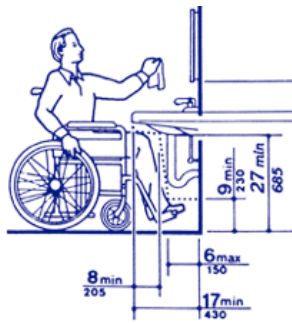# VOCABULARY

Salvaged materials – re-used building materials. It's a way to recycle perfectly good building materials, cutting down on waste from demolition and reducing the need for new materials.

Chronicle / Jerry Teller

Elevation – architectural drawing showing the outside of a building from one side.

Scale drawing – a way to represent an object that is large (like a building) in a size that is manageable. When you measure the drawings in this packet, note that 1/8 inch of drawing is equal to 1 foot of real life building.

1/8 inch = 1 foot	¼ inch = ___ feet
½ inch = ___ feet	1 inch = ___ feet
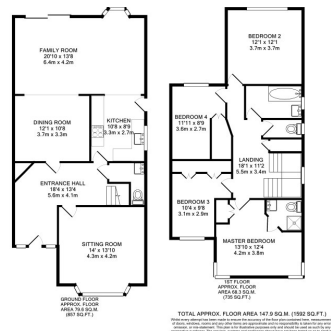
Floor plan – an architectural drawing of what it would look like if you sliced the building horizontally and could look at it from above. A floor plan shows the layout of rooms in a building.

Section – an architectural drawing of what it would look like if you sliced the building vertically and could look at it from the side.

PRE-1980s TOILET 5.0+ gallons per flush

HIGH-EFFICIENCY TOILET TODAY 1.28 gallons per flush

Low-flow – a description given to plumbing fixtures (faucets, toilets, etc.) that have a lower gallons-per-minute flow rate than standard fixtures. These fixtures significantly help to reduce water use in a building.

ADA compliance – making sure your building follows all rules of the Americans with Disabilities Act of 1990. The point of the act is to make sure that buildings are accessible to all people, which is why the River Center has ramps and an elevator.
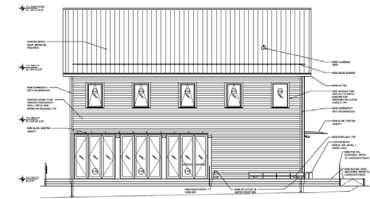
Energy efficiency – reducing the amount of energy used in a building. With efficient light bulbs and appliances you can still use your lights or hair dryer as much as you normally do, but you will use less energy.

kWh – unit of energy equal to 1000 watt hours or 1 kW of power used for 1 hour of time. Confused? All you really need to know is it is the standard unit power companies use to bill their customers. You have to burn about .8 lbs of coal to make 1 kWh of electricity.

Daylighting – practice of placing windows and reflective surfaces so that buildings are effectively lit by sunlight during the day.
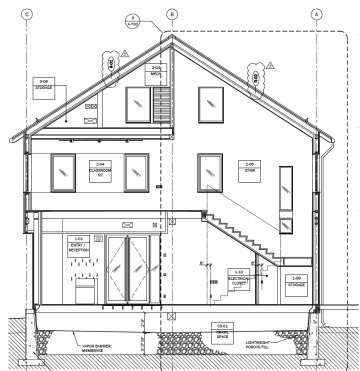
Formulas

Area of a square or rectangle = length x width

Area of a right triangle = ½ base x height

Calculating the area of an irregular polygon – break the polygon up into shapes that you can calculate the areas of. Add the areas together.

SCENIC HUDSON
land ■ parks ■ advocacy

REDESIGNING THE RIVER CENTER:

Where Math, Art and the Environment Meet

This design manual belongs to: _____

Scenic Hudson's River Center was once an old storage barn and underwent a spectacular renovation to become the building it is today. Though unmaintained for several years, some of the building's materials were still in good shape at the time of renovation. The architect **salvaged materials** from the original barn and created a design that kept the original character of the building. These activities will give you a sense of what the architect had to think about while re-designing the River Center. Check the back cover for helpful hints!

EXTERIOR

Use the **elevation drawings** to answer the following problems. These are the actual drawings created by the architect and used to renovate the River Center. You will need a ruler, pencil and calculator. Round your answers to the nearest tenth.

**Scale**: 1/8 inch = 1 foot
1 inch = 8 feet
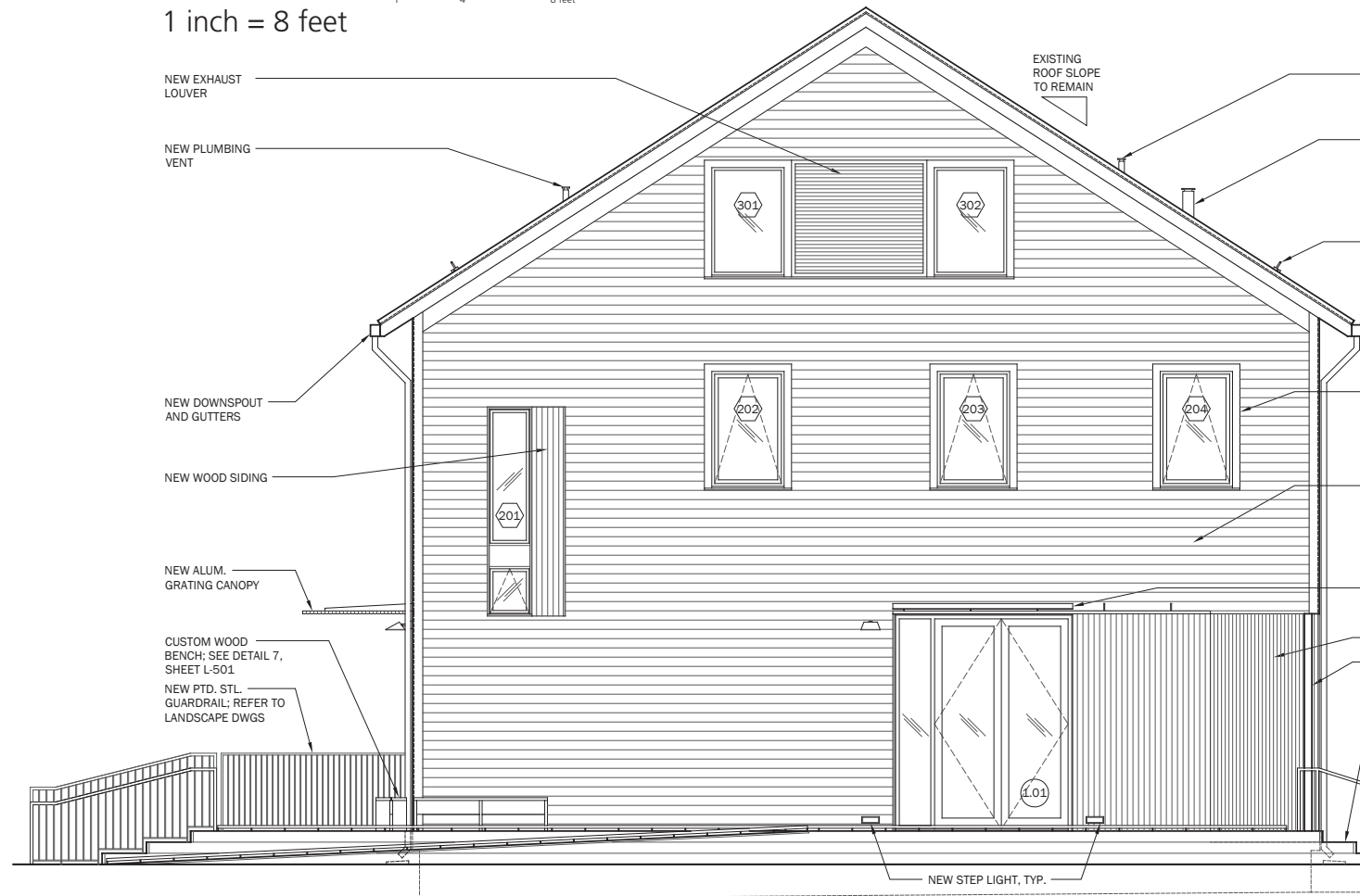
South Elevation

1. The exterior siding on the south wall of the River Center needs to be painted. Exterior siding is represented by the wide-spaced horizontal lines. If 1 gallon of paint can cover 350 ft² of siding, how many gallons of paint are needed to put two coats of red paint on the siding? (Hint: non sided areas are 587.5 ft²)

2. If 65% of the River Center's old roof is salvageable and not leaking, how many square feet of new metal roofing do we need to fix the leaks?
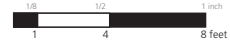
1. Be creative with shapes! The banner cannot be a single rectangle.

2. The banner cannot prevent access to the education closet.

3. The banner must be more than 500 ft² total.

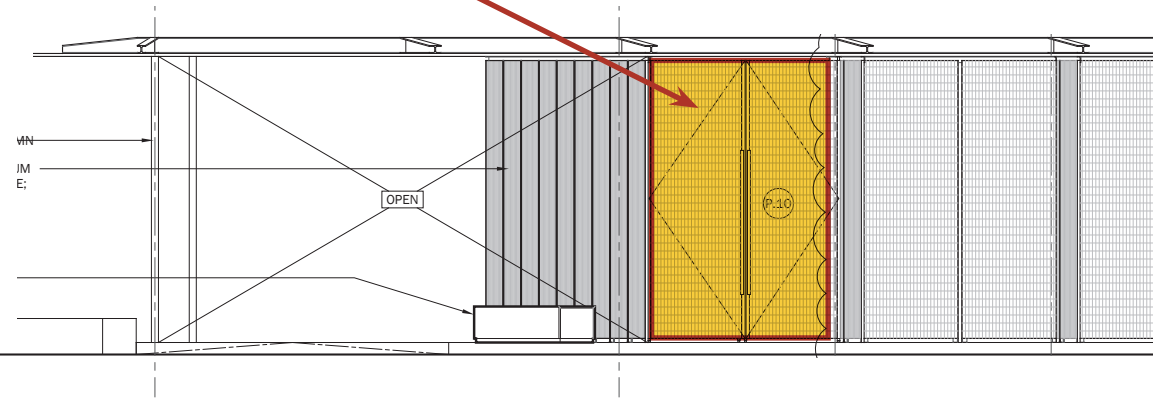4. The banner must use more than two colors.
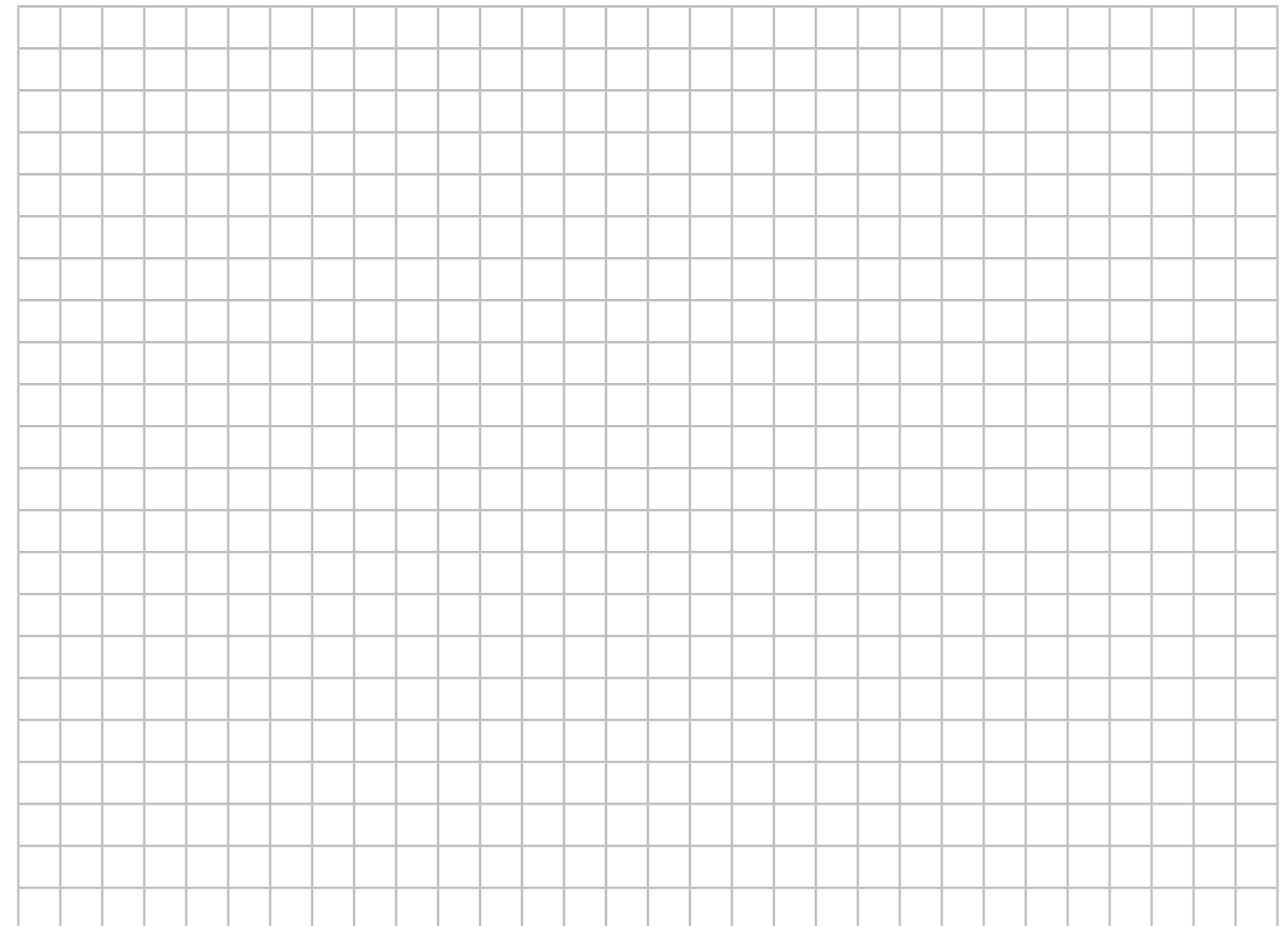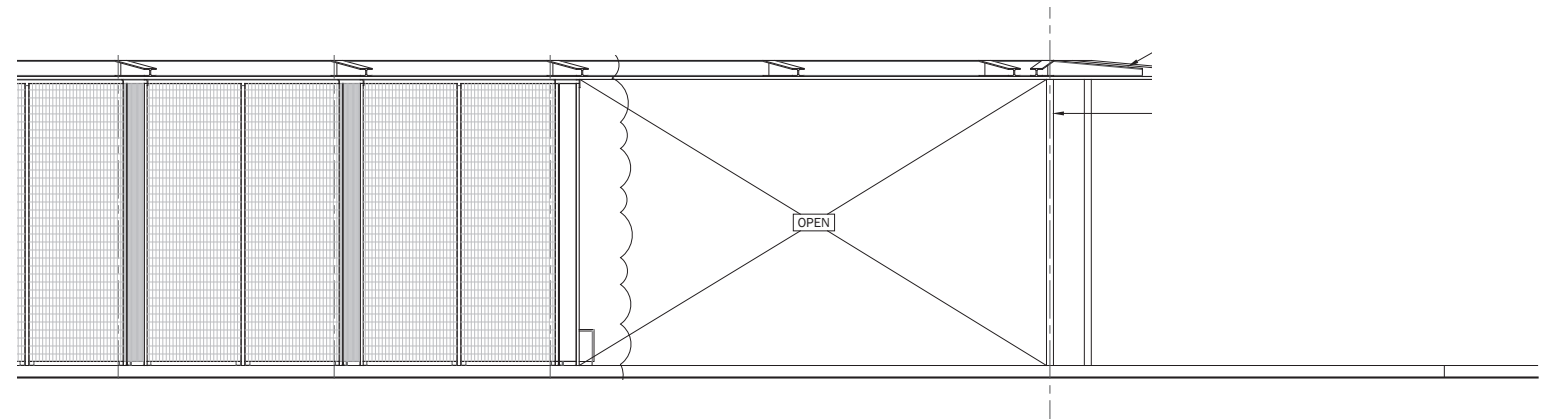
DESIGN A BANNER

Scenic Hudson is celebrating our 50th anniversary. We want you to come up with an idea for a 50th anniversary banner that could be hung on the east side of the Kayak Pavilion. You have 1000 ft² of banner material and can put anything on it that you want. Use the following criteria to design your banner.
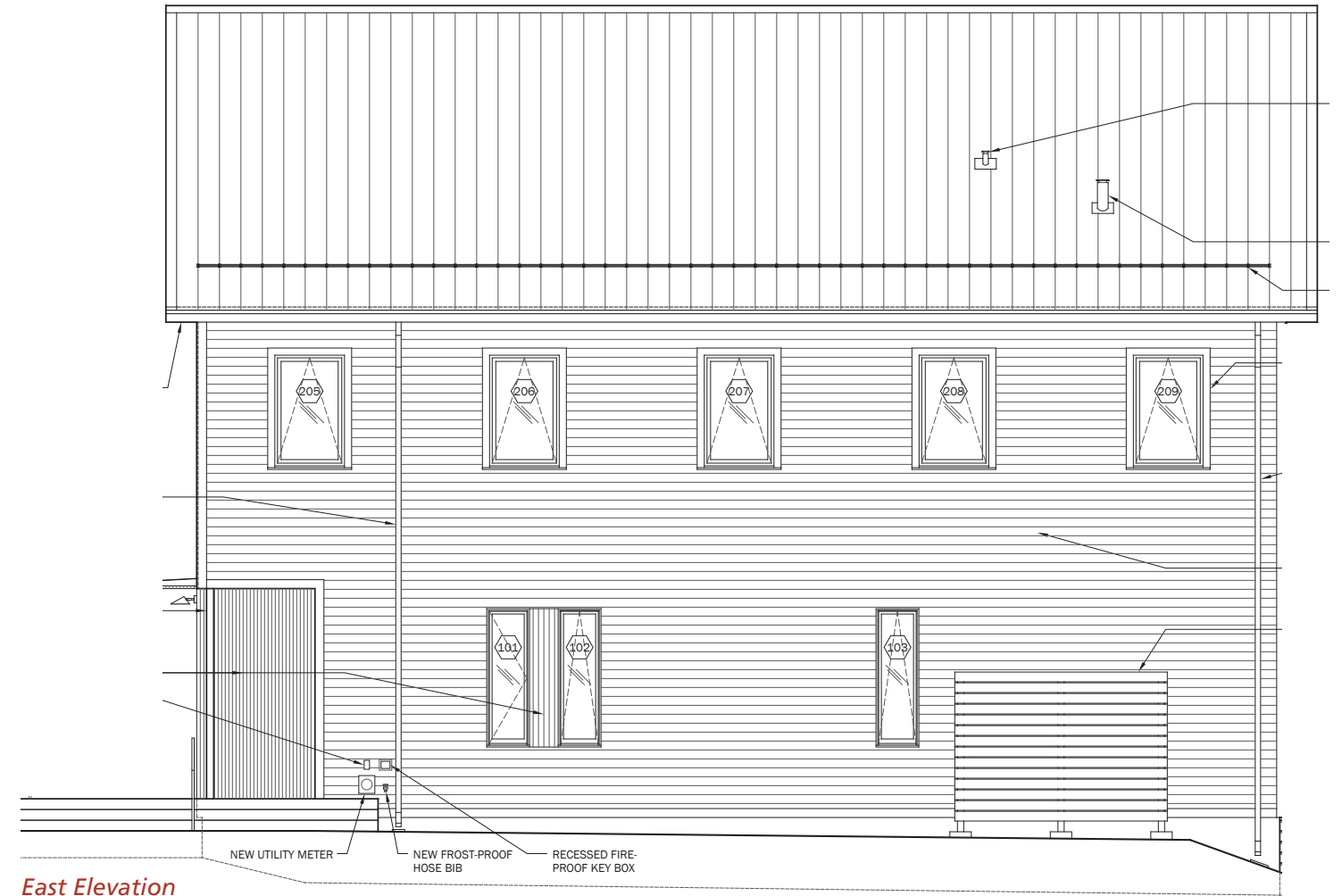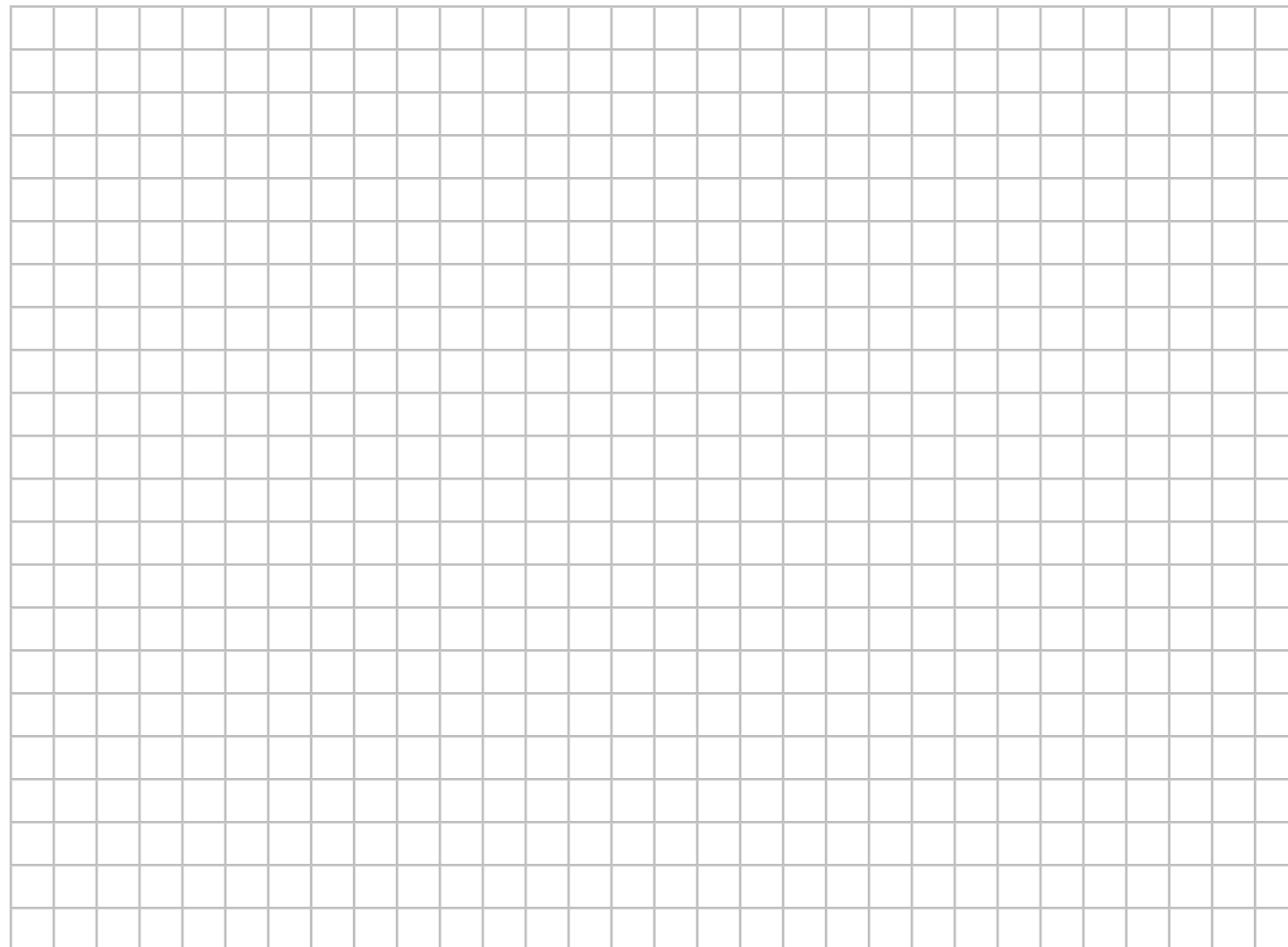
Scale: 1/8 inch = 1 foot (hint – squares on the grid have ¼" sides)
          1 inch = 8 feet

education closet

East Elevation

East Elevation

NEW UTILITY METER   NEW FROST-PROOF   RECESSED FIRE-
                           HOSE BIB   PROOF KEY BOX

3. Rainwater harvesting is a term for collecting and using the rainwater that falls on a building's roof. Given the following, how many gallons a year could be collected from the River Center's roof?

    a. Total roof square footage x 0.62 gallons = gallons of rain caught by roof/ inches of rain a year

    b. Beacon gets an average of 45.79 inches of rain a year.

4. Rainwater is not good to drink, but it is good for flushing toilets. The River Center has 3 **low-flow** toilets that are each flushed about 3000 times per year. Each flush uses 1.6 gallons of water.

    a. How much water are the toilets using each year?

    b. Would the amount of harvested rainwater be enough to flush that many times?

    c. What can we do with the extra water?

INTERIOR

We need your help to draw the **floor plan** for the first floor of the River Center. We've got some basic requirements for the layout, but we want you to arrange the space. Read each of the following criteria carefully and begin your design! Use a ruler to make straight lines and a pencil so you can erase. Label each room.

Scale: 1/8 inch = 1 foot (hint – squares on the grid have ¼" sides)
   1 inch = 8 feet

1. Use the **elevation drawings** to find the length and width of the building. On the grid, draw the outer walls of the building as if you were looking straight down on them from above. Remember to show where the windows and doors are! Check the back page for an example of a floor plan.

2. The River Center is shaped like a rectangle except the southeast corner has been cut off. The area of the missing right triangle is 13.75 ft². The base of the triangle is 5 ft.

3. There are four posts running that divide the building in half lengthwise. Each post is about 10 feet from the north and south walls and from each other post

4. The River Center needs a staircase. The staircase needs dimensions of at least 19 x 7 ft.

5. The River Center is a place for people to gather. We need at least 500 ft² of open assembly space.

6. People always need restrooms! The men's and women's restrooms take up a total of 250 ft² combined and cannot be square or rectangular.

7. **ADA compliance** requires an elevator. The elevator is a rectangle with a width of 5 feet and a length of 6 feet.

Lighting usually uses a large amount of energy in a building but the architect designed this building to be **energy efficient**. Answer the following problems to see how efficient the lighting at the River Center is.

1. The assembly space is lit by 24 fluorescent light bulbs. Each light bulb uses 0.032 kWh of energy when on for one hour. If all 24 lights are left on 12 hours a day, how many kWh of energy would they use?

2. We don't need to turn the lights on for 7 hours of the day while the sun is shining. How much energy do we save by **daylighting**?