directions (Continued)

- d. All angles must be checked by repeating or doubling.
- e. The theoretical error due to the accumulation of direction uncertainties must not exceed 65 percent of the limiting tu.
- f. The transit or theodolite must be leveled to assure horizontal angles and minimize errors in inclined sights.

3. Electronic Distance Measuring Devices

Use standard deviation as shown in the operator's manual.

d. Adjustment.

All positions must be adjusted to balance out the closure discrepancy and provide a more probable value for the position of the points. The adjustment method must be chosen with reason and logic to suit the surveying conditions. Generally, a least-squares adjustment will be satisfactory, though it is not justified in many cases. If the uncertainty has been caused by distance and direction in equal proportions and is a function of the distance, the Compass Rule will be satisfactory. In any case, the adjustment must not shift the position of the point more than the limiting tu.

B. MONUMENTATION

1. All corners should be marked with physical monuments that are both

- a. of a type and character, and
- b. set in a manner providing a degree of permanency

consistent with the terrain, physical features, intended use, and character of the corner being marked.

2. When conditions warrant setting a monument on an offset, the location should be selected so that the monument lies on a line of the survey, or on a prolongation of such line. Offsets should not be in fractional feet from the corner unless a physical obstruction affects their location. Offset monuments should be identified as such on the plat and, if possible, in the field.

3. Monuments should have the surveyor's professional license number, or other identification, affixed thereto whenever possible.

4. Monuments should be witnessed in such a manner that will enable the surveyor to recover the monument over a reasonable period of time.

5. Monuments should be marked (ribbon, paint, lath, etc.) so that the client can recover the monument over a reasonable period of time.

C. FIELD NOTES

All pertinent information, measurements, and observations made in the field during the course of the survey should be recorded in an appropriate field note form and in a manner that is clear and intelligible to those who will follow in the surveyor's footsteps.

D. PLATS

The client should be furnished with copies of the plat(s) which have been drawn to an appropriate scale showing the following:

1. The client's name, date of the field work, surveyor's file number, and the name, address, signature and registration number of the surveyor responsible for the work.

2. Title description and political subdivision of the parcel surveyed. If necessary to define the location, a vicinity map should be provided.

3. North arrow and scale.

4. Angles or bearings. When bearings are shown, their basis should be indicated.

5. All pertinent dimensions. On dimensions other than those measured, sufficient notations should be used to identify their source, such as:

- a. Recorded measurement (Rec.)
- b. Calculated from record values (Calc. Rec.)

6. All pertinent monuments with a notation indicating which were found and which were set, and identified as to their character. Found monuments should be accompanied by a reference to their origin, when it is known. Where there is no available documented reference, it shall be noted on the plat.

7. All monuments and evidence of possession beyond the surveyed premises on which establishment of the corners of the surveyed premises are dependent.

8. Where possession affects the survey, the character of observed evidence of possession and the location of such evidence given in relation to the surveyed boundary lines shall be noted.

9. Adjoining parcels identified by title description or record reference, when pertinent. Map delineation must be such that contiguity, gaps and overlaps are clearly shown. Gaps and overlaps should be dimensioned.

10. Any non-platted record easements or setback lines [if copies of such record documents are provided for the surveyor] or any platted easements and setback lines with appropriate references.

11. Any required setback lines created by zoning ordinance with appropriate references when same are specifically required for the purpose of the survey.

D. PLATS (Continued)

12. Sufficient data to clearly indicate the theory of location applied in finalizing the locations of the corners; any data at variance with this theory of location; sufficient data to allow the retracement of all pertinent lines and corners shown on the plat, without difficulty.

13. Data intentionally excluded by the survey; such as easements, setback lines, etc.

14. A certificate stating the final date of the field survey and that the survey was conducted either by the surveyor or under his direction. The certification should bear the signature, registration number and seal of the surveyor and the date of the certification.

SECTION II-A

INDIANA LAND TITLE SURVEYS

(Sections I, II, and III apply except as to Surveyor's Certificate)

Indiana Land Title Surveys are used for the purpose of inducing a title company to delete certain standard exceptions from loan policies or owner's policies [except where a Surveyor Location Report will suffice].

The following is a reduced copy of the form and certificate to be used for Land Title Surveys. The form lists the survey instructions for said surveys.

ADOPTED JAN. 1, 1970 BY:	CHICAGO TITLE INSURANCE CO. LAWYERS TITLE INSURANCE CORP. PIONEER NATIONAL TITLE INSURANCE CO.	Policy No. _____ (FOR TITLE CO. USE)
ADOPTED JAN. 16, 1970 BY:	INDIANA SOCIETY OF PROFESSIONAL LAND SURVEYORS	
ENDORSED OCT. 27, 1970 BY:	INDIANA LAND TITLE ASSOCIATION	

MINIMUM STANDARD DETAIL REQUIREMENTS
FOR INDIANA LAND TITLE SURVEYS

This certificate shall be executed by an Indiana Registered Land Surveyor and attached to and made a part of each Land Title Survey which is submitted for the purpose of inducing a Title Insurance Company to delete certain standard exceptions from Loan Policies (except single or double family residential tracts) or owners policies. The following survey instructions establish the basis on which the survey is to be performed and the certificate to be rendered.

1. Every parcel of land whose boundaries are surveyed by a licensed surveyor shall be made conformable with the record title boundaries of such land. When it is necessary or desirable to revise or modernize the record description, it should be certified on the plat of survey that the real estate in the revised or modernized description is the same as or lies entirely within the record description, or it should be noted that the record description is faulty or ambiguous and why.
2. Show all monuments, stakes or marks found or placed and note which were found and which were placed. Proof of establishment of all boundaries is of the utmost importance and it should be apparent, from an examination of the plat of survey, why the surveyor adopted the location delineated. This often requires a showing of actual measured distances and bearings around the entire block and any monuments found which indicate property lines. Where occupation alone is chosen as the best possible location, enough ties to buildings, walls, fences, surveyor's monuments, etc. and their actual or estimated age, must be shown to indicate the pattern of occupation within the block. Interior parcel lines must clearly indicate contiguity, gores, and/or overlaps.
3. When the surveyor has doubt as to the location on the ground of street or lot lines or monuments (for such reasons as street and lot lines being undefinable or indefinite because of insufficient monuments or markers in the ground or where errors are found to exist in the legal descriptions or recorded plats), the surveyor shall clearly indicate the nature of the difficulty and give his professional opinion as to range and scope of differences possibly involved and the effect of same on the surveyed positions.
4. Show any physical evidence at or near a boundary that is or appears to be a line of possession or occupation. This will include buildings, fences, hedges, etc. Where there is no physical evidence of possession along the record line the survey shall note along that line "no physical evidence of line."
5. Show the location, dimensions and type of all buildings on the surveyed property. Show their location by the shortest dimension to the exterior boundaries and their relationship to any known setback lines.
6. As a result of having viewed the property with reasonable diligence, show any physical evidence of possible easements, such as roads, rights of way, railroads, drains, telephone, telegraph, or electric lines, water, sewer, oil or gas pipelines, driveways, billboards, etc., if they are on or run across the surveyed property and appear to serve the public or adjoining property owners. If there are any surface indications of underground easements, such as manholes, pipe line markers, sewer or drain outlets, etc., on (or near if pertinent) the surveyed property, show them.
7. In built-up areas with walls on the property line, show them, and indicate whether they are or appear to be independent or party walls. Show location and thickness of these walls, and if a building on the surveyed property appears to use a wall of adjoining premises, show this.
8. Show by dimension the extent of any apparent encroachments by buildings or other improvements appurtenant to the surveyed property or the adjoining property.
9. As a result of having viewed the property with reasonable diligence, show any cemeteries and burial grounds located within the surveyed tract (i.e., "family" cemeteries), either with the boundaries accurately located or with as much information as possible and a note that the boundaries are uncertain, if that is the case.

- Over -

10. Show the existence of any lakes, ditches, streams or rivers running through or bordering on the premises being surveyed. The detailed locations are required only when a boundary or property line is determined thereby.
11. Show any and all roads, streets, or alleys running adjacent to the boundaries of or partly or entirely on the surveyed property, with width, right-of-way lines, name and location clearly indicated. If the above cannot be determined, then this will be noted.
12. If the survey shows an easement that is established by a recorded instrument, the identification of the easement shall show the record reference of the instrument, and, unless otherwise noted, this showing indicates that the physical evidence and record description of the easement conform.
13. The accuracy of measurements and calculations performed in the preparation of surveys which accompany this certificate shall conform to professionally recognized standards as applicable to the type survey performed. Such standards have been adopted by the Indiana Society of Professional Land Surveyors. All field measurements must be balanced, both as to angles and distances, so as to provide a mathematical closure. Show the basis of bearings, assumed or otherwise, the scale of the plat and a north arrow. The plat of survey shall show the following information for any curve; length of arc, radius, central angle and bearing to the radius point from the beginning and end points of the curve.
14. All surveys must carry a date within 30 days of the date of this certificate. Updating of a survey by recertification is acceptable if conditions as of date of recertification are shown thereon.
15. Cite any qualification of the preceding requirements in the space below.

CERTIFICATE

This is to certify to ☐ Pioneer National Title Insurance Co.
☐ Lawyers Title Insurance Corp.
☐ Chicago Title Insurance Co.
☐

that the attached plat is a true and correct survey of the premises briefly described as:

Survey By (Co. Name) —
Date of Survey —
Job No. (If Any) —
Client's Name —
Brief Description —

and completely described on the attached plat.

I further certify that this survey was made in accordance with the instructions set out above and which are by reference made a part of this certificate.

Dated this _____ day of _____, 19____.
Seal

Signed: _____

Registered Surveyor No. _____

SECTION II-B

SURVEYOR LOCATION REPORT

(Section I applies)

When a lender requests that a title policy be issued without taking exception to any matters that might be revealed by a survey, a Surveyor Location Report may be used. The Report should be limited to use on one to four family residential tracts smaller than six (6) acres in size.

The following is a reduced copy of the standard form for Surveyor Location Reports. The form lists the requirements of the report and the certificate form.

SURVEYOR LOCATION REPORT

*** Minimum Requirements
Adopted January 29, 1981

Surveyor Location Reports are to be executed by an Indiana Registered Land Surveyor. THEY ARE FOR USE ON ONE TO FOUR FAMILY RESIDENTIAL TRACTS, not exceeding six acres in size. The instructions for this report are as follows:

The accuracy of location for this report shall be plus or minus one foot on tracts in platted subdivisions and plus or minus two feet on other tracts, unless otherwise specified and explained on the drawing.

CORNER MARKERS WILL NOT BE SET.

The report shall show the record description, if any, and conform with it.

The drawing shall show the following:

1. Location, dimensions, and description of all buildings or other permanent structures. **SHOW THEIR LOCATION BY THE SHORTEST DIMENSION TO EXTERIOR BOUNDARIES, OR ADJACENT EASEMENT LINES.** No location data is shown relative to Flood Hazard Boundary Maps or solar easements.
2. The approximate location of any walls, fences, hedges, etc., that appear to mark lines of possession appurtenant to subject real estate that are farther from the title lines than the distance specified as the accuracy limitation herein or on the drawing. However, the existence or non-existence of any such visible lines of possession will in all cases be noted by a statement such as, "The rear yard has a (describe, for example, "fence") on the (give direction, for example, "north") or "There are no visible lines of possession."
3. The existence and extent of any encroachments, including any possible encroachments that may be indicated by location dimensions that are less than the stated limits of accuracy herein, on to the property or any easements shown on the property, or the abutting property by buildings or other permanent structures, including driveways (with driveway width shown), shall be specially noted.
4. Any evidence of possible common or joint use of driveways, but do not label driveways as "Common" or "Joint."
5. Any visible physical evidence of use which lies outside non-platted easements of record, (if copies of such record documents are provided for the surveyor) or platted easements.
6. Lakes, open ditches, streams or rivers, **BUT EXCLUDING TILE DRAINS**, on or abutting on the premises being inspected. Show locations by dimension only when the buildings or permanent structures are 75 feet or less from the top of the bank of ditches, streams or rivers which are possible legal drains.
7. Roads, streets, or alleys on or abutting the boundaries of the inspected property, with any known width, right-of-way lines, name, and location clearly indicated.
8. Any non-platted record easements or setback lines (if copies of such record documents are provided for the surveyor) or any platted easements and setback lines. **BUT EXCLUDING THOSE CREATED BY ZONING ORDINANCE.** Show the recording data for such items not created by plat.
9. The drawing scale; a north arrow; date of certification; surveyors signature, address, seal, job number, and company name; any names provided to the surveyor of: owner or buyers; mortgagee; title company and any associated reference numbers; and, property address.
10. Certification or recertification date within 30 days of submission.
11. Any exception to these requirements.
12. The minimum acceptable Surveyor's Certificate is shown on page one. The content and format of page one shall be as shown, but the type size and spacing may be altered to suit so long as the finished form is neat and clearly legible. The sheet size for the reports shall be no less than 8½ inches by 11 inches and no greater than 8½ inches by 14 inches. The surveyors name, address and phone number may be shown at the top or bottom margin if desired.

SURVEYOR LOCATION REPORT

THIS REPORT IS BASED ON LIMITED ACCURACY DATA AND THEREFORE NO DATA HEREIN SHOULD BE USED FOR CONSTRUCTION OR ESTABLISHING BOUNDARY OR FENCE LINES.

PROPERTY ADDRESS:
PROPERTY DESCRIPTION:

DESIGNATED PARTIES

MORTGAGEE
OR ASSIGNEES:
TITLE CO.:
OTHER:

REFERENCE NO.

REFERENCE NO.

I, the undersigned, an Indiana Registered Land Surveyor, hereby certify that on the date shown, I supervised the inspection of the real estate described herein at the Address indicated. **THIS LOCATION REPORT WAS PREPARED FOR USE BY THE DESIGNATED PARTIES ONLY AND FOR NO ONE ELSE. THE ACCURACY OF THE LOCATION DATA SHOWN IS LIMITED TO THAT REQUIRED BY THE INDIANA "SURVEYOR LOCATION REPORT" MINIMUM REQUIREMENTS UNLESS OTHERWISE SPECIFIED AND EXPLAINED ON THIS DOCUMENT. IF A MORE ACCURATE OR DETAILED LAND SURVEY IS DESIRED OR IF CORNER MONUMENTS ARE REQUIRED, AN INDIANA LAND TITLE SURVEY SHOULD BE ORDERED.**

I further certify that to the best of my knowledge this Location Report conforms with the **SURVEYOR LOCATION REPORT** Minimum Requirements, as adopted by the Indiana Society of Professional Land Surveyors, Inc., on January 29, 1981, and approved by the Title Underwriters of Indiana, Inc., on March 20, 1981.

CERTIFICATION DATE

SURVEYORS SIGNATURE _____

SURVEYORS JOB NO.

SEAL

SECTION III

ORIGINAL SURVEYS

(Section I applies)

III-1 Procedural Standards

A. PRELIMINARY SURVEY, RESEARCH, AND INVESTIGATION

The surveyor should:

1. Obtain or prepare the documents establishing the intended position of the lines to be created by the original survey, i.e.

Client's approved sketch.
Instructions defining the lines.
Tentative subdivision map.

2. Obtain copies of the laws regulating original division of property that govern in the area in which the property is located.

3. Survey the parcel upon which the original survey is to be based, or such portion thereof as is relevant to the proposed work. This work should be in accordance with the procedural standards for retracement surveys, contained herein as Section II.

Any conflicts between the lines of the retracement survey and the adjoiners must be reconciled prior to the creation of original lines if such conflicts would affect the new lines.

4. When appropriate, conduct field surveys to determine the location of planimetric or topographic features that are to control the intended position of the lines being created.

B. ANALYSIS OF RESEARCH AND PRELIMINARY CONCLUSIONS

The surveyor should:

1. Examine, probe, and analyze data.
2. Test consistency of data.
3. Reconcile the data.

Any inconsistencies between intended positions of the lines to be created and the law and regulations must be resolved.

4. When the exact location of the lines being created is to be determined by mathematical calculations prior to the final monumentation, perform the work in a manner that provides a check on the calculated dimensions of each line being created.

B. ANALYSIS OF RESEARCH AND PRELIMINARY CONCLUSIONS (Continued)

5. Plan the necessary methods and procedures for performing the field surveys.

C. FIELD SURVEYS

The surveyor should:

1. When the size or complexity of the project requires it, establish control points upon which further work is to be based, and adjust said controls to the lines of the retracement survey.
2. Set any final monuments required.
3. Take sufficient check measurements to satisfactorily verify the work.
4. Record all information in an appropriate field note form.
5. Make necessary computations to substantiate correctness of field measurements.

D. PUBLICATION OF RESULTS

The surveyor should:

1. Furnish the client with copies of the plat(s) that show the results of the survey.
2. Furnish the client with a written Surveyor's Report which in addition to other pertinent data gives the Surveyor's professional opinion of the amount of theoretical uncertainty (tu) in the lines and corners used in the Survey because of each of the following:
 - a. Availability and condition of referenced monuments.
 - b. Clarity or ambiguity of the record description used and/or adjoiner's descriptions.

And effective June 1, 1989:

- c. Random error in measurements, both linear and angular.
3. File the plat, when appropriate, in the permanent files of the County Surveyor's Office [or equivalent].
 4. When applicable, furnish the client with a metes and bounds description of each new parcel involved in the survey.

III-2 Technical Minimums

[Note: The survey of the parcel upon which the original survey is to be based shall be in accordance with the technical minimums for retracement surveys contained herein as Section II.

When platting laws set forth technical minimums more stringent than the ones contained herein, they shall take precedence.]

A. MEASUREMENTS

1. Measurements should be obtained with a precision compatible with the particular problem involved, and with the size and shape of the parcel involved.
2. Measurements should be taken with a precision that is consistent with that required by the agreement with the client.
3. Measurements should be recorded and shown on the plat with a number of significant figures representative of the precision of the work.
4. Effective June 1, 1989, the following measurement specifications (Reference: Brown, Curtis M., Robillard, Walter G., Wilson, Donald A., "Evidence and Procedures for Boundary Location", 2nd Edition, John Wiley & Sons, Inc., 1981) will apply for all Retracement Surveys, surveys based on record documents, and land title surveys.

No quantity can be measured to the absolute true value, and each stated measurement has some inherent doubt. It is essential that each measurement be accompanied with statement of its reliability.

The theoretical uncertainty (tu) is a value derived from the theory of probability and the propagation of accidental errors that will provide an indication of the reliability of the position.

[See Appendix "A" for methods for calculating the measurement theoretical uncertainty.]

a. Specifications for the Location of Property Boundaries.

Class of Survey	Theoretical Uncertainty (tu)
A	+/- 0.10'
B	+/- 0.25'
C	+/- 0.50'
D	+/- 1.00'

A. MEASUREMENTS (Continued)

b. Size of Properties for Each Class.

Assuming that each property will be located with equal diligence and care, irrespective of the value of the land, the listed classes of surveys will fall into the following sizes:

Class A -- Small area wherein dense monument controls exist, as in a downtown commercial area. Lots 50' x 100'.

Class B -- Longest side under 250 feet.

Class C -- Longest side from 250 feet to 2,500 feet and no side under 100 feet unless the periphery exceeds 500 feet.

Class D -- All sides 1,000 feet or larger, and those having a periphery of 5,000 feet or more.

c. Required Procedures.

The foregoing specifications, based upon uncertainties, are sufficient to define accuracies desired. The surveyor will need to decide on the necessary procedure to attain such accuracy, and it will vary somewhat depending upon the type of equipment used. Techniques used when measuring with an electronic measuring device certainly differ from those used when measuring with a tape.

Assuming that equal care will be used for all sizes of surveys and assuming taping and angular measurements will be made with usual instruments, the following procedures will ordinarily come within the limiting uncertainty for the sizes listed above:

1. Taping

a. The length of the tape under the prevailing conditions must be known according to the U. S. Standard of length, and appropriate correction must be made. Length must be known to plus or minus 0.005 feet.

b. The temperature must be observed and proper correction made. The field temperature must be correct to the nearest 5 degrees F. for steel tapes and can be neglected for invar tapes.

c. The pull exerted on the tape must be gauged by some device such as a spring balance. Standard pull for fully supported tapes is 10 pounds. The pull for end-supported tapes must be sufficient to allow the tape to clear the ground. This pull for 100-foot tapes must be observed to the nearest 5 pounds when fully supported and to the nearest 3 pounds when the tape is end-suspended. The proper corrections for pull and sag must be made in each case.

d. The weight of the tape between the end supports must be known to the nearest 0.1 pound.

1. Taping (Continued)

e. The tape must be aligned so that it is never off line either vertically or horizontally by a distance exceeding 0.5 feet.

f. The ends of the tape and the fractions should be set in the ground with steel taping arrows or other devices that will adequately mark the distance within plus or minus 0.005 feet at each end.

2. Directions

a. Directions should be observed with sufficient precision that an uncertainty in the last place will contribute no more than 65 percent of the limiting tu.

b. Targets or range poles must be centered on the stations within 0.01 percent of the distance being sighted.

c. The instruments must be centered within 0.005 feet on the station occupied.

d. All angles must be checked by repeating or doubling.

e. The theoretical error due to the accumulation of direction uncertainties must not exceed 65 percent of the limiting tu.

f. The transit or theodolite must be leveled to assure horizontal angles and minimize errors in inclined sights.

3. Electronic Distance Measuring Devices

Use standard deviation as shown in the operator's manual.

d. Adjustment.

All positions must be adjusted to balance out the closure discrepancy and provide a more probable value for the position of the points. The adjustment method must be chosen with reason and logic to suit the surveying conditions. Generally, a least-squares adjustment will be satisfactory, though it is not justified in many cases. If the uncertainty has been caused by distance and direction in equal proportions and is a function of the distance, the Compass Rule will be satisfactory. In any case, the adjustment must not shift the position of the point more than the limiting tu.

B. MONUMENTATION

1. All corners should be marked with physical monuments that are both

- of a type and character, and
- set in a manner providing a degree of permanency

consistent with the terrain, physical features, intended use, and character of the corner being marked.

B. MONUMENTATION (Continued)

2. When conditions warrant setting a monument on an offset, the location should be selected so that the monument lies on a line of the survey, or on a prolongation of such line. Offsets should not be in fractional feet from the corner unless a physical obstruction affects their location. Offset monuments should be identified as such on the plat and, if possible, in the field.
3. Monuments should have the surveyor's professional license number, or other identification, affixed thereto whenever possible.
4. Monuments should be witnessed in such a manner that will enable the surveyor to recover the monument over a reasonable period of time.
5. Monuments should be marked (ribbon, paint, lath, etc.) so that the client can recover the monument over a reasonable period of time.

C. FIELD NOTES

All pertinent information, measurements, and observations made in the field during the course of the survey should be recorded in an appropriate field note form and in a manner that is clear and intelligible to those who will follow in the surveyor's footsteps.

D. PLATS

The client should be furnished with copies of the plat(s) which have been drawn to an appropriate scale showing the following:

1. The client's name, date of the field work, surveyor's file number, and the name, address, signature and registration number of the surveyor responsible for the work.
2. Title description and political subdivision of the parcel surveyed. If necessary to define the location, a vicinity map should be provided.
3. North arrow and scale.
4. Angles or bearings. When bearings are shown, their basis should be indicated.
5. All pertinent dimensions. On dimensions other than those measured, sufficient notations should be used to identify their source, such as:
 - a. Recorded measurement (Rec.)
 - b. Calculated from record values (Calc. Rec.)
6. All pertinent monuments with a notation indicating which were found and which were set, and identified as to their character. Found monuments should be accompanied by a reference to their origin, when it is known. Where there is no available documented reference, it shall be noted on the plat.
7. The relationship of all monuments to the surveyed lines and corners.

D. PLATS (Continued)

8. When a planimetric or topographic feature controls the position of a line or corner being created, the relationship of the feature to the line or point.
9. Sufficient delineation of data on the plat to allow the retracement of all the created lines and corners without difficulty.
10. Data intentionally excluded by the survey; such as easements, setback lines, etc.
11. A certificate stating the final date of the field survey and that the survey was conducted either by the surveyor or under his direction. The certification should bear the signature, registration number and seal of the surveyor and the date of the certification.

SECTION IV

DATA ACCUMULATION SURVEYS

(Section I applies)

IV-1 Procedural Standards

A. PRELIMINARY RESEARCH AND INVESTIGATION

The surveyor should:

1. Determine the purpose of the survey, the specific data to be accumulated, the degree of completeness, and the tolerances necessary.
2. Obtain copies of available maps, plans, as-built plans, and surveys that are pertinent to the survey.
3. Obtain the available descriptions of monuments referencing the horizontal and vertical datums upon which the work is to be based.
4. Utilize only recognized authorities and offices as sources of information necessary for the conduct of the survey.

B. ANALYSIS OF RESEARCH AND PRELIMINARY CONCLUSIONS

The surveyor should:

1. Examine, probe, and analyze the data.
2. Test the consistency of the data.
3. Form the preliminary conclusions.
4. Plan the necessary methods and procedures for conducting the field survey.

C. FIELD INVESTIGATION

The surveyor should:

1. When appropriate, search for and substantiate monuments that reference horizontal and vertical datums.
2. Establish, adjust, and set monuments on necessary control lines to which the data accumulation survey is to be referenced.
3. Obtain sufficient check measurements to satisfactorily verify the work.
4. Record the data in an appropriate form, such as planetable sheets, field notes, photographs, etc.

D. COMPLETION AND EVALUATION

The surveyor should:

1. Make the necessary computations to evaluate the correctness of the measurements.
2. Make any reductions and compilations necessary.
3. Evaluate and edit the collected data.

E. PUBLICATION OF RESULTS

The surveyor should:

1. Prepare in an appropriate form (plat, topographic map, cross sections, diagrams, report, etc.) the results of the survey.

IV-2 Technical Minimums

A. MEASUREMENTS

1. Measurements should be obtained with a precision compatible with the particular problem involved and consistent with the tolerances required in the agreement with the client or the appropriate governmental regulations.
2. Measurements should be recorded and shown with a number of significant figures representative of the precision of the work.

B. MONUMENTATION

1. The control lines and/or points to which the data recording survey is referenced should be marked with a physical monument that is both

- a. of a type and character, and
- b. set in a manner providing a degree of permanency

consistent with the terrain, physical features, and purpose of the survey.

C. FIELD NOTES AND DATA RECORDS

All pertinent information, measurements, observations, and data accumulated in the field during the course of the survey should be recorded in an appropriate field note form, or by other data recording techniques, in a manner that is clear and intelligible to those who will follow in the surveyor's footsteps.

D. PRESENTATION OF DATA

The client should be furnished with the results of the survey in an appropriate form (plats, maps, cross sections, diagrams, tabulations, etc.) showing the following:

1. The client's name, date of the field work, surveyor's file number, and the name, address, signature and registration number of the surveyor responsible for the work.
2. A location description of the project referenced to title description and political subdivision or geographic location.
3. A statement describing the survey technique used to accomplish the work, such as:

"This map prepared by photogrametric methods--"

--or--

"Topography by transit stadia method--"

4. Identification of the horizontal and vertical datums to which the work is referenced, and specific descriptions of the monuments used to establish the reference.

D. PRESENTATION OF DATA (Continued)

5. North arrow and scale.
6. Pertinent dimensions and directions with sufficient notations to identify their source, such as:
 - a. Adjusted measurement (Adj. Meas.)
 - b. Calculated from measured values (Calc. Meas.)
7. All pertinent monuments with a notation indicating which were found and which were set, and identified as to their character. Found monuments should be accompanied with a reference to their origin, when it is known. Where there is no available documented reference, it shall be so stated.
8. Sufficient information so that the control lines and/or points used in the survey can be easily retraced or re-established.
9. Source and authority of informational data and to what degree the information was verified by the surveyor, such as:

"Sewer information shown hereon was obtained from the as-built plans on file in the Office of the City Engineer. Manhole locations and invert elevations were field verified."
10. Data intentionally excluded by the survey, such as easements, setback lines, etc.
11. When the presentation consists of more than a single document, all material should be adequately indexed and cross-referenced.
12. A certificate stating the final date of the field survey and that the survey was conducted either by the surveyor or under his direction. The certification should bear the signature, registration number and seal of the surveyor and the date of the certification.

SECTION V

CONSTRUCTION LAYOUT SURVEYS

(Section I applies)

V-1 Procedural Standards

A. PRELIMINARY RESEARCH AND INVESTIGATION

The surveyor should:

1. Obtain from the client, or other proper source, the approved documents [plans] setting forth the project for which the layout survey is to be conducted.
2. Obtain copies of any documents necessary for the intelligent interpretation of the approved layout plans and specifications.
3. Determine the appropriate number of layout monuments to be established, and the relationship of those monuments to construction lines and grades and offsets.

B. ANALYSIS OF RESEARCH AND PRELIMINARY CONCLUSIONS

The surveyor should:

1. Examine, probe and analyze the data.
2. Test the consistency of the data and bring any observed inconsistencies to the attention of the client.
3. Form the preliminary conclusions.
4. Plan the necessary methods and procedures for conducting the field survey.

C. FIELD INVESTIGATION

The surveyor should:

1. Search for and substantiate monuments, lines or objects indicated by the construction documents as the intended references for the horizontal and vertical project datums.
2. When appropriate, establish, adjust and monument the control points and lines necessary as intermediate to the final layout survey.
3. Establish the final layout control monuments in proper relationship to construction lines and grades.
4. Obtain sufficient check measurements to satisfactorily verify the work.
5. Record all information in an appropriate form.

C. FIELD INVESTIGATION (Continued)

6. Immediately bring to the attention of the client any inconsistencies disclosed by the survey or by examination of the plans.
7. Refuse to set layout monuments for any inconsistent portion of the project until authorized to do so by the client.

D. CONCLUSIONS

The surveyor should:

1. Make the necessary computations to substantiate the correctness of the measurements.
2. Contact other parties involved in any disagreement or inconsistency discovered during the survey, and investigate the disagreement. If the problem cannot be resolved, notify the client.

E. PUBLICATION OF RESULTS

The surveyor should:

1. When applicable, prepare a plat or other appropriate report showing the results of the survey.
2. Prepare any necessary grade sheets.
3. Notify the client in writing in the event of any inconsistency or disagreement. The notice should deal with specific inconsistencies or disagreements and should identify the corrective measures that were authorized and taken, if any.

A. MEASUREMENTS

1. Measurements should be obtained with a precision compatible with the construction tolerances as required in the agreement with the client.
2. When appropriate, measurements should be recorded and shown with a number of significant figures representative of the precision of the work.

B. MONUMENTATION

1. Construction layout monuments should be both
 - a. of a type and character, and
 - b. set in a manner providing a degree of permanencyconsistent with the terrain, physical features, and intended use.
2. Sufficient monuments and offset information should be provided to enable the user to check the accuracy of any point or line established therefrom.
3. Monuments should be witnessed in a manner that will enable them to be easily found by the user for a reasonable period of time. Any witness stakes or lath that show offsets and/or cut and fill data should also show sufficient information to identify the horizontal position of the point being referenced.

C. FIELD NOTES

All pertinent information, measurements, and observations made in the field during the course of the survey should be recorded in an appropriate form and manner that is clear and intelligible to those who will follow in the surveyor's footsteps.

D. PRESENTATION OF DATA

When appropriate, the client should be furnished the results of the survey in an appropriate form, such as plat(s), map, grade sheet, etc. The form selected should show the following:

1. The client's name, date of the field work, surveyor's file number, and the name, address, signature and registration number of the surveyor responsible for the work.
2. A location description of the project referenced to title description and political subdivision or geographic location, and, when appropriate, the specific description of the constructed facility surveyed.
3. The identification of the construction documents used in the survey, and a statement whether or not they were marked on their face as "approved", and the date of their latest revision.

D. PRESENTATION OF DATA (Continued)

4. Sufficient information to reference the layout to the construction documents.
5. Identification of the horizontal and vertical datums on which the survey was based, and the specific descriptions of the monuments that were used.
6. North arrow and scale.
7. Horizontal dimensions and directions with sufficient notations to indicate their source, such as:
 - a. As per plans (Plans)
 - b. Calculated from data shown on plans (Calc. Plans)
8. All pertinent monuments with a notation indicating which were found and which were set, and identified as to their character. Found monuments should be accompanied with a reference to their origin, when it is known. Where there is no available documented reference, this should be so stated.
9. Sufficient information for all layout control lines and points to allow the retracement of the work with minimal difficulty.
10. Any discrepancies or inconsistencies between the construction documents and the layout as surveyed, with a statement of the surveyor's authority for deviating from the construction documents.
11. Data intentionally excluded from the survey.
12. An index and cross reference when the presentation consists of more than a single document.
13. A certificate stating the final date of the field survey and that the survey was conducted either by the surveyor or under his direction. The certification should bear the signature, registration number and seal of the surveyor and the date of the certification.

SECTION VI

SURVEY DATA

A. ACCUMULATE A "BODY OF KNOWLEDGE"

It is the duty of the surveyor to:

1. Accumulate, through experience and research, information on the historical development of surveys in the geographical area in which he practices.
2. Accumulate survey records, field notes, plats, and other data pertinent to the area of practice.

B. PRESERVATION OF DATA

It is the duty of the surveyor to:

1. Properly file and index for future reference those field notes, computations, maps, plats, photographs, and other data accumulated during the survey.
2. Provide for the long term preservation [maintenance] of the survey data. Filing of public records will partially meet this obligation. If possible, the surveyor should make arrangements for the transfer of his records upon his retirement or death.

C. SHARING THE DATA

It is the duty of the surveyor to:

1. Share survey knowledge and/or data, when requested, with other surveyors who wish to tie or cross reference their survey work to that of others.
2. Discuss his survey work **confidentially** with other surveyors in the event of conflicts or discrepancies revealed by the survey. These discussions must not violate the surveyor-client confidence, but must be sufficient to discharge the obligations to the public and the profession.

APPENDIX "A"

THEORETICAL UNCERTAINTY DUE TO MEASUREMENTS

A. SUMMARY

It is necessary to use four different equations to compute the Theoretical Uncertainty (tu) for all of the points of a survey.

Equation I calculates the uncertainty of a point contributed by random angular error. The equation is shown in Section B, Item 4 below.

Equation II (either "a" [EDM] or "b" [taping]) calculates the uncertainty of a point contributed by random distance error. The equations are shown in Section B, Items 5 and 6 below.

Equation III calculates the uncertainty of any point or points observed from an individual set-up by choosing the larger of the results of Equations I or II. It should be noted that for a specified procedure, all of the variables in the above equations become constants except for the distance of the measured line. The equation is shown in Section B, Item 7 below.

Equation IV calculates the contribution to the uncertainty from previous set-ups along the path. The 'tu' of any given point can be either plus or minus. Therefore, the 'tu' of consecutive points along a path cannot be directly additive since the signs may be reversed. As there is no way of determining whether a 'tu' is plus or minus, Equation IV (developed from the accepted Laws of Probability), is used to calculate the probable contribution from previous set-ups along the path. The equation is shown in Section B, Item 8 below.

B. COMPUTATIONS FOR THEORETICAL UNCERTAINTY

1. Definition

Theoretical Uncertainty is defined as the radius of a circle which circumscribes an area which contains the probable true location of a specified point. The following prescribed formulas for the calculations are based on standard accepted laws of probability and are designed to show the probable average uncertainty, not a minimum or maximum.

2. Use

Since Theoretical Uncertainty is theoretical, it is not to be considered as an absolute value except when used to determine compliance with an established minimum standard. Its principal use is to provide a standardized figure to show the relative accuracy of a given procedure when compared to a minimum standard or another procedure. This provides the client with a standardized evaluation of a proposed or performed procedure. It is also useful to a surveyor doing a retracement as it shows relative strengths of the various points.

3. Theory

No measurement, either of angles or distances, is absolute. Therefore some uncertainty exists in every measurement. Distance measurements produce uncertainty along the axis of the line while angle measurements produce uncertainty perpendicular to the line. The uncertainty produced would thus be elliptical. Computations of ellipses, each with a different axis, become very complicated. Therefore, for the purpose of these standards, the Theoretical Uncertainty shall be deemed to be the larger of the angular or distance uncertainty. Thus a circle is produced which simplifies computations. Since uncertainty may have either a positive or negative value in relation to any measured line, then uncertainty is not directly additive when one line is attached to another. The Law of Probability states that the addition shall be the square root of the sum of the squares. This is shown in Section B, Item 8 below.

4. Angular Error

Angular error, shown as AE, is the dimension, measured perpendicularly to the left or right of the observed line, which occurs from the random errors made in measuring an angle. It is dependent on the distance observed, the accuracy (least division of direct reading) of the instrument used, and the number of times that the angle was observed. The equation sanctioned is as follows:

EQUATION I
=====

AE = dist x sin (AVE)

where: dist is the distance observed
AVE is the error (in seconds) as shown in the following table number I:

TABLE I

AVE

Least Division of Theodolite or Transit

Number of Pairs*	1 sec	6 sec	10 sec	20 sec	30 sec	60 sec
1	4.7	4.9	5.0	7.0	8.7	10.0
2	3.9	4.1	4.2	5.9	7.3	8.4
3	3.5	3.7	3.8	5.3	6.6	7.6
4	3.3	3.4	3.5	4.9	6.1	7.1
6	3.0	3.1	3.2	4.5	5.5	6.4
8	2.8	2.9	3.0	4.1	5.1	5.9

*Note - Number of pairs refers to the number of direct/reverse pairs of angles observed.

5. Distance Error [EDM]

Distance error [EDM], shown as DE(a), is the positive or negative error along the EDM observed line. It is dependent upon the accuracy of the instrument used and the distance measured. The distance error to be expected may be found in the operation manual of the instrument. Standard procedure, as followed by most instrument companies, is to show the amount of error expected as a "standard deviation" and to express it in the form of a constant + a constant times the distance observed.

EQUATION IIa
=====

DE(a) = A + (B x dist)

where: DE(a) is the Distance Error (from EDM measurement)
A and B are the constants supplied by the manufacturer
dist is distance measured

6. Distance Error [taping]

Distance Error [taping], shown as DE(b), is the positive or negative error along the taped line. All of the taping parameters were set in Section II-2-A-4-c, therefore all of the variables, except line length, are now constants. Thus it is possible to derive an equation for DE in terms of only one variable, the distance. An empirical form of that equation is as follows:

EQUATION IIb
=====

DE(b) = $\sqrt{n}(.01)$ + n/200

where: DE(b) is the Distance Error (from taping)
n is the number of full and partial tape lengths

7. Theoretical Uncertainty [for an individual point]

EQUATION III
=====

tu = AE or DE (a or b) [whichever is larger]

where: tu is the Theoretical Uncertainty [of an individual point]

8. Theoretical Uncertainty [last point of a string]EQUATION IV

=====

$$tu = \sqrt{tu(1)^2 + tu(2)^2 + \dots tu(n)^2}$$

where: tu is the Theoretical Uncertainty of the last of a string
of previously determined points

ETHICS COMMITTEE

- (1) TO MAKE RECOMMENDATIONS TO THE BOARD OF DIRECTORS ON ETHICAL MATTERS PER SOCIETY BYLAWS.
- (2) ESTABLISH COMMUNICATIONS WITH THE REGISTRATION BOARD AND OFFER ASSISTANCE TO SAID BOARD WHERE NEEDED AND REQUESTED.

FINANCE COMMITTEE

- (1) TO PREPARE ANNUAL BUDGET RECOMMENDATIONS FOR THE BOARD OF DIRECTORS.
- (2) TO MONITOR SOCIETY EXPENDITURES TO ENSURE BUDGET COMPLIANCE.
- (3) TO MAKE MONTHLY FINANCIAL REPORTS TO THE BOARD OF DIRECTORS.
- (4) TO PREPARE THE SOCIETY ANNUAL FINANCIAL REPORT UTILIZING SUCH ACCOUNTING SERVICES AS MAY BE REQUIRED WHEN AUTHORIZED BY THE BOARD.
- (5) INVESTIGATE AND MAKE RECOMMENDATIONS TO THE BOARD ON COMPUTER SYSTEMS AND SOFTWARE FOR IN-HOUSE BOOKKEEPING AND WORD PROCESSING.

GOVERNMENTAL AFFAIRS COMMITTEE

- (1) TO MONITOR STATE LEGISLATIVE ACTIVITIES THAT AFFECT SURVEYORS AND REPORT SAME TO THE BOARD.
- (2) TO MAKE RECOMMENDATIONS TO THE BOARD ON NEEDED LEGISLATION.
- (3) TO WORK WITH AND DIRECT THE SOCIETY'S LOBBYIST IN THE PREPARATION OF PROPOSED LEGISLATION AND OBTAINING SPONSORS FOR SAID LEGISLATION.
- (4) COORDINATE WITH THE PUBLIC RELATIONS COMMITTEE FOR THE PREPARATION OF INFORMATIVE MATERIAL TO BE DISTRIBUTED TO THE MEMBERSHIP.

L. S. EXAM COMMITTEE

- (1) TO PREPARE EXAM QUESTIONS FOR SUBMITTAL TO THE REGISTRATION BOARD.
- (2) TO STUDY EXAM FORMAT AND MAKE ANY DESIRED RECOMMENDATIONS FOR CHANGE TO THE REGISTRATION BOARD.
- (3) TO ENSURE STRICT CONFIDENTIALITY OF SAID QUESTIONS.

MEMBERSHIP COMMITTEE

- (1) TO ADVISE THE BOARD ON PROGRAMS TO INCREASE MEMBERSHIP AND TO FOLLOW-UP ON THOSE PROGRAMS APPROVED BY THE BOARD.
- (2) TO PROCESS MEMBERSHIP APPLICATIONS AS REQUIRED BY SOCIETY BYLAWS.
- (3) TO MAINTAIN A CURRENT MEMBERSHIP LIST.
- (4) PREPARE AND PUBLISH A ROSTER OF THE MEMBERS OF I.S.P.L.S..
- (5) COORDINATE WITH THE PUBLIC RELATIONS COMMITTEE FOR ASSISTANCE IN A MEMBERSHIP DRIVE.
- (6) ESTABLISH A PROGRAM TO INCREASE FIRM AND SUSTAINING MEMBERSHIPS.

NOMINATION COMMITTEE

- (1) TO CONDUCT THOSE ACTIVITIES REQUIRED BY THE SOCIETY BYLAWS.

PUBLIC RELATIONS COMMITTEE

- (1) TO ADVISE THE BOARD ON PROGRAMS TO ENHANCE THE SOCIETY'S PUBLIC IMAGE AND TO FOLLOW-UP ON THOSE PROGRAMS APPROVED BY THE BOARD.
- (2) TO MAKE MONTHLY WRITTEN REPORTS TO THE BOARD AND TO THE HOOSIER SURVEYOR EDITOR ON CURRENT PROMOTIONAL ACTIVITIES.
- (3) TO COORDINATE AND WORK WITH THE MEMBERSHIP COMMITTEE, LEGISLATIVE COMMITTEE AND CHAPTERS COMMITTEE IN ORDER TO HELP PROMOTE MEMBERSHIP, LEGISLATIVE AND CHAPTER ACTIVITIES.

PUBLICATIONS COMMITTEE

- (1) TO REVIEW THE DEMAND OR NECESSITY FOR REVISIONS OR REPRINTING OF EXISTING ISPLS MANUALS AND TO FOLLOW-UP ON THOSE APPROVED BY THE BOARD.
- (2) TO INVESTIGATE THE NEED FOR THE PREPARATION AND PRINTING OF NEW MANUALS AND MAKE RECOMMENDATIONS TO THE BOARD.
- (3) TO PREPARE AN INDEXED CODIFICATION OF ALL BINDING VOTES AND RESOLUTIONS PASSED BY PREVIOUS ISPLS BOARDS.
- (4) PREPARE NEW ISPLS STANDARDS NOTEBOOK IN COORDINATION WITH THE STANDARDS COMMITTEE.

STANDARDS COMMITTEE

- (1) COORDINATE WITH THE CONTINUING EDUCATION COMMITTEE IN THE PREPARATION OF WORKSHOPS ON THE NEW SURVEYOR'S STANDARDS.
- (2) MONITOR COMMENTS AND/OR COMPLAINTS FROM THE MEMBERSHIP PERTAINING TO THE USE OF THE NEW STANDARDS AND REPORT TO THE BOARD AND THE MEMBERSHIP AT THE 1987 ANNUAL MEMBERSHIP MEETING.
- (3) COORDINATE WITH THE STATE BOARD OF REGISTRATION LIAISON COMMITTEE AND THE PRESENTATION OF THE NEW STANDARDS TO THE STATE BOARD OF REGISTRATION FOR THEIR ADOPTION.
- (4) STUDY NEW ACSM AS-BUILT STANDARDS RELATIVE TO ISPLS STANDARDS AND REPORT TO THE BOARD.

SCHOLARSHIP COMMITTEE

- (1) INVESTIGATE THE FEASIBILITY OF CREATING A SCHOLARSHIP FOR QUALIFIED INCOMING FRESHMAN INTO THE L.S. PROGRAMS AT VINCENNES AND PURDUE AND MAKE RECOMMENDATIONS TO THE BOARD.
- (2) ADMINISTER THE SCHOLARSHIP AWARDS PROGRAM AT VINCENNES AND PURDUE.
- (3) INVESTIGATE THE POSSIBILITIES OF ENDOWING THE SCHOLARSHIPS AT VINCENNES AND PURDUE AND MAKE RECOMMENDATIONS TO THE BOARD.
- (4) COORDINATE WITH THE PUBLIC RELATIONS COMMITTEE IN SOLICITING CONTRIBUTIONS FROM THE PUBLIC AND THE MEMBERSHIP FOR THE SCHOLARSHIP FUNDS.
- (5) MAKE RECOMMENDATIONS TO THE BOARD FOR THE AMOUNT OF THE SCHOLARSHIP TO BE AWARDED.

COUNTY SURVEYORS COMMITTEE

- (1) PROVIDE A LIAISON BETWEEN ISPLS AND THE COUNTY SURVEYORS ASSOCIATION.
- (2) PROVIDE A LIAISON BETWEEN THE LEGISLATIVE COMMITTEES OF ISPLS AND THE COUNTY SURVEYORS ASSOCIATION.

STATE BOARD OF REGISTRATION LIAISON COMMITTEE

- (1) COORDINATE AND COMMUNICATE WITH THE STATE BOARD OF REGISTRATION ON ALL LEGISLATIVE MATTERS.
- (2) WORK WITH THE STANDARDS COMMITTEE IN PRESENTING THE NEW SURVEYORS STANDARDS TO THE STATE BOARD OF REGISTRATION FOR THEIR ADOPTION.

COLLEGIATE LIAISON COMMITTEE

- (1) COORDINATE AND COMMUNICATE WITH VINCENNES AND PURDUE UNIVERSITIES IN ORDER TO PROMOTE INCREASED ENROLLMENT IN THE TWO YEAR DEGREE AND FOUR YEAR DEGREE PROGRAMS AT THE UNIVERSITIES.
- (2) INVESTIGATE THE POSSIBILITIES OF CURRICULUM CHANGES IN TWO YEAR TECHNICAL COLLEGES AND PURDUE'S CURRICULUM IN ORDER TO FACILITATE THE TRANSFER OF STUDENTS FROM TWO YEAR PROGRAMS TO PURDUE WITH A MINIMUM LOSS OF CREDIT HOURS AND MAKE RECOMMENDATIONS TO THE BOARD.

**ISPLS
APPLICATION FOR MEMBERSHIP**

(Type or Print all information - check box for mailing address desired.)

NAME _____ AGE _____
Last First Middle

☐ HOME ADDRESS _____ PHONE _____
Street and Number City State Zip

☐ BUSINESS ADDRESS _____ PHONE _____
Street and Number City State Zip

PRESENT OCCUPATION _____
Firm Name Position

SCHOOL ATTENDING _____
Name Grade

REGISTRATION STATUS _____
L.S., P.E., or S.I.T. Number State

MEMBER OF AMERICAN CONGRESS ON SURVEYING AND MAPPING _____
Yes No

MEMBER OF LOCAL CHAPTER OF I.S.P.L.S. _____
Yes No Chapter

TYPE OF MEMBERSHIP DESIRED

- ☐ MEMBER \$90.00
☐ JUNIOR \$50.00
☐ ASSOCIATE \$50.00
☐ STUDENT \$10.00

Check One

REFERENCES

Name	Address	Phone
_____	_____	_____
_____	_____	_____
_____	_____	_____

I hereby certify the above statements are true and correct and that I will abide by the Constitution and By-Laws of the "Indiana Society of Professional Land Surveyors" and will promote and uphold its principles and objectives.

Signature _____ Date _____

MEMBERSHIP CLASSIFICATIONS

- Member:** A member of this Corporation shall be limited to Registered Land Surveyors in good standing with the Indiana State Board of Registration for Land Surveyors. A member shall be eligible to vote, hold office and to participate fully in the affairs of the Corporation.
- Junior:** A Junior Membership will be granted to those non-registered individuals who are endeavoring to make Surveying their chosen career. A Junior Member is entitled to vote and participate fully in the affairs of the Corporation but shall not be entitled to hold office.
- Associate:** An Associate Membership will be granted to anyone who is associated or affiliated with the Land Surveying profession but is not otherwise pursuing registration or any non-resident who is registered and in good standing as a Land Surveyor. An Associate Member is not entitled to vote or hold office but will receive Newsletters and be invited to participate in meetings.
- Student:** A Student Member shall have the same eligibility requirements as those of a Junior Member, except that this class of Membership shall apply for a period of four (4) years only. A Student Member is not entitled to vote or hold office but will receive Newsletters and be invited to participate in meetings.

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Indiana Society of Professional Land Surveyors, Inc.

5355 E. 38th Street, Suite 209

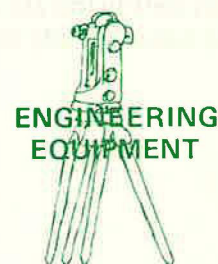
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