

GIS/GPS Systems and Topographic Maps
Preparing an Architectural Survey – Drawing a Plot Plan

Technology Education Lab
TLAB

I. **Lesson: Surveys and Plot Plans**

II. **Duration: 1-Cycle/6 periods**

III. **Objectives:**

- a. To define and differentiate the following terms: plot plan, survey, contour lines.
- b. To identify and plot the necessary points of a given lot using a GPS
- c. To identify the altitude of predefined points in a given lot using a GPS.
- d. Identify tree location and species in the lot.
- e. Evaluate the tree species that would bring environmental benefits to the family unit (house).
- f. To transfer the surveyed coordinates into a CAD system.
- g. To draw a plot plan of the lot using a CAD system.
- h. To transfer CAD drawings into GSI data maps.
- i. To transfer the landscaped plot plan into the GSI data file.

IV. **NYS Standards Connection**

Engineering Design: Students will use *mathematical* analysis, *scientific* inquiry, and *engineering design*, as appropriate, to pose questions, seek answers and develop solutions.

Key Idea: Engineering design is a repetitive process involving modeling and optimization, finding the best solution within given constraints, which is used to develop technological solutions to problems within given constraints.

Key Idea: Information technology is used to retrieve, process, and communicate information and as a tool to enhance learning.

Key Idea: Technological tools, materials and other resources should be selected on the basis of safety, cost, availability, appropriateness and environmental impact; technological processes change energy, information and material resources into more useful forms.

Key Idea: Computers, as tools for design, modeling, information processing, communication, and system control, have greatly increased human productivity and knowledge.

V. Constructivistic Approach

a. Engaging Process – Identifying the Problem

Students are in the process of putting together a set of plans of a single family residential unit. They would revise the list of plans that they have to draw. The purpose of this activity is for the students to prepare and gather the necessary data to produce a plot plan of the lot, identifying the physical elements (tree species, creeks, roads, neighboring units, etc) that would affect the construction and the inhabitants of the new construction (residential unit). Also in this step the students will determine the basic needs and wants of the family and have them internalize the diversity of the interactions between the physical elements, the environment and the individual. It is also important to establish the characteristics of the lot on which this residential unit would be constructed.

b. Exploration - Setting goals and identifying the criteria

Encourages students to explain concepts in their own words, do research, and understand the process: What do I have to do? It may also help them unto understand the rubric.

“Four basic steps apply to the process of architectural survey: establishing the *purpose for the survey*, conducting research, undertaking fieldwork, and preparing a written report.

Students must answer these basic questions:

1. To establish the *purpose of the survey*, one must answer:
 - Why is the survey being undertaken?
 - What information and analysis must result?
 - How and from where will the necessary information be generated or retrieved to address this purpose?
2. *Background research* is then geared to the survey purpose. Research can relate to a broad overview of many properties (buildings, roads). *The may find information using Google Earth on the specific lot and GIS maps.*
3. *Field work* entails the physical and visual identification, documentation, and recordation of historic resources in the survey area. *Students would get ready for the field work experience, experimenting with a GPS unit before they go to the lot.*
4. Finally, the research and fieldwork are synthesized into a *written report* that presents survey findings with *illustrations* and text, and summarizes the methodology of the first three steps.”

<http://www.state.nj.us/dep/hpo/1identify/survarcht.htm>



Encourages the students to explore using multiple media.

Students will explore the use of GPS technology (Instructions depend on GPS available) to plot coordinates of different landmarks in school grounds (Worksheet #2). This exercise is to prepare them for the fieldwork.

They would define the terms to be used through the whole process: plot plan, survey, contour lines, GPS and GIS. (worksheet #2), making use of the notes taken during the introductory presentation.

c. Explanations

Student must present notes taken during the exploration process. They must take notes and illustrate the process using an engineer's journal format (Worksheet #3)

d. Elaboration – Field work experience Gathering data

Encourages the students to work without direct instruction.

Students will explore the lot and using the GPS unit they would plot the location of the physical elements affecting the lot (trees, creeks, elevations, etc)
Student will take pictures of the lot to produce renderings and illustrate their findings.

e. Evaluation – The Product

Assesses students' knowledge or skills, and allows students to assess their own learning.

The students will plot the x,y,z coordinates in their GIS maps.
Students will draw the plot plan using the gathered information on the physical elements encountered in the lot.
Students would draw their landscape designs in their CAD drawings.
Students will transfer their CAD drawings (Trees, house, driveways, landscape, etc) into the GIS files.
Students would present maps, drawings and engineer's journal as the synthesis of the TLAB experience.

VI. Materials

5 GPS units
GIS software
CAD software
Digital Camera
Worksheet 1,2,3
Clip boards



VII. Rubric

GIS/GPS Systems and Topographic Maps Preparing an Architectural Survey – Drawing a Plot Plan –Journal Production

I. Field Research - Journal

A. Step Sketches – Brainstorm and Research

Total: ___/25

1. No attempt
2. Sketches and notes are incomplete; difficult to understand/read, messy; sketches are very similar in conception.
3. Complete set of sketches some notes; show some effort.
4. Complete set of sketches; easy to understand/read, sketches show effort.
5. Complete set of sketches; presentation is neat and organized; sketches and notes are easy to understand/read; both show effort and creativity.
6. Outstanding demonstration of creativity; impressive sketching qualities and notes.

B. Understanding the Problem – The Solution to the Problem

Total: ___/15

1. No attempt
2. Completely misinterprets the problem; the solution does not match all the constraints; no control over the solution.
3. Misinterprets major parts of the problem; student has some control over the solution; solution matches some of the constraints.
4. Student understands the problem; student has some difficulty implementing the solution; the solution matches most of the constraints.
5. Student understands the problem; the solution matches the constraints; and a student controls the solution without difficulty.
6. The student completely understands the problem; develops an outstanding solution to the problem; the solution is creative, imaginative and contains extra features that show high level skills in problem solving and decision making.

II. Implementing the solution

A. Drawings- Design - GSI Solution – Data Collection

Total: ___/35

1. No attempt
2. Incomplete set of drawings; no effort to explain the solution to the problem; totally inappropriate set plans; plans are confusing and without detail.
3. Complete project with some or no effort to explain the solution; some or minor technical drawing omissions; general organizational procedures are taking place; drawings are clear and with some or no detail.
4. Complete project; very detailed and complete set of drawings; substantially correct procedure with minor or no omissions or procedural errors.
5. Complete project and outstanding job.
 - a. Project is complete
 - b. All drawings are clear and easy to understand
 - c. The drawings *clearly describe* the agreement established between the client and the designer (personal statements and teacher requirements)
 - d. The drawings *clearly* illustrate *the* location of the different physical elements, *spatial relationships*, sizes, and circulation patterns.
 - e. Precise geometrical solutions
 - f. Drawings are precisely formatted
 - g. Outstanding detail

B. Plot Plan

- **General Layout** **Total: ___/15**
1. No attempt
 2. Incomplete, poor technique, messy
 3. Complete but improper technique and little attention to detail
 4. Complete, proper technique, average skill, some minor mistakes
 5. Complete, proper technique shows much skill and attention to detail
 - Minor or no mistakes
 - The drawing is neat, organize, precise.
 - The drawing ***clearly conveys*** the information. It is easy to understand.
 - *Views*, layers and dimensions are complete
 - All lines have the correct linetype, lineweight and are in the correct layers
 - Correct dimensioning practice. (Follow information in packet)
- **Dimensions** **Total: ___/5**
1. No attempt
 2. Incomplete dimensions, poor technique, messy
 3. Complete but improper technique and little attention to detail
 4. Complete, proper technique, some minor mistakes
 5. Complete, proper technique shows much skill and attention to detail
- **Layers, Lineweight, CAD Detail** **Total: ___/5**
1. No attempt
 2. Incomplete, poor technique, messy
 3. Complete but improper technique and little attention to detail
 4. Complete, proper technique, some minor mistakes
 5. Complete, proper technique shows much skill and attention to detail

Final Grade: _____

Brighton Central School District
Technology Education
Architectural Survey Journal
GIS/GPS

Journal Requirements

1. Introduction

2. Daily entries

- Characteristics of the daily entries:
 - Factual information based on the material received during class and the research on plot plans and architectural surveys.
 - Write each journal entry from an engineer's perspective, with factual information.
 - Each entry must be connected to the Problem Solving Process
 - Identification of the technological problem
 - Information found and skills developed to solve and implement the solution (GIS, GPS, CAD software)
 - Vocabulary words
 - The gathered information in a GIS format
 - All physical and special data collected
 - Written description (attributes of the spatial data)
 - The drawing
 - Techniques and tools used and applied to build the model
 - Results
 - Each step goes side-by-side following the problem solving process. Consult the informational packets and use the new vocabulary words to express the ideas, and concepts with engineering terms.

3. Conclusion

4. Annexes

- Pictures of the lot
- Drawing – Plot plan (landscaped and roof plan included)
- GIS map
- Data collection