ARCHITECTURE BY CHILDREN 2012

BRIDGE

Produced and Developed by:
AIA Cincinnati
Architectural Foundation of Cincinnati

AIA Cincinnati
a chapter of
the American Institute of Architects

AFC
ARCHITECTURAL
FOUNDATION
OF CINCINNATI

ABC 2012

Enriching Education Through Architecture

ARCHITECTURE BY CHILDREN is a committee of the Cincinnati Chapter of the American Institute of Architects. Through ABC, AIA Cincinnati aims to educate our community about the value of the role of the architect and how what architects do affects all our lives through the design and development of our shared environment.

For further information, please visit us online at
www.architecturebychildren.org

ABC Committee

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ONLINE CONTENT ABC CURRICULUM RESOURCES

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STATE OF OHIO ACADEMIC CONTENT STANDARDS

A list of Ohio standards and benchmarks by subject and grade level which can be met through the process of completing an ABC project. If you wish to develop a particular benchmark activity related to the project, please contact ABC at info@architecturebychildren.org

DRAWING LIKE AN ARCHITECT

*Plan, Section, Elevation

Drawing to Scale (7-12)

*Free-hand Drawing Exercises

DESIGN CONCEPTS

*Size, Shape, Orientation, Location, Treatment

Lighting

Scale of Space

**STRUCTURAL (& BRIDGE) CONCEPTS

Five Bridge Types – arch, beam, truss, suspension, cable-stay

The Two Major forces – Compression & Tension (5th and up)

Structural Forces – Body Building (all ages)

**GREEN DESIGN INTRODUCTION & SOLUTIONS HANDOUTS

**MODELING

Tips and tricks for successful models.

QUESTIONS?

Contact the ABC Committee at AIA Cincinnati:
info@architecturebychildren.org or 513-421-4661

ABC 2012 PROGRAM CALENDAR—BRIDGES

December 1, 2011__**Architects Assigned**

Teachers will receive an e-mail shortly thereafter with their architect's information. Architects and teachers are responsible for coordinating the date and time for presentations and return visits. A planning meeting prior to the initial presentation is highly recommended.

January 2012__**Architect Presentations**

CD Roms will be mailed out by request only. The Presentation and supplemental project data may be downloaded from our new FTP site (we recommend using FileZilla FTP interface http://filezilla-project.org):

NEW

Host: ftp.tilsleyarchitects.com
Username: ABC2012
Password: 2012#BRIDGE

(username and password are CASE SENSITIVE!)

January 2012 – April 6, 2012__**Research, Design and Production Period**

See the design problem and step-by-step timeline for a detailed breakdown of suggested benchmarks and order of activities.

Saturday, April 7, 2012__**Presentation Drop-Off**

Time: 9:00 am - 12:00 pm
Location: DOWNTOWN PUBLIC LIBRARY
800 Vine Street, Cincinnati 45202
See page 5 for directions and drop-off instructions.

Tuesday, April 10, 2012__**Jury**

See the Design Competition Details on page 10 for what the jury will be looking for.

April 7 - April 13, 2012_**Public Exhibition of Work**

Time: during normal Library hours
Location: DOWNTOWN PUBLIC LIBRARY, 800 Vine Street, Cincinnati 45202

Saturday, April 14, 2012_**Bridge Break & Awards Ceremony**

Location: DOWNTOWN PUBLIC LIBRARY, Tower Room, 800 Vine Street, Cincinnati 45202

Bridge Break Check-In: 9:00 am

Bridge Break Testing: 9:20 am — 12:00 pm

Design Awards 12:00 pm — 1:30 pm

Bridge Break Awards 12:45 pm

T-Shirt Pick-Up 10:00 am — 2:00 pm
Teachers or assigned classroom parent may pick up t-shirts for your class.
Unclaimed shirts left after 2:00 pm will be donated to charity.

Project Pick-Up 1:00 pm - 2:00 pm
ALL PROJECTS MUST BE SIGNED OUT FROM THE EXHIBITION SPACE
NO LATER THAN **2:00 pm on SATURDAY, April 14.**
PROJECTS LEFT AFTER 2:00 pm WILL BE DISCARDED.

NOTE:
Document your students' work by photocopying, photographing, and scanning their work. This project is perfect for portfolios, and submission to the Scholastic Art & Writing Awards (for grades 7-12).

PROJECT SUBMISSION REQUIREMENTS

A MAXIMUM OF 3 PROJECTS MAY BE SUBMITTED FROM EACH CLASSROOM.

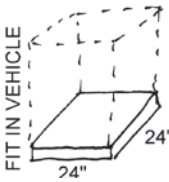
Due to the large number of participating classrooms, this limit will be **strictly enforced**. Please note, projects with teams of more than four students will be disqualified from competition awards.

Final presentations submitted for the design competition must be in one of the following two formats:

REQUIRED FOR ALL SUBMISSIONS:

Exhibit and Emergency Labels: Each submitted entry must arrive with **two copies** of the completed half-sheet Exhibit Label provided in this packet. One shall be affixed to the underside of the model or flat-lying 2D board (this can be done prior to drop off), the other will be affixed to the leading edge by ABC staff during arrangement. An editable electronic copy is available on the FTP site if students wish to type their project descriptions – see Program Calendar for access information.

No Other Data: Reports, papers or drawings not contained within the context of the presentation format elected will not be reviewed or accepted. If your student's project is selected for award, these items MAY be incorporated into a later display at the Architectural Foundation of Cincinnati Gallery.



Presentation Format 1: 3-Dimensional Model

- **Max Size:** 24" x 24"OR 8" x 30" maximum base sizes. Due to space considerations at the library, No part of any model may be outside this boundary. Models arriving significantly larger will not be displayed. There is no minimum size. Height is limited only by imagination, gravity, and transportability (fit into car, through doors, etc). Recommend keeping models under 30" high.
- **Sturdiness:** Submitted models should be well-constructed and able to be moved without fear of destruction. Models will be shifted and re-arranged as-needed after drop-off. See the MODELING tips page on the ABC website for further info. While every effort is made to protect submitted projects, we do not take responsibility for any accidental breakage of models. A "fix-it" station will be available upon arrival with supplies for emergency repairs.
- **Labels:** Text labels on parts of models should be avoided if possible. Students are encouraged to render their model elements so as to negate the need for labels. If labels are desired, they should be discrete, legible and neat.
- **Scale:** Models created to scale will have slight weight over those which do not in the 4-6 grade age group. Models in the 7-8 and 9-12 grade groups must be TO SCALE. Those which are not to scale will not be eligible for awards. Scale is not required for the K-3 projects. Models to scale shall be discreetly and neatly labeled with the scale designation, either architectural (eg: 1/8" = 1'-0") or engineering (eg: 1:40)
- **Format:** Models will be viewed primarily from one side, lined up side-by-side along a table and back-to-back with other projects. (12" x 30" models will be set at an angle)The Exhibit Label will be attached to the front edge of the model and/or along the table edge in front of the model when it is placed. Model orientation and any labeling of elements should take this into consideration.

Presentation Format 2: 2-Dimensional Presentation Boards

- **Size:** Two 24" x 18" boards in horizontal orientation. One board will be laid flat, the other will be propped up vertically behind it. (see sketch). Prop-stands will be provided at the time of drop-off, if you do not provide your own. Use boards stiff enough to remain straight when propped up.
- **Depth:** 2D presentations do not have to be FLAT. Collage, relief, and mini-models may be used to a maximum 3" height/depth.
- **Text:** Students should strive to communicate as much as possible about their designs through graphic representation. Information may be written on the presentation boards, but should be legible, organized, and not dominate the presentation.
- **Sturdiness:** Submitted 2D entries should be well-constructed and able to be moved without fear of destruction. Presentations will be shifted and re-arranged as-needed after drop-off. While every effort is made to protect submitted projects, we do not take responsibility for any accidental breakage of models. A "fix-it" station will be available upon arrival with supplies for emergency repairs.
- **SCALE:** Scale is not required for the K-3 projects. Drawings done to scale will have slight weight over those which do not in the 4-6 grade age group. Drawings in the 7-8 and 9-12 grade groups must be TO SCALE. Those which do not have at least some element of scale will not be eligible for awards. Drawings shall be discreetly and neatly labeled with the scale designation, either architectural (eg: 1/8" = 1'-0") or engineering (eg: 1:40). More than one scale may be used across the whole 2D presentation.
- **Format:** 2D presentations will be viewed from the front of the arrangement, lined up side-by-side along a table and back-to-back with other projects. The Exhibit Label will be attached to the front edge of the flat board along the table edge. Layout of presentation boards should take this into consideration.

ABC 2012 REQUIRED EXHIBITION LABEL

REQUIRED LABEL FOR ALL PROJECTS SUBMITTED TO THE EXHIBIT AND COMPETITION

Make sure **THREE** Exhibition Labels are made for each project – two to bring with the model or presentation boards to the Library (one of these may be **securely** taped to the bottom of the model or flat-lying board), and one for you to keep for your records.

Please photograph students' presentations before bringing them to the Library for submission, and keep an electronic copy of your labels in the event one is lost and needs to be replaced.

The exhibition label below is provided for your use to copy and fill out. It is also available as a separate electronic document with live fields on the FTP server (see Project Calendar for access info.)

Instructions

This label is the primary information for jurors, and serves to level the playing field across all submissions. Labels that are not in this format will cause projects to lose 2 jury points.

Project Description: REQUIRED CREATIVE WRITING ASSIGNMENT

Ask students to use the client information they collected in their interviews, their image board ideas and their list of green design solutions to write a detailed description of their project. Below is a list of possible sentence starters:

Our/my client (if applicable) is _____.
Our/my bridge site is located_____.
I/we chose it because _____.
We used _____, _____, and _____ (i.e. bridge type(s), certain materials, orientation, colors, shapes, etc.) to express _____.
Our green design solutions include _____, _____, _____, and _____. (list all)

SCHOOL: _____ **TEACHER:**_____

PROJECT TITLE: _____

NAME: _____ **GRADE:**_____ **NAME:** _____ **GRADE:**_____

NAME: _____ **GRADE:**_____ **NAME:** _____ **GRADE:**_____

PROJECT DESCRIPTION: MAXIMUM 2500 CHARACTERS

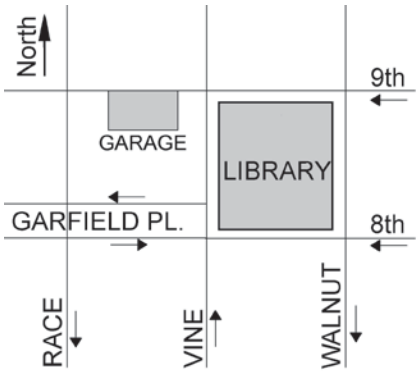
DROP-OFF PROCEDURES

Drop-Off Details:

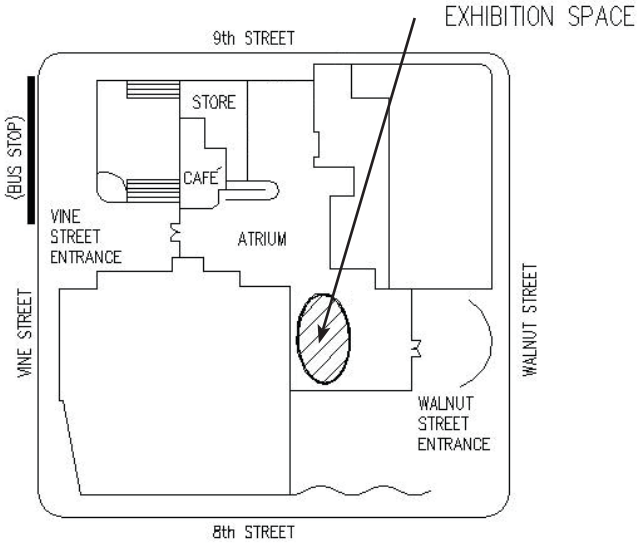
Projects are to be brought to the south building of the downtown public library, just off the first floor atrium behind the library store, **between 9:00 am and noon** on Saturday, **April 7, 2012**. ABC volunteers will be available to assist.

Parking:

- Public garage on 9th Street between Vine and Race (less than 100 paces from the Library's Vine Street entrance)
- Metered parking is available on both sides of Vine Street, Walnut Street, 8th Street, and Garfield Place (free after 6 pm and Sundays).



North



Note:

Bridge Break competition entries should ONLY be brought to the library for check-in and testing the morning of **Saturday, April 14.** Check-in begins at 9:00am, and testing will begin promptly at 9:20 am.

Student teams participating in the bridge break should be present to observe their results.

DESIGN COMPETITION DETAILS

Projects selected for the exhibition at the library are entered into an informal design competition.

AGE GROUPS:

In the interest of comparing "apples to apples" as much as possible, the projects are divided into age groups by grade: **[K—3] [4—6] [7—8] [9—12]** In the case of multi-grade groups, projects will be placed according to the highest grade level represented.

AWARD CATEGORIES:

One project in each of the following categories will be selected from each of the four age groups, for a total of 16 winning projects. Below are descriptions of what the jurors will be looking for in each category.

Future Architect
The 3D model or 2D presentation provides unique and compelling elements that fit the overall theme (BRIDGES). The overall project provides solutions that the theme inherently has which are notable compared to the rest of its peer group. The design has a cohesiveness which allows for the natural flow of both the occupants and vehicles through and/or around the design.

Master Craftsm'n
The 3D model or 2D presentation is constructed/drawn accurately to demonstrate a realistic example of the final structure. The model or drawing was created with great precision and attention was paid to the smallest details. There are few if any flaws in the model/drawing that detract from the overall design of the structure. Special attention will be paid to models/drawings with complicated designs that would require greater skill to construct/draw.

Most Successful use of Green Design Solutions
The project design demonstrates how the structure (and/or site development) will lessen its impact on the environment. Included in the structure is one or more green design solutions in the categories of Site, Water, Energy, Materials, or Indoor Environmental Quality that is implemented in the design in a seamless way, as an integrated part of the overall project.

Most Creative Use of Materials
The model includes materials that are used in a unique and distinctive way. The materials add to the overall concept of the design and bring a new dimension to the structure. Forethought of the materials used for different elements of the design is evident. This award may be given to drawn designs which demonstrate unique and distinctive ways to use materials in the final construction of the structure.

Additional awards will be given as follows:

Juror's Choice
Jurors are invited (but not required) to identify a maximum of 2 outstanding projects in each age group.

People's Choice
Throughout the duration of the exhibit, visitors are invited to vote by write-in slip for their favorite project. All votes will be tallied at the end of the week to reveal a single People's Choice winner.

JURY:

The Jury will be made up of professionals from the local architecture, art, and design communities and city leaders. The group of approximately 12 jurors will be placed in teams divided amongst the award categories. Jury teams will consult one another for the Juror's Choice Award.

AWARDS:

The Awards Reception and Ceremony will be held at 11:00am on April 14, 2012 in the Tower Room at the Library, after which all projects are to be removed from the exhibition space. We ask that projects be left in-place for the duration of the reception and ceremony to give everyone a chance to see all the projects. Often, this is the only chance students have to see the work of others. (T-shirts are also to be picked up at this time.)

PRIZES:

Students producing the winning projects will each receive a prize and ribbon/certificate. Afterward, a photo of their model, their names, school name, teacher name, and project title will be listed on the ABC web page.

PROJECT COLLECTION:

Projects will be signed in on April 7 and signed-out on April 14. T-shirts will also be signed-out in order to minimize confusion on the awards day. Teachers: If you cannot be at the awards ceremony on April 14, please designate a parent to collect your class' t-shirts and projects. We hate to toss kids' work.

Certificates:

Teachers may pick up their blank Certificates of Participation for all students who complete an ABC Bridge project on April 14, 2012 at the Library. If pick-up is not possible, please contact ABC for other arrangements.

T-Shirts:

T-shirt orders will be confirmed in early February via e-mail before our order is placed. T-shirt bundles may be picked up from the library on the day of the awards ceremony. T-shirts not claimed before 2:00 pm on April 14, 2012, will be donated to Goodwill unless special arrangements have been made.

ABC 2012 DESIGN PROBLEM & PROJECT OUTLINE

DESIGN PROBLEM

What comes to mind when thinking of a bridge? If you look it up in the dictionary, it reads "a structure carrying a pathway or roadway over a depression or obstacle." For thousands of years, natural bridges have served both animals and humans by playing a vital role in daily life. In modern times, man-made bridges have transcended utility and become increasingly a form of expression and beauty. And then there is the secondary definition: "a time, place, or means of connection or transition." In today's society, many places or objects can serve as a bridge to connect friends, neighborhoods, races, cultures and countries. Whether in Cincinnati, the United States of America or around the world, what kind of bridge is most important and necessary for you?

The following project guide is meant to help walk your class through the design process with your architect. There are TWO tracks: Design Competition and Bridge Break. Ambitious teachers with extra class time to spend, may elect to do BOTH. Three submissions in each track are allowed per classroom.

Suggested Step-by-Step Timeline — DESIGN COMPETITION TRACK

MONTH	WEEK	STEP
Jan 2	Week 1	Architect Presentation
9	Week 2	Sites & Bridge Types
16	Week 3	Programming & Green
23	Week 4	Design Development – Topography, Maps & Image Ideas
30	Week 5	Design Development - SCALE (7 – 12th)
Feb 6	Week 6	Design Development - Sketching
13	Week 7	In-Class Design Presentations and Feedback
20	Week 8	Design Week - Model Bases / 2D Layout
27	Week 9	Design Week
Mar 5	Week 10	Design Week
12	Week 11	Design Week
19	Week 12	Work Week / Mid-way evaluation
26	Week 13	Work Week / Project Description for Exhibit Label
Apr 2	Week 14	Finishing Touches and Completion of Entries

Week 1: Architect Presentation

Teacher and Architect are responsible for coordinating the day and time of the initial presentation. Your architect will bring a digital copy of the PowerPoint presentation (or you can have it downloaded and ready to go on your system) which will take approximately one class period (50-60 minutes). Prior to the architect's visit, discuss with your architect how the project will be completed (size of teams, any site restrictions, etc.), your desired presentation style options (2D or 3D), and the timeline for architect return-visits. Students should be prepared with questions for their architect about their job or the project. Design teams may already be chosen at this point.The architect's presentation will cover:

The architect's presentation will cover:

- What is Architecture?
- How do you become an Architect?
- Green Design
- Size, Shape, Orientation, Location, Treatment
- Types of Bridges
- Past Project Examples

Week 2: Site, Structures & Bridge Types

Site:
Have student design teams spend 10 to 15 minutes deciding on WHERE their bridge is.

The site can be made-up (crosses a river between mountains, crosses the grand canyon, between two mountains, connects San Francisco to Hawaii...), or a real place (the Brent Spence replacement). This can be as simple as a one-liner description or detailed with sketches, internet images, Google Earth locations, etc. as skill sets or time allows. Older students may come prepared with their site information as an assigned homework due at this class time.

Bridge Types Tutorial:
There are THREE separate downloads needed for this week from the ABC web page:

Five Bridge Types

Two Major Forces – Compression and Tension

Structural Forces – Body Building

Combined with the bridge types section of the architect presentation, these downloads form a tutorial which will help them get into "bridge mode." Students in grades 5 and up should have access to printed copies or electronically. Younger students will benefit more from the experiential exercises and revisiting the bridge types section of the architect presentation.

Forces:
Walk through the Two Major Forces tutorial section. Bridges feel and resist massive forces as they span distances both short and long. Review Compression and Tension with students to build a foundational knowledge of how bridges work. Illustrate this to students with the body-building excercises.

Five Bridge Types:
Walk through the Five Bridge Types guide and/or the Bridge Types section of the architect presentation. Review with students how each type resist the forces of tension and compression to carry heavy loads. Understanding these bridge types will help students make decisions about how their own bridges will be built.

ALTERNATELY: Teachers may wish to pre-assign bridge typologies to students or project groups for research and in-class presentation during Weeks 2 and 3. Students should describe the bridge type in words and pictures, explain how their bridge type resists spans and resists the forces placed upon it, and present examples to the rest of the class.

Body Building:
Doing the Body Building activities will allow students to feel the forces that bridges feel. You and your architect may lead the class through these exercises.

Week 3: Programming & Introduction to Green Design

Programming:

Students should have an idea of their site prior to this class. In the professional design-world, program information is usually provided by a client and a given site. The "program" is the "who, what, when, and why" of design. Similar to writing a news story, students will develop the "story" of their bridge. Their site is the "where" and they can start fleshing out that description out here as well. Students may invent a client for this project, or just develop these ideas for themselves. Who will use it? Pedestrians, vehicles, trains, bicycles, animals, aliens...? What is it connecting? Cities? Mountains? What obstacle will it span? A river, gorge, valley, bay, or ocean? Will it span time? Where is it? What and who will it connect? Cities, neighborhoods, buildings, countries, continents, islands, cultures, generations, planets, dimensions?

The "how" part is where their design muscles get exercised. (see week 4)

Have students record their ideas and program on the Design Ideas form. Fleshing out the "story" and determining attributes of their site will inform and support them while making design decisions.

Green Design:

Sustainable (Green) design is a fundamental design consideration, and just like buildings, bridges can have a major impact on the environment — positively or negatively.

Review the *Introduction to Green Design* handout to introduce the sustainable concepts architects deal with. Students should each (or each team) receive a copy of the Green Design Solutions handouts (available online). Have students evaluate their bridge on its site in relationship to each of the Green Design Solutions concepts.

Sample thought-starters:

How much land will the bridge ends occupy?

Will the bridge create or harness energy?

What impact will they have on the world around them?

Can it affect where rainwater goes or how a river it spans flows?

What materials is it made of?

Will it need energy to provide part of its function?

Week 4: Design Development — Topography, Maps and Imagery

Armed with their program, site, green design solutions and bridge knowledge, it's time to start designing, but FIRST, they'll need a really clear picture of their site. Even if they're making it up.

Topography: (6th grade and up)

Pull up a topographic map online, or pre-download one in preparation for this class. A great source on teaching about topography — or directing students to for independent learning is:
http://earthsci.org/education/fieldsk/topmap.htm

Real bridge sites:

Find it on a map! If using electronic maps, turn on the "topographic" layers. Recommended sources:

Google Maps

Google Earth

Bing Maps

CAGIS (if site is within Hamilton County)
http://cagisonline.hamilton-co.org/cagisonline/index.html

Topo Quest
http://www.topoquest.com

Fictional Sites:

Have students find and study a real map of a hill or valley or other geologic feature that is very close to the place they have in mind. Next, have them create their own topographic map, or trace then modify an existing one to their liking.

Week 5: Design Development — Plan, Section, Elevation + SCALE

Grades 7 – 12 MUST have project submissions that are to scale to be considered for awards. Grades 4 through 6 may attempt scale at the teachers' discretion based on student ability. 4th-6th grade submissions to scale should be labeled as such, for additional points to be granted. Grades K-3 do not need to work with scale.

Plan, Section Elevation:

Download and hand out copies of "Drawing Like an Architect – Plan Section Elevation" from the ABC web page. Activities may be done in-class or assigned as homework. At the end of the review, students should be able to draw a plan, an elevation and a section of a simple one or two-room building.

Learning to Draw To Scale:

Download the "Drawing Like an Architect – Scale" packet from the ABC web page. This is an in-class workshop on using an architectural scale. Your class will need architectural scales to complete this work. Standard 12" rulers may be substituted, and you may add reading an engineering scale to this exercise. At the end of the tutorial is an exercise that can be done in-class or assigned for homework.

Translating to the Project: (grades 4-6 optional, grades 7-12 required)

If students are designing a bridge for a real place, have them research via Google Earth or Bing maps to get dimensions of the span they are designing. Then, have them draw a plan and/or elevation of their bridge to scale using actual dimensions. Students will need to determine at what scale their bridge needs to be drawn in order for it to fit on the page. If the location of their bridge is fictitious, ask them to find a similar location around Cincinnati they could look up and use as a guide to size.

Have students determine their model base size and board layouts. They will need to then determine what scale the model or drawings will need to be in order to fit on the boards.

Week 6: Design Development — Sketching / Storyboarding

Armed with their program (the 'where, why, and for whom/what') and a basic knowledge of the bridge types, structure and materials, their site data and a starting point for their presentation, the students now begin the design process. The process of designing is different for everyone. Some individuals immediately start thinking in plan, while others think in elevation and still others' minds go straight to visualizing in three dimensions.

Sketching — Dowload and utilize the "Drawing Like an Architect – Freehand" exercises. Walk through them as a class, or, assign as homework.

Storyboarding — one way to get the creative juices flowing is to look at and collect images – LOTS of images. Have student design teams collect images that reflect options that could work for their bridge's site and program. Each project should have at least 4 or 5 "big-idea" images that can represent the users, the site, materials, shapes, colors, textures, structural types, etc..

Architects design in many different ways – some draw on paper, some build models, some model with computer software – and on, and on. Students should explore their designs in any number of ways at this point. For week 7 or 8, teams should have prepared an image board of drawings, pictures, etc. or a PowerPoint presentation to assist them as they explain their design ideas to their peers. Each team should record all their ideas on the Design Ideas form to clarify their direction as they design, and use as a touchstone as the designs progress.

Remember, bridges do not necessarily have to exactly model one of the five types. In fact, most will be a combination – and that's OKAY! Nearly all bridges have the characteristics of two or more of the structural types. Also, if your students' bridges are of a more "theoretical" nature, they may not fall into any of these categories!

Week 7 or 8: Peer Presentations

(5 minute presentation + 5—10 minute discussion. With more than 4 groups per class, this process may take extra time. Schedules should be adjusted accordingly. This process is at the core of how architects work and evaluate. Do not skip it.)

"We play for a living. The work comes in the evaluation of the results of the play."

Preparation:

Talk to the class about 'feedback' and 'criticism'. Do a little role-playing to show helpful versus negative criticism. Encourage students to each offer some critique or idea for at least one of the presentations. This is a process in which everyone is on the same team, so being helpful to one another and assisting in the refinement of ideas is the goal.

The Presentation: With your architect, and the class in attendance, each team presents their Image Board or PowerPoint in 5-minutes or less. Students, teacher and architect offer suggestions, likes and dislikes to the team. One or more team members doing the presentation takes notes on the feedback for use.

When their presentation is complete, design teams re-group with their feedback and make any adjustments as necessary, recording major shifts on the Design Ideas form.

Weeks 8-9: Design Weeks: Model Bases / 2D Layout

Armed with their ideas, images, sketches and feedback, students begin their presentation in 3D or 2D format. By this time, student should have amassed a pile of reusable materials to be used for modeling, or have all materials ready to go for 2D presentations. See the Presentation Requirements page for rules and expectations for each format. Architects may return to provide feedback and design review, as well as helping students to track their progress against their design intent and green design ideas.

Building Model Bases with Topography:
Hills and valleys may be modeled by stacking layers of museum board, cardboard, foam core and the like. Once the relative scale is determined, and the topographic map of the bridge site is enlarged to fit on the model base, cut out a layer or several layers for each topographic line to model the height variations of their site. If the design requires digging DOWN into the site, stack enough layers to give the depth required.

Weeks 10-11: Work Weeks

Keep on building! Try out different ideas, make sure models are sturdy and transportable. Make sure students are incorporating their Green Design Solutions and other concepts from their Design Ideas form.

Week 12: Work Week / Evaluation

This week, teams should start writing their Exhibit Label information. Do not leave this until the last minute! Information at this level can spark ideas to help them finish strong.

Architect returns to the classroom to review projects and presentation progress as students continue to work on their designs/presentations. Your architect may assist with providing guidance on modeling ideas or presentation techniques.

Week 13: Weeks 13: Work Week / Project Description for Exhibit Label

Teams continue to progress on the completion of their models or two-dimensional presentations. Students and teachers should complete their exhibit labels for each project during this week.

Week 14: Finishing Touches and Completion of Entries

Your architect should be invited to return this week to see the results. Students may still be finishing up their presentations, and making sure they are travel-worthy.

Selecting Competition Entries.

First, be sure the entries meet the 3D model or 2D submission guidelines.
Make sure **THREE** Exhibition Labels are made for each project – two to bring with the model or presentation boards to the Library (one of these may be **securely** taped to the bottom of the model or flat-lying board), and one for you to keep for your records.

Selecting Whose Projects Go
A maximum number of 3 projects per full-size classroom may be submitted. In the real-world architects don't win every competition and only one gets picked to be the architect for any given project, even though multiple architects or firms are invited to present proposals.

There are any number of ways to select the three projects from your class that will be displayed at the library exhibit and entered into the competition. One possibility is an anonymous vote. Each voter receives receives three different-colored post-its or stickers.. Each color represents a first, second and third-choice. All voters go around to each project and place their post-it/sticker at their 1st 2nd and 3rd choice projects to go to the ABC exhibit and competition. Options:

- For blind-voting within the class, the only rule is that you cannot vote for your own project.
- Invite other classrooms and/or groups of parents & teachers to listen to brief presentations of each project and then they may vote, using the sticker/post-it method.

- Invite the principal and other teachers to hear presentations and do a blind-vote.
- Invite your architects' firm to attend presentations and vote for favorites.

DON'T FORGET PHOTOS!

Take pictures of student work for your and their records.

Further, students in grades 7–12 may submit work to the 2013 national Scholastics Art & Writing Awards and win regional and potentially national recognition for their work. Seniors with portfolios can win scholarship dollars. For details, visit http://www.artandwriting.org.

Suggested Step-by-Step Timeline — BRIDGE BREAK TRACK (7-12th grades)

MONTH	WEEK	ACTIVITY
Jan 2	Week 1	Architect Presentation
9	Week 2	Sites & Bridge Types
16	Week 3	Programming & Green
23	Week 4	Design Development – Topography, Maps & Image Ideas
30	Week 5	Design Development –Structural Types/Strategy/Review Rules
Feb 6	Week 6	In-Class Design Presentations and Feedback
13	Week 7	Materials Collection/Distribution + Finalize Strategy
20	Week 8	Build testable models
27	Week 9	Build testable models
Mar 5	Week 10	Build testable models
12	Week 11	In-Class Bridge Break + evaluation
19	Week 12	Rebuild (modify designs based on results)
26	Week 13	Rebuild
Apr 2	Week 14	Rebuild – Bridge Break submissions due on April 14
9	Week 15	Bridges to the Library at 9:00 am on April 14 for check-in

Bridge Break models will **not be on display for the week-long exhibit**. Bridge break models should only be brought to the library at 9:00am, Saturday, April 14 to check-in for the official Bridge Break. (we will be video-taping!)

Weeks 1 through 4 (SAME as for design competition track)

Week 5 — Design Development — Structural Types/Strategy/Review Rules

Have students review ALL the rules. We have re-published documents in this packet. You, the teacher, can choose whether or not to have them look through past photos and video of bridge break bridges on www.bridgebreak.com.

Using their programming information, have students sketch out several (6 – 10) structural type options, shape options and combinations. Then, have them narrow down the options to two or three for their structural strategy of the bridge they will build. Append this information to the Design Ideas form.

Week 6 — In-class Presentations and feedback

Students should compile their weeks 3 and 4 data, images, and their three top structural design strategies into a presentation to their peers: 3 minute presentation and 5-8 minute discussion. Can be drawings on the wall or a PowerPoint. Depending on the size of your class and number of teams, your class schedule may need to be adjusted, or split this into two class periods. Don't skip it.

Other students, teachers and your architect should be present and prepared to give feedback. Teams should be prepared to RECEIVE said feedback, and be taking notes during the discussion.

Students should enter significant feedback and especially ideas that will be incorporated onto their Design Ideas form. Assignment at the close of this week is for each team to determine the size and quantity of balsa wood pieces to be purchased to execute the design.

Week 7 — Materials Collection/Distribution + Finalize Strategy

By this week, teams are to finalize which structural strategy they will use, and have a solid direction for their designs. Also, at this time, you should have the appropriate materials purchased for your teams. Alternately, student teams may put in "orders" for the size and quantities of pieces they desire to use, and distribution happens the following week when construction begins. Keep in mind to order double quantities if bridges will be tested in-class then re-built.

Weeks 8-10 — Build Testable Models

Following the balsa bridge competition rules, student teams build their bridge designs. Be sure students review and follow all dimensional requirements carefully.

Week 11 — IN-CLASS TESTING!

If pre-testing your bridge designs, you will need the supplies listed on the Testing Materials page in this packet.

Testing student models in-class will give them an opportunity to learn how their designs react under loading. This is an optional step. Bridge building may stop here and be submitted to competition on the 14th without pre-testing the designs.

Record the original bridge weight. Stop loading as soon as "major structural failure" occurs. See the Bridge Break rules page for what constitutes official structural 'failure'. It is not necessary to load it until it explodes. Weigh the bridge and all loading apparatus once significant structural failure is reached.

Weeks 12 — 14 Re-Build!

Using what they learned during the in-class testing, students now re-build their designs for the competition, making improvements and modifications as necessary. It is anticipated that models that are tested then improved upon will do better than those which are not. Note: encourage students not to abandon their original structural design strategy, but rather to improve their details and craftsmanship so that they perform better than the first time.

Bringing Bridges to be Tested To the Library!

A MAXIMUM OF THREE BRIDGES PER CLASS MAY BE SUBMITTED FOR THE BRIDGE BREAK!

Saturday, April 14

9:00am Check-in opens
Submitter will need to have:
School Name, Teacher Name, Team Member Names and Grade Levels

9:20am Testing Begins

11:00am ABC Exhibition Reception

12:00pm ABC Design Awards

12:45pm ABC Bridge Break Awards

Adjustments to this schedule may be made in the event of larger than anticipated participation numbers. Projects selected for the exhibition at the library are entered into an informal design competition.

BRIDGE DESIGN IDEAS FORM PAGE 1

PROGRAMMING

Our bridge is located _____
(in a city, the suburbs, a rural area, a park, a forest, etc.)

The bridge crosses over_____
(a valley, river, etc. if a real place, say where.)

_____

_____ will travel across the bridge.
(who / what)

GREEN DESIGN SOLUTIONS:

As a team, review your client's main sacred space ideas after the interview:

SITE (Protect & work with the natural environment)

_____

_____

WATER (Collect, use and protect wisely)

_____

_____

ENERGY (Generate without fossil fuels & Use less)

_____

_____

MATERIALS & RESOURCES (Safe, Efficent, Recycled, Recyclable)

_____

_____

ENVIRONMENTAL QUALITY (Make healthy on the inside)

_____

_____

Topography (hills, valleys, distance):

How long is your span? _____

Will your bridge need support in the middle?_____

How wide does your bridge need to be to serve its traffic (the 'who' you filled in above) _____

Bridge Types: (Circle one or more types to incorporate in your design.)
Beam Arch Truss Suspension Cable-stayed

What materials will your bridge be made of? _____

_____

BRIDGE DESIGN IDEAS FORM PAGE 2

Starting your Story Board:

1) Find several examples of your selected bridge type(s) for your storyboard.
2) Sketch a view of your bridge from above (plan) (7-12th graders, your plans should be to scale)
   THEN, each team member should draw their ideas for what the bridge would look like from the side (elevation). Decide as a team if one or a combination of more than one design is the direction your team should go.
3) Find images of the materials your bridge will be made of, the kinds of traffic that will use the bridge, photos of the location (if it's a real place) or photos of places LIKE the fictional location you are creating. Don't forget images of bridges at night and in the daytime!

Peer Presentation:

Record comments from your classmates, teacher, and other invited guests. Use additional pages as necessary.

After your presentation, go back through your notes as a team and highlight the comments you will incorporate into the design.

Give your bridge project a title!

PROJECT TITLE:_____

Project Description (for your exhibit card)

On a separate page (or on the computer), use the above information as a starting point for writing your project description. It should be approximately 300 – 500 words, and highlight your major programming needs, resulting design decisions, and green solutions.

BRIDGE BREAK

The **ABC 2012: BRIDGE project** includes an optional structural bridge break contest open to students in grades 7 – 12. Classes may elect to enter both a design model and a balsa bridge, or choose one of the two tracts. (Reminder: Bridge Break submissions are NOT on display for the exhibition and only brought to the Library the morning of April 14.) Submissions from student design teams embarking on the Bridge Break Track shall follow the rules and performance requirements as set forth below. The requirements and testing procedures have been adapted from Notre Dame Regional Secondary School, Vancouver, BC, Canada as found on their program page at www.balsabridge.com. Variations we have made from the published rules and restrictions are highlighted in red.

Purchase of MATERIALS for the balsa bridge break are the sole responsibility of teachers and/or students. Materials may be purchased from any number of hardware or craft stores including Hobby Lobby, Lowes, Home Depot, and ACE Hardware. It is expected that the average bridge design will require approximately $5-8 in balsa pieces.

BALSA BRIDGE BREAK COMPETITION RULES

Scoring: Before testing, bridges will be awarded points for each requirement as indicated, for a maximum of 50 points. The goal of testing is to maximize the weight-of-bridge/weight-held ratio, to be rounded up to the nearest .1 percent. In the case of a weight ratio tie, points awarded will come into play. Prizes will be awarded to the top three bridges in the 7-8 and 9-12 grade levels.

Bridge Construction Restrictions

1. Materials used in the construction of the bridge shall consist of only commercially available rectangular **balsa stock**, **wood glue and 100% cotton string. (5 points)**

2. The total mass of the bridge must not exceed 100.0 grams (g). **(5 points)**

3. The bridge shall contain **no element wider than 1.0 cm (3/0") nor thicker than 0.65 cm (1/4")**. Two or more elements, each separately meeting this requirement, may be laminated together to construct members exceeding these dimensions. **(5 points)**

4. The bridge shall allow a **5.0 cm cube to pass underneath** without touching the structure. The bridge shall also allow a **40.0 cm long by 2.0 cm high board to slide underneath** (sideways) without touching the structure. **(5 points)**

5. The bridge shall be "free standing". **(5 points)**

6. An approximately level, **smooth roadway surface**, of **minimum length 40.0 cm** and above the 5.0 cm mark, shall be provided, across which a small metal car (e.g. Matchbox, Hot Wheels) will roll when given a single, light push of the hand. This roadway shall have a **minimum width of 5.0 cm** and shall **allow a 5.0 cm cube to pass freely** along its extent. Note: the roadway materials must conform to rule #3. **(10 points)**

7. No fastening mechanism except mechanical interlock of the balsa pieces or commercial glue is permitted. **If string is employed (in the case of suspension or cable-stay designs), it may only serve as it's own connection, and not be a part of connections between balsa members. (5 points)**

8. The bridge design shall allow the **'standard test frame'** to be placed on the roadway surface with the load support rod(s) extending beyond the bridge sides. **(10 points)**

Bridge Testing

1. The bridge pedestals shall be placed on level surfaces separated by approximately 35 cm. These surfaces shall be level with respect to each other.
2. The standard 'test frame' will be placed on the roadway over the center of the bridge span. Depending on the bridge design, the load applied to the bridge shall either be suspended from a single ½" diameter rod placed in the center slot of the test frame, or from two such rods placed in the outer slots. Where either option will work, the judge(s) shall decide on the method to be used.
3. A container shall be suspended from the load-supporting frame. To this container (which may be pre-weighted with steel weights as warranted in the opinion of the judge(s)), **dry sand and/or steel weights shall be added at a slow, steady rate, until either an audible cracking sound together with visual evidence indicates the failure of some structural member or a glue joint of the bridge, or until a suitable reference point on the roadway at the center of the span has been lowered by more than 1.0 cm**. A competitor may not participate in the addition of weight to his/her own bridge. All decisions of the judge(s) are final.
4. The total mass of the test frame, container, hanging devices and container contents shall be recorded as the competitor's score.

IF PERFORMING IN-CLASS PRE-TESTING, SEE THE TESTING-ITEMS PAGE FOR CONSTRUCTION OF A 'STANDARD TEST FRAME'. SEE THE BRIDGE-BREAK TRACK IN THE ABC 2012 BRIDGE PROGRAM OUTLINE

BRIDGE BREAK — TESTING ITEMS

If you will be testing in-class and re-building, below is a list of the items you will need:

Standard Test Frame

Ruler

Safety goggles (a pair for everyone nearby)

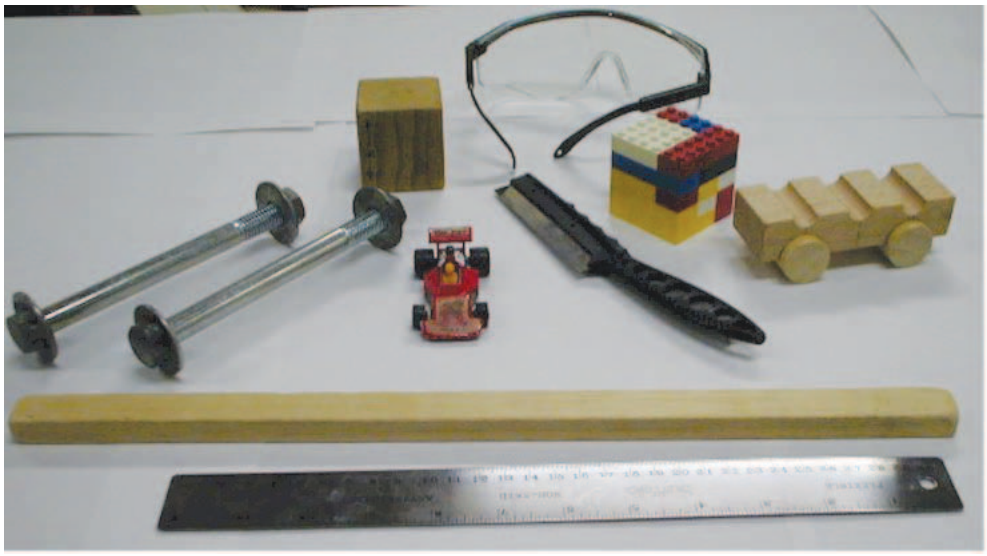
(2) ½" x 10" long bolts w/ (2) washers and 1 nut, each

5 cm X 5 cm block

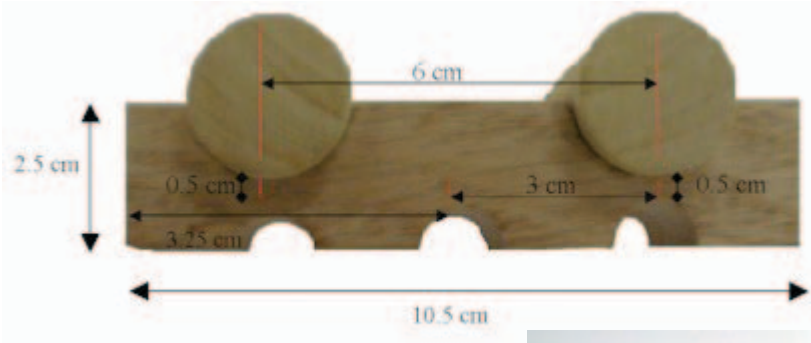
40 cm x 2 cm x 2(+) cm board

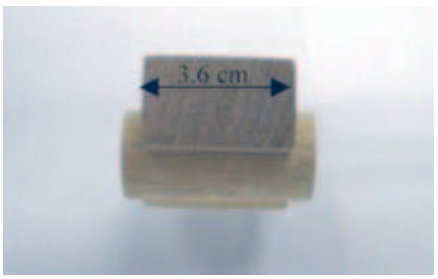
Matchbox Car

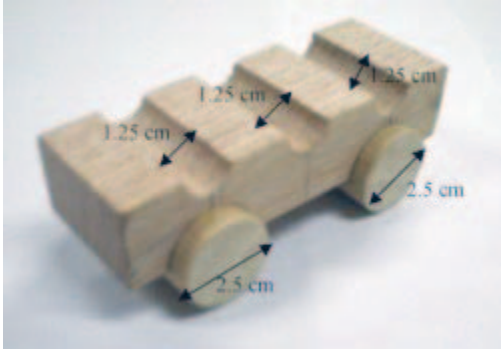
Not shown: Bucket, Wire Hooks, Metal Weights, Dry Sand



Measurements of Standard Test Frame to build your own:







photos courtesy of www.balsabridge.com

BRIDGE BREAK — TIPS AND COMMON MISTAKES

TIPS

1. Use a small balsa wood saw (about $4) instead of an exacto knife to make cuts
2. Cut small notches to connect bridge components
3. Use basic carpenter's glue (yellow wood glue)
4. Yellow glues contain aliphatic resign, used in the majority of winning bridges.
5. Fewer pieces mean fewer problems
6. Keep pedestals (feet) simple
7. Clamp glued pieces for about a half an hour (use protective strips to avoid damaging the balsa). If you don't have clamps, you can use clothes pins. C-type and plastic grip-clamps are inexpensive and available at Home Depot and Lowes.
8. Design for strength at the load application point
9. Construct roadway of thin, narrow strips of balsa
10. Don't glue down ends of roadways – they usually bend upwards under load
11. Use minimal support under roadway, except at load application point.
12. Roadway must support a small Hot-Wheels type car, and be smooth enough to allow it to roll freely across the whole length.
13. Most bridges bend inwards (as viewed from one end); consequently they require horizontal bracing.
14. Double-check that a 40 cm-long board will fit between the pedestals (feet) of your bridge.
15. Double-check that a 5 cm cube will fit underneath your bridge AND along your roadway. You can make a nearly perfect 5cm cube from Lego bricks.
16. Do not cover your bridge with any material. Glue should be used only to JOIN components
17. Use light sandpaper (#150 or higher) to gently clean your bridge and remove excess glue

Common MISTAKES:

1. Using a single sheets of balsa for roadway (solution: cut into strips)
2. Making outside width 5.0 cm instead of inside dimension
3. Making overall length 40 cm instead of SPAN (between pedestals)
4. Forgetting 2.0 cm height requirement at 40cm width
5. Not allowing room for horizontal bars to sit on the test frame.