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| <b>Title:</b>  | <b>Connecting Downtown</b>  |
| <b>Author:</b><br><b>Organization:</b><br><b>Location:</b> | Michael Gray<br>Child and Youth Friendly Calgary<br>Calgary, Alberta, Canada  |
| <b>Grade Level:</b>  | 3 – 6   |
| <b>Time Allotment:</b>                                     | Three class sessions (75 minutes each) <ul style="list-style-type: none"> <li>• One class on discovering integrated walkways systems using Calgary's <i>Plus 15</i> system as an example.</li> <li>• One class on building a model of a large office tower.</li> <li>• The final class on designing and building a model of an integrated walkway system connecting two buildings.</li> </ul>   |
| <b>Overview:</b>   | <p>This lesson plan is designed to study how engineering and design can make cities more efficient places. In many large cities around the world pedestrian walkway systems are going above and beyond standard sidewalks. This lesson plan will begin with a brief discussion on how people get around in large urban cores. The discussion can move into the concept of elevated or underground walkways between large buildings in close proximity and why we would build these types of walkways.</p> <p>The class can use the Calgary <i>Plus 15</i> system as an example to study; Web sites as well as pictures are available.</p> <p>Following a background discussion on integrated walkway systems, the class can design and create their own walkway system by having the students break into building teams so that they may build an office tower. Once the students have built their office towers, ask the students to pick a building they would like to connect to. The students will then proceed to work with a larger team in designing and constructing an integrated walkway connection between the two buildings.</p> <p><b>What are Integrated Walkway Systems?</b><br/>Integrated Walkway Systems (IPWs) are like highways and roads for automobiles except that they are designed for pedestrians and are predominately enclosed with temperature controls. IPWs come in many different sizes and shapes. The bulk of the building of IPWs began in the 1970's when office towers and large buildings were being constructed.</p> <p>Architects during the 1970's were looking at ways in which</p> |

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|                             | people could travel from one building to another without having to go outside, especially in cities that have extremely cold winters or hot summers. IPWs are not <i>always</i> designed as a connection between buildings above ground. In some cases IPW's are built underground. However, because of the high cost of building underground tunnels, many IPWs are built as bridges or skywalks.   |
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| <b>Subject Matter:</b>      | Mathematics, Social Studies (Urban Planning, Team Work, Negotiation Skills)  |
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| <b>Learning Objectives:</b> | <ul style="list-style-type: none"> <li>• Students will learn about integrated pedestrian walkway systems</li> <li>• Students will discover the reasoning behind integrated walkway systems</li> <li>• Students will work in teams creating models of buildings</li> <li>• Students will work in teams in designing and building an integrated walkway system between model buildings</li> </ul>  |
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| <b>Standards:</b>           | <b>Alberta (Canada) Social Science Curriculum for Grade 3</b><br><a href="http://www.learning.gov.ab.ca/k_12/curriculum/bySubject/">http://www.learning.gov.ab.ca/k_12/curriculum/bySubject/</a> <ul style="list-style-type: none"> <li>• Building with a variety of materials</li> <li>• Testing Materials and Designs</li> </ul>   |
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| <b>CUBE components:</b>     | <b>Structural Design Challenges</b> by Jan Ham (1996)<br><b>Community Connections</b><br><b>Box City</b> (additional)  |
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| <b>Materials:</b>           | For Buildings: <ul style="list-style-type: none"> <li>• Cardboard boxes</li> <li>• Toilet/paper towel tubes</li> <li>• Construction paper (for doors/windows and possible wrap for building)</li> <li>• Glue or hot glue gun</li> <li>• Scissors</li> <li>• Rulers</li> </ul><br>For Integrated Walkway Systems <ul style="list-style-type: none"> <li>• Cardboard</li> <li>• Plastic Drinking straws</li> <li>• Playdoh</li> <li>• Tape and glue</li> <li>• Paper clips</li> <li>• Popsicle sticks</li> <li>• Construction paper</li> </ul> |

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| <p><b>Prep for Teachers:</b></p> | <p>1) Background material on Calgary's <i>Plus 15</i> system is available on the Internet at these URL's.<br/> <a href="http://www.calgaryplus.ca/feature/221/index.html">http://www.calgaryplus.ca/feature/221/index.html</a><br/> <a href="http://www.gov.calgary.ab.ca/planning/land_use_planning/plus_15/index.html">http://www.gov.calgary.ab.ca/planning/land_use_planning/plus_15/index.html</a> (information and map are available at this Internet site)</p> <p>There are a number of pictures of Integrated Pedestrian Walkways (IPW) bridges on the Internet but it is easier to search for images of major cities and find the bridges in the background of pictures than by searching for the bridges themselves. <b>Some examples of these pictures can be found at the Lesson Images link on the Connecting Downtown index page.</b></p> <p>When searching try using different wording for searches such as skywalks, pedestrian bridges, downtown walkways, walkway bridges.</p> <p>Some sites that have pictures of IPWs.</p> <ul style="list-style-type: none"> <li>• <a href="http://www.city.winnipeg.mb.ca/extreme/city_of_extremes/excellenttraffic.htm">http://www.city.winnipeg.mb.ca/extreme/city_of_extremes/excellenttraffic.htm</a></li> <li>• <a href="http://www.rentcanada.com/cityscape/skywalk.jpg">http://www.rentcanada.com/cityscape/skywalk.jpg</a></li> <li>• <a href="http://www.swgc.mun.ca/tours/arts_sciences_tour.html">http://www.swgc.mun.ca/tours/arts_sciences_tour.html</a></li> </ul> <p>Some sites for IPWs</p> <ul style="list-style-type: none"> <li>• <a href="http://167.142.103.203/310.html">http://167.142.103.203/310.html</a> (<i>Des Moines. Iowa</i>)</li> <li>• <a href="http://www.flint.umich.edu/home/tour/bsky.htm">http://www.flint.umich.edu/home/tour/bsky.htm</a> (<i>Flint, Michigan</i>)</li> <li>• <a href="http://www.kcconvention.com/3_facility/3a15_parking.htm">http://www.kcconvention.com/3_facility/3a15_parking.htm</a> (<i>Kansas City, Missouri</i>)</li> <li>• <a href="http://www.emich.edu/public/geo/557book/d364.skywalks.html">http://www.emich.edu/public/geo/557book/d364.skywalks.html</a> (<i>Minneapolis/St. Paul</i>)</li> </ul> <p>2) For the <i>Office Tower Building Contest</i> you will need to have a number of boxes available as well as all of the building materials prior to beginning this section of the lesson plan.</p> <p>3) After the office towers have been built, and prior to the integrated walkway building class, number each of the buildings with a Post-It note. Create a list of teams that will be working together e.g. team 1 with team 16, team 2 with team 15, and so forth.</p> <p><b>Optional</b></p> |
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|                                      | <p>4) Ask the Vice-Principal or the Principal of the school to play the role of the wealthy Canadian Oil Company. Create a time when the students will present their final buildings with the integrated walkway system attached. The winner of the competition can be announced if the teacher decides to do so.</p>  |
| <p><b>Introductory Activity:</b></p> | <p><b>Background on Integrated Pedestrian Walkway systems</b><br/> Integrated Pedestrian Walkways are common in most major cities in North America and Europe. However they are more common in northern climates (Canada and Northern Europe).</p> <ul style="list-style-type: none"> <li>• Ask the students why they would be more common in Northern climates? IPWs are designed to allow pedestrians to walk from one building to another. There are many different types of IPWs.</li> <li>• Ask the students ways that people could get from one building to another. List these on the board.</li> <li>• Discuss some of the observations.</li> <li>• Is an IPW good or needed in your city? What are the benefits and disadvantages? What about local merchants at street level, etc.?</li> <li>• Do we need every aspect of our lives to be climate controlled?</li> </ul> <p>Inform the students that the largest IPW in the world is located in Calgary, Alberta Canada. (If you have a map point out the city.)</p> <p>The system is called the <i>Plus 15</i> (called that because the bridges are 15 feet above the street) and it has been around for almost 30 years.</p> <p>The <i>Plus 15</i> currently has 57 bridges and 15 kilometers (9.3 miles) of public walkways.</p> <ul style="list-style-type: none"> <li>• <a href="http://www.calgaryplus.ca/feature/221/index.html">http://www.calgaryplus.ca/feature/221/index.html</a></li> <li>• <a href="http://www.gov.calgary.ab.ca/planning/land_use_planning/plus_15/index.html">http://www.gov.calgary.ab.ca/planning/land_use_planning/plus_15/index.html</a></li> </ul> |
| <p><b>Learning Activity:</b></p>     | <p><b>Office Tower Building Contest</b><br/> Have the students pair off into teams of two or three. Explain to the teams that they are to pretend that each of their teams are an architecture firm. A wealthy Canadian oil Company wants each of the firms to build a model of an office tower. This is a <i>competition</i> and only one model will win the multi-million dollar contract (you may hype this up as much as you want). Have the students construct an office tower using the supplies you provide. Allow the students to build however tall a building that</p>   |

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|                                     | <p>they want with the exception that it must be free standing. Remind the students that this is a <i>design</i> contest not a <i>tallest</i> building contest. They must finish their building by the end of the allocated class time.</p> <p><b>Additional Math Component</b><br/>         If you want to integrate scale into the project you may refer to the <b>Box City</b> curriculum section on scale. In addition, commercial building drawings are drawn in <math>\frac{1}{8}</math>" scale (1" is equal to 8'). Have the students construct their buildings using this scale. Hint—most floors on office buildings are an average of 12' high.</p>  |
| <p><b>Culminating Activity:</b></p> | <p><b>Integrated Walkway</b><br/>         In the next class, after the model towers have been built, have the students pair off into their architecture teams. Announce that the Canadian Oil firm has struck it rich in wind power and now needs to build another office tower. However, since there are so many great designs already built, the decision will be made based upon the following design requirements.</p> <ul style="list-style-type: none"> <li>• The oil company requires an integrated walkway system between the two office buildings because of the cold Canadian winters.</li> <li>• The walkway system must connect the two buildings at or about the third floors.</li> <li>• Explain to the students that each firm must team up with another to compete for the competition. Inform the teams that the following teams will work together with their buildings (use list created before class).</li> </ul> <p>Allow the students the class time to build a connection between the two buildings</p> <p>You may display the projects in the classroom or in another section of the school for other students to investigate.</p> <p><b>Optional</b></p> <ol style="list-style-type: none"> <li>1) Once the integrated walkway systems are completed, inform the students that a representative from the Canadian Oil Company will be by shortly to judge the designs. Once that person is in the classroom, have them tour each of the designs and ensure that the students present their ideas.</li> <li>2) Adding more to this project is not difficult. The students can write-up their design features and place on the models for people to read.</li> </ol> |

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|  | 3) Not all IPWs are connection between two buildings, some have three to four connections. The students could connect three or four buildings.  |
| <b>Evaluation/<br/>Teacher<br/>Reflection:</b> | <p>This project is a design project and therefore can be evaluated as a design project.</p> <p>A) Define the design problem:</p> <ul style="list-style-type: none"> <li>• Whom are we designing for?</li> <li>• With what materials?</li> <li>• When should we be done?</li> <li>• Where will the final product end up?</li> <li>• Why are we doing this?</li> </ul> <p>B) At the end of the project ask the students:</p> <ul style="list-style-type: none"> <li>• Did you solve the stated design problem?</li> <li>• How well did you solve it?</li> <li>• What was the biggest challenge your team faced?</li> <li>• How did your team overcome the challenge?</li> <li>• What was the most important thing you learned from this project?</li> </ul> |
| <b>Cross<br/>Curricular<br/>Extensions:</b>    | This lesson plan can be integrate into the <b>Box City</b> program as well as the science curriculum for bridges.   |
| <b>Community<br/>Connections:</b>              | The community can be involved in this lesson plan by asking local engineers and planners to come to class to assist in designing and possibly playing the role of the Canadian Oil Company.   |



Picture 1 - Two Plus 15 bridges in Calgary. The one in the foreground is an enclosed glass bridge. The bridge in the background is an open bridge with a canopy protecting its users from rain and such but is not heated.



Picture 2 - This Plus 15 bridge in Calgary actually has three stories and is completely glassed in.



Picture 3 - Winnipeg is a city in Manitoba, Canada and it also has an IPW in it's downtown connecting a number of buildings.  
[http://www.city.winnipeg.mb.ca/extreme/city\\_of\\_extremes/excellenttraffic.htm](http://www.city.winnipeg.mb.ca/extreme/city_of_extremes/excellenttraffic.htm)



Picture 4- Another IPW in Winnipeg.  
<http://www.rentcanada.com/cityscape/skywalk.jpg>



Picture 5 - An IPW at Memorial University in Newfoundland, Canada.

[http://www.swgc.mun.ca/tours/arts\\_sciences\\_tour.html](http://www.swgc.mun.ca/tours/arts_sciences_tour.html)



Picture 6 - An IPW in Spokane Washington.

[http://www.swgc.mun.ca/tours/arts\\_sciences\\_tour.html](http://www.swgc.mun.ca/tours/arts_sciences_tour.html)



Picture 7 - An IPW at St. Luke's Hospital in Cedar Rapids, Iowa.

[http://www.swgc.mun.ca/tours/arts\\_sciences\\_tour.html](http://www.swgc.mun.ca/tours/arts_sciences_tour.html)



Picture 8 - An IPW in Ballston, Virginia.

<http://www.beyonddc.com/cities/ballston.html>

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Picture 9 - Eaton's Center IPW in Toronto,  
Ontario. Canada.

[http://www.swgc.mun.ca/tours/arts\\_sciences\\_tour.html](http://www.swgc.mun.ca/tours/arts_sciences_tour.html)

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