**K-12 Student Outreach**

**6.3** **Watertown Competition – Montana Section**

|  |  |  |
| --- | --- | --- |
| **1. Section, Branch** | Montana Section |  |
| **2. Section/Branch Size** | Medium |  |
| **3. Project Contact** |  | |
| Name | Pat White | |
| Phone Number | (406) 896-6253 | |
| Email | patrickjw.white@gmail.com | |
| **4. Project Category** | K-12 Student Outreach | |
| **5. Project Description** | Watertown, an outreach activity that fits well in 4-5 grade but can also easily be used in lower and higher grades. | |
| **6. The Process**  (What you did, When and How) | We contact schools to ask if we can come and visit their 4-5 graders and talk about engineering and let the students do some hands-on exercises that allows them to get a brief insight into what engineers do. | |
| **7. Those in Charge** (Committee, Task Committee, Etc.) | We have an outreach committee in the Billings Engineers club, through which ASCE members in Billings do most of their activities. The committee is headed by Jarred Harris [HarrisT@ci.billings.mt.us.](mailto:HarrisT@ci.billings.mt.us) Tor Anderzen has worked with various student chapters in Region 8 to spread this activity. | |
| **8. Time Frame**  (When Started, When Completed) | We typically do this exercise in the spring, but in conversation with the best time of year can be determined. Spring tends to be busy, so fall may be a better time. | |
| **9. Success Factors**  (The Parts that Worked Really Well) | The mat allows the students to design the system and test it themselves. | |
| **10. Setback Factors**  (The Parts that did Not Work Well) | Giving the students too much time will make you lose their interest, so while we usually give the groups about 10 minutes or so, improvising is essential. | |
| **11. Creativity**  (This is something off the wall that we did) | Watertown was a competition event at the Regional Student chapter competitions in Helena 2009. While this outreach event is much geared to grades around 4-5, we modified the concept to be challenging at College level. | |
| **12. Administration**  (What was most Important?) | Early planning with the Schools and allowing them to set the schedule. Follow up with the schools a few weeks before the event to ensure that the planned day still will work. Ensure that the engineers that are doing the class visits are comfortable with the concepts that come into play in the distribution of drinking water. | |
| **13. Follow-Up**  (What was most important?) | Check in with the teachers of the classes you visited about a week later to get their comments and hopefully also request to return next year. | |
| **14. Recommendations**  (What you should ALWAYS do with this project?) | Bring the topic home to the students by talking about how they use engineered water in their lives. Invite the students’ questions and comments. Make them part of the event and make them excited about science in general and engineering in particular. | |
| **15. Cautions**  (What you should NEVER do with this project?) | Talk above the students’ heads. | |
| **16. The Outcome** | When we visit schools we often hear “We did that in 5th grade - that was cool.” Or “I remember when we did that, can I try again?” | |
| **17. Ongoing Activity**  (Would you do it again?) | Yes, Billings Engineers Club has been doing this and other outreach activities for over ten years, I’m on my third year and I love the interaction with the students. | |
| **18. Speaker Contact Information**  (person from your Region who would be willing to speak about the Best Practice) |  | |
| Name |  | |
| Address |  | |
| Phone Number |  | |
| Email |  | |
| **19. Additional Comments** | This Best Practice includes the following attachments:   * Materials list * Event Instructions | |

Watertown outreach setup

Attached material list is based on two setups.

The mat is a play rug, search Amazon for play rug, you may not find exactly what we used. Go for a rug with as rectangular streets as possible, easier to route waterlines.

We used 5/8” OD tubing for all pipes. The 1/2“fittings slip into the tubing nicely.

For a fountain we used a basic showerhead, connected to a 90-degree bend with one end threaded.

For the water tower we used a cereal container with flat sides, which makes it easier to drill a hole and attach the fittings at the base.

We used a 3/8” brass bushing inside the tank, connected to a 3/8” to 1/4” plastic coupler, a #9 O-ring fits snugly and with some Teflon tape the connection should not leak.

From the tank we used 1/4” OD tubing to a 1/4” valve, so the water can be connected but not on during assembly.

The valve is then connected to another 1/4” to 3/8” coupling. This is the end of the preassembled water tank. The 5/8” tubing fits nicely over the threaded 3/8” end of the tank assembly, but can be secured with a clamp if so desired.

Cut the 5/8” tubing into three 4”, three 6”, five 8”, and five 10” segments. Watertown outreach event (Best done outdoors):

Typically, this is aimed at 4th to 6th grade students.

We take 10 to 20 students at a time. Separating girls to one group may allow more girls to participate actively. As often as not it will not matter if the kids are from the same class.

Before students arrive, lay out mat and supplies; fill the water tanks and the 5 gallons pail with water. The event takes about 15 to 20 minutes.

We give a short presentation of what a municipal engineer does. (Try to invite to dialogue rather than giving a speech, encourage questions from the students).

We talk about the fact that tap water is engineered and what all goes into getting water from the source to costumer, water treatment at the source, distribution system from tank/tower to costumer etc.

We also give a short summary of the benefits to placing utility lines within public Right of Way (under streets); accessibility, no need for easement from land owners etc.

Then we set them the task to find a spot for a water tower and to build piping from the tank to 3 different costumers (depending on what your play rug looks like this will differ) evenly spread over the mat. The fourth delivery point will be a fountain placed in a park etc. that is where the showerhead goes. Except for the fountain, all delivery points are plugged.

Once both groups are done we gather around the mats and allow one of their engineers to turn on the water.

As this happens we talk about the consequences of leakage, and the engineer’s role as inspector during construction.

We ask if there are any additional questions.

Thank the students and their teacher for allowing us to come to their class and tell a little about Civil Engineering.

**WATER TOWN SUPPLY LIST Costs (March 2009)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item  Mat of Watertown | Unit ea | Unit Cost  $43.70 | Quantity 2 | Total  $ 87.40 | Location Amazon.com |
| 5/8" OD Tubing | 10 ft | $7.26 | 2 | $ 14.52 | Home Depot |
| 1/4" OD Tubing | 10 ft | $2.98 | 1 | $ 2.98 | Home Depot |
| 1/2" Tee | ea | $0.80 | 10 | $ 8.00 | Home Depot |
| 1/2" Bend | ea | $0.73 | 10 | $ 7.30 | Home Depot |
| 1/2" Plug | ea | $0.68 | 10 | $ 6.80 | Home Depot |
| 1/2" Coupler | ea | $0.38 | 10 | $ 3.80 | Home Depot |
| 1/4" Valve  1/2" bend for w thread for showerhead | ea  ea | $6.98  $0.92 | 2  2 | $ 13.96  $ 1.84 | Home Depot  Home Depot |
| 5 gallon bucket | ea | $0.00 | 1 | $ 0.00 | SK geotech |
| Teflon Tape | ea | $0.99 | 1 | $ 0.99 | Home Depot |
| 1/4" 3/8" Quick-Connect | ea | $1.85 | 4 | $ 7.40 | Home Depot |
| #9 O-Ring Kit | ea | $1.97 | 1 | $ 1.97 | Home Depot |
| Coupling Nut | ea | $2.02 | 2 | $ 4.04 | Home Depot |
| Clamps | 10 pack | $6.50 | 1 | $ 6.50 | Home Depot |
| Water Tank | ea | $3.24 | 2 | $ 6.48 | Wal-Mart |
| Shower Head | ea | $1.97 | 2 | $ 3.94 | Home Depot |
| Storage Bin (18 gal) | ea | $8.93 | 1 | $ 8.93 | Home Depot |
| 3-drawer storage organizer | ea | $3.49 | 2 | $ 6.98 | Home Depot |
| Pipe storage bin | ea | $0.99 | 2 | $ 1.98 | Home Depot |

TOTAL EXPENDED COSTS $ 195.81