



Measuring the World Around Us

A High-Tech Career in Professional Surveying



Speaker's Guide

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Section 1

Introduction

The goal of the National Society of Professional Surveyors (NSPS) Student Recruitment Program is to help primarily high school students across the United States learn more about the many career paths available to professional surveyors. Much of this kit's content is also appropriate for students of middle-school age. By increasing awareness of the profession at a time when students are beginning to make career decisions, NSPS hopes to increase the number of young people who decide to pursue a career in surveying. NSPS, with support from National Council of Examiners for Engineering and Surveying (NCEES), developed the materials in this Speaker's Kit to help speakers effectively and consistently present these career opportunities. In addition, the materials describe what it's like to work as a surveyor, salary potential, and how one can become a licensed professional surveyor.

Why Student Recruitment Is Important

Several factors have created an increased demand for qualified professionals in the surveying field. First, the number of licensed professional surveyors has decreased through attrition and retirement. NSPS has recognized this trend, which is likely to continue in coming years. Second, an increasing number of state licensing boards are requiring four-year college educations in order for individuals to obtain surveying licenses. In the short-term, this may decrease the number of surveyors eligible to pursue licenses in these states until the four-year college programs can increase enrollment. Finally, in the past few decades, the surveying field has experienced a technology explosion that has revolutionized how surveying is performed. These new technologies create a need for extensive training for practicing surveyors to become proficient, thus reducing the numbers of professionals with extensive experience in the new technologies.

These factors together motivated NSPS and NCEES to create this student outreach program to encourage young people making career choices to

Included in the Speaker's Kit:

- PowerPoint presentation in multiple formats on the CD-ROM to meet various venue requirements and presentation time limits
- A Web site URL, www.surveyingcareer.com, that provides the audience with first-hand information about a career in land surveying
- Materials to distribute after the presentation
- VHS tape that includes a short version of the presentation for venues where computer technology is not available

consider professional surveying. The materials in this kit convey the variety of paths one can follow in a surveying career, the cutting-edge technology used in the field, examples of successful surveying careers, and how to become a licensed surveyor. Ultimately, this kit will establish NSPS and NCEES as information sources about the surveying profession and professional licensure, respectively.

Intent of This Speaker's Guide

This Speaker's Guide is intended to help convey the opportunities that a career in surveying can offer to students, provide suggestions regarding the format and organization of the presentation, and help incorporate examples from your experiences, if appropriate.


This presentation is designed to reinforce the following key messages:

1. Surveyors have exciting and varied job opportunities, and qualified candidates are in high demand.
2. Many career paths are available, including choices of specializations (e.g., photogrammetry, hydrography, geodesy, etc.) and types of employers (e.g., large corporations, government offices and agencies, engineering and surveying firms, independently owned businesses, etc.).
3. A career as a professional surveyor offers extensive use of cutting-edge technology.
4. Surveying has made a significant contribution to the development of civilization throughout history.
5. Every U.S. state requires a licensed surveyor to examine and verify each finished survey before its use by citizens.

The goal of the NSPS Student Recruitment Program is to help students across the United States learn more about the many career paths available to professional surveyors. By increasing awareness of the profession at a time when students are beginning to make career decisions, NSPS hopes to increase the number of young people who decide to pursue a career in surveying.

Getting Started with the Speaker's Guide

It is recommended that you use the CD-ROM to walk through the Speaker's Guide information. It contains multimedia elements that will provide valuable information for delivering the material. The steps are:

1. Open the file *GettingStarted.pdf* on the CD-ROM. To return to the Getting Started interface, use the *Go to Previous View* button in Acrobat or the *Return to Getting Started* button at the top of each initial page.
2. Click on the icon labeled Self-playing Sample to view a self-playing version of the presentation to see how the material is delivered.
3. From the Getting Started interface, click on the icon labeled Speaker's Guide, which is an interactive version of this printed guide. Also provided is an excerpt from the full Speaker's Guide that includes just the Slide-by-Slide Notes section. Each slide has a written script as well as a list of key points. You can click on the audio button  next to where the script begins to hear the script.

Technical Requirements

To run this Speaker's Guide from the CD-ROM, you must have a PC with the following:

1. Windows-based PC
2. Microsoft® PowerPoint 97 or higher
3. Windows® Media Player
4. Adobe Acrobat Reader® (minimum version: 3.0) For download: <http://www.adobe.com/products/acrobat/readstep2.html>
5. Internet browser (Internet Explorer® or Netscape Navigator®)
6. At least a 24X CD-ROM player (Note: Your CD-ROM drive must be designated as the D: drive on your PC, or some of the multimedia components will not work properly.)

NSPS Contact Information

Executive Administrator
National Society of Professional Surveyors
6 Montgomery Village Avenue
Suite 403
Gaithersburg, MD 20879

Phone: (240) 632-9716, ext. 113

Fax: (240) 632-1321

E-mail: info@surveyingcareer.com

NCEES Licensing Boards

For information on contacting the licensing boards, visit:

http://www.ncees.org/licensure/licensing_boards/

Ordering New Materials

Please contact the Executive Administrator at the NSPS to obtain additional materials for your Speaker's Kit.

The Role of NSPS in Promoting the Surveying and Mapping Profession

Today, the technology explosion has provided new methods of attaining and using spatial data. Geographic Information Systems (GIS), Land Information Systems (LIS), and the Global Positioning System (GPS) have revolutionized the spatial relationships of both actual objects and planned concepts. Because NSPS is the recognized national face of the surveying professional, it continually seeks to respond to the challenges presented by these new technologies. NSPS is recognized not only as the face but also as the voice for the surveying profession. Its members use their expertise and knowledge to provide the surveying perspective as they work with members of their fellow American Congress on Surveying and Mapping (ACSM) member organizations on matters of collective interest related to cartography, geodesy, geographic information systems, and surveying.

NSPS provides the platform by which members can share their thoughts and opinions about common interests through business meetings, committees, regional groups, and student chapters. It also provides a forum for input from other groups such as the National Association of County Surveyors, the Forum for State Boards of Registration, and the Forum for State Surveying Society Executives.

NSPS-sponsored awards programs for students include: NSPS Student Project of the Year; University Student Competition; and the TrigStar competition for high school students. Additionally, NSPS sponsors badge counselors for the Boy Scouts Surveying Merit Badge program.

NSPS administers a number of certification programs, including: Certified Survey Technician—CST (tests and certifies survey technicians for skills and knowledge in four levels); Hydrographic Surveyor Certification (tests and certifies those specifically experienced in hydrographic surveying); Certified Flood Plain Surveyor (currently a pilot program in conjunction with FEMA; expected to go nationwide soon).

NSPS maintains affiliations and memorandums of understanding with many related national and international organizations. Some of these include:

- FIG (International Federation of Surveyors): NSPS is the member organization within ACSM responsible for representation in the Commissions of FIG related to the surveying profession. ACSM is the only organization officially recognized by FIG as representing the surveying and mapping profession for the United States.
- ABET (Accreditation Board for Engineering and Technology): NSPS provides the evaluators who observe and monitor the university programs offering surveying education in the United States. These evaluators visit the various institutions to review the programs' curricula and infrastructure for providing surveying education.

- NCEES (National Council of Examiners for Engineering and Surveying): NSPS and ACSM hold seats on NCEES Participating Organizations Liaison Council and have been active participants in the proceedings associated with the revised Model Law definition for surveying. NSPS is also the U.S. organization responsible for the development of a Mutual Recognition Document with Canada and Mexico as a result of NAFTA. NCEES is a partner with NSPS in the development of the recruitment materials in this Speaker's Kit.
- IRWA (International Right of Way Association): NSPS works with IRWA to provide cross-education to their respective members regarding the practices of others within the geospatial community.
- CCLS (Canadian Council of Land Surveyors): NSPS and CCLS maintain liaison by providing an advisory seat in their respective governing board meetings.
- Additional organizations with which NSPS maintains a relationship include BLM (Bureau of Land Management) and the Russian Association of Private Land Surveyors.

NSPS Foundation is a multipurpose, nonprofit corporation which provides an avenue to preserve the past and invest in the future of surveying and mapping through the administration of a variety of scholarship programs. The criteria for granting scholarships is set by the donor. Currently, more than a dozen organization-sponsored and privately sponsored scholarships are administered by the Foundation.

As a member organization of ACSM, NSPS provides legislative representation and agency contact through the Government Affairs Committee, the executive director and a lobbying consultant in Washington D.C., a bimonthly update of issues and activities, situational legislative alerts, and a political action committee (PAC).

NSPS governance structure includes a Board of Governors and a Board of Directors. Each of the 50 state surveying societies, as well as the ones in Guam, Puerto Rico, and Washington, D.C., has an affiliation with NSPS. Each provides a representative to the NSPS Board of Governors. The Forum for State Society Executives provides two representatives to the NSPS Board of Governors. The Board of Directors comprises NSPS officers, chair of the NSPS Board of Governors, 10 regionally elected area directors, and two advisory representatives from the Forum for State Society Executives.

NCEES and Its Role in Professional Licensure

NCEES, commonly referred to as the Council, is a nonprofit organization whose membership consists of engineering and land surveying licensing boards for all states and territories of the U.S. These Member Boards represent all states and U.S. territorial jurisdictions. There are no individual members of NCEES. Rather, the delegates who represent their respective boards are members of the NCEES. NCEES membership consists of 70 Member Boards. These Member Boards are subdivided into four zones: Western, Central, Southern, Northeast.

The Council was founded in 1920 by seven of the 13 state boards having engineering and surveying licensing laws. These laws—and thus the Council—were designed to coordinate the issues of interstate licensing problems that began to develop as a result of the mobility of engineers. Council membership steadily increased as state boards and jurisdictions assumed legal status through legislation in states and territories across the nation.

The vision of NCEES today is to provide leadership in the professional licensure of engineers and surveyors and to help shape the future of licensure. This will be achieved through excellence in uniform laws, licensing standards, and rules of professional ethics as administered by its Member Boards for the protection of the public health, safety, and welfare.

The primary role of the Council is to prepare the engineering and surveying examinations through its Committee on Examinations for Professional Engineers and Committee on Examinations for Professional Surveyors. Examinations are administered twice a year on specific dates.

Surveying and Engineering examination committees are composed of professionals from different engineering disciplines in industry, consulting, and universities. They carefully compile, review, edit, and categorize examination questions and solutions according to specifications developed from the Professional Activities and Knowledge Studies. Questions are checked for the level of difficulty, required response time, and clarity.

After content is approved by the examination committees, the Council distributes the examinations to Member Boards for administration to candidates. The boards return the completed examinations to NCEES for scoring.

Section 2

Things to Do in Advance

Thorough preparation is the foundation of a successful presentation. At a minimum, be sure that you:

1. Study the Slide-by-Slide Notes in Section 5 of this guide.
2. Ask the organizer of the speaking opportunity about the venue and technology capabilities in order to decide which presentation option is appropriate for the venue (See Section 3 for Technology Requirements and Section 5 for Presentation Options).
3. Ask the organizer how much time you will have for the presentation and ask if including a classroom activity is appropriate for the age level and time allocation. (Available on the Web site affiliated with the NSPS Student Recruitment Program, www.surveyingcareer.com).
4. Ask the organizer of the speaking opportunity the questions in Section 4 of this guide, The Audience.
5. Print multiple copies of the Student Evaluation Form to provide to the organizer of your presentation. You will find the evaluation form on your CD-ROM.
6. Make sure you have enough copies of the brochures to distribute at the end of the presentation.

Additional activities to ensure success:

7. Develop a brief bio to be used to introduce yourself to the group
A sample is included below.

Sample Biography

Today we have an opportunity to learn more about an exciting career. [INSERT YOUR NAME] is a [INSERT AFFILIATION] who is here to tell you what it's like to be a surveyor. The career is becoming increasingly high-tech and offers many choices of specialties, including surveying and mapping from aerial photos and satellite images, defining navigation routes based on surveys of the land under water, using high-precision GPS equipment, and many other career paths. Demand for qualified surveyors is high. [YOUR NAME] is currently [INSERT SENTENCE OR TWO ABOUT YOUR CURRENT OR PAST EMPLOYMENT].

NOTE: Please send this completed bio/introduction via e-mail, fax, or regular mail to NSPS, Executive Administrator, for the society's records. Send this bio to the contact information located in Section 1 of this guide.

8. Think of a few anecdotal stories regarding your experience, or of an experience you know about from a colleague or peer. Some examples could include:
 - A project in which you realized that your career choice was the best one for you
 - Those aspects of the surveying profession that appeal to you most
 - A lesson you've learned in your career. For example: a situation in which you wish you'd done something differently

Section 3

The Venue

Assessing the Venue and Coordinating with the Organizer

This section of the Speaker's Guide is intended to help determine the type of presentation and the type of venue where you will present. Answers to the questions below will help you match the technology requirements to the venue. This section of the guide will also help you determine which presentation option to follow: the *Intro Movie* option, the *PowerPoint Kiosk* option, the *Complete PowerPoint* option, or the *No Multimedia* option. See Section 5, Presentation Formats, for more details.

Questions to Ask the Organizer

1. Confirm the date and time of the presentation. Will there be time to set up and test the presentation equipment in advance?
2. How long will I be speaking?
3. Where does the presentation fit into the agenda?
4. Will there be time to conduct a classroom activity to reinforce specific surveying concepts? (If yes, refer to the Web site affiliated with the NSPS Student Recruitment Program, www.surveyingcareer.com for more details about Classroom Activities).
5. Who are the other presenters, and what are their topics?

Questions to Ask About the Venue

1. Does the presentation space support a computer-driven multimedia slide show using PowerPoint? Will the presentation space run a video via a computer CD-ROM, or does it have options for a video to play with a standard VHS tape on a VCR and monitor?
2. Do you have a projector that I can use? Can I bring my own computer? Make sure you follow up with questions regarding specifications of the projector. You can find this information on the next page, under the heading “Using Your Computer with Venue Projection Equipment.”
3. Does the computer in the room have a synchronized video monitor to display the slides and videotape, or will the slides be displayed on a screen?
4. How many people can the room seat?
5. How are the seats arranged?
 - classroom style
 - auditorium style
 - study lounge or similar casual area
6. What type of audio system is available? Will the sound be projected through built-in speakers connected to the projector/ computer, through the sound controls on a TV monitor, or speakers built-in to the wall? If I’m bringing my computer, should I also bring speakers?
7. Will I have a microphone and a podium?
8. Will I be speaking from a raised platform?
9. Will food and beverages be served during the presentation?
10. How will the room be darkened during the presentation? Are there windows with shades or curtains that can be drawn?
11. What will be directly behind me where I will present? Is there a window, a chalkboard, a door, etc.?

Technology Requirements

Use the following information as a checklist to make sure the necessary technology is available at the venue.

Using Venue Computer Equipment and Projector

If you plan to use the equipment provided at the venue, you will need the CD-ROM enclosed in the NSPS Speaker's Kit, and you will need to tell the venue coordinator that you need the following specifications in the computer system:

1. Windows-based PC
2. Microsoft® PowerPoint 97 or higher
3. Windows® Media Player installed
4. At least a 24X CD-ROM (The CD-ROM must be designated as the D: drive.)
5. Room speakers for the PC

Using Your Computer with Venue Projection Equipment

If using your own computer to connect to a presentation room projector (with PowerPoint 97 or higher), you will need the CD-ROM enclosed in the NSPS Speaker's Kit, and you will need to tell the venue coordinator that you need:

1. An LCD projector to connect to a laptop computer
2. A computer that meets the same criteria as stated above and that you have tested on a projector compatible with the one in the presentation room

Projector Setup and Troubleshooting

If using your PC with the venue-provided projector and you have PowerPoint 2000, use the Projector Wizard to go through the step-by-step setup of an external projector or monitor. Follow these steps before starting the Projector Wizard:

1. Connect a cable from the external display port on your laptop PC to the video input on the external monitor or projector.
2. From within PowerPoint, open your presentation and then select *Slide Show > Set Up Show* to display the *Set Up Show* dialog box.
3. Click the Projector Wizard button to display the first screen of the Projector Wizard.
4. Follow the steps in the Wizard to properly set up your computer and projector/monitor for your presentation.

If you run into problems in how the presentation displays on the projector screen, review the following to see if these hints and solutions will solve the problem (hints and solutions from *PowerPoint 2000: I Didn't Know You Could Do That*, by Michael Miller, 2000, Sybex Inc.).

Your Computer Images Don't Appear Onscreen

Assuming that the projector is working, this problem is typically caused by an incorrect setting on your PC or a bad connection between your PC and the projector.

1. Make sure that your PC is configured to send output to an external monitor. Most laptop computers use a function key or software command to activate or deactivate the video output signal on the back of the computer. In many cases, this keyboard command toggles through three different display states: internal monitor only, external monitor only, and both internal and external monitors simultaneously. You may need to toggle through this sequence once or twice to hit the right combination.
2. Sometimes your computer has to boot up with the projector connected in order to recognize the new external connection. If this is the case, start by turning off both your computer and the projector. Turn on the projector, let it warm up a minute, and then turn on your computer again.
3. Try turning off the internal monitor completely. Some projectors need the full attention of your computer to overcome compatibility problems.
4. Check the video resolution of your projector against the resolution set on your PC. In some cases, you will need to adjust your PC's display settings to better match your projector. This typically means setting a lower resolution by going to the *Windows Control Panel*, selecting *Display* to open the *Display Settings* dialog box, selecting the *Settings* tab, and choosing a lower setting for both *Colors* and *Screen Area*. An 800 x 600 screen size displaying 16-bit color is a common standard with LCD projectors.
5. Check the cable between the projector and your PC. Make sure the cable is firmly seated on both ends. You should also check for bent pins on the connectors and for a tight crimp in the cable itself. If you have a spare cable available, replace the original.

Screen Image Doesn't Look Right

If your projected picture just doesn't look right—the entire screen isn't viewable, or text and other objects appear stretched or crunched or just plain ragged—then you have a compatibility issue between your PC and your projector. Here are some items to check:

1. Try adjusting the resolution of your computer's video display. Use the *Settings* tab in the *Display Settings* dialog box to choose a lesser *Color* setting or a smaller *Screen* area. (You may need to reboot your computer after changing these settings, to send the proper signal to the projector.) In some rare instances, you may need to choose a *higher* resolution to match the resolution of the projector; try several different settings to see which works best. (Note that most projectors use 800 x 600 resolution; set your PC to this resolution when all else fails.)
2. Turn off your laptop's internal display. This might be necessary if your PC's native video resolution exceeds the resolution of the projector.
3. If the text onscreen doesn't look right—and you're using Windows 98 (or if you have Microsoft Plus! installed with Windows95)—turn on font smoothing. Go to the *Display Settings* dialog box, select the *Effects* tab, then select the *Smooth Edges of Screen Fonts* option.
4. If the projected image isn't quite rectangular, your projector probably needs to be moved or adjusted. Make sure the projector is lined up perfectly perpendicular to the screen; then try raising or lowering the front of the projector as necessary. (You can use the projector's built-in elevating or leveling mechanism, or just stick some books under the front legs.)

Projector Goes Blank During Breaks in Your Presentation

This problem is an easy one to fix. It's typically caused by an aggressive power-saving utility or screen saver and power-related utilities. You should also turn off screen blanking in Windows' Power Management utility. (Select *Power Management* from the *Control Panel*; then click the *Power Schemes* tab, and set *Turn Off Monitor* to *Never*.)

Section 4

The Audience

The following will help you understand the makeup of your audience in advance of the presentation. This will allow you to select the appropriate presentation option and think of professional experiences to tell the audience.

1. How many students are expected to attend?
2. What are the grade/class levels of the group?
3. Do you know if similar presentations about professional surveying have been made? If so, how long ago? Do you know who sponsored the presentation?
4. How has this presentation been promoted?
5. Why are students attending this presentation? Is it a class requirement, or is attendance voluntary based on interest in the topic?)
6. Which topic or topics do you think are the most important to address to this audience?
7. What levels of math have the students experienced in case we complete a classroom activity? (For ideas about classroom activities, see the Web site affiliated with this NSPS Student Recruitment Program, www.surveyingcareer.com, and select Classroom Activities under the Resources section.)

Section 5

How to Give the Presentation

Coordinating with the organizer in advance will be helpful in planning for the presentation. For example, your presentation may be part of a larger program. In addition, the venue in which you will present can range from a standard classroom to an auditorium to a student study lounge. In many cases, this variety requires flexibility in multimedia capabilities and presentation length.

Sections 2 and 3 of this guide are crucial to helping you find out more about the presentation venue, length of time to present, and technology capabilities. Section 4 of this guide helps you assess your audience. This section provides details about the different ways you can deliver the presentation material.

Presentation Objectives

This presentation is designed to introduce the following key messages:

1. Surveyors have exciting and varied job opportunities, and qualified candidates are in high demand.
2. Many career paths are available, including choices of specializations (e.g., photogrammetry, hydrography, geodesy, etc.) and types of employers (e.g., large corporations, government offices and agencies, engineering and surveying firms, independently-owned businesses, etc.).
3. A career as a professional surveyor offers extensive use of cutting-edge technology.
4. Surveying has made a significant contribution to the development of civilization throughout history.
5. Every U.S. state requires a licensed surveyor to examine and verify each finished survey before its use by citizens.

Presentation Formats

In general, the full multimedia presentation (*Complete PowerPoint*) can be delivered in 15-minutes from start to finish. This complete timeframe does not include periodic breaks to ask or answer questions, and it does not include the recommended sidebars provided in this Speaker's Guide, Slide-by-Slide Notes, for you to add insight regarding your own experiences and knowledge of surveying.

Intro Movie

This format includes only the two-minute animation introduction to the surveying field. This format is best if you have limited time to present information about the profession. After showing the animation, you can use the brochure to briefly explain the various options available in the surveying field (found on the inside of the brochure) and refer students to the Web site, www.surveyingcareer.com. You will find this presentation format on your CD-ROM, *Intro_movie.exe*.

PowerPoint Kiosk/No Computer Equipment

This format includes a seven-minute self-playing slide show that provides more details about the profession, emphasizing key messages from the *Complete PowerPoint* presentation.

If it is necessary to give a presentation without the benefit of a presenter or the interaction between a presenter and the audience, the *PowerPoint Kiosk* format is the best solution. This format can be used on the appropriate computer and display equipment at events where a presenter is not available or is not appropriate, such as a career event or open house. You will find this presentation format on your CD-ROM, *PowerPoint_Kiosk.pps*.

In addition, your Speaker's Kit provides this format on a VHS tape in the event that computer equipment is not available at the venue.

Complete PowerPoint

This presentation format includes the full slide presentation including the animation introduction described in the *Intro Movie* option above. Follow the Slide-by-Slide Notes in Section 5 to learn more about how to give this presentation. To use this presentation format, you should use the presentation on your CD-ROM, *PowerPoint_Only.pps*.

No Multimedia

In some situations, you may be required to give the presentation in an area that does not support multimedia slides through PowerPoint, video, or audio, such as a student lounge or outdoors. In this case, you should provide the enclosed student brochures and refer to the Slide-by-Slide Notes in Section 5 of this guide to give your presentation.

Both the PowerPoint presentation and the brochure provide details about the different paths that someone in surveying can pursue, as supported by the illustration below. The brochure briefly describes the various career paths possible to a surveyor, with additional details provided in the Slide-by-Slide Notes, numbers 13-22 in this guide (pp. 32–41). Because the center panel in the student brochure and the PowerPoint slides mirror each other, the brochure can serve as visual support to the topics you are presenting when a PowerPoint presentation is not possible.

In addition, you should try to cover the information found in slides 23, 24, and 25 (pp. 42-44). The topics on these slides cover, salary potential, job availability, and the steps to becoming a surveyor, respectively.



Speaking Tips

The following presentation notes are provided in both outline format and word-for-word script. The outline format is included as key points listed to the right of each slide in the Slide-by-Slide Notes. Use the format with which you are most comfortable.

Advantages of an outline format include the ability to handle different presentation styles, to keep the presentation flexible for different environments and audience groups, and to be more spontaneous in presenting the points. However, an outline format can also lead to tangential comments, overstating or belaboring a point, and confusing the audience. We've included a few speaking tips to help you present using an outline format.

- Plan the opening of your presentation to prevent you from stumbling and searching for words. You can do this by creating a bulleted list of the things you want to say for the first minute or two of the presentation. Rehearse this opening in advance. This will allow you to set the pace of the presentation and to open it with confidence.
- Plan what you want to say in your closing. The closing of your presentation includes a review of the main points you presented. Rehearse it in advance. A solid finish will help the audience remember the major points of what you presented.
- This presentation uses handouts to serve as supporting material to reinforce the points made in the presentation. Give students the handouts **at the end** of the presentation, not at the beginning. This keeps the focus solely on what you are saying and the visual aids that you use as part of the presentation.

If you have to provide handouts to reference while you are presenting a point, **do not** distribute as students come into the room or place them on the desks at the beginning of the presentation. People tend to read through the materials rather than listen to you. When you need the handout for reference, take a few minutes to distribute the handouts and begin speaking only after all the handouts are distributed. By waiting, you will draw the students' attention to the document *and* pay attention to what you have to say about it.

- Bring a bottle of water to the presentation.


Slide-by-Slide Notes

The presentation is organized in a specific series of slides that the NSPS believes best presents the concepts.

The Slide-by-Slide Notes begin on the next page. Consider using these notes while listening to the sample presentation, described below.

Sample Presentation for Reference

The CD-ROM provides an example of the complete presentation running the animation intro and the slides from start to finish. The sample includes a script of the types of things that a presenter could include.

This sample presentation is self-guided and allows you to study the notes and key points for each slide while using the Slide-by-Slide Notes that begin on the following page. This sample presentation format is called *Slide_by_Slide.pdf* on your CD-ROM. To hear the script for each slide in this sample presentation, click on the audio icon  next to where the script begins.

Please note, when giving the presentation, you do not have to follow the script word for word. It has been provided to you as an example of what one might say. Use as much or as little of the script as you like. Just make sure that you cover the key points indicated on each slide.



Script:

My name is <INSERT NAME>, and today I'm here to talk about careers in professional surveying. When you picture a surveyor, what comes to mind? < GET ANSWERS FROM AUDIENCE > What you've mentioned are all true but only a fraction of the story.

Notes to Presenter:

If you haven't done so already, give the audience a little bit about your career background. If you are a surveyor, you will have time later to get into detail about the types of surveying you do, specifically on slide 13, page 32.

Slide Summary

Slide Objective:

Introduce yourself.

Key Points:

- Introduction
- Find out how much the audience knows about surveying.



Script:

As a surveyor, you have vast opportunities. You can map the world's terrain. Explore new oil sources. Investigate crime scenes. Take charge as a CEO. Appear in court as an expert witness. Run a business. And excel with computers and other high-tech equipment.

Slide Summary

Slide Objective:

Demonstrate to audience that surveyors have many opportunities and career paths.

Key Points:

- Varied opportunities:
 - Be a CEO.
 - Own a business.
 - Use computers and other high-tech equipment.
 - Work on a construction site.
 - Map oceans, lakes, and rivers.
 - Be an expert witness.
 - Conduct forensic investigations.



Script:

Surveyors are like detectives. They use courthouse and computer records to research an area's deed records and previous surveys. They determine the best technology and equipment needed to collect the data. They fit pieces of the past together to confirm previous surveys.

Notes to Presenter:

Slides 3, 4, and 5 generally describe the three stages of a surveying project: 1) planning and research; 2) fieldwork and data collection; and 3) analysis and map creation.

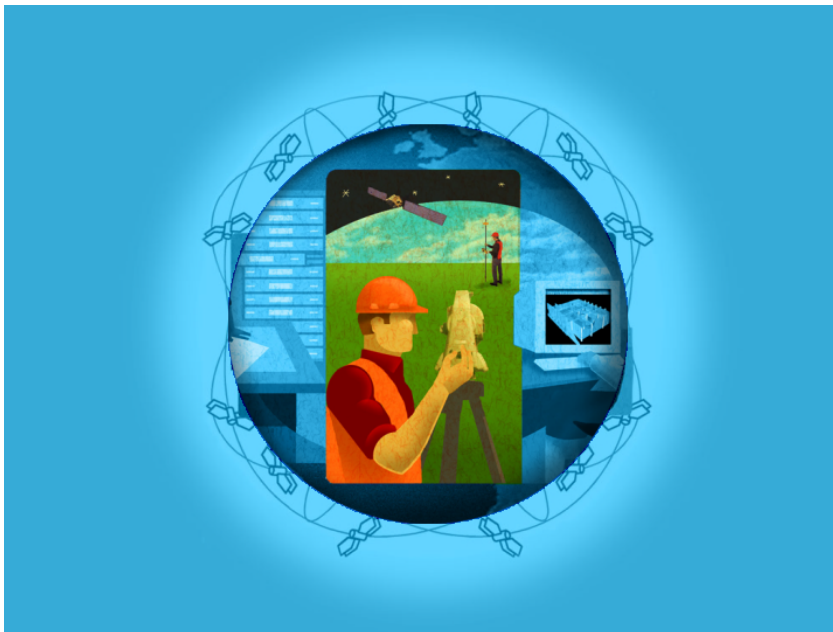
Slide Summary

Slide Objective:

Generally describe the first stage of a surveying project: planning and research.

Key Points:

- Surveyors are detectives.
- They search deed records and previous surveys.
- They identify best technology for project.
- They fit pieces of the past to confirm previous surveys.



Script:

Surveyors work outdoors while still challenging themselves intellectually. Years ago, surveyors used chains, compasses, and plumb bobs. Now, field work is often high-tech. It involves digital measuring devices, handheld computers, GPS systems, and more recently, 3D laser scanning.

Let's suppose a surveyor is working on a shopping center that is being expanded. Using this new type of scanning, a surveyor can digitally capture measurements of the entire shopping center within minutes instead of weeks.

Notes to Presenter:

If time permits, an additional point can be made:

The same 3D laser technology is being used by the movie industry and in video games to create digital environments into which animated characters can be placed.

Slide Summary

Slide Objective:

Generally describe the second stage of a surveying project: fieldwork and data collection.

Key Points:

- Surveyors work outdoors and challenge themselves intellectually.
- Make a comparison between the older technologies used and the high-tech equipment used today.
- Use 3D laser scanning as an example of the increased speed in which a surveyor can do his or her job with the new technologies used in fieldwork today.

If time permits:

- 3D laser technology also is used by the movie industry and in video games.



Script:

Surveyors document their fieldwork and map things out. They collect, validate, and process data that other professionals—engineers, lawyers, architects—rely on. What surveyors do affects us all. Sometimes a surveyor may work in the field and then hand off the data to a surveyor who works in the office. The office-based surveyor analyzes the data and creates the maps. The maps must then be double-checked and signed by a licensed surveyor. Only then is the data and map officially ready to be used.

Notes to Presenter:

If time permits, an additional point can be made:

Data and maps are checked and double-checked. All states require results from fieldwork be signed by a licensed professional surveyor before they can be used. This is an important point emphasized later in the presentation. However, if time permits, you can introduce this point here.

Slide Summary

Slide Objective:

Generally describe the third stage of a surveying project: analysis and map creation.

Key Points:

- Analysis and confirmation of work is important.
- Some surveyors work in the field and hand off the data to an office-based surveyor for analysis.

If time permits:

- Data and maps are verified by a licensed professional surveyor before they can be used.

**Script:**

Surveyors have shaped our history. Surveying tools and basic mathematical principles helped ancient Egyptians set the corners of the great pyramids.

Notes to Presenter:

This is the first of six slides that describe the historical impact of surveying. These slides should be shown in quick succession, allowing for some audience interaction in Slide 11. The historical slides are organized in chronological order from oldest to most recent.

Slide Summary**Slide Objective:**

This is the first of six slides that describe the historical impact of surveying.

Key Points:

- Surveying tools helped set the corners of Egyptian pyramids.

**Script:**

President Thomas Jefferson commissioned Lewis and Clark to explore and survey the territories from Jefferson's great real estate deal, the Louisiana Purchase. Their extensive reports, maps, and collected data provided critical information that encouraged westward settlements.

Slide Summary**Slide Objective:**

This is the second of six slides that describe the historical impact of surveying.

Key Points:

- Lewis and Clark's exploration, documentation, and surveys of the Louisiana Purchase territories encouraged westward expansion.



Script:

Surveyors made sure the Union Pacific and the Central Pacific railroads met in Promontory Point, Utah, to form the first transcontinental railroad.

Slide Summary

Slide Objective:

This is the third of six slides that describe the historical impact of surveying.

Key Points:

- Surveyors made sure the first continental railroad met at Promontory Point, Utah.

**Script:**

Surveyors helped measure the distance from the earth to the moon. The first men to land on the moon placed a grouping of reflector prisms—measuring tools used by surveyors. The distance measured was accurate within just a couple of feet.

Slide Summary**Slide Objective:**

This is the fourth of six slides that describe the historical impact of surveying.

Key Points:

- Reflector prisms—measuring tools used by surveyors—helped measure the distance between the earth and the moon.



Script:

When the Space Shuttle Columbia disintegrated on February 1, 2003, debris scattered over hundreds of miles across 40 counties. Using high-precision GPS equipment, surveyors helped to mark the location of debris so that scientists could reconstruct the accident.

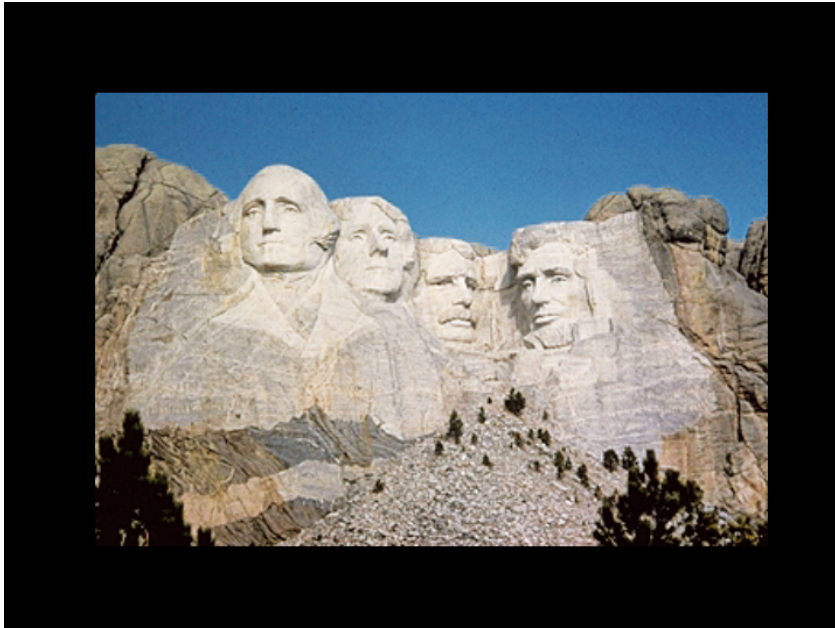
Slide Summary

Slide Objective:

This is the fifth of six slides that describe the historical impact of surveying.

Key Points:

- Surveyors assisted in accident reconstruction of the Space Shuttle Columbia by using GPS equipment to locate the debris.



Script:

Who can name the four presidents on Mount Rushmore? Good. (George Washington, Thomas Jefferson, Theodore Roosevelt, and Abraham Lincoln) Now who can name the three who were also surveyors?

[Click] *(George Washington, Thomas Jefferson, and Abraham Lincoln)*

Slide Summary

Slide Objective:

This is the sixth of six slides that describe the historical impact of surveying.

Key Points:

- Encourage audience participation by asking them to identify the presidents carved into Mount Rushmore. Then ask them to identify the three presidents who started their careers as surveyors.



Slide Summary

Slide Objective:

Make a transition from history to surveying specialties.

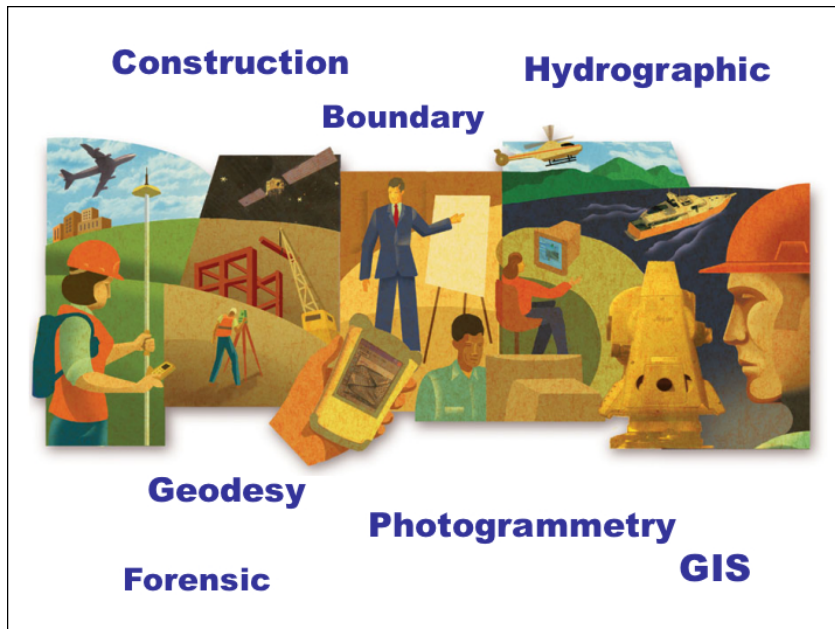
Key Points:

- Surveyors have had and will continue to have a huge impact on our everyday lives.



Script:

Surveyors have made a huge impact on our past and will continue to shape our future. Technology is rapidly changing the surveying profession. What used to take weeks or months can now be done in a single day with computerized tools. Now surveyors combine time-tested practices and high-tech proficiency.



Script:

An additional benefit to the surveying profession is that you can choose from several disciplines. You can focus on construction, boundary, hydrographic, geodesy, photogrammetry, GIS, or forensic surveying.

Notes to Presenter:

If you are a surveyor, spend some time here talking about the type of work you do.

Slide Summary

Slide Objective:

Introduce the surveying specialties.

Key Points:

- Introduce the surveying specialties covered in this presentation.
- If presenter is a surveyor, he or she should describe the work he or she does.



CONSTRUCTION

Slide Summary

Slide Objective:

Describe construction surveying.

Key Points:

- Construction surveyors work on large projects (give examples).

If time permits:

- Construction surveying requires extreme precision.



Script:

Construction is an area commonly associated with surveying. Construction surveyors work on large housing developments, business office parks, and shopping centers. Their work also applies to other types of projects, such as highways, bridges, tunnels, and skyscrapers.

Notes to Presenter:

If time permits, additional points can be made:

- Construction surveying requires extreme precision. As you see pictured here, a refinery's maze of pipelines is on a fixed piece of property, often with little room for movement. If a new pipeline has to be added, surveyors are the first on the job making measurements and recommendations about where the new pipeline can be placed without damaging nearby structures.
- In another example, surveyors ensure that a bridge begins and ends at the right spots. Even small measurement errors can mean significant deviations across the span of a bridge. The same precision applies to underground construction for train tunnels, pipelines under cities, and mining.

CONSTRUCTION**Script:**

Construction surveyors also can work on projects such as trying to piece back together a site after a natural disaster, such as this one: I-10 after the San Francisco earthquake a few years ago.

Slide Summary**Slide Objective:**

Continue describing construction surveying.

Key Points:

- Surveyors also get involved in rebuilding after natural disasters.

BOUNDARY

**Script:**

Boundary surveyors are also known as cadastral surveyors. They measure, mark, and map a property's boundary lines. They document these lines for public record and tax purposes. Individual property owners may interact directly with this type of surveyor. These surveyors use markers to indicate the corners of boundaries. This picture shows a couple examples of what these markers can look like.

Some older surveys indicate property corners by carvings on trees, buried metal stakes, or even piles of rock. This is why being a surveyor is like being a detective. Today's surveyors use the notes from a previous survey to find these property corners. They need to re-measure them to make sure they haven't been moved. Boundary surveyors can also serve as expert witnesses for court cases involving boundary disputes.

Slide Summary**Slide Objective:**

Describe boundary surveying.

Key Points:

- Another name for boundary surveying is cadastral surveying.
- They measure, mark, and map a property's boundary lines for tax purposes and land ownership.
- Property markers can look like those pictured on the slide or can be markings on trees, piles of rock, or buried metal stakes.



Script:

An area often overlooked when thinking about land surveying is hydrographic surveying. The land under bodies of water also must be surveyed. Hydrographic surveying requires training with different types of high-tech equipment and is used to measure erosion, guide dredging projects, explore for oil, or mark underwater hazards. The shipping industry relies heavily on these types of surveys.

Notes to the presenter:

If time permits, additional points can be made:

- Clarify that hydrographic surveying is topographic surveying under water. Topographic surveyors measure and map the shape, contour, and location of land features such as valleys, mountains, and man-made objects.
- The demand for surveyors who have training in hydrographic surveying is high. Land under water constantly changes due to currents and storms, so waterways are often surveyed and resurveyed to record changes.
- According to the National Oceanic and Atmospheric Administration, only 5 percent of the earth's oceans have been mapped.

Slide Summary

Slide Objective:

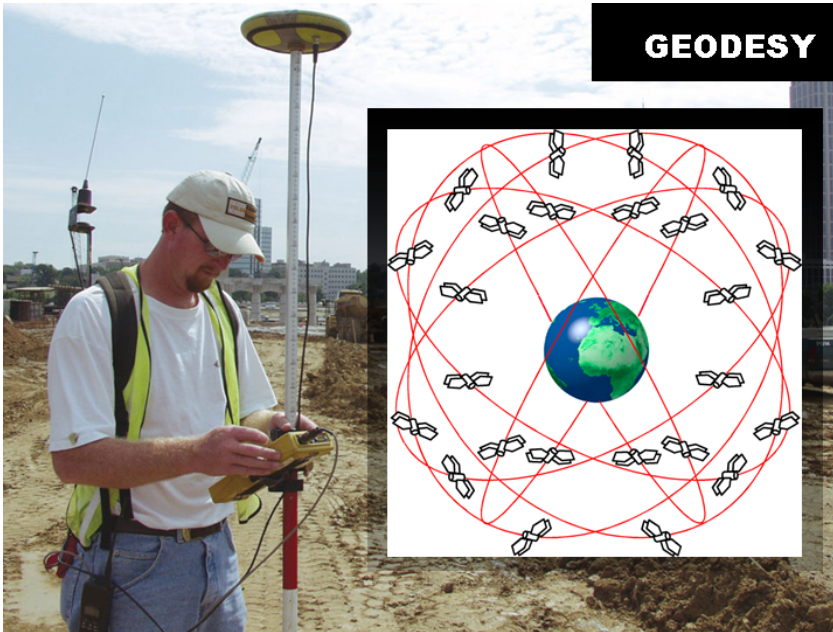
Describe hydrographic surveying.

Key Points:

- Hydrographic surveyors measure and map the land beneath bodies of water.
- The shipping industry relies on hydrographic surveys.

If time permits:

- Topographic surveyors measure and map the shape and contour of land. Underwater topographic surveying is called hydrography.
- Demand for hydrographic surveying is high.
- Land underneath bodies of water constantly changes, which requires the land to be resurveyed periodically.
- Only 5 percent of the earth's oceans have been mapped (NOAA).



Script:

Who can tell me what GPS is? Right, GPS stands for Global Positioning System. Geodesists are one type of surveyor who uses sophisticated, high-precision GPS technology to determine the exact location of points on the earth's surface.

[Click] *GPS is possible because 24 satellites circle the earth. Using a receiver on the ground that connects with at least three of these satellites, [Click] geodesists receive a series of coordinates that can tell the exact position—usually within a centimeter—of the GPS equipment. This coordinate reference system is the backbone of a mapping project, aids in guiding space satellites and airplanes, tracks the movement of trucks and trains, and helps locate people who need assistance.*

[Click] *Geodesists often work for government—such as the National Geodetic Survey or the Department of Defense. The National Geodetic Survey manages the GPS system. The NGS geodesists help surveyors and other mapping professionals interpret their own GPS data to ensure accuracy.*

Slide Summary

Slide Objective:

Describe geodesy and GPS.

Key Points:

- Geodesists use high-precision GPS to determine the location of points on the earth.
- Geodesists work for government.
- Geodesists help surveyors and other professionals interpret GPS data.

If time permits:

- GPS is possible because 24 satellites circle the earth.
- The coordinates are accurate within a centimeter.
- The NGS manages the GPS reference system.

**Script:**

If you like to fly, photogrammetry might interest you. It's a specialty that allows the surveyor to analyze land without actually coming into contact with it. For example, surveyors take aerial photos and use them to create detailed maps of large areas in a very short time. From the air, photogrammetrists can gather a lot of details about the topography, vegetation, and existing structures.

Notes to Presenter:

If time permits, an additional point can be made:

- A surveyor on the ground, using precise measurements, will place something known as ground controls at particular locations. The ground controls essentially are a giant "X" that the photogrammetrist can see with a detail view of the photo. Because photogrammetrists know the location of the ground control measurements, they can create a map using computerized tools and the photos.

Slide Summary**Slide Objective:**

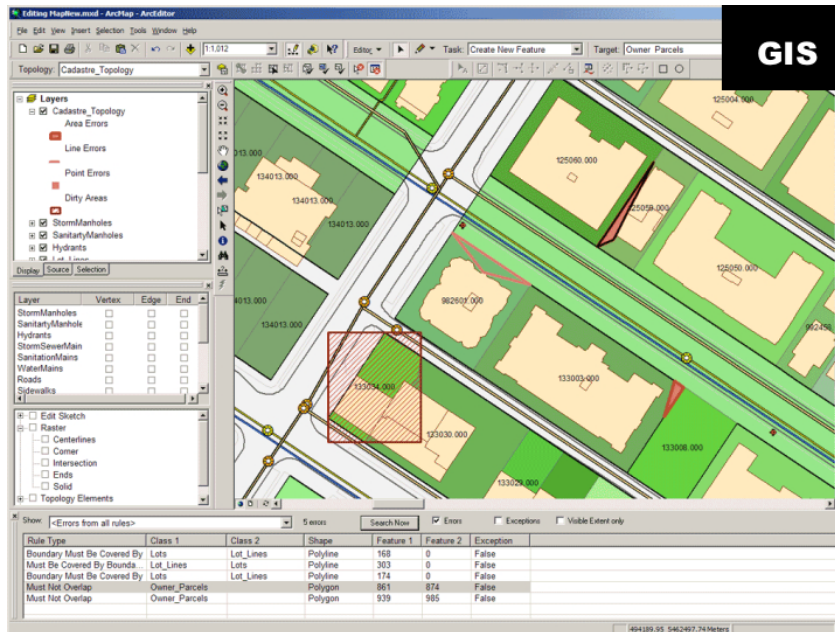
Describe photogrammetry.

Key Points:

- Photogrammetry is a type of remote sensing using airplanes and sophisticated photographic equipment.
- Benefits of photogrammetry is being able to survey large areas quickly and land inaccessible by foot.

If time permits:

- Photogrammetry requires a surveyor on the ground to place a ground control that the photogrammetrist can see with detail views of the photographs.



GIS

Slide Summary

Slide Objective:

Describe Geographic Information Systems.

Key Points:

- GIS helps people solve problems and make decisions.
- City planners, large companies, and commercial developers use GIS studies.
- GIS is a system of computer software and hardware that stores, displays, analyzes, and maps geographic information.
- Surveyors provide the data for the geographic information for GIS studies.

If time permits:

- GIS is a layering system that allows analysts to relate different types of data on one map.



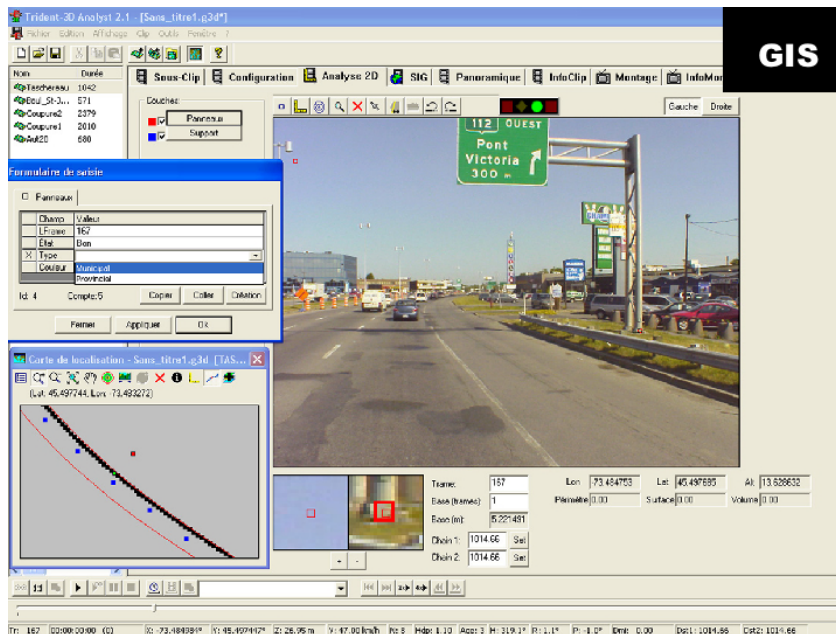
Script:

Surveyors who specialize in geographic information systems, or GIS, use sophisticated software that maps data relative to a physical location. Developing a map or visual representation of data helps people solve problems and make decisions. For example, city planners may use a GIS study to determine where a new roadway should be built. This field is growing quickly, mostly due to high-tech computer software and hardware that stores, displays, analyzes, and maps information. Large companies and commercial developers also use GIS studies.

Notes to Presenter:

If time permits, an additional point can be made:

- GIS involves layering data about a particular site. The first layer that provides the framework for the GIS study is a survey. For example, an area of hazardous waste is discovered. A GIS analyst layers data sets about the area where the hazardous waste is located. The data layers could be the slope of the land, the groundwater and surface water sources, vegetation, location of cities and roadways. A surveyor will provide the data to create this map. By layering these data sets on one map, a GIS analyst can provide information to those responsible for cleaning up the pollution.



Script:

In addition to GIS software, sophisticated information-gathering tools are used in GIS. One example is mobile-mapping systems. These systems can map an entire area in a fraction of the time that it used to take. A series of cameras are placed on a vehicle and used in conjunction with a GPS system. Someone drives the vehicle around the area needing to be mapped. The cameras take video of the road. Later, using the footage, someone can accurately map signs, telephone poles, and traffic lights, and other items of interest related to the area.

While this type of mapping may not be as accurate as that done for boundary surveys or provide the exact location of physical features, it serves its intended purpose.

Notes to Presenter:

If time permits, you can show “The District” information on GIS and how it benefits police work as part of your presentation. The video clip is located on your CD-ROM.

Slide Summary

Slide Objective:

Describe data gathering for GIS.

Key Points:

- Describe mobile-mapping systems and the benefits to GIS analysis.

If time permits:

- Show the video from the television program, “The District” and how GIS benefits police work.



Slide Summary

Slide Objective:

Describe forensic surveying and how it is used in court cases.

Key Points:

- Knowledge of laws play an important part of surveyors' careers.
- Licensed surveyors can clarify court cases about property disputes, automobile accidents, and industrial accidents.
- Surveyors need extensive experience before they can be an expert witness or perform forensic work.



Script:

A final specialty area is forensic surveying. Federal, state, and local laws play a large part of all surveyors' careers. A licensed surveyor can clarify and add credibility to a court case about an automobile accident. Surveyors who build reputations in the forensics field and serve as expert witnesses are in high demand. Being an expert witness and forensic surveyor requires extensive knowledge about surveying and many years of experience.



Script:

OK, so we've covered the day-to-day aspects of the surveyor's job and the different specialties. But what about the all-important questions: are salaries good, and are jobs available? The answer is yes to both questions.

Surveyors can earn excellent salaries. Surveying is a valued profession that combines strong analytical abilities with high-tech advancements.

[Click] *How much do surveyors earn? The average salary for all experience levels of surveying and mapping scientists is nearly \$63,000 a year, according to the U.S. Bureau of Labor Statistics. [Click] That's comparable to a civil engineer's salary, which is a little more than \$61,000 a year. I give you this example to show you that surveying is a profession that is as valued as other similar professions.*

Now, granted, these numbers show the average salary level of an experienced professional. Surveyor's salaries will vary depending on the level you strive for. You can be the owner of your own company or work as a technician on a crew. It's really up to you on how far you go. As a CEO of your own firm, you can make twice the average shown here.

Notes to Presenter:

Entry-level salaries vary across the country but average about \$44,000 for a surveyor with a four-year degree. Of course, the starting salary could be higher or lower depending on experience and other factors. Surveying technicians, who generally have two-year degrees, have average starting salaries of about \$25,000.

Slide Summary

Slide Objective:

Describe salaries and job availability.

Key Points:

- Surveyors can earn excellent salaries.
- Job opportunities are plentiful.
- A licensed professional surveyor with several years experience can earn an average of \$63,000 annually.
- A civil engineer's salary (at similar experience levels) is comparable at \$61,000.
- Surveyors who are CEO of their own firms can make six-figure incomes.

If time permits:

- Entry-level salaries for 4-year candidates average about \$44,000.
- Technician average salaries range start at \$25,000.

I won't say,
“Can I Get a Job?”

Instead, I'll say,
“Where Would I Like to Work?”



Script:

This is a quote from a student in a college surveying program. The demand for qualified surveying professionals is high. The technology explosion the field is experiencing means that demand will most likely increase. Surveying also tends to be a portable career, meaning that surveyors can change jobs between states and companies relatively easily. Of course, the surveyor will have to obtain a license if he or she moves to a new state.

Slide Summary

Slide Objective:

Job availability is high.

Key Points:

- Jobs are plentiful, exciting, and varied.
- Technological advancements will increase the demand for qualified surveyors.
- Surveyors can change jobs relatively easily, taking into account the learning curve required for the state and local laws in which the surveyors will work.

GEOMETRY

TRIGONOMETRY



Script:

What do you have to do to become a surveyor? In general, people who like surveying also like math. The field is based mostly on geometry and trigonometry. [Click] The field also attracts people who like geology, forestry, history, and astronomy.

[Click] To become a licensed surveyor, you basically follow four steps: First, you get your degree. Several accredited college programs throughout the country, sometimes called geomatics engineering, offer two-year and four-year degrees. You can check out www.surveyingcareer.com to see a list of surveying education programs.

[Click] After finishing your education, you need to take the Fundamentals exam. Successfully passing this exam helps potential employers know that you've achieved a recognized standard.

[Click] Then you need to get some work experience under the supervision of a licensed surveyor.

[Click] After attaining the required experience, you take a national exam and, if required, a state-specific exam to obtain a license for the state in which you will work. Many surveyors obtain a license in multiple states, especially if they work for large firms. Licensed surveyors receive some of the highest salaries and can take on the responsibility to verify a finished survey. Each state has slightly different requirements for licensing, but they all agree that surveys must be verified by a licensed surveyor.

[Click] You can find out more information about how to become a licensed surveyor at the Web site www.ncees.org. NCEES is the organization that develops and administers the licensing exams for surveyors.

Slide Summary

Slide Objective:

Describe the steps needed to become a surveyor.

Key Points:

- Surveyors like math, mostly geometry and trigonometry.
- Four basic steps:
 - 1) Get your degree.
 - 2) Take the surveying Fundamentals Exam.
 - 3) Obtain work experience supervised by a licensed surveyor.
 - 4) Take a national licensure exam, and, if applicable, an exam for the state in which you will work.
- All states require a licensed surveyor to sign a finished survey.
- Licensed surveyors earn the highest salaries.
- Visit these Web sites to learn more:
www.surveyingcareer.com
www.ncees.org



Script:

Thank you for letting me introduce you to high-tech careers in professional surveying. This is an exciting time to become a surveyor. It's a profession that pays well, opens many career possibilities, challenges you intellectually, and allows you to work on the cutting edge of technology.

For more about pursuing surveying as a career, go online to www.surveyingcareer.com.

Thanks for listening. If any one has any questions I'd be happy to answer them.

Slide Summary

Slide Objective:

Make closing statements and answer questions.

Key Points:

- It's an exciting time to become a surveyor.
- There are many career options.
- It is intellectually challenging.
- You can work in the cutting edge of technology.
- Give Web site address: www.surveyingcareer.com

Section 6

How to Close the Presentation

Assessing the Presentation Topics After You Finish

If time permits, take a few minutes to validate that your audience absorbed the points of the presentation. Taking this step will be helpful to you in future presentations. NSPS would also like to hear this feedback in its Speaker Evaluation Form.

Consider asking the following questions after you have finished the presentation as a form of assessment. Write down your general impression by estimating the percentage of the audience that answered the questions below. Please include the information on the NSPS Speaker Evaluation Form.

- How many students didn't know anything about surveying before hearing this presentation?
- How many learned more about surveying?
- What aspects interested you the most about surveying?
- Which parts of my presentation surprised you the most?
- Is anyone here considering surveying as a career option?

Things to Provide to Audience Members

Make sure you have the following information with you to present to audience members at the end of the presentation.

1. Surveying Brochures (Included in your Speaker's Kit. Additional brochures are available by contacting the NSPS Executive Administrator at the information on the following page.)
2. Evaluation forms (Available on your CD-ROM. See descriptions below.)

3. Professional surveyor career profiles. Many students are interested in the details of professional surveyors' career paths. (Available on the Web site affiliated with the NSPS Student Recruitment Program, www.surveyingcareer.com).
4. Glossary of terms provides general descriptions of the terms that surveyors use. This may be appropriate for distribution if classroom activities are planned. (Available on the Web site affiliated with the NSPS Student Recruitment Program, www.surveyingcareer.com).

Evaluation Forms

Feedback from speakers is crucial to the success of the Student Recruitment Program as the NSPS continues to update and enhance this presentation and Speaker's Kit to meet your needs.

Student Evaluation Forms

The form is located on the CD-ROM, *EvaluationForms.pdf*.

1. Make sure you have ample copies of the evaluation forms. Distribute them to the audience members at the end of the presentation.
2. Provide the organizer of the speaking opportunity with one of the business reply envelopes included in this Speaker's Kit notebook.
3. Ask the organizer to collect the completed evaluation forms and send them to NSPS, Executive Administrator, using the enclosed business reply envelope (postage paid by NSPS).

Speaker Evaluation Forms

Complete the Speaker Evaluation Form included on your CD-ROM (*EvaluationForms.pdf*) and send it via regular mail or fax to:

Executive Administrator
National Society of Professional Surveyors
6 Montgomery Village Avenue
Suite 403
Gaithersburg, MD 20879

Phone: (240) 632-9716, ext. 113

Fax: (240) 632-1321

E-mail: info@surveyingcareer.com

Answering Audience Questions

NSPS is available to answer any audience and speaker questions by contacting the Executive Administrator at the number listed above. In addition, if questions arise regarding licensing or the surveying exams, refer to the NCEES Web site, <http://www.ncees.org/introduction/faq/>