

# NSPS Workforce Development Committee

## Fall Meeting Report – October 2024

### 1. Committee Membership

The Workforce Development Committee holds monthly meetings with full participation from all members. The current committee consists of:

Trent Keenan, Sherri Barron, Linda Foster, Jason Ness, Marcus Hampton, Dick Kleinmann, Jim Craddock, Joanne Williamson, Nolan Mark, Rodney Kelly, and Tim Murphy.

### 2. Outreach Overview

We are pleased to announce the release of the "Outreach 101 Document," a comprehensive guide to help individuals navigate available resources and opportunities. Whether new to the industry or unsure of where to start, this guide offers clear instructions and support. It is available now on the BEaSurveyor.com website: <https://beasurveyor.com/outreach-101/>

Please provide any feedback you may have, or send us some of your resources that you have success with.



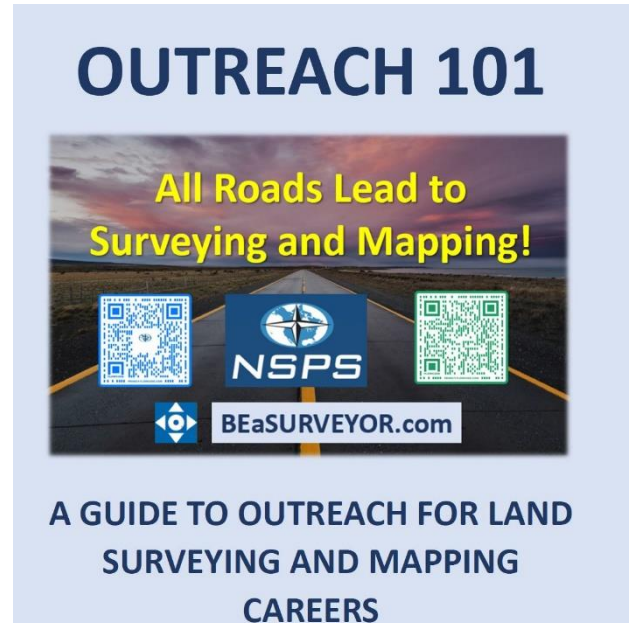
#### Outreach Introduction

There are many ways to get in ways to get involved in outreach efforts for the surveying profession. Maybe you are new to outreach, and it seems like a daunting task. Or maybe you are seasoned outreach veteran looking for some new tips. BEaSurveyor.com's outreach 101 has you covered.

Many surveyors are passionate about fostering the next generation of surveying professionals. We believe that by reaching out to K-12 students, entry college students, and educators, we can ignite their curiosity and interest in the dynamic field of surveying. It is valuable to the profession to bridge the gap between the classroom and the real world of surveying by offering valuable insights, guidance, and resources.

#### Outreach 101: A Guide To Outreach

DOWNLOAD GUIDEBOOK



BEaSURVEYOR.com

### 3. Career Path Poster Initiative

States can easily create a Career Path Poster for free! By providing the required links and collaborating with a local printer, you can produce a poster to showcase at upcoming career fairs. This is a simple, effective tool to engage with potential surveyors.



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### 4. Postcard Templates and Newsletter Advertisements

We offer support in creating state-specific postcard templates and advertisements for use in local publications. These resources are available in the WFD Dropbox. Please contact us for access to files and further assistance..



### 5. Outreach Strategy and Goals

- Promoting workforce-related events and opportunities.
- Participating in and sponsoring professional conferences such as School Counselors, Career Technical Education, and Future Farmers of America.
- Expanding the visibility of the Discover Surveying PowerPoint by presenting it to counselors and students.
- Encouraging states to collaborate with NSPS to optimize outreach efforts and share success stories.
- Encouraging states to promote the Outreach 101 Document.

### 6. Outreach Resources

The committee is dedicated to supporting state directors and associations in their efforts to recruit and train the next generation of professionals in surveying, mapping, and related fields. Various customizable outreach materials are available, which can be tailored to meet specific workforce development needs. For more information, refer to the Outreach 101 Document included earlier in this report.

### 7. Call to Action for Enhanced Participation

We strongly encourage every state to increase its involvement in outreach activities. Your participation is vital for the continued growth and success of our initiatives. Please consider joining in and contributing to the future of surveying.

# NSPS Workforce Development Committee

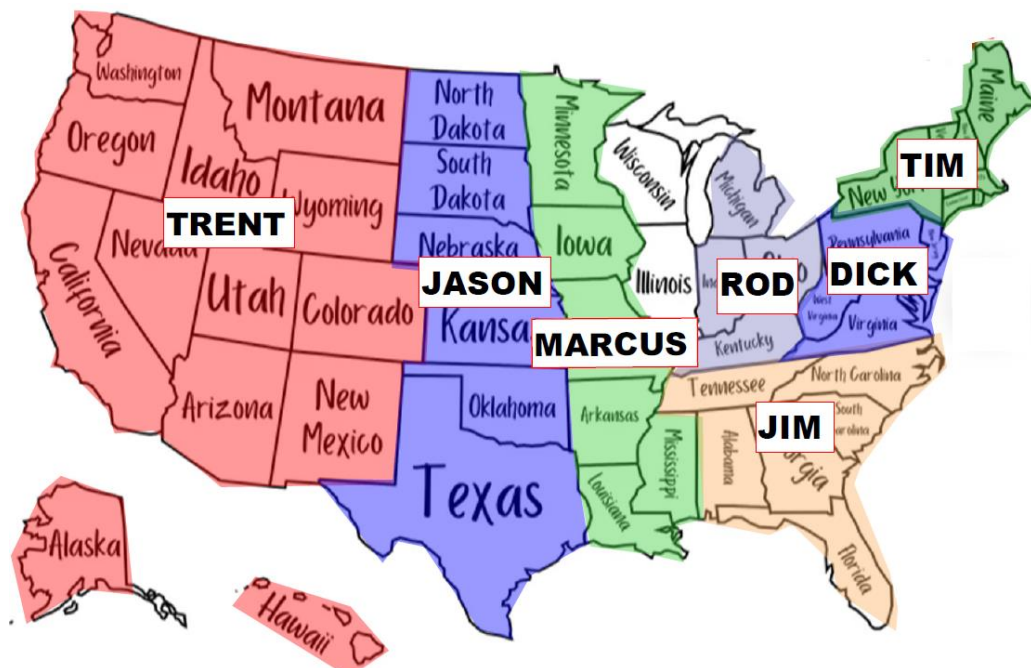
## Fall Meeting Report – October 2024

### 8. Goals for 2023 & 2024

- **Goal #1:** Enhance communication within the Workforce Development Committee and with NSPS members through monthly emails and social media engagement. **(In Progress)**
- **Goal #2:** Update the NSPS Workforce Development webpage to better feature the Discover Surveying presentations and other relevant information. **(In Progress)**
- **Goal #3:** Broaden the reach of the Discover Surveying presentation and Career Path poster by presenting them to various associations and high schools nationwide. **(In Progress)**
- **Goal #4:** Introduce elementary students to surveying through age-appropriate presentations, including live and narrated formats. **(Completed – Using the Get Kids Into Survey Presentation) Both a PowerPoint presentation and a Narrated PowerPoint presentation are available. Please save the file and revise it as needed for your State.**
- **Goal #5:** Develop and distribute templates for outreach materials for use at various educational and career events. **(Completed) Please reach out for the template file.**
- **Goal #6:** Establish clear communication lines with state Outreach/Workforce Development Committee contacts. **(In Progress)**
- **Goal #7:** Foster collaboration within NSPS and with external organizations to streamline efforts and share outreach strategies. **(Partially completed) The relations outside of NSPS have been created and established, but we still need to work on the internal relationships of NSPS.**
- **Goal #8:** Assess and expand training opportunities for surveying technicians nationwide, with a completion target by the end of Q3 2024. **(In Review at the Fall Meeting) – See #12 below for more information – A copy is also attached to this report.**

### 9. OUTREACH – WE NEED YOUR HELP!!

Your involvement is important. Let's work together to increase participation and make a difference in shaping the next generation of surveyors.





# NSPS Workforce Development Committee

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### 10. CareerView XR (Be More Colorful)

Exciting news! Filming for CareerView XR has finally commenced this month (and also wrapped up). The final product should be available early next year.

NCEES is working on securing multiple headsets and a couple of licenses. These will be available on the NCEES Hub at the beginning of year.

We look forward to seeing the results and sharing them with everyone soon! For more information, visit: <https://www.bemorecolorful.com/>

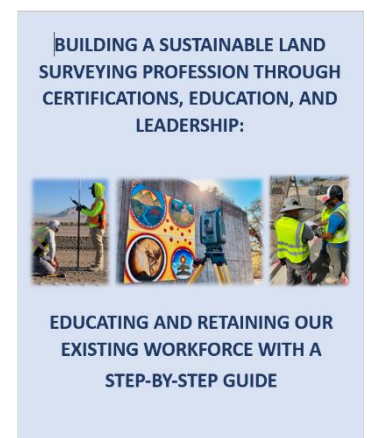


### 11. 2024 National Events

- A. Future Cities Competition – 24/25 Future City Competition Theme: Above the Current
- B. American School Counselors Association (ASCA) (Kansas) July 13-16, 2024 (5,000 attendees) – Booth hosted by Norm Ellerbrock, Tim Murphy, Chris Idhe (KS), and Christian Cernauskas (NCEES)
- C. Future Farmers of America (FFA) (October 23-26, 2024 – Indianapolis)- BYF paid for the entire booth, Indiana Surveyors along with additional volunteers will be in attendance again this year!
- D. Career & Technical Education (CTE) conference (December 4-7, 2024 – San Antonio) – Currently working with TSPS to secure volunteers for the booth. NCEES is hopefully picking up some or all of the cost of the booth.
- E. Are there additional national conferences that NSPS should promote and ensure that NSPS is budgeting for the events. (Please reach let us know!)

### 12. Building a Sustainable Land Surveying Profession through Certifications, Education, and Leadership.

This document provides a comprehensive guide to help companies strengthen and retain their existing workforce. It emphasizes professional development as one of the keys to industry sustainability by offering step-by-step strategies focused on career progression, certification support, and mentorship. The document also highlights the role of technology and inclusive mentorship programs in driving innovation and long-term growth within the profession. (Please review and provide any feedback)



### 12. Goals for 2025

- A. Future committee goals. (What would you like to see the committee complete next?)
- B. Continue to work with YSN on building their YSN Mentorship Program



## 2024-2025 Future City Competition Theme: Above the Current

### Overview: The Floating City Challenge

Floating cities have captured our imaginations for thousands of years. As long ago as the 7<sup>th</sup> century BC, Homer described one in *The Odyssey*. But now, floating cities are more than a fantastical idea: engineers, scientists, and architects are making them real.

It's predicted that by the end of this century more than 500 coastal cities around the world will be underwater because of sea level rise. Massive storms fueled by climate change will further threaten flooded coasts.

In recent years, scientists and engineers have been building prototypes of floating cities. Floating cities can rise along with sea levels and ride the waves of big storms. If floating cities near coastlines become a reality, then coastal ecosystems can be restored to act as natural flood barriers. In some cases, floating cities are extensions of existing cities, in other cases they are completely independent.

Today's experimental floating cities use cutting-edge technology and clean energy to house people comfortably and provide everything they need. Built with materials that have neutral or beneficial impacts on biological systems, they are designed to start healing the damage done to the ocean as well as keep their residents safe and healthy.

### The students' challenge:

Design a floating city and provide two innovative examples of how your floating city works and keeps its citizens healthy and safe.

# **BUILDING A SUSTAINABLE LAND SURVEYING PROFESSION THROUGH CERTIFICATIONS, EDUCATION, AND LEADERSHIP:**



## **EDUCATING AND RETAINING OUR EXISTING WORKFORCE WITH A STEP-BY-STEP GUIDE**

## NOTE TO USERS

### Focusing on Professional Development and Workforce Retention

This guide has been carefully crafted to assist companies in strengthening and retaining their existing workforce in the land surveying profession. Professional development is the cornerstone of fostering long-term sustainability in our industry, and it is imperative that we prioritize the growth of our current employees through well-defined career pathways, continuous learning, and accessible training programs.

In a time when many land surveyors are approaching retirement and new employees face challenges in pursuing licensure due to time and educational constraints, we must shift our focus inward—on creating an environment that values professional growth, certifications, and mentorship. By investing in the current workforce, we not only ensure their personal and professional success but also uphold the future of our profession.

This guide explores key strategies to develop and retain talent, including crafting clear career progression plans, creating effective mentorship programs, supporting certification efforts, and leveraging technology to stay driven. The goal is to help companies embrace a leadership approach that emphasizes hands-on training, structured feedback, and regular recognition of accomplishments, ensuring employees feel supported and motivated in their careers.

We can create an atmosphere that encourages long-term commitment and excellence by offering financial support for certifications, developing flexible educational opportunities, and promoting continuous learning through industry organizations and online platforms. As you utilize this guide, remember that by focusing on internal professional development, we ensure the growth and sustainability of our workforce—and, ultimately, the future of the land surveying profession.

Let's build a future where our workforce thrives, grows, and leads the way forward!

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## Introduction:

### *An Industry Guide to Empowering the Next Generation of Land Surveyors*

The land surveying profession faces a significant challenge: an aging workforce is retiring, and many current staff are reluctant to pursue licensure due to time and educational barriers. We must adopt a new leadership approach to retain our existing talent and attract the next generation. This involves building pathways emphasizing hands-on training, mentorship, and accessible Education while fostering a culture of support and professional growth. This guide provides a step-by-step strategy for nurturing and retaining land surveyors through a new leadership lens.

To empower career growth and retain talent in the land surveying profession, companies should focus on providing structured support for certification, Education, and continuous development. The NSPS Certified Survey Technician (CST) Program offers field and office technicians a clear path to advancement, recognizing their skills without requiring a college degree. Employers can enhance participation by covering certification costs, offering bonuses, and providing study resources.

Supporting flexible Education through online platforms like Geo-Learn, NLC Prep, and others and partnerships with universities allows surveyors to pursue further learning without sacrificing work commitments. Encouraging licensure through the Fundamentals of Surveying (FS) and Principles and Practice of Surveying (PS) exams is important, with companies offering study groups, workshops, and financial incentives to reduce barriers to professional growth.

Companies should create pathways to higher Education for those aspiring to managerial roles. Focusing on continuous professional development, including training on new technologies and participation in industry organizations like NSPS, WFPS, or your state association —ensures that skills remain current.

Finally, companies should map out clear career pathways for surveyors, providing regular feedback, and celebrating milestones like certification and licensure achievements. By embracing servant leadership principles, which emphasize hands-on training, mentorship, and ongoing support, the land surveying profession can foster a motivated workforce prepared for future challenges, ensuring the long-term sustainability and growth of the industry.

Below are a few steps you can take within your company to build an incredible workforce.

# Chapter 1: Providing Clear Career Pathways and Celebrating Milestones

## Defining Career Progression in Land Surveying

Establishing clear career pathways in land surveying is fundamental for employee retention and professional growth. For many surveyors, the path to career advancement can seem ambiguous, leading to disengagement. Defining a structured progression from entry-level technician to leadership positions provides clarity and motivation for employees to pursue certifications, licensure, and advanced roles.

Career pathways should outline the necessary skills, certifications, and experience required for each stage of advancement. For example, a technician might progress from earning their Certified Survey Technician (CST) Level I certification to achieving licensure as a Professional Surveyor after completing the FS and PS exams. By clearly mapping out these steps, employees understand what is needed to advance and can actively work toward achieving their career goals.

## Creating Regular Feedback Mechanisms

Providing employees with regular feedback is crucial to their development and progression. Constructive feedback helps surveyors understand their strengths and identify areas for improvement, while positive reinforcement encourages continued growth. Companies should implement a structured feedback system that includes performance reviews, one-on-one check-ins, and mentorship evaluations.

Feedback should be tied to measurable goals, such as improving specific technical skills or preparing for certification exams. This makes sure that employees remain focused on their development and understand the direct impact of their efforts on their career progression.

## The Role of Leadership in Recognizing Certification and Licensure

Leadership plays a vital role in celebrating milestones such as certifications and licensure. Acknowledging these achievements publicly within the organization reinforces the importance of professional growth and inspires others to pursue their own development. Leaders should create a culture of recognition by celebrating certification completions with company-wide announcements, awards, or financial bonuses.

Recognition not only boosts morale but also enhances retention by showing employees that their hard work and dedication are valued. When employees feel appreciated and supported in their professional development, they are more likely to remain with the company and continue contributing to its success.

## Possible Career Paths within the Land Surveying profession: From Entry-Level to Professional Licensure

Establishing a structured career pathway in the land surveying profession is critical to both employee retention and professional development. Defining a clear roadmap from entry-level positions to leadership roles motivates surveyors to pursue continuous learning, certifications, and ultimately, licensure. The following guide provides a step-by-step progression from entry-level Surveyor to licensed Professional Surveyor (PS), detailing key certifications, skills, and responsibilities required at each stage.

### 1. Entry-Level Survey Technician (0-2 Years) – *Note: Timeframes may vary depending on Survey Technician*

#### Role Overview:

The entry-level position in the land surveying profession is typically that of a **Survey Technician**. At this stage, individuals begin by learning basic fieldwork and office tasks under the supervision of experienced surveyors. The focus is on gaining hands-on experience, familiarizing oneself with equipment, and learning fundamental surveying principles.

#### Skills Acquired:

- Understanding survey instruments (total stations, GPS receivers)
- Basic data collection and field note-taking
- Introduction to CAD software for drafting
- Basic knowledge of safety protocols and regulations

#### Certifications:

- **Certified Survey Technician (CST) Level I:** This entry-level certification, offered by the National Society of Professional Surveyors (NSPS), demonstrates proficiency in basic field and office surveying skills. It is typically pursued after 6 months to 1 year of experience.

#### Responsibilities:

- Assist with field data collection, boundary staking, and topographic surveys
- Set up and operate survey equipment under supervision
- Perform basic calculations and assist with data entry in the office
- Adhere to safety protocols during fieldwork

#### Next Steps:

- Gain 1-2 years of hands-on experience in the field or office.
- Begin preparing for CST Level II certification, which demonstrates intermediate-level skills in surveying.

### 2. Intermediate Survey Technician (2-4 Years) - *Note: Timeframes may vary depending on Survey Technician*

### Role Overview:

As a **Survey Technician II**, individuals take on more responsibility and begin to work independently on certain field and office tasks. They continue to refine their technical skills and knowledge of surveying principles.

### Skills Acquired:

- Proficiency with advanced survey equipment (GPS, total stations, drones)
- Conducting boundary and topographic surveys with minimal supervision
- Intermediate CAD drafting skills for creating survey maps and plans
- Understanding of legal descriptions and basic boundary law

### Certifications:

- **CST Level II:** This certification demonstrates an intermediate level of skill in fieldwork, data collection, and office tasks. It typically requires 1.5-2 years of experience.
- **Fundamentals of Surveying (FS) Exam Preparation:** Begin studying for the FS exam, the first step toward licensure as a Professional Surveyor (PS).

### Responsibilities:

- Perform field data collection independently for boundary, topographic, and construction surveys
- Manage data processing and assist in generating legal survey documents
- Assist in project planning and client communication
- Prepare for the FS exam to move closer to professional licensure

### Next Steps:

- After gaining 2-4 years of experience and passing CST Level II, focus on studying for and passing the FS exam.
- Pursue further training in boundary law, GIS, and advanced surveying techniques.

## 3. Survey Crew Chief or Office Survey Coordinator (4-6 Years) - *Note: Timeframes may vary depending on Survey Technician*

### Role Overview:

At this stage, individuals are often promoted to **Survey Crew Chief** (field-based) or **Office Survey Coordinator** (office-based). These roles involve supervising field teams, managing survey projects, and taking on more complex surveying tasks.

### Skills Acquired:

- Leadership skills in managing survey crews and office teams
- Advanced data collection and interpretation
- Project management, including client communication and scheduling
- Comprehensive understanding of boundary law and regulatory requirements



### Certifications:

- **CST Level III:** This certification demonstrates advanced skills in fieldwork, project management, and office tasks. It is ideal for individuals who want to take on leadership roles in surveying teams.
- **Fundamentals of Surveying (FS) Exam:** Passing the FS exam is a significant milestone, marking the transition from technician to licensure track.

### Responsibilities:

- Lead field crews in performing complex boundary, topographic, and construction surveys
- Manage office teams responsible for CAD drafting, data processing, and legal document preparation
- Oversee project delivery, ensuring accuracy and compliance with regulations
- Begin preparation for the **Principles and Practice of Surveying (PS) Exam** to pursue full licensure

### Next Steps:

- Continue to gain experience in both field and office tasks.
- After passing the FS exam, accumulate the required experience hours to qualify for the PS exam (varies by state, usually 4 years of experience under a licensed surveyor).
- Pursue CST Level IV or the PS exam, focusing on advanced project management and legal survey work.

## 4. Professional Surveyor (PS) or Licensed Surveyor (6-10 Years) - *Note: Timeframes may vary depending on Survey Technician, and your state licensing requirements.*

### Role Overview:

A **Licensed Professional Land Surveyor (PLS)** is a significant achievement in a surveyor's career. This individual is responsible for overseeing all survey projects, certifying legal documents, and managing client relationships. Licensure allows for greater autonomy and the ability to sign off on official survey documents.

### Skills Acquired:

- Mastery of surveying principles and techniques
- In-depth understanding of land boundary law, easements, and property rights
- Advanced project management, client relations, and business development skills
- Ability to lead large teams and manage multiple projects simultaneously

### Certifications:

- **Principles and Practice of Surveying (PS) Exam:** Passing this exam, along with meeting state experience requirements, passing state specific exams, allows individuals to become licensed Professional Land Surveyors. This is a critical milestone for those wishing to take on leadership roles or start their own surveying firm.

### **Responsibilities:**

- Manage all aspects of survey projects, from fieldwork to legal documentation
- Certify and sign off on boundary surveys, subdivision plats, and construction staking projects
- Provide expert testimony in court cases involving boundary disputes
- Mentor junior surveyors and help them progress toward licensure

### **Next Steps:**

- Pursue continuing Education to stay current on new technologies, boundary law updates, and industry trends.
- Consider additional certifications, such as **Certified Federal Surveyor (CFedS)**, for specialized work with federal lands.

## **5. Senior Surveyor or Project Manager (8-10+ Years)** - *Note: Timeframes may vary depending on Surveyor*

### **Role Overview:**

At this stage, surveyors often move into **Senior Surveyor** or **Senior Project Manager** roles, where they oversee entire departments or large-scale projects. They are responsible for leading business development, managing high-profile projects, and ensuring compliance with all legal and regulatory requirements.

### **Skills Acquired:**

- Strategic leadership in business development, operations, and team management
- Advanced knowledge of the legal aspects of surveying, including subdivision design and land development
- Expertise in new technologies such as drones, GIS, and 3D Modeling
- Strong communication and negotiation skills

### **Certifications:**

- **Continuing Professional Development (PDH's):** Maintain licensure through ongoing professional development courses, workshops, and conferences.
- Optional: **Certified Federal Surveyor (CFedS)** or specialized certifications depending on areas of expertise (e.g., PLSS, hydrographic surveying, forensic surveying).

### **Responsibilities:**

- Lead large survey projects, managing budgets, timelines, and client relationships
- Mentor and develop the next generation of surveyors within the organization
- Lead business development efforts, including client acquisition and strategic partnerships
- Ensure compliance with local, state, and federal regulations in all survey work

## **6. Survey Firm Owner or Senior Executive (10+ Years)** - *Note: Timeframes may vary depending on Surveyor*

### **Role Overview:**

At the pinnacle of the career path, experienced surveyors may choose to start their own land surveying firm or move into a **Senior Executive** position within a larger organization. These individuals are responsible for shaping the future of their companies and the profession.

### **Skills Acquired:**

- Entrepreneurial skills, including business development, financial management, and operations
- Strategic leadership in managing large teams and complex projects
- Visionary thinking to drive innovation and growth in the firm
- Strong industry networking and influence within professional organizations

### **Responsibilities:**

- Lead the strategic direction of the company, focusing on growth and sustainability
- Manage the financial, operational, and legal aspects of running a surveying firm
- Serve as an industry thought leader, contributing to the advancement of surveying standards and technologies
- Continue mentoring and developing the firm's staff, ensuring the company remains competitive

### **Next Steps:**

- Stay engaged with industry organizations such as NSPS, WFPS, and state associations to contribute to the profession's growth.
- Focus on legacy-building by training future leaders and ensuring the firm's long-term success.

Defining a clear career path in land surveying helps professionals understand the steps needed to advance their careers, achieve licensure, and take on leadership roles. By providing a roadmap from entry-level technician to licensed Professional Land Surveyor, companies can support employee growth, enhance job satisfaction, and ensure the long-term sustainability of the surveying profession.

## **Chapter 2: Building a Culture of Training and Mentorship**

### **The Importance of Mentorship in the Land Surveying Profession**

Mentorship is a cornerstone in retaining and nurturing the land surveying workforce. In an industry where hands-on experience is crucial, mentorship provides a platform for experienced professionals to pass down knowledge, offer guidance, and instill confidence in less experienced surveyors. This process helps bridge the knowledge gap between generations and fosters a sense of community and belonging within the profession, which is essential for long-term retention.

Mentorship plays a pivotal role in empowering surveyors, accelerating career growth, and cultivating leadership skills. By fostering a culture of support, companies can create an environment where employees feel valued and are more likely to stay engaged in their roles.

## Key Elements of an Effective Mentorship Program

A successful mentorship program is built on several key elements:

1. **Thorough Planning and Preparation:** Successful programs invest time in setting clear objectives and timelines that align with the company's goals and the individual development needs of mentees. Planning includes identifying essential skills like boundary law, GPS technology, and project management, which are necessary for career advancement in the land surveying profession.
2. **Careful Mentor-Mentee Pairing:** Compatibility between mentors and mentees is crucial. Consider pairing individuals based on skill sets, experience, and career aspirations to facilitate knowledge-sharing and create effective relationships. For example, pairing a seasoned boundary surveyor with a technician aiming to specialize in property law can be highly beneficial.
3. **Prioritization of Diversity, Equity, and Inclusion (DEI):** In the land surveying profession, diverse perspectives can drive innovation. Successful programs create inclusive environments where land surveyors of all backgrounds feel valued. This might include pairing female or minority surveyors with mentors who can guide them through industry challenges.
4. **Leadership Buy-In and Support:** Leadership involvement is key. Leaders reinforce the importance of mentorship by providing resources, support, and visibility. In professional land surveying firms, leaders can champion mentorship by setting the tone for learning, providing training tools, and recognizing achievements.
5. **Tracking Progress and Measuring Outcomes:** A successful mentorship program involves continuous feedback and progress tracking. Establishing metrics such as certification rates, skill development, and employee retention helps assess the program's impact and ensures it remains relevant and practical.

## How to Avoid Common Pitfalls in Mentorship

While mentorship is a powerful tool for development, certain pitfalls can derail its effectiveness:

1. **Unclear Objectives:** Mentors and mentees can struggle to understand their roles without well-defined goals, leading to ineffective engagement. Within the land



surveying profession, setting specific goals like mastering field surveying techniques or preparing for the FS exam can provide direction and focus.

2. **Lack of Leadership Buy-In:** Without the support of senior leaders, mentorship programs can suffer from limited resources, low visibility, and lack of commitment. Leaders should promote the program as a cornerstone of professional development within the company.
3. **"Set It and Forget It" Approach:** Mentorship programs require ongoing support and adaptation to meet participants' evolving needs. Regular check-ins and resources ensure that mentorships remain productive.
4. **Poor Matching of Mentors and Mentees:** A mismatch in expectations, communication styles, or developmental needs can hinder progress. Consider factors such as specialty areas, experience levels, and professional goals when pairing individuals within the land surveying profession.
5. **Neglecting DEI (Diversity, Equity, and Inclusion ) Considerations:** Overlooking diversity and inclusion can create barriers to engagement and perpetuate preconceptions. Strive for diverse mentor-mentee pairs to ensure a richer exchange of ideas and equitable growth opportunities.
6. **Failure to Track Progress:** Without a way to measure outcomes, it becomes difficult to assess the program's impact and justify continued investment. Set benchmarks like certification rates, licensure rates, skill advancement (think CST Exams), and job satisfaction to gauge success.

## How to Start a Successful Mentorship Program within your Company

### Step 1: Design Your Mentorship Program

Begin with clear objectives. What do you want to achieve with the program? For example, is the goal to increase the number of licensed surveyors or improve the skill set of your workforce within your company? Set SMART objectives (Specific, Measurable, Attainable, Relevant, and Time-bound) to guide the program's direction.

#### Key Considerations:

- Enrollment: Open or application-based? This will depend on the size of your firm.
- Mentoring Style: One-on-one, group mentoring, or reverse mentoring?
- Connection Type: 1:1, mentor groups, or many-to-one?
- Measurement: Define successful metrics, such as licensure rates, skill advancement (think CST Certifications), or employee retention. Or maybe it is all the above?

### Step 2: Attract Participants

Promote the benefits of the mentorship program to potential participants. Highlight how

mentorship can enhance their skills, career progression, and job satisfaction. Recognize and reward mentors to attract and retain their participation.

### **Step 3: Match Mentors and Mentees**

Study skills, experience, career goals, and learning styles when pairing mentors and mentees. For example, pair a field surveyor specializing in topographic surveys with a technician looking to develop in that area. Ensuring diversity and inclusion are key factors in the matching process. The same would work for construction surveyors within your company as well. Make sure to pair those with the same career goals.

### **Step 4: Guide the Mentorship Relationships (Action Plans)**

Structure the program to keep it on track. Provide goals and action plans for each mentor-mentee pair. Offer resources and best practices to support their journey. Schedule regular check-ins to monitor progress and address any challenges.

*(Below is a sample "action plan" to use within your company.)*

## **36-Month Action Plan for Entry-Level Field-Based and Office-Based Land Surveyors**

This action plan outlines a 36-month program designed for entry-level field-based and office-based land surveyors. The structured path includes mentor, mentee, and joint actions for each week, progressing through key phases to prepare participants for CST Level I, II, and III or possibly the NCEES FS exam (depending on experience). The plan includes on-the-job training, mentorship, and exam preparation.

### **Field-Based Land Surveyor Path**

#### **Phase 1: Introduction to Land Surveying and Field Techniques (Months 1-3)**

**Objective:** Develop basic field skills and equipment proficiency. *(see Chapter 10 for resources)*

- **Month 1:**
  - **Week 1:**
    - **Mentor Action:** Introduce field equipment (total stations, GPS receivers) and basic safety procedures.
    - **Mentee Action:** Observe and learn the basics of equipment setup and safety protocols.
    - **Joint Action:** Set specific goals (e.g., mastering equipment setup) and review safety procedures.

- **Week 2:**
  - **Mentor Action:** Demonstrate equipment setup, leveling, and basic field measurements.
  - **Mentee Action:** Practice equipment setup and taking basic measurements under supervision.
  - **Joint Action:** Conduct a debrief to evaluate progress and address challenges.
- **Week 3:**
  - **Mentor Action:** Lead joint fieldwork focusing on boundary and topographic surveys.
  - **Mentee Action:** Participate in fieldwork, applying learned boundary-staking skills and data collection skills.
  - **Joint Action:** Review the accuracy of data collected and troubleshoot any issues.
- **Week 4:**
  - **Mentor Action:** Review the mentee's data collection performance.
  - **Mentee Action:** Analyze field data and suggest improvements for accuracy.
  - **Joint Action:** Discuss results and identify areas for improvement.

**Mentor Homework:** Provide mentee with resources (e.g., survey books, etc.)

**Mentee Homework:** Study the types of surveying equipment and their uses.

- **Month 2:**
  - **Week 1:**
    - **Mentor Action:** Provide instruction on taking elevation readings and recording topographic points.
    - **Mentee Action:** Practice elevation readings and record topographic points independently.
    - **Joint Action:** Review field notes for accuracy and precision.
  - **Week 2:**
    - **Mentor Action:** Assign independent field tasks, such as staking boundaries and taking level readings.
    - **Mentee Action:** Complete tasks with minimal supervision, focusing on accuracy.
    - **Joint Action:** Review field notes and discuss methods for improving accuracy.
  - **Week 3:**
    - **Mentor Action:** Identify errors and suggest ways to improve.
    - **Mentee Action:** Review field notes and assess data accuracy.

- **Joint Action:** Conduct a debrief on data collection and accuracy improvement strategies.
- **Week 4:**
  - **Mentor Action:** Lead field exercises on boundary staking and data collection.
  - **Mentee Action:** Independently collect field data and prepare detailed notes.
  - **Joint Action:** Review performance and evaluate the overall effectiveness of data collection.

**Mentee Homework:** Write a report on field procedures and common challenges faced.

- **Month 3:**
  - **Week 1:**
    - **Mentor Action:** Introduce GPS data collection and real-time kinematic (RTK) surveys.
    - **Mentee Action:** Practice setting up GPS and RTK equipment for data collection.
    - **Joint Action:** Review equipment setup and troubleshoot any issues.
  - **Week 2:**
    - **Mentor Action:** Guide the mentee through GPS data collection for boundary and topographic surveys.
    - **Mentee Action:** Collect accurate data using GPS under mentor supervision.
    - **Joint Action:** Review collected data for accuracy and precision.
  - **Week 3:**
    - **Mentor Action:** Conduct fieldwork focused on GPS accuracy and troubleshooting.
    - **Mentee Action:** Identify and resolve common GPS errors during data collection.
    - **Joint Action:** Evaluate overall data quality and discuss troubleshooting methods.
  - **Week 4:**
    - **Mentor Action:** Review the mentee's GPS data collection and processing skills.
    - **Mentee Action:** Process collected GPS data into usable formats.
    - **Joint Action:** Review the processed data and provide feedback on workflow.

**Mentee Homework:** Write a report on troubleshooting GPS errors in the field.



## **Phase 2: Intermediate Fieldwork and Data Collection (Months 4-6)**

**Objective:** Improve field efficiency and accuracy in complex survey tasks.

- **Month 4:**
  - **Week 1:**
    - **Mentor Action:** Introduce control surveys, benchmarks, and traversing techniques.
    - **Mentee Action:** Practice setting up control points and traversing surveys.
    - **Joint Action:** Review the accuracy of collected control data.
  - **Week 2:**
    - **Mentor Action:** Assign an independent control survey and traversing task.
    - **Mentee Action:** Complete the task independently, focusing on accurate data collection.
    - **Joint Action:** Review the task results and discuss challenges.
  - **Week 3:**
    - **Mentor Action:** Review field notes and evaluate accuracy.
    - **Mentee Action:** Correct errors and improve field techniques.
    - **Joint Action:** Review progress and adjust the focus as needed.
  - **Week 4:**
    - **Mentor Action:** Assign a complex survey task for independent completion.
    - **Mentee Action:** Execute the task, ensuring data accuracy and completeness.
    - **Joint Action:** Review performance and provide feedback.

**Mentee Homework:** Practice traversing and leveling techniques in the field.

- **Month 5:**
  - **Week 1:**
    - **Mentor Action:** Introduce construction staking and as-built surveys.
    - **Mentee Action:** Perform construction staking tasks in the field.
    - **Joint Action:** Review the accuracy of initial fieldwork.
  - **Week 2:**
    - **Mentor Action:** Assign a full construction staking task.
    - **Mentee Action:** Independently complete the task, ensuring accuracy in field point layout.
    - **Joint Action:** Review results and provide feedback.
  - **Week 3:**
    - **Mentor Action:** Review placement of field points for accuracy.
    - **Mentee Action:** Correct errors in fieldwork and improve techniques.

- **Joint Action:** Evaluate field performance and set improvement goals.
- **Week 4:**
  - **Mentor Action:** Conduct a debrief of the construction staking task.
  - **Mentee Action:** Reflect on challenges and solutions.
  - **Joint Action:** Set goals for future tasks based on feedback.

**Mentee Homework:** Review staking methods and create a field staking plan.

- **Month 6:**
  - **Week 1:**
    - **Mentor Action:** Introduce advanced GPS techniques for high-precision surveys.
    - **Mentee Action:** Practice advanced GPS data collection.
    - **Joint Action:** Review collected data for accuracy.
  - **Week 2:**
    - **Mentor Action:** Assign an independent GPS data collection task.
    - **Mentee Action:** Complete the task with a focus on precision.
    - **Joint Action:** Review collected data and identify improvement areas.
  - **Week 3:**
    - **Mentor Action:** Review the accuracy of collected GPS data.
    - **Mentee Action:** Identify and correct any errors.
    - **Joint Action:** Finalize the project and prepare the data for reporting.
  - **Week 4:**
    - **Mentor Action:** Assign a challenging field survey project.
    - **Mentee Action:** Complete the project independently, ensuring data quality.
    - **Joint Action:** Review the project and assess overall performance.

**Mentee Homework:** Create a step-by-step guide on setting up an RTK GPS survey.

### Phase 3: Advanced Fieldwork and CST Level I Preparation (Months 7-18)

**Objective:** Refine field skills and prepare for the CST Level I exam.

- **Months 7-9:**
  - **Mentor Action:** Assign complex field tasks (boundary, topographic, and as-built surveys).
  - **Mentee Action:** Manage field teams and solve real-world survey challenges.
  - **Joint Action:** Weekly check-ins to review progress and address field efficiency.

**Mentee Homework:** Complete mock CST Level I exam questions focused on field tasks.

- **Months 10-12:**
  - **Mentor Action:** Assign independent survey projects focusing on field-to-office data integration.
  - **Mentee Action:** Lead projects, ensuring data collection accuracy.
  - **Joint Action:** Conduct mock exam sessions and review technical skills.

**Mentee Homework:** Study boundary law and common fieldwork challenges.

- **Months 13-18:**
  - **Mentor Action:** Provide intensive exam preparation (fieldwork efficiency, legal principles).
  - **Mentee Action:** Focus on CST Level I exam topics and skills refinement.
  - **Joint Action:** Weekly check-ins to evaluate exam readiness and troubleshoot gaps.

**Mentee Homework:** Complete mock exams and test-taking strategies.

### Office-Based Land Surveyor Path

#### **Phase 1: Introduction to CAD and Data Processing (Months 1-3)**

**Objective:** Develop basic CAD and data processing skills. *(see Chapter 10 for resources)*

- **Month 1:**
  - **Week 1:**
    - **Mentor Action:** Provide an overview of land surveying principles and introduce CAD software (AutoCAD Civil 3D, Carlson, Trimble, Leica Infinity, Topcon MAGNET Tools, etc.)
    - **Mentee Action:** Familiarize with software tools and interface.
    - **Joint Action:** Set learning objectives and create a training schedule.
  - **Week 2:**
    - **Mentor Action:** Provide hands-on training in data import and data setup in CAD software.
    - **Mentee Action:** Practice data import and setup.
    - **Joint Action:** Review initial work and set goals for improvement.
  - **Week 3:**
    - **Mentor Action:** Guide the mentee through CAD functions, including layer management and object creation.
    - **Mentee Action:** Practice creating objects and managing layers.
    - **Joint Action:** Review accuracy and discuss areas for improvement.
  - **Week 4:**
    - **Mentor Action:** Review the mentee's CAD work and provide feedback.

- **Mentee Action:** Make necessary adjustments based on mentor feedback.
- **Joint Action:** Set specific goals for the next phase.

**Mentee Homework:** Research basic surveying concepts and CAD layer management techniques.

- **Month 2:**
  - **Week 1:**
    - **Mentor Action:** Assign a simple topographic survey drawing for practice.
    - **Mentee Action:** Create the survey drawing using sample data.
    - **Joint Action:** Review the drawing and discuss areas for improvement.
  - **Week 2:**
    - **Mentor Action:** Guide the mentee through contour creation and boundary lines in CAD.
    - **Mentee Action:** Practice creating contours and boundary lines.
    - **Joint Action:** Review progress and troubleshoot challenges.
  - **Week 3:**
    - **Mentor Action:** Review the mentee's ability to create accurate survey drawings.
    - **Mentee Action:** Apply feedback and improve accuracy.
    - **Joint Action:** Evaluate progress and suggest further refinements.
  - **Week 4:**
    - **Mentor Action:** Provide final feedback on the topographic survey drawing.
    - **Mentee Action:** Make adjustments based on mentor feedback and prepare for more complex tasks.
    - **Joint Action:** Review the mentee's overall progress and set goals for the next phase.

**Mentee Homework:** Complete a basic topographic drawing using sample data.

## Phase 2: Intermediate CAD and Data Processing (Months 4-6)

**Objective:** Enhance skills in complex data management, map creation, and survey analysis.

- **Month 4:**
  - **Week 1:**
    - **Mentor Action:** Introduce advanced data manipulation techniques, including creating contours and volume calculations.
    - **Mentee Action:** Create a comprehensive topographic map using real-world data.
    - **Joint Action:** Review map accuracy and discuss visualization techniques.

- **Week 2:**
  - **Mentor Action:** Review the mentee's topographic map for accuracy and data clarity.
  - **Mentee Action:** Correct errors in data processing and improve clarity.
  - **Joint Action:** Review improvements and discuss the next steps.
- **Week 3:**
  - **Mentor Action:** Guide the mentee in performing volume calculations and data annotation.
  - **Mentee Action:** Apply these techniques to real-world data.
  - **Joint Action:** Review and troubleshoot any challenges.
- **Week 4:**
  - **Mentor Action:** Assign an advanced CAD project, such as integrating GIS data.
  - **Mentee Action:** Complete the project using advanced techniques.
  - **Joint Action:** Review the project and provide feedback.

**Mentor & Mentee Homework:** Develop a practice project that includes volume calculations and data annotation.

### **Phase 3: CST Level I Preparation and Advanced Data Processing (Months 7-18)**

- **Months 7-9:**
  - **Mentor Action:** Assign complex survey projects (boundary, topographic) for independent completion.
  - **Mentee Action:** Complete tasks, integrate multiple data sets, and conduct error checks.
  - **Joint Action:** Review data accuracy and discuss workflow improvement strategies.

**Mentee Homework:** Complete mock CST Level I exam questions focused on CAD tasks.

- **Months 10-12:**
  - **Mentor Action:** Conduct mock exams and review the mentee's performance on complex projects.
  - **Mentee Action:** Finalize survey maps and ensure accurate data integration.
  - **Joint Action:** Review project results and prepare for exam readiness.

**Mentee Homework:** Study boundary law and legal aspects of survey data processing.

- **Months 13-18:**
  - **Mentor Action:** Provide additional CAD and data challenges to prepare for the CST Level I exam.



- **Mentee Action:** Complete advanced data processing tasks and focus on CST exam preparation.
- **Joint Action:** Weekly reviews to assess exam readiness and fill knowledge gaps.

**Mentee Homework:** Complete mock exams and refine data processing techniques.

**Phase 4: Preparation for CST Level II and III (Months 19-36)** *(note CST Level III Requires 42 months of experience)*

**Objective:** Build advanced skills and prepare for the CST Level II and III exams.

- **Months 19-24:**
  - **Field-Based Path:** Assign a boundary survey task, guiding the mentee through the process of establishing property corners based on legal descriptions.
  - **Office-Based Path:** Focus on legal aspects of survey projects and CAD customization.
  - **Joint Action:** Meet to review field notes, discuss challenges faced, and ensure compliance with legal standards.

### **Month 19: Introduction to Boundary Law**

- **Mentor:** Provide an overview of fundamental boundary law concepts, including the types of boundaries and principles of boundary establishment.
- **Mentee:** Review provided reading materials on boundary law and land tenure.
- **Joint Action:** Discuss key concepts in a weekly meeting and address any questions.

### **Month 20-21: Deed Research and Interpretation**

- **Mentor:** Introduce the process of researching land records, including interpreting legal descriptions in deeds.
- **Mentee:** Conduct a case study by researching a sample deed and mapping the described property boundaries.
- **Joint Action:** Review the case study together, analyzing the accuracy of boundary placement and addressing potential legal issues.

### **Month 22-24: Advanced Legal Concepts and Final Assessment**

- **Mentor:** Introduce advanced legal concepts such as easements, encroachments, and resolving boundary disputes.

- **Mentee:** Apply these concepts in a final project, preparing a comprehensive boundary survey report with legal considerations.
- **Joint Action:** Review the final report, provide feedback, and discuss the next steps for deepening legal expertise.

**Mentee Homework:** Complete a mock CST Level II exam.

- **Months 25-36:**

- **Field-Based Path:** Focus on leadership in complex surveys, boundary disputes, and legal resolutions.
- **Office-Based Path:** Focus on advanced project management, legal boundary surveys, and CAD customization.
- **Joint Action:** Weekly reviews on advanced project work, legal compliance, and technical accuracy.

**Mentee Homework:** Prepare for the CST Level III or NCEES FS exam through mock tests and field applications.

## Step 5: Measure the Impact

Track the progress of mentorship relationships, collect feedback, and measure program outcomes by the week and month. Evaluate the program's impact on skill development, exam passing rates, potential licensure rates, and retention. Use this data to refine the program and demonstrate its value.

## Continuous Learning and Advancement

- Encourage participants to apply their newly acquired skills in ongoing projects.
- I suggest participation in advanced modules, such as boundary surveying and construction staking, for further skill development.

By embedding mentorship into the fabric of land surveying organizations, companies can cultivate a culture of learning and professional growth, which ultimately supports the industry's long-term sustainability.

## Chapter 3: On-the-Job Training and Certification Pathways

### The Importance of Certifications in Career Advancement

Certification is an important tool for career progression in land surveying. By achieving certifications, surveyors enhance their technical skills and gain formal recognition of their

expertise. Certifications open doors to new opportunities, higher responsibilities, and leadership roles within the profession.

For many surveyors, the certification process can seem daunting, especially for those who may not have formal degrees. This is where structured support from employers becomes critical. Companies can retain talent and motivate surveyors to pursue advanced organizational roles by investing in certification programs and encouraging participation.

### **Quick Overview of the NSPS Certified Survey Technician (CST) Program**

The National Society of Professional Surveyors (NSPS) Certified Survey Technician (CST) Program offers a clear certification pathway for both field and office surveyors. The program is divided into multiple levels, allowing technicians to progress from entry-level to more advanced expertise as they acquire experience and knowledge.

The CST Program recognizes the skills of surveyors without requiring a college degree, making it accessible to a wider range of individuals. Employers can support this program by covering the costs of certification exams, offering financial incentives for achieving different certification levels, and providing study materials and resources.

### **Structuring On-the-Job Training (OJT) for Field and Office Surveyors**

On-the-job training (OJT) is an integral part of land surveyors' certifications and skill development. OJT allows employees to apply theoretical knowledge in practical settings, bridging the gap between classroom learning and real-world application. A well-structured OJT program ensures that surveyors receive hands-on experience in key areas, such as boundary law, topographic surveys, and project management.

OJT should focus on mastering equipment use, data collection techniques, and field safety protocols for field-based surveyors. On the other hand, office-based surveyors should receive training on CAD software, data processing, and legal aspects of land surveying work. Companies can help employees build the competencies needed for certification and career advancement by providing clear OJT pathways.

### **Create Separate (OJT) Tracks for Field-Based and Office-Based Surveyors**

Surveying roles can be divided into two primary categories: field-based surveyors, who focus on data collection and fieldwork, and office-based surveyors, who manage data processing, CAD drafting, and legal documentation. Each category requires different training paths, with specific skills and competencies tailored to their respective duties.

## Field-Based Surveyor OJT Track:

### 1. Equipment Mastery:

- Training in the setup and operation of survey instruments (total stations, GPS, laser scanners).
- Understanding instrument calibration, maintenance, and troubleshooting.

### 2. Data Collection Techniques:

- Learning methods for accurate data collection, including boundary surveys, topographic surveys, and construction staking.
- Emphasizing precision and field note-taking to ensure accurate measurements.

### 3. Field Safety Protocols:

- Training on safety procedures for fieldwork, including working near traffic, hazardous sites, and environmental conditions.
- Ensuring compliance with OSHA regulations.

### 4. Boundary and Legal Surveys:

- Introduction to legal aspects of boundary establishment and research.
- Teaching methods to properly identify property boundaries using deed interpretation.

### 5. Surveying Ethics and Professionalism:

- Understanding ethical standards in field operations and dealing with landowners and clients professionally.

## Office-Based Surveyor OJT Track:

### 1. CAD and Data Processing:

- Training on AutoCAD Civil 3D, Carlson, or other industry-standard software.
- Learning to import field data, manage layers, and generate accurate maps and plans.

### 2. Survey Calculations and Data Analysis:

- Handling coordinate geometry (COGO), traverse calculations, and error adjustments.
- Creating detailed topographic maps and boundary lines, and calculating volumes.

### 3. Legal Documentation:

- Training in creating and interpreting legal descriptions, plats, and survey reports.
- Understanding the regulatory environment, including easements and right-of-way documentation.

### 4. Project Management:

- Developing organizational skills for managing multiple projects, communicating with clients, and preparing final survey documents.
- Learning how to handle client communications, contracts, and deliverables.

## 5. Advanced GIS and 3D Modeling:

- Introduce advanced geospatial data management and analysis techniques.
- Training on integrating field-collected data into geographic information systems (GIS).

## Financial Incentives and Employer Support for Certification

Financial support is a key motivator for employees pursuing certifications. Employers can offer to cover exam fees, provide bonuses for achieving certifications, or offer pay increases tied to certification milestones. Additionally, offering study materials, workshops, and access to online learning platforms like Geo-Learn, NLC Prep, etc. can further reduce barriers to certifications and professional growth.

Investing in certification pathways not only benefits individual employees but also strengthens the entire organization by ensuring that its workforce is highly skilled and capable of handling complex projects.

## Chapter 4: Supporting Flexible Education and Licensure

### Online Learning Platforms and University Partnerships

Supporting flexible Education is crucial for the growth of land surveyors who are balancing work commitments with professional development. Online learning platforms, such as Geo-Learn, Illinois Survey Technician Training, Learn CST, Mentoring Monday, etc. offer surveyors the opportunity to enhance their skills without sacrificing their job responsibilities. These platforms provide courses in key areas such as geospatial technology, boundary law, and survey math.

Partnerships with universities can also offer pathways to advanced Education, particularly for those aspiring to leadership roles. By creating collaborative programs, companies can provide employees with access to higher Education that aligns with their career goals, whether it be for technical expertise or management development.

There are a lot of online surveying degree programs throughout the U.S. be sure to check out BEaSurveyor.com click on Education, then universities to find a degree program in your area.

<https://beasurveyor.com/collegesanduniversities/>

### Encouraging Participation in NCEES - FS and PS Exams



The Fundamentals of Surveying (FS) and Principles and Practice of Surveying (PS) exams administered by NCEES are essential milestones for land surveyors pursuing licensure. Encouraging employees to prepare for and pass these exams ensures the next generation of licensed professionals are well-prepared for the responsibilities within the profession.

Employers can support licensure by providing access to study groups, workshops, and financial incentives, such as covering the costs of exam preparation courses. By reducing the financial and educational barriers to licensure, companies create a more motivated and capable workforce.

### **Continuous Professional Development for Future Managers**

Continuous professional development is critical for those aspiring to leadership roles. In addition to technical skills, future managers need training in project management, client relations, and regulatory compliance. Encouraging participation in professional organizations like NSPS, WFPS, and state associations also helps employees stay up to date with industry trends and technology.

By offering leadership development programs and encouraging participation in industry conferences and webinars, companies make sure that their workforce remains engaged, adaptable, and prepared for future challenges.

### **Overcoming Educational Barriers through Company Support**

Educational barriers, such as time constraints and costs, can discourage employees from pursuing further Education and licensure. Companies can overcome these barriers by offering flexible work schedules, financial support for tuition and exam fees, and access to online learning resources. When employers invest in the Education and growth of their employees, they not only enhance individual career prospects but also strengthen the overall capabilities of the organization.

## **Chapter 5: Diversity, Equity, and Inclusion within the Land Surveying Profession**

### **The Significance of Diversity in the Land Surveying Profession**

Diversity, equity, and inclusion (DEI) play a vital role in ensuring the long-term growth and innovation of the land surveying field. Traditionally, this profession has been male-dominated, but there has been an increasing awareness of the profession, which has led to having a more diverse talent from various backgrounds, including women, minorities, and other underrepresented groups.

Diversity brings fresh perspectives and ideas to the profession, fostering innovation and improving problem-solving capabilities. In an industry facing workforce shortages, expanding the talent pool by creating an inclusive environment is essential for the future of land surveying.

### **Creating Inclusive Mentorship Programs**

Mentorship programs should be designed with DEI principles in mind, ensuring that all employees, regardless of background, have access to the same opportunities for professional growth. Inclusive mentorship programs actively seek to pair mentors and mentees in ways that encourage diversity of thought and experience. For example, pairing a female surveyor with a mentor who has experience navigating gender-related challenges in the field can provide invaluable support.

Inclusive mentorship fosters a sense of belonging, encourages underrepresented groups to pursue leadership roles, and ensures that everyone has the opportunity to advance in their careers.

### **Encouraging Growth Opportunities for Underrepresented Groups**

Companies must take proactive steps to encourage growth opportunities for underrepresented groups in surveying. This includes offering targeted development programs, scholarships, and financial support for certifications and licensure. Providing platforms for diverse voices within the organization, such as diversity councils or employee resource groups, ensures that underrepresented employees feel heard and valued.

By actively supporting the career growth of diverse employees, companies create a more equitable workplace and position themselves as leaders in a more inclusive and forward-thinking profession.

## **Chapter 6: Advancing Skills with the CST, FS, and PS Exams**

### **The Role of Certifications and Licensure in Professional Growth**

Certification and licensure are key drivers of professional growth in land surveying. Certifications through the CST, FS, or PS exams validate a surveyor's technical expertise and opens doors to career advancement, higher salaries, and leadership positions. These certifications are essential for those aspiring to become licensed Professional Surveyors, as they demonstrate the ability to apply both theoretical knowledge and practical skills.

Employers can play a pivotal role in promoting certifications by offering resources, covering exam costs, and providing time off for study. Encouraging certifications among employees ensures a highly qualified and motivated workforce.

### **Detailed Exam Preparation Strategies**

Preparing for the CST, FS, and PS exams requires a structured approach. Surveyors should create a study plan that breaks down the content areas covered in each exam, such as mathematics, boundary law, and field techniques. Employers can assist by offering study groups, access to online learning platforms, and mock exams that simulate the actual test environment.

Regular review sessions with mentors or study partners can help reinforce key concepts and ensure readiness for the exams. By preparing thoroughly and methodically, surveyors can increase their chances of passing these critical milestones in their careers.

### **Study Resources for the CST, FS, and PS Exams** *(see Chapter 10)*

There are numerous study resources available to help surveyors prepare for certification exams. The NSPS offers preparation guides and practice tests for the CST exams, while organizations like NCEES provide resources for the FS and PS exams. Online platforms such as Geo-Learn, NLC Prep, etc. also offer targeted courses that cover key exam topics.

Employers should provide access to these resources and encourage their use by incorporating them into professional development programs. By supporting employees through the certification process, companies foster a culture of learning and continuous improvement.

## **Chapter 7: Mentoring and Professional Development for Leadership Roles**

### **Building Leadership Skills through Mentorship**

By pairing aspiring managers and leaders with seasoned professionals, mentorship helps individuals gain the skills needed to oversee projects, manage teams, and interact with clients. Leadership development focuses not only on technical skills but also on soft skills such as communication, decision-making, and conflict resolution.

A structured mentorship program that emphasizes leadership development ensures that the next generation of land surveyors is prepared to take on managerial roles, driving the company forward and ensuring its long-term success.

## **Developing Future Firm Leaders and Project Managers**

Surveying firms must actively cultivate future leaders by providing clear pathways to management positions. This involves offering leadership training, project management courses, and opportunities to take on increased responsibilities within the organization. Encouraging participation in professional organizations, such as NSPS, WFPS, state organizations, allows employees to gain exposure to the profession's trends and build leadership skills outside the company.

By investing in leadership development, companies can ensure a smooth transition of responsibilities as senior leaders retire, maintaining continuity and organizational growth.

## **Creating Opportunities for Advancement**

Creating opportunities for advancement within the company is essential for retaining top talent. Employees must see a clear path to leadership roles and understand the steps required to get there. Companies should offer a mix of formal training, mentorship, and hands-on project experience to prepare employees for leadership roles.

Encouraging continuous learning, offering leadership opportunities in small projects, and recognizing emerging leaders through promotions and awards are all effective strategies for developing future leaders within the organization.

## **Chapter 8: Continuous Learning through Industry Organizations**

### **The Importance of NSPS, WFPS, and State Associations**

Professional organizations such as the National Society of Professional Surveyors (NSPS), the Western Federation of Professional Surveyors (WFPS), and state associations play a critical role in the continuous professional development of surveyors. These organizations offer resources, training, certifications, and networking opportunities that help surveyors stay current with industry standards and emerging trends.

By encouraging employees to engage with these organizations, companies can promote lifelong learning and professional growth. Membership in these organizations provides access to conferences, workshops, webinars, and other educational opportunities that are essential for staying competitive in the field.

### **Leveraging Conferences, Workshops, and Webinars for Development**

Conferences, workshops, and webinars offered by professional organizations are valuable tools for continuous learning. These events provide surveyors with the opportunity to learn about new technologies, regulatory changes, and best practices. Employers should encourage participation in these events and provide financial support for attendance when possible.

Attending industry events also allows surveyors to network with peers, share knowledge, and gain insights from leaders in the profession. By staying engaged in industry events, employees can broaden their understanding of land surveying and bring new ideas back to their organization.

## **Chapter 9: The Role of Technology in Modern Surveying**

### **Introduction to New Surveying Technologies**

The land surveying profession has seen a significant transformation due to advancements in technology. Tools like GPS, drones, 3D scanning, and Geographic Information Systems (GIS) have revolutionized the way surveyors collect and analyze data. These technologies allow for greater accuracy, efficiency, and productivity in the field.

To remain competitive, surveyors must be proficient in the use of these emerging tools. Companies should invest in training programs that introduce employees to the latest technologies and ensure they are comfortable using them in their daily work.

### **Training Employees on Emerging Tools**

Training is key to successfully integrating new technologies into surveying operations. Employers should offer hands-on training sessions that teach employees how to use equipment like drones, LiDAR scanners, and advanced GPS systems. This training ensures that surveyors can take full advantage of the capabilities these tools offer, improving the quality and efficiency of their work.

In addition to technical training, companies should encourage employees to stay informed about the latest industry developments by attending webinars and workshops focused on technological innovation in surveying.

### **Ensuring the Long-Term Viability of Surveying Through Technological Adaptation**

As technology continues to evolve, land surveying firms must adapt to these changes. By staying ahead of the curve, companies can ensure their long-term viability in a competitive market. Embracing technological advancements enhances productivity and attracts younger, tech-savvy professionals to the field.



Companies that prioritize technological adaptation will be better equipped to handle the increasing complexity of projects and maintain a skilled workforce capable of meeting future demands.

## Chapter 10: Online Resources Available

*(Please note that not all these resources are affiliated with NSPS; they are just listed as helpful resources)*

### Resource Guide for Aspiring Survey Field Technicians

If you're entering the field of land surveying, building a strong foundation of technical skills and knowledge is essential for success. There are many valuable resources available to help you get started. Below are some recommended training programs and courses designed to enhance your understanding and help you advance in the profession.

#### Geo-Learn

Geo-Learn offers a variety of online training programs for surveyors at all levels, particularly those who are just starting out. Their courses cover essential topics like:

- **Instrumentation:** Learn how to handle and use survey instruments properly.
- **Leveling and Centering a Tripod:** Gain hands-on knowledge of fundamental field skills.
- **COGO (Coordinate Geometry) and Traverse:** Explore the math and geometry used in surveying.
- **Math for Surveying:** Develop your basic and advanced mathematical skills specific to the surveying profession.

These courses are great for those looking to master the technical aspects of fieldwork and improve their overall knowledge of the profession.

### Survey Technician Training by the Illinois Professional Land Surveyors Association (IPLSA)

The IPLSA offers comprehensive training programs specifically designed for survey technicians. Whether you're new to the field or looking to expand your expertise, these programs can help you in areas such as:

- **Instrumentation and Leveling:** A focus on the practical skills needed in fieldwork.
- **COGO and Traverse Topics:** Enhance your understanding of geometry and traverse techniques.
- **Math and Advanced Math:** Strengthen your math skills, which are critical for computations in surveying.
- **Boundary Surveying:** Learn the principles of property boundary surveying.

This program also provides a structured approach to understanding the critical concepts necessary for career growth in the surveying profession.

### **Learn CST (Certified Survey Technician) – NOT affiliated with NSPS**

For those aiming to pass the Certified Survey Technician (CST) exams at Levels I, II, or III, the Learn CST program offers multiple courses to support your preparation. While not affiliated with NSPS, these courses cover key areas that will help you succeed:

- **Survey Types and History:** Gain a solid understanding of the evolution and types of surveys.
- **Field Equipment and Survey Control:** Learn about the tools and techniques used in the field and how to maintain control over your survey data.
- **Survey Computations and Plan Reading:** Master the mathematical and technical aspects of surveying, including the ability to read and interpret survey plans.

The program is designed to provide the entry-level information needed for beginners, as well as more advanced knowledge for those seeking to pass the CST Level III exam.

### **Resource Guide for Aspiring Survey Field Technicians Focused on Construction Staking**

Construction staking is a critical component of land surveying, particularly for projects that involve building structures, roads, or utilities. As a survey field technician entering the profession, understanding the ins and outs of construction staking is essential for ensuring the accuracy and success of construction projects. Below are some excellent online resources that can help you develop the skills and knowledge necessary for this aspect of surveying.

#### **Lean Surveying – YouTube Channel**

Lean Surveying is a valuable YouTube channel for survey technicians looking to sharpen their skills in construction staking. The channel covers various topics related to field surveying, with a particular emphasis on efficiency and best practices in construction projects. You can expect to find instructional videos on:

- **Staking techniques:** Learn how to accurately stake out points for construction.
- **Field efficiency:** Discover tips for optimizing your workflow in the field.
- **Surveying equipment:** Get hands-on guidance on using different types of surveying instruments essential for construction staking.

Lean Surveying's content is well-suited for those seeking practical advice and easy-to-follow tutorials to improve their field skills.

#### **Construction Staking for Beginners – YouTube Playlist**

This YouTube playlist offers a comprehensive guide to construction staking for beginners. The videos in this playlist cover a range of topics designed to help you understand the basics of construction staking, including:

- **Reading and interpreting construction plans:** Essential for ensuring the accuracy of your staking.
- **Setting up for construction staking:** Learn how to prepare your equipment and approach each project with confidence.
- **Field techniques for staking:** Improve your hands-on skills and gain insights into real-world construction staking scenarios.

This playlist is an ideal starting point for anyone new to construction staking or looking to solidify their foundational knowledge in this specialized area of surveying.

### **Todd Horton Surveying – YouTube Channel**

Todd Horton is a licensed land surveyor who shares a wealth of information on his YouTube channel, with a focus on practical surveying topics, including construction staking. His channel features videos that walk you through various aspects of construction staking, including:

- **Step-by-step staking processes:** From plan interpretation to executing the staking in the field.
- **Equipment handling and usage:** In-depth tutorials on using total stations, GPS, and other essential surveying instruments.
- **Problem-solving in the field:** Tips on overcoming common challenges during construction staking.

Todd Horton's channel is a great resource for technicians at all levels who want to deepen their understanding of construction staking and improve their practical field skills.

### **Surveying with Robert – YouTube Channel or <https://surveyingwithrobert.com/>**

Surveying with Robert offers a wide variety of videos designed to guide survey field technicians through the critical skills and concepts of land surveying. Whether you're just starting out or looking to improve your current techniques, Robert's tutorials and demonstrations are a great learning resource. Key areas of focus include:

- **Instrument Setup and Usage:** Robert provides detailed tutorials on setting up and using essential surveying instruments like total stations, GPS units, and levels. These are must-know tools for any field technician.
- **Surveying Best Practices:** The channel covers practical tips for efficiency, accuracy, and troubleshooting in the field. Topics like field measurements, error prevention, and safety protocols are addressed, helping you avoid common pitfalls.
- **Real-World Applications:** Learn about how surveying is applied in real-world projects, such as construction staking, boundary surveys, and topographic surveys. Robert

explains the methods and techniques used in these applications, bridging the gap between theory and practice.

- **Survey Computations and Data Handling:** For those looking to understand the math and data side of surveying, Robert's channel includes tutorials on coordinate geometry (COGO), basic and advanced survey math, and processing data collected in the field.

If you're entering the land surveying profession and are particularly interested in construction staking, these YouTube channels and playlists offer a wealth of free, accessible information to get you started. By learning from experienced professionals through these online resources, you can develop the skills needed to perform construction staking accurately and efficiently, setting the foundation for a successful career in land surveying.

## **Resource Guide for Aspiring Survey Office Technicians: Mastering Drafting and Survey Software**

Entering the profession as a Survey Office Technician involves acquiring essential skills in drafting and using industry-standard software. Your role will often focus on transforming field data into precise maps and models, requiring proficiency in software like AutoCAD Civil 3D and Carlson Software. As you begin your journey, YouTube is an excellent resource to learn from, providing tutorials and demonstrations that can help you build the skills necessary for success. Below are some key channels and playlists to guide you through this process.

### **AutoCAD Civil 3D – YouTube Channel**

AutoCAD Civil 3D is an official YouTube channel that offers a wealth of tutorials on using one of the most important tools for survey office technicians. Civil 3D is essential for drafting, designing, and managing civil infrastructure projects, and the videos on this channel cover a wide array of topics, including:

- **Basic and Advanced Drafting:** Learn the core functions of Civil 3D, from setting up projects to creating complex designs for roads, subdivisions, and utility networks.
- **Survey Data Processing:** Tutorials on importing field data, managing survey points, and working with surfaces to create accurate models.
- **Surface Modeling and Alignments:** Gain a deep understanding of how to model terrain and work with alignments to ensure that your designs meet project requirements.

This channel is highly recommended for beginners who need a comprehensive introduction to Civil 3D and for those looking to sharpen their existing skills.

### **Crucible Phoenix – YouTube Channel**

Crucible Phoenix is a YouTube channel focused on AutoCAD Civil 3D, offering a practical, hands-on approach to the software. It is an excellent resource for survey office technicians seeking to understand more advanced features of Civil 3D, such as:

- **Grading and Surface Creation:** Learn how to generate accurate terrain surfaces and perform grading tasks for land development projects.
- **Design Automation:** Explore the automation tools within Civil 3D to streamline repetitive tasks and improve drafting efficiency.
- **Troubleshooting and Tips:** Find solutions to common problems that arise in Civil 3D projects, helping you save time and avoid costly errors.

This channel provides practical advice that can help you solve day-to-day challenges in your drafting work.

### **Carlson Software for Surveying – YouTube Playlist**

If you are working with Carlson Software, this [YouTube playlist](#) is a must-watch. Carlson is a popular surveying software used for drafting, data management, and designing, especially in land development and mining applications. This playlist covers:

- **Introduction to Carlson Survey Tools:** Learn how to use the key features of Carlson, including point management, surfaces, and contours.
- **Field-to-Finish:** Discover how Carlson integrates fieldwork into office drafting processes, allowing you to efficiently turn raw data into final deliverables.
- **Data Management:** Get tips on importing and exporting data, ensuring that your projects run smoothly from field to office.

This playlist is ideal for technicians who want to become proficient in Carlson Software, particularly in managing survey data and creating detailed designs.

### **Infratech Civil – YouTube Channel**

Infratech Civil offers an excellent series of tutorials for both Civil 3D and Carlson Software. This channel focuses on:

- **Step-by-Step Software Training:** Walk through specific features of Civil 3D and Carlson, including drawing creation, point management, and contour modeling.
- **Real-World Applications:** Learn how to apply drafting skills in real-world projects, from grading plans to utility layouts.
- **Efficiency Tips:** Discover shortcuts and techniques to speed up your workflow, saving time in your day-to-day tasks.

Infratech Civil's content is well-suited for both beginners and those looking to refine their technical drafting skills.

As a survey office technician, mastering drafting software like AutoCAD Civil 3D and Carlson Software is essential for your success in the field. YouTube offers a wealth of free resources that can help you get started, with detailed tutorials and real-world examples. Whether you are just starting out or looking to advance your skills, channels like AutoCAD Civil 3D, Crucible



Phoenix, Carlson Software for Surveying, and Infratech Civil will provide you with the knowledge and practical tools needed to excel in your role.

Leverage these resources to become proficient in drafting and data management, and build a solid foundation for a rewarding career in land surveying.

## **Data Processing Software YouTube Channels**

### **Trimble – YouTube Channel**

Trimble's YouTube channel offers a wide range of educational and promotional content centered around their advanced positioning technology and data processing software. The channel features detailed tutorials on using Trimble products, including surveying hardware like GNSS receivers, total stations, and data collection software. Videos also cover land surveying, construction, and geospatial data management workflows.

Trimble's channel emphasizes hands-on training, product demonstrations, and tips for optimizing workflows using Trimble Access software and Trimble Business Center for the next generation of land surveyors. Young professionals can gain valuable insight into how Trimble's tools can be integrated into their surveying processes, with a focus on increasing efficiency and precision.

#### **Video Types:**

- Product tutorials and software walkthroughs
- Best practices for field data collection and processing
- Webinars on geospatial technology trends and advancements
- Case studies and customer success stories

### **Leica Geosystems – YouTube Channel**

Leica Geosystems' YouTube channel is a rich resource for land surveyors, offering instructional content on their suite of geospatial and measurement tools. Their videos provide in-depth guides on using total stations, GNSS solutions, other survey equipment, and their software platforms, such as Leica Infinity and Leica Captivate. The channel frequently updates viewers on technological innovations, including 3D scanning and reality capture, which are becoming essential tools for modern surveyors.

The next generation of surveyors can benefit from Leica's focus on cutting-edge technology and how it integrates into land surveying workflows. Their videos are particularly useful for

learning about the latest hardware and software updates, understanding geospatial data integration, and mastering the use of digital twin technology.

### **Video Types:**

- Step-by-step software and equipment tutorials
- Training videos on modern survey techniques, including 3D scanning and UAVs
- Webinars and interviews with industry experts
- Product updates and how-to guides

### **Topcon Positioning System YouTube Channel**

Topcon Positioning Systems' YouTube channel provides diverse videos focused on positioning technologies for the construction and surveying industries. It offers training content on their comprehensive software suites, such as Topcon MAGNET and Sitelink3D, as well as hardware, including total stations, GNSS receivers, and machine control systems. The videos also cover real-world applications of their technology in construction, agriculture, and civil engineering.

For emerging land surveyors, Topcon's channel is an excellent resource for learning about the practical applications of data processing software in field operations. The channel emphasizes workflow optimization, site management, and remote data collection, which are key skills for the next generation of surveyors looking to leverage automation and smart positioning tools.

### **Video Types:**

Hands-on tutorials for using Topcon hardware and software

Case studies on implementing positioning technologies in various industries

Webinar series focusing on the future of surveying and geospatial technology

Troubleshooting and technical support videos for surveyors

All three YouTube channels—Trimble, Leica Geosystems, and Topcon Positioning Systems—offer valuable educational content aimed at the next generation of land surveyors. They provide a mix of product training, real-world case studies, and tutorials on data processing software. Each channel emphasizes the importance of adopting modern geospatial tools, with a focus on improving workflow efficiency, accuracy, and integration with advanced technologies like 3D scanning and automation.

Surveying students and young professionals can use these channels as key resources to learn the latest skills and stay up to date with technological innovations in the land surveying field.

## Resource Guide for Aspiring Survey Office Technicians: Preparing for the FS and PS Exams

As you begin your career as a Survey Office Technician, one of your long-term goals might be to become a licensed professional surveyor. Passing two key exams—the Fundamentals of Surveying (FS) and Principles and Practice of Surveying (PS)—is essential. These exams, administered by the National Council of Examiners for Engineering and Surveying (NCEES), are designed to test your knowledge and readiness for professional practice. Below is a helpful guide to understanding these exams and preparing for them.

### NCEES Fundamentals of Surveying (FS) Exam

The FS Exam is the first step toward licensure as a professional surveyor. It is designed for individuals who are just starting their careers in surveying, typically after completing an educational program or as part of the transition from field technician to office technician. Here's what you need to know about the FS exam:

- **What It Covers:** The FS exam focuses on the fundamental skills and knowledge required in surveying, including mathematics, mapping, field techniques, boundary law, and data management. It tests the foundational understanding needed to move forward in your career.
- **Format:** This computer-based exam consists of 110 questions and is administered year-round at Pearson VUE test centers.
- **Preparation Resources:** To prepare for the FS exam, you can find a variety of study materials online, including practice exams, textbooks, and videos. NCEES also offers an exam preparation guide that outlines the key areas covered in the exam.

Passing the FS exam demonstrates that you have mastered the essential principles of surveying, making it a significant milestone in your career journey.

### NCEES Principles and Practice of Surveying (PS) Exam

After passing the FS exam and gaining some practical experience, you will be eligible to take the PS Exam, which is the final step toward licensure as a professional surveyor. Here are some important details about the PS exam:

- **What It Covers:** The PS exam focuses on the application of surveying principles in real-world scenarios, including boundary resolution, legal descriptions, field data analysis, and professional ethics. It tests your ability to handle complex surveying tasks and make informed professional judgments.
- **Format:** This exam is also computer-based and consists of 100 questions. Like the FS exam, it is available year-round at Pearson VUE test centers.
- **Preparation Resources:** In addition to the study materials available for the FS exam, the PS exam may require more advanced resources. NCEES provides a detailed exam

specification that outlines the key content areas, and there are numerous review courses and study guides available to help you prepare.

Passing the PS exam marks the final step in your journey to becoming a licensed professional surveyor, allowing you to take on more responsibility and pursue leadership roles in the profession.

As a survey office technician, preparing for and passing the FS and PS exams are critical milestones in your career. These exams test both your foundational knowledge and your ability to apply surveying principles in practical situations. By utilizing the resources available through NCEES and other online study platforms, you can effectively prepare for both the FS and PS exams, setting yourself up for long-term success in the profession.

Whether you're just starting your career or have gained some experience in the field, passing these exams will open up new opportunities for growth, responsibility, and professional recognition in the land surveying profession.

### **Resource Guide for Aspiring Survey Technicians: Preparing for the CST, FS, and PS Exams**

As a **Survey Office Technician**, one of the most important aspects of advancing in your career is gaining certification and licensure through key exams such as the **Certified Survey Technician (CST)**, **Fundamentals of Surveying (FS)**, and **Principles and Practice of Surveying (PS)** exams. Below are some helpful resources that can aid you in preparing for these crucial milestones in your professional journey.

#### **WestFed Continuing Education Library**

The WestFed Continuing Education Library is a valuable resource for anyone looking to expand their knowledge in the surveying field. It offers a wide range of educational materials, from webinars to study guides, which can help prepare you for exams like the CST, FS, and PS. You can find:

- **Webinars and Workshops:** Covering a variety of topics relevant to surveying, these can help build your understanding of both fundamental and advanced concepts.
- **Study Materials:** Access reference materials and practice problems geared toward exam preparation, particularly useful for reviewing specific topics tested in these certification exams.

The WestFed library is an excellent resource for structured, continuous learning as you advance through your certification and licensing journey.

#### **NLC Prep**

NLC Prep is a well-known exam preparation platform, offering courses designed to help you pass the CST, FS, and PS exams. Their content is organized to help you systematically study for these important exams:

- **CST Exam Prep:** Learn the key concepts and practical skills required for each level of the Certified Survey Technician exam.
- **FS and PS Exam Prep:** NLC Prep provides comprehensive courses that break down the complex topics covered in both the FS and PS exams, offering practice exams and test-taking strategies.

This resource is particularly beneficial for those seeking a guided, step-by-step approach to exam preparation.

### **Dane Courville – FS Exam Prep Book**

Dane Courville's FS Exam Prep Book is a highly recommended resource for those preparing for the Fundamentals of Surveying (FS) Exam. This book covers all the key areas tested on the FS exam and provides detailed explanations, practice questions, and strategies for success.

Inside, you'll find:

- **Topic-by-Topic Breakdown:** Each section is designed to help you master the core subjects tested in the FS exam, such as mathematics, boundary law, field techniques, and geodesy.
- **Practice Exams:** These realistic practice exams simulate the actual FS exam environment, helping you gauge your readiness and improve your time management.

Using this prep book can provide you with the confidence and knowledge needed to pass the FS exam and take the next step toward licensure.

### **Confluence Land Surveying (Daily Quiz & Practice Exams)**

Once a day Confluence Land Surveying creates and sends a free survey quiz question, along with answer explanations. Feel free to use them to study or stay sharp.

To receive the quiz questions (via link to a Google Form), please sign up on the website. If you prefer to check in daily, Daily Survey Quiz will have links as well.

### **Practice Exams (There is either a 100 Question exam or 25 Question Exam)**

100 Practice Test Questions provided in a digital format, with full explanations and citations of the correct answers.

Test Questions are designed to approximate substance and style of the PS Test as closely as possible.

2 versions of the same test are provided. One is a full 100 question test, with time limits, and no ability to stop and resume later. The other is a results-as-you-go style test without time limits to allow you to review your answers for each question and study the correct answers.

### **HP 33 Surveyor**

The HP 33 Surveyor is a valuable tool for anyone preparing for the FS or PS exams. It is a programmable calculator commonly used in the surveying industry and can significantly improve your efficiency when solving complex survey problems. Features include:

- **Survey-Specific Programs:** The HP 33 can store and run various surveying programs, making it a powerful asset for solving problems related to traverse calculations, coordinate geometry (COGO), and field data adjustments.
- **Exam-Friendly Features:** Familiarizing yourself with this calculator will help you perform calculations more quickly and accurately during your exams.

By mastering the HP 33 Surveyor, you can streamline your problem-solving process during both the FS and PS exams, giving you a distinct advantage.

### **The Surveying Mathematics Made Simple book series by Jim Crume**

The Surveying Mathematics Made Simple book series by Jim Crume is a comprehensive resource designed to simplify the often-complex mathematical concepts involved in land surveying. Aimed at both beginners and experienced professionals, this series breaks down essential mathematical principles and applies them to practical surveying problems. Each book is structured to guide readers through topics such as geometry, trigonometry, coordinate systems, and measurement calculations, offering clear explanations, step-by-step solutions, and real-world examples.

Jim Crume's approach emphasizes making these concepts accessible by focusing on practical application rather than abstract theory. The series is an excellent reference for those preparing for certification exams or looking to strengthen their understanding of surveying mathematics in everyday practice.

### **Resource Guide for Aspiring Survey Technicians: Preparing for Certification with Cal-Trans Exam Prep Resources**

As a Survey Office Technician entering the profession, building the right skill set is crucial, and preparing for certification exams like the Land Surveyor in Training (LSIT) and Professional Land Surveyor (PLS) exams is an important step in your career. Although some resources may be slightly outdated, they still provide valuable insights and foundational knowledge for your preparation. Below are some excellent resources to help you along the way.

### **Older Cal-Trans Exam Prep Videos**

This [YouTube Playlist](#) features older yet still highly useful Cal-Trans Exam Prep Videos. These videos are a fantastic resource for anyone studying for their LSIT or PLS exams, providing real-world examples and detailed explanations of core concepts. While some of the content may



not reflect the latest updates in survey technology, the foundational knowledge is timeless. Topics covered include:

- **Basic Surveying Principles:** Learn to understand key concepts like leveling, traversing, and boundary surveys.
- **Field Techniques and Procedures:** Learn the hands-on techniques essential for both office and field technicians.
- **Problem-Solving Examples:** The videos provide step-by-step solutions to typical survey problems that can help you better understand how to tackle similar questions on the exam.

These videos are a great resource for brushing up on fundamental surveying techniques and can serve as a helpful supplement to your study materials.

### **LS/LSIT Manual – On the HP 33 Surveyor Website**

The LS/LSIT Manual is a valuable PDF guide available on the HP 33 Surveyor website. Although the manual is somewhat older, it is still packed with comprehensive information for those preparing for the Land Surveyor (LS) and Land Surveyor in Training (LSIT) exams. It covers a wide range of topics, including:

- **Surveying Math and Computations:** Detailed sections on the math you'll need to master for the exams, including trigonometry, coordinate geometry (COGO), and adjustment calculations.
- **Boundary Law and Legal Descriptions:** Essential knowledge for interpreting and drafting legal descriptions for property boundaries.
- **Fieldwork Procedures:** Best practices and tips for conducting accurate field surveys and translating that data into reliable results.

This manual is an excellent resource for self-study and exam preparation. It offers both theoretical knowledge and practical insights that are crucial for passing the LSIT and LS exams. While some of the Cal-Trans Exam Prep Videos and the LS/LSIT Manual might be a little outdated, they remain invaluable tools for those preparing for their LSIT or LS exams. These resources provide timeless knowledge in surveying principles, field techniques, and exam strategies. Supplement these materials with more up-to-date resources as needed, but don't overlook the practical wisdom and solid foundation these older guides provide.

As you work toward becoming a licensed surveyor, using these prep materials will help you solidify your understanding of key concepts and increase your confidence in tackling the challenges of your certification exams.

### **Resource Guide for Aspiring Survey Technicians: Building Essential Skills with "Math for the Surveyor" by Jim A. Coan**

As a Survey Office Technician, having a solid grasp of mathematics is crucial for your success in the profession. The calculations and computations you perform in the office, based on field

data, are fundamental to producing accurate maps, designs, and legal descriptions. The book "Math for the Surveyor" by Jim A. Coan is a great resource for building this mathematical foundation.

### **Math for the Surveyor by Jim A. Coan**

This book is specifically tailored to surveyors, providing an accessible guide to the mathematical concepts and techniques required in the field and office. Whether you're new to surveying or looking to reinforce your knowledge, Coan's book offers step-by-step explanations that cover a broad range of math topics relevant to your daily work. Key areas covered include:

- **Basic Arithmetic and Algebra:** Build or refresh your understanding of essential math skills, such as solving equations, working with fractions, and converting units—all critical for accurate survey computations.
- **Trigonometry:** Learn how to apply trigonometric functions in practical survey problems, such as determining distances, angles, and elevations.
- **Coordinate Geometry (COGO):** Master the principles of COGO, a key part of processing survey data and generating accurate maps and plans.
- **Survey-Specific Applications:** Coan provides detailed examples of how these mathematical principles are used in real-world surveying tasks, from calculating bearings and distances to resolving boundary problems.

This book is invaluable for survey technicians who need to develop or strengthen their math skills. The practical approach and clear explanations make it a go-to reference for handling the mathematical challenges that come with working as a survey office technician.

"Math for the Surveyor" by Jim A. Coan is an essential resource for survey office technicians entering the profession. The mathematical concepts it covers are fundamental to performing accurate survey computations and data analysis. By mastering the material in this book, you'll build a solid foundation in the math critical to field and office work, setting yourself up for success in your career as a surveyor.

### **Certified Federal Surveyor (CFedS) Program:**

The Certified Federal Surveyor (CFedS) program is an intensive course designed to equip licensed surveyors with an unsurpassed Public Land Survey System (PLSS) knowledge base. Created in 2005 by the Bureau of Land Management, CFedS has become the hallmark program for surveyors wishing to provide cadastral services on federal trust lands while deepening their understanding of working within the PLSS. The non-PLSS surveyor can also benefit from the program by becoming more well-rounded in the many intricacies of our profession.

### **Building a Survey Reference Library:**

For a new surveyor starting in the profession, developing a personal survey reference library is crucial for several reasons. First, it provides a foundational resource, offering key insights into land surveying principles, techniques, and regulations that are essential for a successful career. Additionally, access to various textbooks, manuals, and reference materials can aid in problem-solving and decision-making throughout different projects. Finally, a personal library fosters ongoing learning and professional growth while also boosting confidence when tackling complex assignments.

### **Additional Resources for all types of surveying discussions:**

#### **Mentoring Mondays**

Mentoring Mondays is a bi-weekly program designed for individuals in the land surveying profession to learn, grow, and connect with experienced professionals. Held twice a month on Mondays via Zoom, these sessions feature guest speakers who are experts in various aspects of land surveying. The discussions are open to everyone in the profession, from college students to seasoned professionals, offering a space to explore current industry trends, ask questions, and gain practical advice (like office hours) for professional development.

Each session focuses on a different topic, such as practical field management, survey adjustments, or drone surveying, making it a great resource for continuous learning. Participants are encouraged to attend live sessions to benefit from real-time interaction and Q&A, but all meetings are also recorded and available online for later viewing. The program supports lifelong learning and provides a platform for networking and sharing knowledge across the land surveying community.

The recent Mentoring Monday sessions have covered topics like exam preparation for the FS, PS, CST, and CFedS certifications, highlighting resources to help survey technicians advance their careers. The sessions emphasize the importance of continuous learning, workforce development, and professional networking, offering helpful links, study guides, and exam materials (such as Geo-Learn and NLC Prep) for those looking to prepare for these key certifications.

Whether you're a new land surveyor or an experienced professional, Mentoring Mondays provides valuable opportunities to learn from experts, engage with peers, and expand your surveying knowledge. For more information, you can visit [\*\*MentoringMondays.xyz\*\*](https://mentoringmondays.xyz)

#### **Wisdom Wednesdays**

Wisdom Wednesdays is a bi-weekly book club and discussion group designed specifically for any land surveyor (tech to professional) in the land surveying profession. The primary goal of

Wisdom Wednesdays is to promote continuous learning by reading and discussing chapters from essential industry texts, often referred to as our "Surveying Bibles." Participants read a chapter in advance and then engage in a roundtable discussion to explore the concepts, clarify doubts, and share practical applications of the information. This program is highly beneficial for new and experienced land surveyors interested in refining their understanding of land surveying practices, legal concepts, and technical methods.

The current book being discussed is "*The Pincushion Effect*" by Jeffrey Lucas, which addresses common issues in boundary surveying, such as the "pincushion corner" problem, where multiple boundary monuments exist at one location, creating discrepancies. Discussions focus on improving survey accuracy, understanding property boundaries, and ensuring effective surveying practices. The interactive sessions encourage participants to contribute their experiences, thoughts, and lessons learned from the reading material.

In addition to book discussions, Wisdom Wednesdays also provide a platform for land surveyors to ask questions and gain insights from seasoned professionals, making it a supportive community for career growth and knowledge-sharing.

Wisdom Wednesdays is currently in its 3rd book. Please visit the website for the archived Evidence and Procedures for Boundary Location sessions, 7<sup>th</sup> Edition (1<sup>st</sup> book), and Gurdon H. Wattles, Writing Legal Descriptions, as our 2<sup>nd</sup> book. There are some GREAT discussions in all of these sessions! Please join us in any upcoming session! [\*\*WisdomWednesdays.xyz\*\*](https://www.wisdomwednesdays.xyz)

The right resources are key to success for Survey Technicians aiming to pass the CST, FS, and PS exams. The WestFed Continuing Education Library provides ongoing learning opportunities, while NLC Prep offers targeted courses for all three exams. Dane Courville's FS Exam Prep Book is an invaluable study tool, and mastering the HP 33 Surveyor calculator will help you efficiently tackle the exam's mathematical challenges.

These resources, combined with diligent study and practice, will ensure you are well-prepared to pass these exams and confidently move forward in your land surveying career.

We hope this guide proves helpful for your company. If you are currently using a resource that is not listed, please contact us so we can add it to the list! If you have any questions or concerns, feel free to reach out via email at: [info@nsps.us.com](mailto:info@nsps.us.com)

### **Future Goals:**

**Survey Technician Boot Camps are coming in 2025! – Stay tuned for more information!**