# Subjects: Geometry (English, Landscaping)

# Hospital Garden/Park Design Project

Subject Area: Geometry
Grade Levels: 9-12 Revised: November 2011

## Lesson Overview

The following lesson plan was originally created by another (unknown) teacher in August 2009 and has been revised and enhanced to incorporate different facets and components learned by this teacher during her externship in 2011.

The following lesson plans were designed to incorporate real world construction ideas gained from a home remodeling company. Students will learn scale drawings, and will apply geometric concepts as area, perimeter, and volume to design a hospital garden. Students will also create a list of costs (sod, mulch, top soil, concrete, fountains, plants) to complete this hospital garden

### Materials Included in this Lesson

- Technical Specifications
- Materials Cost (Basic)
- Cost Sheet
- Rubric
- Calculations Page
- Playground Samples
- Sixteenth of Inch Conversions
- 3 copies of Ground Space "Area"

### Student Deliverables

- Landscape Design/Plan
- Spreadsheet/Bid for Landscape Design

### Skills the Student will Learn

- Students will review/reengage in geometric concepts: area, perimeter, volume.
- Students will learn/relearn scale factor and ratios.
- Students will review/relearn measuring techniques and practices.

## Supplies

- Ruler
- String
- Calculator
- Colored Pencils
- Paper/Pencil

## Length of Lesson: 5 Days

### Activity Day Zero

Teacher will guide students through a "practice" lesson on measuring, dividing, calculating area.
Students will learn/re-learn how to use a ruler, how to convert sixteenth of an inch to decimals.

### Activity Day One

Demonstrate various ways of measuring – rulers, string…
Review/Reengage concepts of scaling, area perimeter, and volume (in general sense).
Find area of irregular, "odd" shapes by cutting into rectangular, triangular, trapezoidal shapes.
Show student copies of garden designs and landscape plans. Discuss positive and negative aspects of various designs.
Students receive 3 copies of Garden/Park space. Students start dividing it up and measuring the area (to the nearest sixteenth of inch).
Students convert square inches to square ft.

### Activity Day Two

Students finish total area calculations. Class discussion on "reasonable" totals.
Review specification sheet with students (fountain, benches, walkways, playgrounds, etc). Distribute and review materials cost, calculation sheet, total cost sheet.) Students visualize garden and do rough sketches. As students sketch, teacher to circulate and evaluate accuracy of perimeters and areas.

### Activity Day Three

Students to calculate approximate area of grass/sod and approximate area of plants, flowers, concrete, playground area. Students start design project and maintain an on-going spreadsheet of plant, grass/sod, fountain, and bench costs.

## Activity Day Four

Students work on final design and spreadsheet.

## Activity Day Five

Students finish final design and spreadsheet. Present in groups.

# Enrichment Suggestions

This lesson only touches the surface of what it would take to actually landscape a garden. We are focusing on area and volume principals – not actual landscaping. If time were not an issue, students could design sprinkler systems, plumbing systems and water lines to feed the fountain and electrical systems to light the pathways. They might also create their own specific plant and material list instead of using the teacher-provided list. Students might research the "drought resistant" plants and their benefits to the environment. They could also calculate labor costs and research the cost of prevailing wage job vs. non-prevailing wage jobs. This project might also be expanded to a computer design class where students are learning to use AutoCAD and other designing programs.

# Foundation Academic Standards

**Reading 2.1** – Analyze the structure and format of workplace documents.

**Reading 2.6** – Follow technical directions.

**Writing 2.6a** – Report information and convey ideas effectively.

**Speaking Applications 2.2** – Deliver expository presentations.

**Geometry 8.0** – Students know, derive, and solve problems relating to area, perimeter, circumference, and volume of common geometric figures.

**Geometry 10.0** – Students compute areas of rectangles, triangles, parallelograms, and trapezoids.

**Geometry 11.0** – Students determine how changes in dimensions affect perimeter, area, and volume.

**Geometry (general)** – Students use ruler and compass.

# CTE Pathway Standards

## F. Ornamental Horticulture Pathway

The Ornamental Horticulture Pathway prepares students for careers in the nursery, landscaping, and floral industries. Topics include plant identification, plant physiology, soil science, plant reproduction, nursery production, and floriculture as well as landscaping design, installation, and maintenance.

*F1.0 Students understand plant classification and use principles:*

F1.4 Understand how to classify and identify plants by using botanical growth habits, landscape uses, and cultural requirements.

F1.5 Understand plant selection and identification for local landscape applications.

*F10.0 Students understand basic landscape planning, design, construction, and maintenance:*

F10.1 Know the terms associated with landscape and design and their appropriate use.

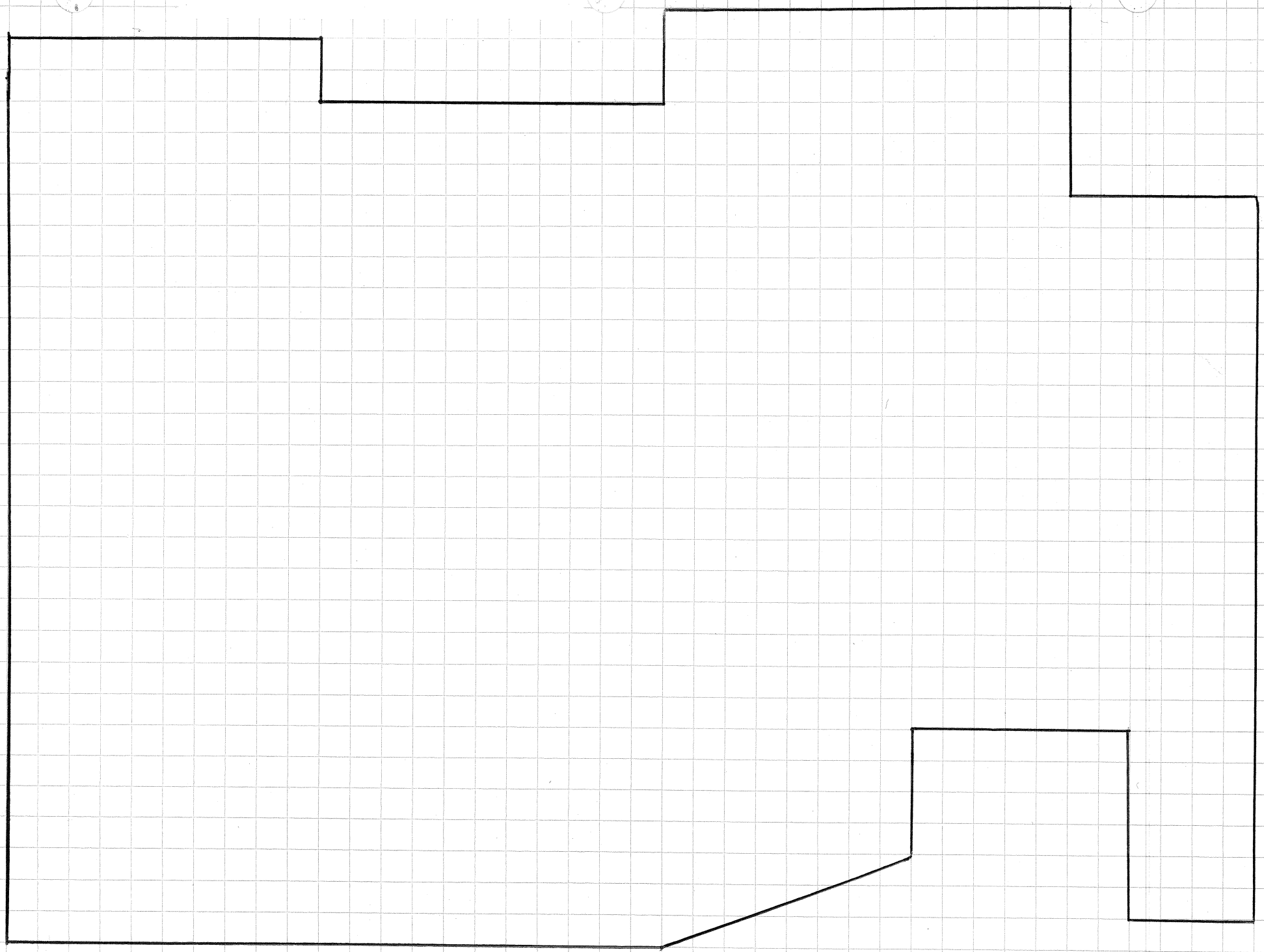
F10.2 Understand the principles of residential design, including how to render design to scale.

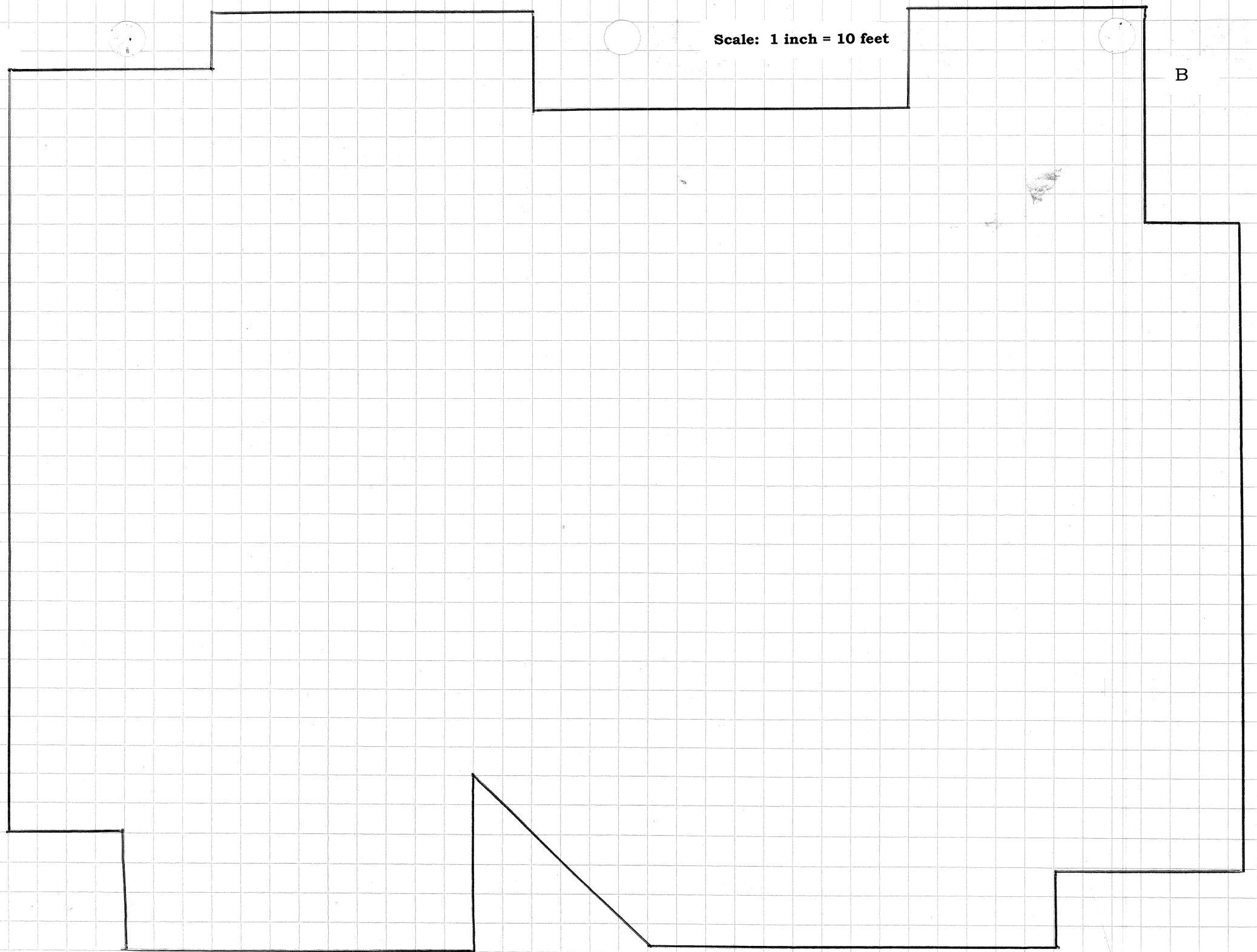
# Lesson Plan Relevance To Externship

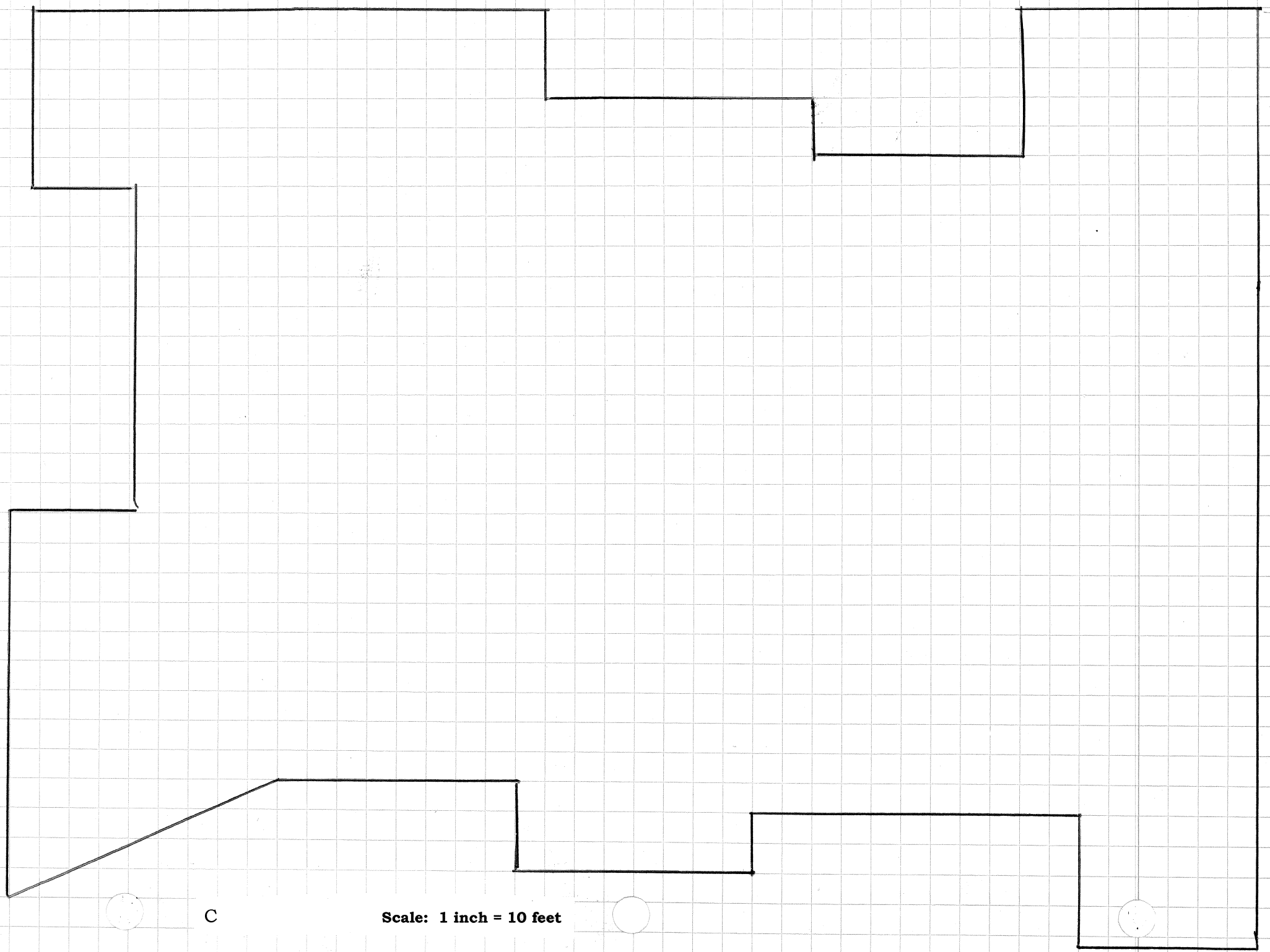
My extern company remodeled homes. Landscaping the front yard and pricing out the cost of the plants, sod, etc is part of the remodel process.

A

**Scale: 1 inch = 10 feet**

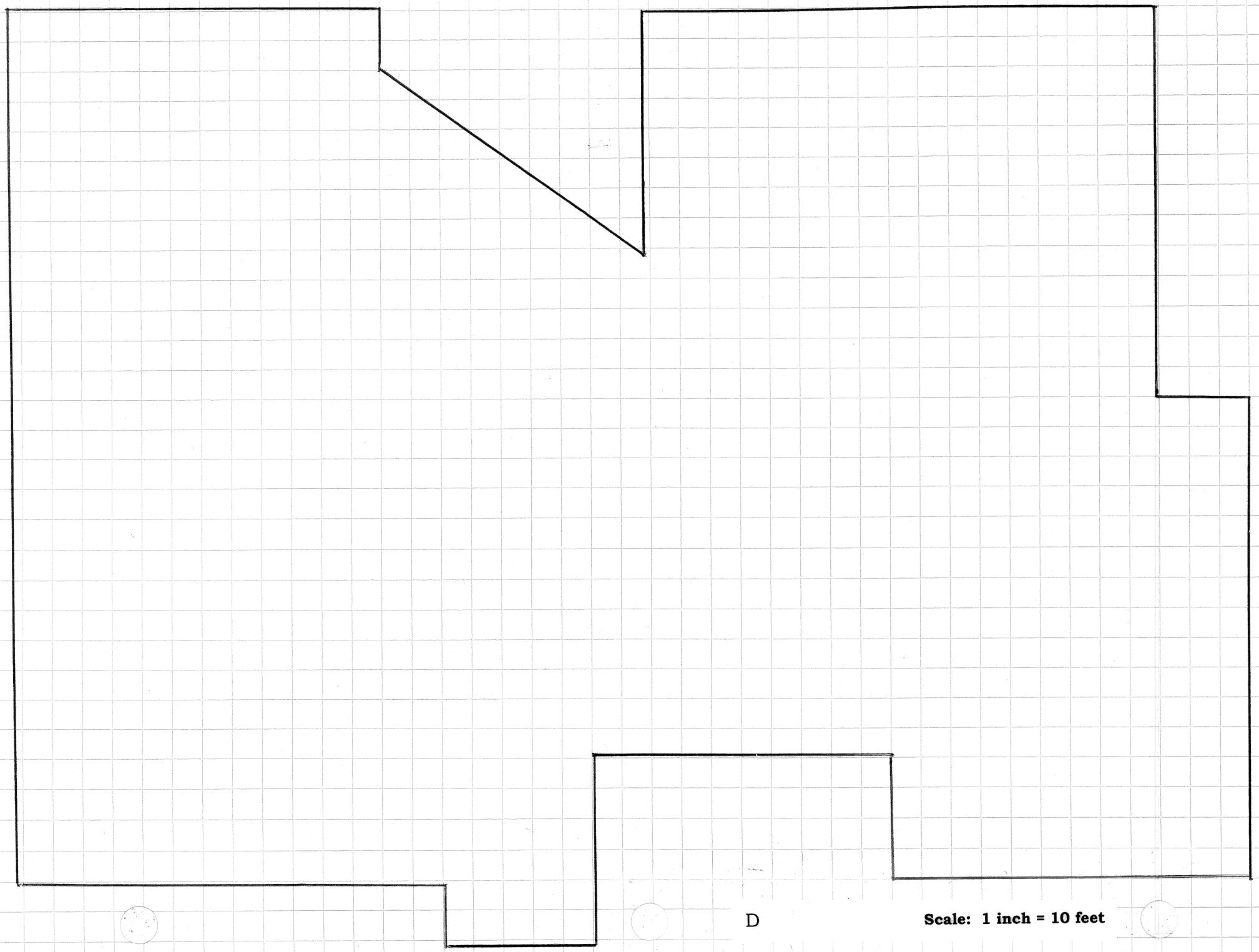



Scale: 1 inch = 10 feet
B



C

**Scale: 1 inch = 10 feet**

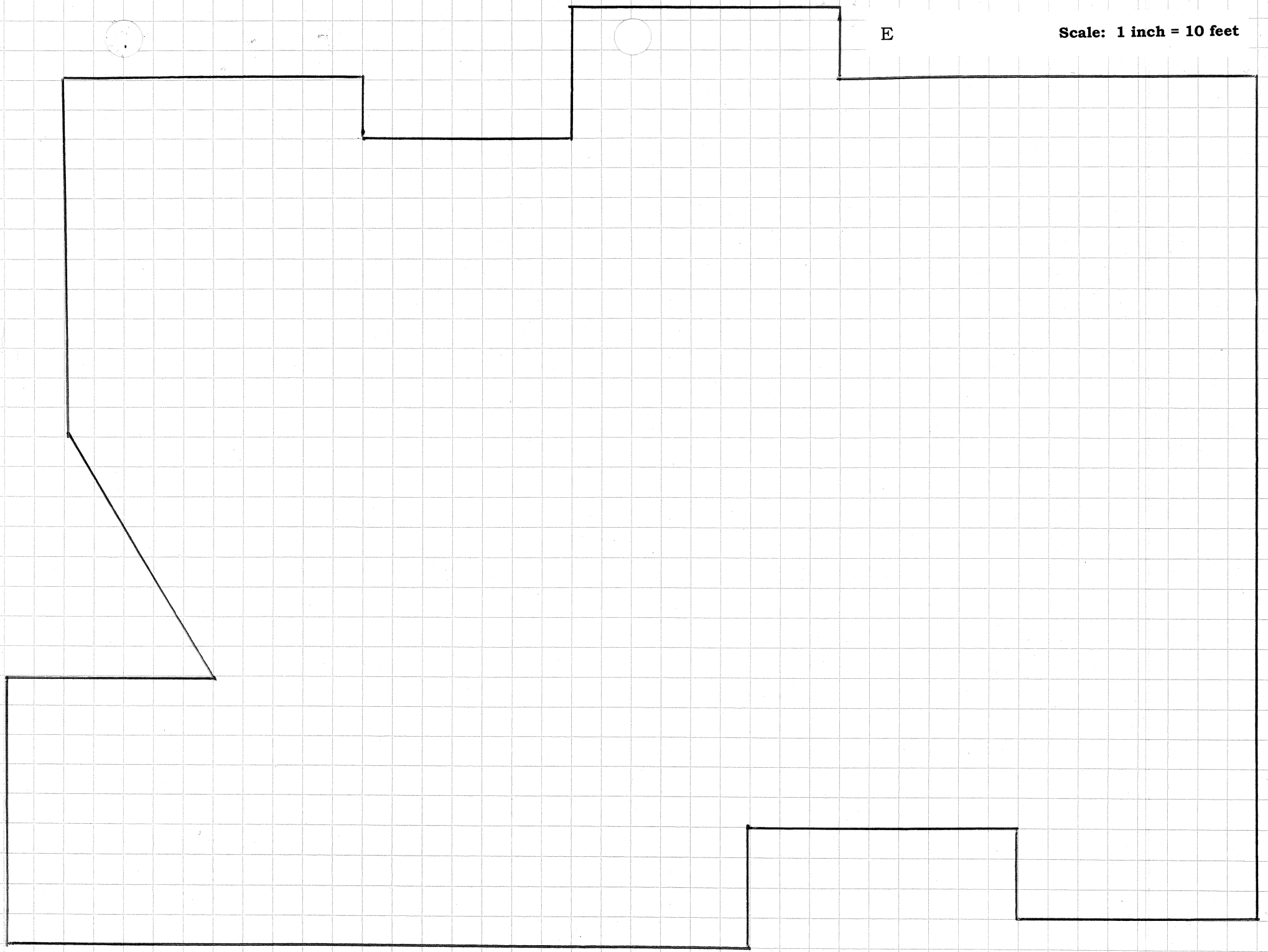


D

**Scale: 1 inch = 10 feet**

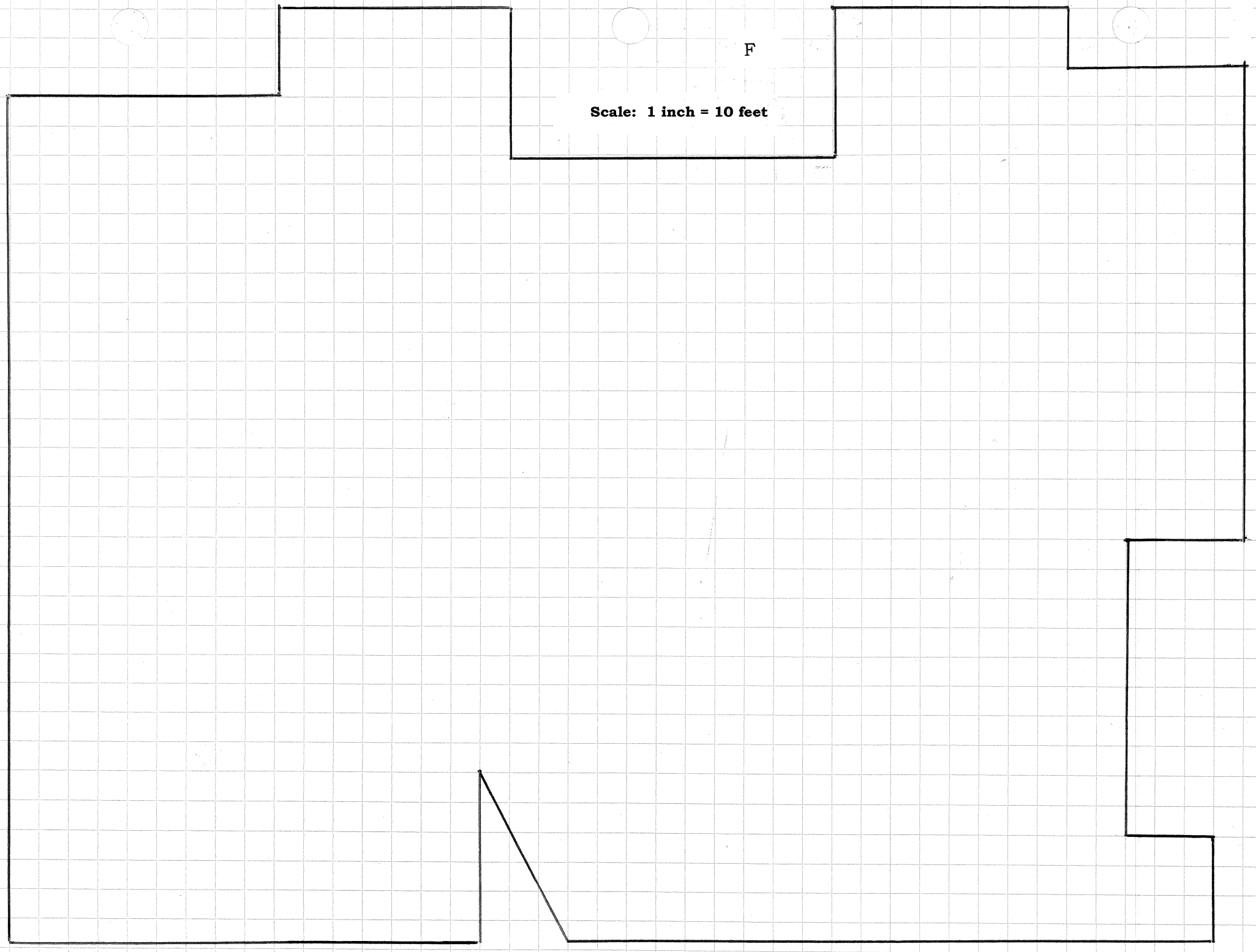
E

**Scale: 1 inch = 10 feet**



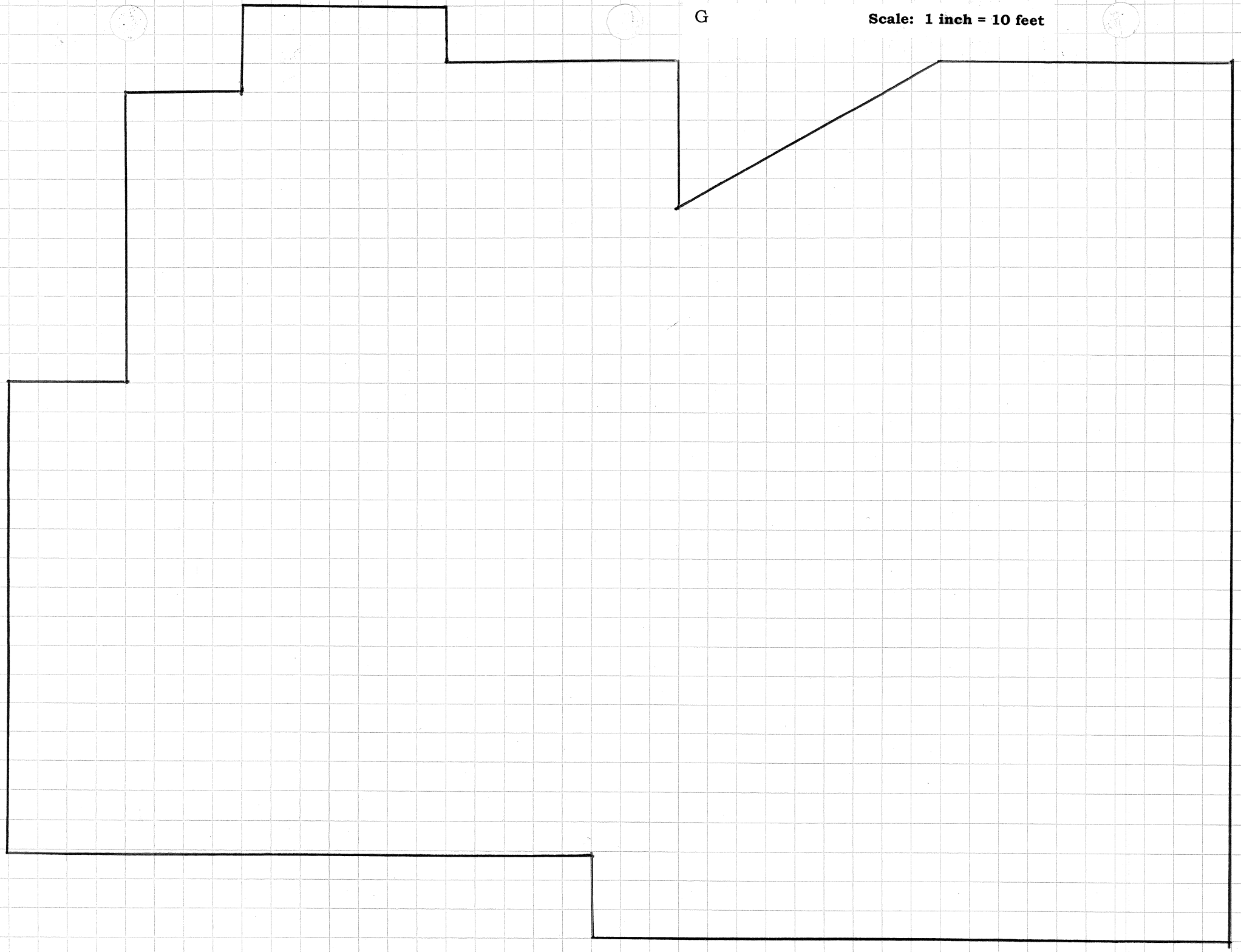
F

**Scale: 1 inch = 10 feet**



G

**Scale: 1 inch = 10 feet**



# Landscape Plan and "Bid"

| Student Deliverables | 4<br>Exceeds Expectations | 3<br>Meets Expectations | 2<br>Approaches Expectations | 1<br>Fails to meet Expectations |
|---|---|---|---|---|
| Landscape Design/Plan | Plan is to scale. Plan demonstrates exceptional planning and execution and has all the required details. Plan is neat. Plan is color coordinated, complex, and easy to read/use. Student showed exceptional creativity in providing a functional, aesthetically pleasing design. | Plan is to scale. Plan has correctly implemented student's ideas and the bid. Plan has all the required details. Plan is color coordinated for ease of use. Plan should be fairly complex and incorporate both aesthetic value and function. Student has a creative, functional design, drawn to scale. | Plan is mostly to scale. Plan has mostly implemented student's designs and bids with some errors. Students attempted to include all the required details. Plan may be very simple. Student has attempted a creative design that is somewhat functional. Design is mostly to scale with a few mistakes. | Plan is not to scale. Student did not seem to attempt to implement their design in their final plan. Student did not seem to attempt to create a functional design. Design is mostly not to scale. |
| Spreadsheet/Bid for Landscape Design | Bid has very effective, organized layout and clearly demonstrate material cost. Bid correctly calculates costs. Student may have an equation used to represent some information. | Bid has effective layout that clearly demonstrates material costs. Bid correctly calculates costs. Students understands their bid well enough to discuss how they would cut costs, add aesthetics, etc. | Bid has fairly effective layout. Bid is mostly correct in terms of calculating costs. Bid incorporates almost all items on the final scale drawing. | Bid is not in an effective format. Bid has many errors in calculations. Bid does not represent items in the scale drawing. |

## Calculations Page

**Total "Area"**

**1 inch = 10 feet**
**1 inch² = 100 feet²**

**Total Playground "Area"**

**1 inch = 10 feet**

**Concrete "Area"**

**Sidewalk:**

**Concrete Pads:**

**Concrete "Volume"**
**(recommended depth: 4 inches = 0.33 feet)**

**Shrubs "Area"**

**Flowers "Area"**

**Soil/Dirt "Area"**

**Grass/Sod "Area"**

**Miscellaneous Calculations**

# Cost Sheet

| **Item** | **Measure** | **Quantity** | **“Unit” Price** | **Extension (Total)** |
|---|---|---|---|---|
| Playground Structure | Each | | | |
| Concrete | Cubic Foot | | | |
| Grass (Sod) | Square Foot | | | |
| Flowering Plants | Square Foot | | | |
| Shrubs | Square Foot | | | |
| Benches | Each | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# Materials Cost

| Item | Cost | Size of Item |
|---|---|---|
| Basketball Hoop | $ 150 | 4 ft. x 4 ft. |
| Benches – no back | $ 150 | 2 ft. x 6 ft. |
| Benches – with back | $ 300 | 2 ft. x 6 ft. |
| Concrete Patio or Walkway | $ 2 per cubic foot | |
| Flowering Plants | $ 3 per square foot | |
| Fountain | $ 200 per ft. radius | 2 ft. – 10 ft. radius |
| Grass (Sod) | $ 0.50 per square foot | |
| Park Lighting | $ 250 each | 2 ft. diameter |
| Patio Covers (canvas) | $ 300 each | 10 ft. x 10 ft. |
| Patio Covers (wood) | $ 700 each | 10 ft. x 20 ft. |
| Picnic Table | $ 350 each | 5 ft. x 8 ft. |
| Playground Structure | $ 15,000 + | see handout |
| Shrubs (bushes) | $ 10 per square foot | |
| Tree | $ 60 each | 5 ft. – 15 ft. radius |

## 704-S023

**Product model :** 704-S023
**Price:** $21,246.00
**Age Range :** 2 to 5

**CAD file: 704-S023.dwg**
**PDF file: 704-S023.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 48' x 37' (14.6 m x 11.2 m)

## 714-S099

**Product model :** 714-S099
**Price:** $26,516.00
**Age Range :** 5 to 12

**CAD file: 714-S099.dwg**
**PDF file: 714-S099.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 51' X 38' (15.5m x 11.6m)
Ground Space: 36' X 25' (11.0m x 7.6m)

## 714-S170

**Product model :** 714-S170
**Price:** $33,324.00
**Age Range :** 5 to 12

**CAD file: 714-S170.dwg**
**PDF file: 714-S170.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 47' x 41' (14.3 m x 12.5 m)

## 714-S208

**Product model :** 714-S208
**Price:** $51,772.00
**Age Range :** 5 to 12

**CAD file: 714-S208.dwg**
**PDF file: 714-S208.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 45' x 42' (13.7m x 12.8m)
Ground Space: 33' x 30' (10.1m x 9.1m)

## 714-S228

**Product model :** 714-S228
**Price:** $47,013.00
**Age Range :** 5 to 12

**CAD file: 714-S228.dwg**
**PDF file: 714-S228.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 45' x 44' (13.7m x 13.4m)

## 714-S275

**Product model :** 714-S275
**Price:** $68,099.00
**Age Range :** 5 to 12

**CAD file: 714-S275.dwg**
**PDF file: 714-S275.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 41' x 48' (12.5 m x 14.6 m)
Ground Space: 27' x 35' (8.2 m x 10.7 m)

## 714-S215

**Product model :** 714-S215
**Price:** $33,066.00
**Age Range :** 2 to 12

**CAD file: 714-S215.dwg**
**PDF file: 714-S215.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 38' x 48' (11.6m x 14.6m)

## 714-S098

**Product model :** 714-S098
**Price:** $28,210.00
**Age Range :** 5 to 12

**CAD file: 714-S098.dwg**
**PDF file: 714-S098.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 37' X 41' (11.3m x 12.5m)
Ground Space: 24' X 28' (7.3m x 8.5m)

## 714-S158

**Product model :** 714-S158
**Price:** $22,409.00
**Age Range :** 5 to 12

**CAD file: 714-S158.dwg**
**PDF file: 714-S158.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 41' x 40' (12.5 m x 12.2 m)

## 714-S268

**Product model :** 714-S268
**Price:** $42,165.00
**Age Range :** 5 to 12

**CAD file: 714-S268.dwg**
**PDF file: 714-S268.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 40' x 41' (12.2 m x 12.5 m)
Ground Space: 26' x 30' (7.9 m x 9.1 m)

## 714-S271

**Product model :** 714-S271
**Price:** $26,059.00
**Age Range :** 2 to 12

**CAD file: 714-S271.dwg**
**PDF file: 714-S271.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 43' x 38' (13.1 m x 11.6 m)
Ground Space: 31' x 26' (9.4 m x 7.9 m)

## 718-S057

**Product model :** 718-S057
**Price:** $30,567.00
**Age Range :** 2 to 12

**CAD file: 718-S057.dwg**
**PDF file: 718-S057.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 44' X 35' (13.4m x 10.7m)

## 704-S035

**Product model :** 704-S035
**Price:** $28,302.00
**Age Range :** 2 to 12

**CAD file: 704-S035.dwg**
**PDF file: 704-S035.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 42' X 32' (12.8m x 9.8m)
Ground Space: 30' X 20' (9.1m x 6.1m)

## 714-S240

**Product model :** 714-S240
**Price:** $33,183.00
**Age Range :** 5 to 12

**CAD file: 714-S240.dwg**
**PDF file: 714-S240.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 40' x 37' (12.1 m x 11.3 m)
Ground Space: 28' x 24' (8.5 m x 7.3 m)

## 718-S052

**Product model :** 718-S052
**Price:** $22,488.00
**Age Range :** 2 to 5

**CAD file: 718-S052.dwg**
**PDF file: 718-S052.pdf**

CPSC Compliant: Yes
ASTM Compliant: Yes

Protective Area: 40' x 37' (12.2m x 11.3m)

Fractions: “Sixteenths”

$\frac{1}{16}$ = $\frac{2}{16}$ = $\frac{3}{16}$ =

$\frac{4}{16}$ = $\frac{5}{16}$ = $\frac{6}{16}$ =

$\frac{7}{16}$ = $\frac{8}{16}$ = $\frac{9}{16}$ =

$\frac{10}{16}$ = $\frac{11}{16}$ = $\frac{12}{16}$ =

$\frac{13}{16}$ = $\frac{14}{16}$ = $\frac{15}{16}$ =

Fractions: “Sixteenths”

$\frac{1}{16}$ = $\frac{2}{16}$ = $\frac{3}{16}$ =

$\frac{4}{16}$ = $\frac{5}{16}$ = $\frac{6}{16}$ =

$\frac{7}{16}$ = $\frac{8}{16}$ = $\frac{9}{16}$ =

$\frac{10}{16}$ = $\frac{11}{16}$ = $\frac{12}{16}$ =

$\frac{13}{16}$ = $\frac{14}{16}$ = $\frac{15}{16}$ =

Fractions: "Sixteenths"

| | | |
|---|---|---|
| $\frac{1}{16} = 0.0625$ | $\frac{2}{16} = 0.125$ | $\frac{3}{16} = 0.1875$ |
| $\frac{4}{16} = 0.25$ | $\frac{5}{16} = 0.3125$ | $\frac{6}{16} = 0.375$ |
| $\frac{7}{16} = 0.4375$ | $\frac{8}{16} = 0.5$ | $\frac{9}{16} = 0.5625$ |
| $\frac{10}{16} = 0.625$ | $\frac{11}{16} = 0.6875$ | $\frac{12}{16} = 0.75$ |
| $\frac{13}{16} = 0.8125$ | $\frac{14}{16} = 0.875$ | $\frac{15}{16} = 0.9375$ |

Fractions: "Sixteenths"

| | | |
|---|---|---|
| $\frac{1}{16} = 0.0625$ | $\frac{2}{16} = 0.125$ | $\frac{3}{16} = 0.1875$ |
| $\frac{4}{16} = 0.25$ | $\frac{5}{16} = 0.3125$ | $\frac{6}{16} = 0.375$ |
| $\frac{7}{16} = 0.4375$ | $\frac{8}{16} = 0.5$ | $\frac{9}{16} = 0.5625$ |
| $\frac{10}{16} = 0.625$ | $\frac{11}{16} = 0.6875$ | $\frac{12}{16} = 0.75$ |
| $\frac{13}{16} = 0.8125$ | $\frac{14}{16} = 0.875$ | $\frac{15}{16} = 0.937$ |

# Hospital Garden/Park Project

# Technical Specifications

**Your Hospital Garden/Park project is due Friday, November 18.**
**Your project must be turned in (in the folder) with…**

1. 3 copies of the landscape plan
   - Plan 1 – divided into measurable sections
     Area calculated by square inch.
   - Plan 2 – rough copy of plan sketched in (see specifications below).
   - Plan 3 – final copy of plan – colored, labeled, easy to read.

   Plans must include
   - Playground equipment (surrounded by sidewalk)
   - Sidewalk runs from edge of landscape area into park area (AT LEAST)
     Sidewalk MUST be 5 feet wide.
     Concrete MUST be 4 inches deep.
   - Benches
   - Grass
   - Flowers and/or shrubs

2. Copy of Playground equipment

3. Calculations sheet

4. Summary of Costs (itemized by item)

5. Copy of the Grade Sheet