

**WOMEN IN CONSTRUCTION BADGE
JUNIOR LEADERS' GUIDE
COLUMBIA RIVER COUNCIL**



The Women In Construction Badge program is being co-sponsored by Associated General Contractors, Oregon-Columbia Chapter (AGC), National Association of Women In Construction, Portland Chapter 54 (NAWIC) and the Girl Scouts Columbia River Council.

More information about these organizations can be found at their websites at:

www.agc-oregon.org

www.nawicportland54.org/home.html

www.girlscoutscrc.org

This Leaders' Guide is intended to assist troop leaders with activities that will lead to earning the Women In Construction Badge. For assistance regarding speakers for troop meetings, job-site visits or other questions that arise, please contact:

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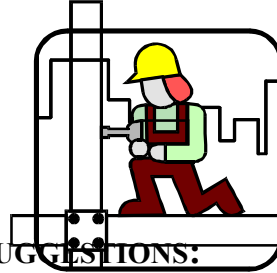
WOMEN IN CONSTRUCTION BADGE

JUNIOR LEADER'S GUIDE

GOAL: To develop an understanding of construction concepts, principles and apply these concepts to the design and construction of structures.

CONSTRUCTION KIT CONTENTS:

- Home Grown Detectives Magazine
- Video: *Bridges*
- Modeling Clay
- Book: *Up Goes the Skyscraper*
- Popsicle sticks



BADGE REQUIREMENTS AND ACTIVITY SUGGESTIONS:

Junior Girl Scouts must complete six requirements to earn this recognition.

Activities in the Junior Women In Construction Patch requirements are formed around the creation of a troop community with specific types of structures, roads, bridges, and environmental issues. The first seven requirements are in sequential order to build your community. The last five requirements are other activities that your troop may like to do instead of creating a community. It is important to remember that the city that you create should be made out of items that you would recycle, like paper bags, cereal or milk containers, soda cans, cardboard, and anything else you can think of—be creative!

1. Learn about the construction industry and the four types of construction: general building, highway, heavy/industrial, and municipal utilities construction. Discuss which of the four types of construction you would want to work in if you were to decide on a career in the construction industry.

ACTIVITY:

- **Teams:**

Supplies: Access to encyclopedias, books about construction, the library, or the Internet

1. Have the girls look up all of the different types of construction and create a list of similarities and differences between each of the different types of construction, i.e. general building, highway, heavy/industrial, and municipal-utilities construction.
2. Have the girls break into construction teams as listed below. Each team will take the lead during that portion of their cities construction as indicated in later activities.
 - Municipal-Utilities Team
 - Highway Team
 - Heavy-Industrial Team
 - General Building Team

2. Learn about the environmental concerns that architects and builders must consider when designing and constructing buildings. Imagine an undeveloped residential area outside your city or town and design a housing

or apartment complex for the area. While creating your design, ask yourself what you can do to make the buildings more energy efficient and how can you reduce the impact of the buildings on the environment.

Some websites that may provide interesting information about green building, energy efficiency, and environmental issues are:

- Environmental Design and Construction – www.edcmag.com/
- US Green Building Council – www.usgbc.org/
- Metro Greenspaces Magazine – www.metro-region.org/article.cfm?articleid=605
- PGE Earth Advantage -- www.earthadvantage.com/commercial/about.asp
- Energy Trust of Oregon -- www.energytrust.org/

ACTIVITY:

■ **Creating Your Community's Location:**

Supplies: Large piece of construction paper or cardboard that will serve as the base for your community, Post-It Notes, paint

1. Have the girls design the environmental aspects of the location. It must include a river, forest, wetland, and meadow so the girls will be able to discuss environmental concerns. Use the Post-Its to designate each area.
 2. Have the girls decide where they would put residential and commercial buildings, bridges, highways, and roads, as well as where they would get their community's water and electricity. Place Post-It Notes in locations or draw sketches on the cardboard to remember where everything goes.
 3. Discuss the best options for development without hurting the environment. What are the most sensitive areas of this environment?
 4. Paint any areas that you won't be doing construction on, like the wetlands.
- 3. Learn about the various sub-systems of a building that are used to make buildings livable (i.e. electricity, water, telephones, etc.) and make a working model of a water system for a house/community.**

ACTIVITY:

Leaders: Municipal Utilities Team

■ **Water, Telephones and Electricity:**

Supplies: Straws that bend, two different colors of thread, stapler or glue

1. By following the basic designs of your city, begin creating your sewer, electrical, and telephone systems.
 2. Begin by determining the location of the main water source. Draw a water system that begins at this point and reaches all of the locations that will need water on the cardboard community location from the above activity.
 3. Connect the straws to follow the design and reach each location. Glue or staple the "pipes" to the cardboard.
 4. Re-do steps 2 and 3 with thread representing telephone and electrical lines.
- 4. Learn about the contributions of Ancient Rome to modern**

construction—including their inventions of concrete and elaborate roads. Compare and contrast Roman roads with the roads of today.

ACTIVITY:

Leaders: Highway Team

■ **Road Work:**

Supplies: Access to the library or Internet to search for information, paint, blocks, or other material for roads

1. Give each girl(s) assignments of what they need to find, like where would you most likely find Roman architecture, what types of materials they used to construct roads, their greatest achievements, etc.
 2. Go to the library or the Internet and have the girls search for any information they can find about Roman construction.
 3. Have the girls report back their findings to the group.
 4. Discuss similarities and differences between roads in Ancient Rome and today.
 5. Create the road system for your community. What types of materials do we use today? What types of materials will you use on *your* roads?
5. **Learn about the following four different types of bridges—beam, arch, suspension, and truss. Design a bridge to span a river or road and build a model of your bridge.**

ACTIVITY:

■ **Design It:**

Supplies: Bridges video, paper, Popsicle sticks, pipe cleaners, cardboard, string and clay

1. Watch the video on bridges.
 2. Discuss the bridges that you saw on the video and the bridges you have seen or crossed.
 3. On a piece of paper, draw a bridge. Do bridges always need to be across water?
 4. Build a model bridge using anything that you can find. Classify your bridge as beam, arch, suspension, or other.
 5. Discuss how you would make the bridges stronger or more beautiful to look at.
 6. Decide which bridge(s) should be part of your community.
6. **Pretend you own a construction company and have been asked to design and build a skyscraper. Design and build a model of a skyscraper. Test and evaluate the strength of your skyscraper.**

ACTIVITY:

Leaders: Heavy/ Industrial Team

■ **Builder's Inc.:**

Supplies: Book Up Goes the Skyscraper, paper, tape, paper clips, toilet paper rolls, paper towel rolls, cardboard, other skyscraper supplies

1. Read the book *Up Goes the Skyscraper* by Gail Gibbons and discuss one new thing

- that each girl learned about construction. (This book may seem “childish” for the girls, but it does have a lot of information that they probably don’t know.)
2. Create a name and a logo for your construction company. Display your company name and logo on a piece of construction paper. (*Note: this can be done by taking one girl from each of the construction teams and creating a company that includes all disciplines or can be done by having each construction team become it’s own company.*)
 3. Assume the role of architects to create a design for your skyscraper. Make sure that you label the parts of the skyscraper in your design. The base of the structure must measure at least an 8” square. There must be a platform at the top to hold one or more books.
 4. Collect the materials that you need to make your skyscraper and BUILD!
 5. Determine whose skyscraper is the strongest and has the best design. Why are some stronger than others? What other aspects are parts of a good design?

Decide which skyscrapers will go where in your community.

Take a tour of your city or town and classify the buildings in your town in terms of the following five building classifications: residential, commercial, public, industrial, and government.

ACTIVITY:

Leaders: General Building

■ **Building Construction:**

Supplies: Recyclable materials that can be used to build structures

1. Break your troop into groups with a leader from the General Building Team. Each group will be responsible to build one type of building classification.
2. Add your buildings to the rest of the buildings to complete your city.
3. Take a picture of your city and send it to the Council office so we can see what you’ve made and make a display!

NON-CITY RELATED REQUIREMENTS

- 8. Find out what determines a structure's strength. Is a larger building necessarily stronger? What keeps a structure from collapsing? Make the following three types of supports—rectangle, triangle, or cylinder—and test them to determine which of the three can support the most weight. Think about and discuss whether or not you would always want to use the strongest of these types of supports.**

ACTIVITY:

■ Making Supports:

Supplies: Six 4" x 6" index cards per girl or group, tape

Construct the following types of supports:

- **Two Cylindrical Supports:** Make a 6" x ½" crease along the side of each card. The crease forms an overlap for taping your supports. Roll each index card into a long cylinder and tape it closed.
- **Two Rectangular Supports:** Make a 6" x ½" crease along the side of each card. The crease forms an overlap for taping your supports. Divide the rest of the card into four equal sections. Mark, and then fold along dotted lines and tape to form support.
- **Two Triangular Supports:** Make a 6" x ½" crease along the side of each card. The crease forms an overlap for taping your supports. Divide the rest of the card into three equal sections. Mark, and then fold along dotted lines and tape to form support.

■ Testing Supports:

Supplies: girl-constructed supports, sheets of cardboard (cut from cereal boxes), unwrapped sticks of clay, unopened soup cans, any other objects that can be used to test supports

1. Attach two supports to a 6" x 6" piece of cardboard. Space the supports evenly between the ends. Secure the supports with a piece of tape at each end.
2. Test the supports in any order by adding weight to the cardboard platforms until the support fails.
3. Keep track of each support and how much weight it can hold. Discuss:
 - Which supports are the strongest?
 - What happens when the supports are closer or farther apart?
 - Why would you choose to construct something using a certain type of support?

- 9. Early builders had to think creatively to move heavy materials. Image you are an early Egyptian building the Great Pyramid. Use a heavy object, such as a dictionary, to represent a 2.3 metric-ton limestone or granite block. Devise a method for moving this object without using your hands to lift or carry the block.**

ACTIVITY:

■ Egyptian Move:

Supplies: large, heavy books, rubber bands, string, unsharpened pencils to use as rollers,

marbles, anything else you think could help move an object

1. In groups, have the girls devise a way that they think would move the book.
2. Have the girls share their devices with each other and come up with a list of what works well.
3. Have the girls identify what type of simple machines (wheel and axle, pulley, wedge, screw and lever) they used. Have them identify other machines that they use everyday that are built out of these simple machines.

10. Talk with a woman who works in construction and ask her to explain the need for the following safety features at a construction site: fences, heavy boots, warning signs, hard hats, yellow warning tape, audible warning ('beeping') on moving equipment.

ACTIVITY:

■ **Safety Zone:**

Supplies: BUILD IT! Poster

1. Have the girls identify all of the different types of safety features on the picture.
2. Discuss what each feature does and why it is important.

■ **Speaker:**

1. Bring in a woman who works in the construction industry and ask her to explain what she does. Have the girls ask the speaker any questions that the girls may have about working in construction, on creating a safe environment, and any other questions that they may have. (*Note: Contact NAWIC or AGC to provide you with a speaker*)

11. Learn about the many different types of careers in the construction industry. Pick one type of construction-related job (i.e. general contractor or project engineer or electrician, etc.) and research the job you have chosen. Report to others in your troop about what you have learned. Use the following guidelines in making your report:

- **Provide a complete description of the job's responsibilities.**
- **Identify any professional organizations to which a person in that job can belong.**
- **Discuss how much education is needed to perform the job.**
- **Explain what the typical salary range is for the job.**

ACTIVITY:

■ **Career Connections:**

Supplies: BUILD IT! Poster, Hot Jobs Cool Careers, Leave Your Mark

1. Have the girls identify all of the different types of careers shown on the poster and in the brochures.
2. Discuss what each career is called and what they do.

■ **Web Resources:**

The following website link provides extensive job descriptions for construction industry

jobs:

www.agcnh.org/public/workforce_dev/employment_labor/job_opportunities.asp

This website provides job descriptions, projections and wage information for Oregon:

www.qualityinfo.org/olmisj/OIC?action=search&key=Construction

■ **Speaker:**

1. Bring in a woman who works in the construction industry and ask her to explain what she does and to describe the variety of jobs available to women today in construction. Have the girls ask the speaker any questions that the girls may have about working in construction, the education and training requirements, salaries, etc. (*Note: Contact NAWIC or AGC for a speaker*)

12.

Take your troop on a field trip to a construction job-site. Have the girls note the variety of jobs they observe and ask questions about the requirements to perform those jobs. After the jobsite visit, have each girl draw a poster about what she saw and explain which jobs she might be interested in performing.

■ **Jobsite Visit:**

Contact AGC to arrange for a guided tour of a local jobsite. Availability of jobsite visits will depend on time-of-year, weather conditions, and troop location. Advance planning is needed—if you are considering this activity, contact AGC well in advance of your intended date for the visit.