Each year 6th, 7th, and 8th grade students embark on a transformative experience as they ask and answer the question: How can we make the world a better place? From this simple starting point, teams spend four months imagining, researching, designing, and building cities of the future.

www.futurecity.org
What Does DiscoverE Do?

DiscoverE leads a growing volunteer movement that inspires and informs present and future generations to discover engineering. Each year, we host programs (like Future City) and create resources educators and volunteers can use to inspire future engineers.

Visit DiscoverE.org for:

**CLASSROOM ACTIVITIES**
Looking for more hands-on engineering activities to support your work? DiscoverE has over 125 educator-tested and approved activities.

**ENGINEERING VIDEOS**
Show your students engineering in action with our collection of videos.

**ENGINEERS WEEK (FEBRUARY 18–24, 2018)**
Engineers Week is a time to celebrate how engineers make a difference in the world. Order the Volunteer Kit and receive two new engineering activities, bookmarks, and a colorful Engineers Week poster you can hang in your classroom or after-school club.

**INTRODUCE A GIRL TO ENGINEERING DAY (FEBRUARY 22, 2018)**
Invite a female engineer into your classroom or after-school club to talk to your girls (and boys) about how rewarding a career in engineering can be.

**DISCOVER ENGINEERING**
Full of information about engineering careers, this is the first place any student, educator or parent should go to learn more about engineering.

Download the Harmless Holder activity and ask your students to design a soda holder that won’t harm wildlife or pollute.

Future City is a program of DiscoverE.
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##区域协调员列表
Overview

What Is Future City?

Future City is a project-based learning program where students in 6th, 7th, and 8th grades imagine, research, design, and build cities of the future. Keeping the engineering design process and project management front and center, students work in teams to ask and answer an authentic, real-world question: How can we make the world a better place?

Students involved in the Future City Competition spend approximately four months creating cities that could exist at least 100 years in the future. Each city must incorporate a solution to a design challenge that changes each year. This year’s challenge, The Age-Friendly City, asks students to identify an issue older people have and engineer two innovative solutions so they can remain active and independent. In January, students will present their cities before a panel of judges at Regional Competitions throughout the United States, Canada, China, and Egypt. Teams that win their regional competition (United States only) receive airfare and hotel accommodations for five members of their team to attend the Finals held in Washington, DC, in February.

Review Handbook and Website

Understanding the scope of Future City requires educators and mentors to have a firm knowledge of the project itself. Read through the handbook and website (futurecity.org) before presenting the challenge to students. With a solid understanding of what the competition entails, you will be able to successfully lead your team.

Future City started in 1992–1993 in just five cities and with 200 students. Today, 40,000 students around the globe learn how engineers make the world a better place.
The Future City Framework

Three strands form the framework of this project, each supporting and informing the others. The creation of the city via five competition deliverables is the main strand. The other two are the engineering design process and project management. This framework gives the project a real-world structure that both enriches the whole experience of Future City and extends the learning into the students’ academic and professional futures.

Engineering Design

Future City introduces students to the engineering design process. Using this logical series of steps illuminates how engineers approach a problem. As students’ work through the process they will realize they can think like engineers and see themselves as problem solvers. Once they get the hang of the engineering design process by using it to build their future city, students can apply it to all kinds of challenges.

Project Management

In engineering, the success of a project often hinges on proper management of the project goals. Project management is a professional organizing system that focuses on keeping projects and teams coordinated and moving forward. Future City uses a student version of the project management process. It dovetails well with the engineering design process, whose steps fit with the broader phases of project management.

What Educators Are Saying

“With Future City, students research, write, build, think, and work as a team. Of all the clubs at my school, I think it’s the most inclusive of all the things we try to teach our kids.”

— John Boyd, North Carolina Educator

“I love that it is so student centered. They do the research. They do the building. It’s in their hands.”

— Halle Timpson, Tennessee Educator
Create Your Future City

Stages and Steps of Future City

This graphic shows the basic steps for guiding your team through the Future City Competition. Your team may move quickly through some steps and take extra time for others. You can share this graphic with your students by:

- Showing an animated version from Leading Your Team at futurecity.org.
- Downloading and displaying a colorful printout at futurecity.org/resources (filter for Handbook & Student Handouts) for students to refer to as they design their city.
How Does the Competition Work?

Future City is open to kids in grades 6, 7, and 8 who are from the same school, a home school environment, or are members of a nationally, regionally, or state-recognized youth-focused organization, such as the Boy or Girl Scouts, Boys and Girls Clubs, or 4-H. Not sure if your organization qualifies? Contact info@futurecity.org.

The Future City Competition consists of five project deliverables. Teams can earn up to 258 points.

About Due Dates:

Each region sets its own due dates. Check with your Regional Coordinator to find out what your region’s due dates are. At the Regional Competition, scores from all of the deliverables are added together to determine the top team. The first place team in each US region advances to Finals held in Washington, DC (February 17–21, 2018).

<table>
<thead>
<tr>
<th>PROJECT DELIVERABLE</th>
<th>COMPETITION POINTS</th>
<th>DUE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PROJECT PLAN</td>
<td>10 POINTS</td>
<td>DUE ONE WEEK BEFORE THE COMPETITION</td>
</tr>
<tr>
<td></td>
<td>Students complete a Project Plan to help them plan and organize the project. They use it throughout the project.</td>
<td></td>
</tr>
<tr>
<td>2. VIRTUAL CITY</td>
<td>48 POINTS</td>
<td>DUE BEFORE COMPETITION</td>
</tr>
<tr>
<td></td>
<td>Students design a Virtual City using SimCity software and present their city’s progress via a slideshow presentation.</td>
<td></td>
</tr>
<tr>
<td>3. CITY ESSAY</td>
<td>60 POINTS</td>
<td>DUE BEFORE COMPETITION</td>
</tr>
<tr>
<td></td>
<td>Students describe the unique attributes of their city and provide a solution to this year’s challenge: Identify an issue that senior citizens have and engineer two innovative solutions so they can remain active and independent. (1,500 words maximum).</td>
<td></td>
</tr>
<tr>
<td>4. CITY MODEL</td>
<td>70 POINTS</td>
<td>PRESENTED AT THE COMPETITION</td>
</tr>
<tr>
<td></td>
<td>Students build a physical model of a section of their city using recycled materials. In addition to highlighting their city of the future, the City Model must also show the solution to this year’s challenge and include at least one moving part.</td>
<td></td>
</tr>
<tr>
<td>5. CITY PRESENTATION</td>
<td>70 POINTS</td>
<td>PRESENTED AT THE COMPETITION</td>
</tr>
<tr>
<td></td>
<td>Students give a 7-minute presentation discussing features of their future city and their solution to the challenge, followed by a 5-8 minute question and answer period with the judges.</td>
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</tbody>
</table>

ONLINE SUBMISSION PROCEDURES

All teams must submit their Virtual City, City Essay, and Project Plan via the online submission center at futurecity.org. Submission instructions are available from your Regional Coordinator or at futurecity.org/resources (filter for Competition Forms & Project Plan).
Can I Still Do Future City Without Competing?

Yes! Future City is first and foremost a Science, Technology, Engineering, Art, and Math (STEAM) program. Educators, parents, and mentors are encouraged to adapt Future City to match their particular goals. Over the years, educators and mentors have used the Virtual City to teach city planning, the City Essay to strengthen research and writing skills, and the City Model to understand scale and city planning.

Future City Aligns with Academic Standards

Go to futurecity.org/resources (filter for Standards) and download PDFs showcasing how Future City aligns with:
- Common Core State Standards
- Next Generation Science Standards
- Benchmarks for Science Literacy
- National Education Technology Standards
- Principles and Standards for School Mathematics
- Performance Indicators for Technology-Literate Students

Future City Curriculum Connections & 21st-Century Skill Development

<table>
<thead>
<tr>
<th>COMPETITION DELIVERABLES</th>
<th>Math</th>
<th>Science</th>
<th>Art</th>
<th>Research</th>
<th>Writing</th>
<th>Civics/City Planning</th>
<th>Public Speaking</th>
<th>Engineering Design Process</th>
<th>Problem Solving</th>
<th>Teamwork</th>
<th>Project Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECT PLAN</td>
<td></td>
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<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
<td></td>
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<tr>
<td>Complete project plan to stay organized and focused throughout the project.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>VIRTUAL CITY</td>
<td>✔</td>
<td>✔</td>
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<td>✔</td>
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<td>✔</td>
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<tr>
<td>Use SimCity software to experiment with city design and development.</td>
<td>✔</td>
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<td>✔</td>
</tr>
<tr>
<td>CITY ESSAY</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Describe your city and solution to a citywide sustainability issue.</td>
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<td>✔</td>
<td>✔</td>
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<td>✔</td>
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<td>✔</td>
</tr>
<tr>
<td>CITY MODEL</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td>✔</td>
<td>✔</td>
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</tr>
<tr>
<td>Build a scale model using recycled materials.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td>✔</td>
<td>✔</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>CITY PRESENTATION</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td>✔</td>
<td>✔</td>
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<tr>
<td>Present your city to a panel of judges at your regional competition.</td>
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<td>✔</td>
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</tr>
</tbody>
</table>
Community and Impact

An evaluation (conducted by Concord Evaluation Group in 2015–2016) found that Future City is delivering on its educational promise.

Students Build 21st-Century Skills

Educators, mentors, and parents agree Future City is strengthening students’ skills.

<table>
<thead>
<tr>
<th></th>
<th>Educators</th>
<th>Mentors</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teamwork</td>
<td>94%</td>
<td>94%</td>
<td>94%</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>90%</td>
<td>84%</td>
<td>92%</td>
</tr>
<tr>
<td>Public Speaking</td>
<td>89%</td>
<td>92%</td>
<td>85%</td>
</tr>
<tr>
<td>Writing &amp; Research</td>
<td>85%</td>
<td>86%</td>
<td>78%</td>
</tr>
<tr>
<td>Time Management</td>
<td>80%</td>
<td>77%</td>
<td>81%</td>
</tr>
</tbody>
</table>

Students Learn Value of Math, Science, and More

- 85% now see math and science as important to their future.
- 57% said Future City helped them in their other classes.

Students Discover Engineering

- 83% reported they learned how to use engineering to solve real-world problems.
- 80% reported that Future City helped them learn the value of project planning.
- 68% said Future City helped them see themselves as engineers someday.
- 69% said Future City made them want to keep doing other engineering clubs or activities.

Student Confidence Soars

- 75% said Future City boosted their self-confidence.
- 85% said Future City taught them they could create something on their own—without the direction of an adult.
- 68% report Future City gave them a place where they fit in.

Students Learn How Their Communities Work

- 85% report that Future City helped them learn how cities work.
- 89% reported that Future City helped them appreciate all of the engineering that goes into a city.
- 73% reported they are more aware of civic issues like politics and taxes.

2017 Alumna of the Year

Amira Gabr

Amira participated in Egypt’s Future City Competition in 2011. The experience inspired her to think about innovative new solutions to the world’s problems. She now studies biotechnology at St. Cloud University in Minnesota. Her ultimate goal is to use biotechnology and biomedical engineering to overcome global health challenges.

Share Your Experiences!

“Like” us on Facebook at www.facebook.com/FutureCityCompetition. You’ll get tips and advice throughout the competition and be able to share your Future City experiences with other teams.

Share your experiences and pictures. Use the hashtag #FutureCity2018.
Preparing for the Competition

Prepare to Lead: A To-Do List for the Educator

This checklist is a compilation of the preparatory tasks successful educators do in order to ensure a great Future City experience for all involved—their students and themselves. Check off each box until you’ve completed the list and you can be sure that you’re ready to lead your team!

Getting Started

☐ Read this handbook in its entirety. It gives you a sense of the scope of the project, who you need to be in touch with, how to find key information, and most of all, what the steps are for students to complete the project.

☐ Contact your Regional Coordinator to find out what your regional deadlines are. See if there are any trainings or other ways to check in and get questions answered.

☐ Register your team at futurecity.org/register by October 31, 2017.

REGISTRATION

It only costs $25.00 per organization to register. Participants who register will receive everything they need to successfully implement Future City, including:

- Program handbook
- Curriculum materials (activities, rubrics, worksheets)
- Competition forms and checklists
- SimCity software (up to two codes per registered educator)
- Support from your region, such as training sessions, email updates, and tip sheets

☐ Complete the Home School Affidavit. If you are a home school educator, you will need to complete the Home School Affidavit Form to verify that your home school is operating in accordance with the laws in your state. The form is on page 90, or you can download a writeable PDF version at futurecity.org/resources (filter for Competition Forms & Project Plan).

☐ Create a preliminary schedule to lead your team through each step of the project, leaving time for contacting mentors and having them work with students as well as allowing a little wiggle room to meet the regional competition deadlines.

☐ Contact parents and see who wants to help with specific tasks.

☐ Obtain SimCity codes. You may request up to two codes. You will receive your codes automatically (after July 15, 2017) in the Online Team Center after completing the second step of registration, the Program Details Survey. Note: Additional codes may be requested by emailing info@futurecity.org. Extra codes are not guaranteed.

☐ Meet with your IT department about setting up SimCity and working out any problems with firewalls or other technological roadblocks.

☐ Explore the Future City website carefully by visiting futurecity.org. Bookmark this site on your computer! Take notes on what you want to remember or work on with your students. Spend some time in the resources section. It’s where you can download everything in the handbook (and additional activities) and where you can solidify your understanding of the project.
Preparing for the Competition

Make sufficient copies of student materials, located in Appendix: Deliverables starting on page 40.

Organize your team. Create the team format that works for you and your students. You may have a team of three students or a larger team that accommodates your needs and goals. As you decide what format works for you, review the Team Format Options.

The Website

Futurecity.org is your online destination for:

- **Activities and Background Information**—Use these resources to teach key concepts to your students.
- **Competition Forms**—Download writeable PDF versions of all the competition forms.
- **Gallery**—Get inspired as you view winning models, read City Essays from past winners, and watch student presentations.
- **Leading Your Team**—Learn how project management can help you successfully complete your future city.
- **Online Submission Center**—Upload your Virtual City, City Essay, Project Plan, and all competition forms via the website.
- **Rules & Rubrics**—Download the assessment rubrics and competition rules for reference throughout the competition.

There is a filter system in place in the Resources section that makes finding all of your favorite resources easier.

Choose activities from the Resources section of futurecity.org to introduce students to specific elements of the project, such as infrastructure and scale. This handbook tells you when students should complete an activity. Practicing with concepts and skills before they work on the project is really important so that students can apply what they’ve learned and exercise some judgment and creativity rather than learning on the fly.

Download and copy competition forms; make sure students complete and sign them.

Visit the Gallery section of futurecity.org to see models, essays, and presentations from previous years. It’s a great way to understand what this competition is all about and what successful entries look like.

Gather supplies for the City Model. Stockpile a wide variety of recyclable materials—art supplies, bits of household appliances, paper towel rolls, leftover paint, water bottles, and so on.

Team Format Options

1. **OFFICIAL PRESENTING TEAM**

   The Official Presenting Team is three students, one educator, and one mentor. Future City welcomes teams that are larger than the three presenting students, however, only the three official students are allowed to present at the Regional and Finals Competitions.

2. **MULTIPLE TEAMS**

   An organization is permitted to form multiple teams under the single $25.00 registration fee. If you decide to field multiple teams, please check with your Regional Coordinator about the number of teams an organization is allowed to bring to the Regional Competition. Note: Only the top scoring team from an organization is allowed to advance to the final round of the Regional Competition. See Competition Rule number ten on page 82 for more information.

3. **OTHER TEAM FORMATS**

   Some classrooms or clubs choose to work together as one team, dividing the work into smaller working groups such as a research group or city model group. If you decide to work in this manner, you will need to select three students to serve as the “official presenters” at the Regional Competition.
Find a mentor. Mentors can be engineers, technical professionals, architects, city or urban planners, city managers, or others who work in the engineering and technical community. Parents are a great mentor resource. Ask your students if their parents or relatives are engineers or technicians. Don’t be shy—mentors who participated in a recent survey told us they volunteered because they were asked!

Download Tips for Working with Your Mentor at futurecity.org/resources (filter for Handbook & Student Handouts).

Can’t find a mentor? Contact your Regional Coordinator. Find your Regional Coordinator’s email address on page 95 or visit futurecity.org and click on Find My Region.

Establish a schedule of when the mentor can work with the team.

Mentors Make a Difference

In a recent evaluation, 80% of students said the mentor was important in guiding them through the project, and 53% said the mentor helped them see themselves as an engineer someday!

“The middle schoolers liked running ideas past me and being treated like a colleague. It gave them the sense that what they were doing wasn’t confined to the classroom — it felt like the real-world.”

– Jarom Wagoner, AICP. Mentor from Idaho. Senior Planner for the City of Caldwell
Preparing Your Students

Students will get the most out of Future City if they first develop some familiarity with:

- Engineering and what engineers do
- The engineering design process
- Project management
- Cities: what they are, and how they are put together and planned

Introduce Engineering

What do your students already know about engineers and the different kinds of engineering? Have a conversation to find out.

WHAT IS AN ENGINEER?

A lot of students don’t know much about engineering. If this is true of your students, adapt this script to initiate a conversation about engineers.

🌟 Engineers are changing the world all the time. They dream up creative, practical solutions and work with teams of smart, inspiring people to invent, design, and create things that matter.

🌟 Can you name a few things that engineers have designed or built?

🌟 Engineers protect the planet by developing state-of-the-art recycling systems. They design high-tech running shoes and develop life-saving medical technology to detect early brain tumors.

🌟 Engineers get to work in any field they want to. Do you love music? Engineers design new ways to record it and listen to it. They also design technology so that deaf people can hear. Love cars? Engineers build better, more efficient engines that run on everything from corn husks to electricity. Love babies? Engineers design new instruments to bring babies into the world safely and keep track of how they’re doing before they’re born.

Explore Engineering Fields

Have students do a quick search of the many careers and areas of focus within the engineering field. A good resource is the Discover Engineering section of the DiscoverE.org site. Some of their results should include aerospace, agricultural, bioengineering, biomedical, chemical, civil, computer, electrical, environmental, industrial, manufacturing, materials science, mechanical, nuclear, petroleum, and more!

Learn from Real Engineers

Work with your mentor to provide students with opportunities to learn more about engineering.

- Have students interview different types of engineers and share what they learn with their teammates.
- See engineers in action. Arrange a field trip to an engineer’s office, power plant, water treatment center, local engineering college or university, and other engineering-related workplaces.
- Invite your mentor and other professionals to talk to the students about science, engineering, and technology careers.
- Share current news about projects your mentor or other engineers are working on.

Learn more about engineering at:

- DiscoverE.org/discover-engineering
- Engineeringyourlife.org
- pbs.org/designsquad
Engineering Design Process

When engineers work to answer questions or solve problems, they use a specific approach: the engineering design process. It is a great way to work through any challenge that involves creating something that did not exist before or improving a process or product.

Explore the Engineering Design Process

As kids learn about engineers through discussion, research, and interviews, introduce them to the engineering design process.

Show your students the engineering design process animation at futurecity.org/leading-your-team. Have copies of the “The Engineering Design Process” graphic on hand so you can review it and discuss the various stages. Point out that engineers don’t follow the engineering design process as if it’s a list, with one step followed by another. Instead, it’s cyclical: they may begin at one step and move back and forth between steps numerous times. Download the graphic at futurecity.org/resources (filter for Handbook & Student Handouts).

PRACTICE USING THE ENGINEERING DESIGN PROCESS

Students can practice applying the engineering design process with:

- Tower Building Activity (at futurecity.org/resources filter for Activities & Background)
- Cargo Bridge Game (coolmath-games.com/0-cargo-bridge-2/index.html)

Display a colorful version of this graphic for students to refer to as they design their city. Download at futurecity.org/resources (filter for Handbook & Student Handouts).
Preparing Your Students

Engineering and Teamwork

Teamwork is essential to the engineering design process. Engineers have to be able to communicate accurately and work well with colleagues and clients in order to be effective members of a team. Frequently, the combined ideas of the team lead to the best solutions!

The Tower Building activity (referenced on the previous page) also allows you to introduce the teamwork element of the engineering design process. After you’ve completed the activity, ask: How easy was it to work together? Was there conflict in their group? How did they resolve it?

We have more resources on teambuilding. Go to futurecity.org/resources (filter for Activities & Background Info) for information and activities related to teambuilding.

WATCH MARSHMALLOW CHALLENGE VIDEO

Share the following TED talk with students. In this video, Peter Skillman shares his research after conducting more than 70 Marshmallow Challenges with a variety of participants ranging from lawyers to recent business school graduates. His findings include the importance of prototyping and that having a team with diverse skill sets really matters. He also shares some of the reasons why engineers, architects, and kindergarten students are able to create the tallest, most stable structures!

Marshmallow Challenge video: marshmallowchallenge.com/TED_Talk.html

“Future City helped me realize what it really means to work together as a team.”

— Student Participant
Project Management

In engineering, the success of a project often hinges on proper management of the goals, budget, timeline, and resources. As engineers work to solve problems they incorporate specific project management methods into the engineering design process.

To help students learn this process, the Future City Competition uses a student version of the project management cycle. This version differs slightly from the more detailed project management cycle used by professional project managers and serves as a wonderful introduction to project management.

Project Management Cycle
(Student Version)

As you introduce students to the project management cycle stages, remember that the time spent in each of the stages differs for educators and students.

ABOUT PROJECT MANAGEMENT

Project Management may be a more familiar concept to students than the engineering design process. Deepen students’ understanding by adapting this script to fit your needs.

✶ We all manage projects—students, parents, educators, everybody. Planting a garden, remodeling a kitchen, pulling together a year’s worth of lesson plans—projects are how we get important things done. Engineers manage them too. Project management is a short way of saying all the stuff that we have to do to get from the beginning to the end of a project, like knowing what we want to accomplish, what we’ll need in order to accomplish it, who needs to do what to get there, and by when. The more complicated the project, the more management it takes!

✶ There are four main stages of project management: Define, Plan, Do, and Review. If you know what you need to do in each stage, your project will go more smoothly. Engineers rely on project management because without a system, their projects can go over budget, take too long, or not meet goals. They also might get really confusing. Using project management as you build your future city will show you how useful it is.

Two resources you can use to introduce project management to your students are:

• A project management cycle animation at futurecity.org/leading-your-team.
• The Lego Structures activity at futurecity.org/resources (filter for Activities & Background).
**THE STAGES OF PROJECT MANAGEMENT**

Adapt this script to review the four stages of the project management cycle. As you discuss each stage, ask students if they can give any examples from projects they’ve worked on.

- **Define stage**
  - In the Define stage of project management, we think about what the project consists of. We get a good understanding of the requirements. We learn what the goals are, what the budget is, and the due date. We gather all of the pertinent information about the project.

- **Plan stage**
  - In the Plan stage we create a schedule, assign roles, and decide what materials we need. The Plan stage is critical to the success of the project. The better a project is planned, the more likely it is to go smoothly! For Future City, your Project Plan is a handy place to write down this information. You will probably have to change things as you go and fill in some things later. Plans need to stay flexible but at the same time help you make your deadline.

- **Do stage**
  - The Do stage is where you actually work on the project. It’s where you build, create, fix—whatever the project needs. You have to stay in good communication with your teammates as you accomplish each step. You also keep track of your progress by checking in with each other.

- **Review stage**
  - The Review stage happens once the project is complete. Now is when you share your results, reflect on what you’ve learned, and celebrate.

“By going through the stages, my students learned about all the elements that go into a city: infrastructure, energy, water. They got to see how all these parts make a city work.”

– Michael Coughlin, Massachusetts Educator

**How the Processes Work Together**

Putting these two processes together is a win-win—the engineering design process helps students design their solution to the Future City Competition, and the project management cycle provides the approach they need to get it done.

Each step of the engineering design process aligns with a different stage of the project management cycle. The Future City Competition follows the stages of both processes, serving as a framework to guide students through the competition.

**Your Coaching Role**

In the Future City Competition, educators act as learning coaches. The work itself should be student-led, from the initial brainstorming to their ideas and work. You will spend more time up front planning and students will spend more time in the Do Stage of the competition.

Remind students that you are always available to guide, support, and inspire them. Your role is to facilitate and guide the process, but the project and the deliverables must reflect the work of the students.
Learn About Cities

In order to create cities of the future, students need to understand what a city is. What makes a city a city? What are its underpinnings? Who designs, builds, and maintains cities?

Build students’ background knowledge before they start their Future City projects so that they can approach the work more like professional engineers, with an informed perspective.

Defining a City

First things first: What, exactly, is a city? Work with your students to come up with an informal working definition of a city. Write down their first thoughts on the board.

WHAT IS A CITY?

Get students’ thinking more deeply about what cities really are by adapting this script to fit your style and needs.

Some people think that a city is a place where a lot of people live and work. Others think that it’s a town—which can also be described as a place where a lot of people live and work—only a city is bigger, with more people. You could say that a city is everything inside the border of a particular city’s government. Everyone inside that border votes on what happens in their city. But a lot of times the city has outgrown those borders, or there is just as much urban area surrounding those borders. If you had to say how many people lived in Mumbai, how would you decide where that massive city begins and ends?

Up until about 150 years ago in England, no matter how big your town was, you couldn’t call it a city unless it had a cathedral. England had a lot of enormous towns, with no cathedrals, and tiny cities that did have one. These days England can’t decide exactly how to define a city. They’re not the only ones! Urban planners, the people whose job is to improve cities, don’t have one unified definition of a city either.

And yet, most people agree on certain features that something called a city has to have. Let’s do some research to see how we think we’d define a city.

VIDEO: HOW CITIES CHANGE?

To highlight the concept of how cities change over time, compare the differences between cities 100 years in the past and cities of today. You can show students the 4-minute video Urbanization and the Future of Cities (youtube.com/watch?v=fKnA4JCSGSc), which illustrates how cities developed and ways cities of the future will need to adapt to growing population.

You can also have students do the What Is a City? activity at futurecity.org/resources (filter for Activities & Background Info).

City Features and Infrastructure

Ask students to look at their working definition of the term “city” and apply it to the city where they live (or the one nearest to where they live). Does it fit? Would they tweak their definition, now that they’re thinking about it from the perspective of a city they know?

Next ask students this question: If you had to describe your city to a stranger, what would you say about it? How is it different from other cities? What do you like about it, and what do you not like?

After hearing from several students, note that they’ve just been talking about a city’s features. Features are anything from parks to schools, shopping centers to freeways, neighborhoods to financial districts.

Explain that a lot of thought goes into the placement of specific city features. People who design and plan cities use certain terms to describe the way cities are organized. One of the most important terms for students to understand and use in this project is “infrastructure.” “Infrastructure” can be a hard word to grasp because it’s about parts of a city that most kids don’t think about or even notice.
Adapt this script to lead a discussion about infrastructure.

“Infrastructure” is a term for the structures, systems, and facilities that make a city habitable—that is, a place that has what people need in order to live there. Examples of systems include sewage systems, electrical systems, and transportation systems. Examples of structures include bridges, roads, and government buildings. Examples of facilities include hospitals and schools. You can see why it’s a very important term when we’re talking about cities, even though it’s a hard term to pin down!

Tell students that their future city’s infrastructure will be a very important part of their project. The more they understand about infrastructure, the better.

A great way to help students wrap their heads around infrastructure is to go on a scavenger hunt. Download the Infrastructure Scavenger Hunt Activity at futurecity.org/resources (filter for Activities & Background).

WHO DESIGNS INFRASTRUCTURE?

Engineers and architects design most of a city’s infrastructure. For instance, civil engineers design water and waste systems, electrical engineers design lighting systems, and system engineers design telecommunication systems. What other types of engineers do you think support a city’s infrastructure?

Zoning

Tell students that another important element of city planning is zoning. Zoning refers to the way in which land in a city gets divided up and categorized. Zoning regulations and laws help ensure that a city can grow and change in a manageable, safe, and attractive way.

ZONING

The following script is designed to help you explain the different zoning categories. Before you begin, write on the board: residential, commercial, agricultural, industrial, and mixed use. As you go along, stop and ask students for examples of what they’d expect to find in a particular zone.

City planners work with city officials, engineers, architects, lawyers, and developers to create specific zones for how land will be used within a city. Zones usually fall into one of the following categories:

- A residential zone is where people live. It can be high density, meaning that a lot of people can live in an area, usually in apartment buildings. Or it can be low density, which is usually single-family houses.
- A commercial zone is for stores and restaurants.
- Industrial zones are where factories and power plants are located.
- Agricultural zones feature farms and ranches.
- Mixed use means a blend of zones. City developers sometimes use the same area for residential and commercial zone. An example of mixed use is where you can leave your apartment and have a café, movie theater, clothing store, and grocery store right on your own block.

Have students explore zoning by creating city layouts in the City Zoning activity at futurecity.org/resources (filter for Activities & Background Info).
To dig deeper into zoning, consider the following:

- Show students a zoning map of their city and identify different zones. (Research the city name plus “zoning map” online to find a map of your city or one nearby.)
- Have students research the zoning designation for their home address, school, or other local businesses. Many cities have websites that allow individuals to input a specific address and receive information on the property, which includes its zoning designation. What are some of the different zones? What areas in their own city are considered industrial, commercial, mixed, and/or residential zones?
- Invite guest speakers from your local city planning department to show zoning maps and explain how cities are typically zoned.

**City Planning**

Tell students that zoning is one aspect of planning a city, but there are many others. City planning requires an understanding of all the systems and features that make up a city. City planners are always thinking about how to improve the quality of life in a city by fixing problems and planning how the city can grow and change.

Tell your students that they now have a good amount of background knowledge that they will call upon as they begin researching their future city. But they’ve only scratched the surface of the amazing world of city planning!

**EXPLORE FURTHER:**

**CITY PLANNING**

Visit futurecity.org/resources (filter for Activities & Background Info) and continue exploring city features and the process of city planning:

- City Planning Background Information
- City Planning Key Terms & Concepts
- Brainstorming and Ranking City Features: Explore how infrastructure helps get goods and services to where they are needed.
- People Who Create and Sustain Cities: Learn about the many professionals involved in designing cities.
- City Planning Word Investigation: Research definitions for common city planning words.
- Zones and Interconnectivity: Make basic urban plans for an imaginary city.
- City Planning Game: Learn how to design the placement of city elements within zoning areas.
Identify the Problem

During this first stage of the engineering design process—Identify the Problem—students establish an initial understanding of the scope of the challenge. This stage aligns with the first stage of the project management cycle, known as the Define stage.

Getting Started

Tell students that they are officially prepared to take on the Future City Challenge. They understand:
- what engineers do;
- the engineering design process;
- the project management cycle;
- what cities are, including infrastructure and zoning; and,
- the roles of professionals who plan and build cities.

They’ve formed their teams. They are ready to start!

On the Create Your Future City graphic, point to the very first bullet: Understand the challenge. Ask students what phase of the project management cycle they are in and then what step of the engineering design process they are in. These questions orient students to how the two systems work together.

Download the graphic at futurecity.org/resources (filter for Handbook & Student handouts).
THE FUTURE CITY CHALLENGE

Introduce Future City by adapting this script to fit your style.

✦ Every year, middle school students dream up cities that could exist 100 years from now. They design their cities in response to the question: How can we make the world a better place?

✦ You will create a city 100 years in the future. Your particular challenge is to identify an issue senior citizens have in your city and engineer two solutions to keep them active and independent.

✦ First you’ll do some research about cities. For example, you’ll research transportation systems, energy systems, and dig deeper into infrastructure and zoning. You’ll also research issues that affect older people and what solutions engineers are creating. You’ll learn more about city design with SimCity. With your team, you’ll envision your own city of the future. You’ll describe this city in detail in an essay. You’ll build a three-dimensional model of it. And you’ll present your city at the competition.

✦ Who will work with you on this project? Your team members, me (the educator), and our mentor. [Give kids the name and some background on your mentor, or have your mentor introduce him or herself, if present.]

✦ What do you have to make for this project? These are called deliverables, or the things you have to produce that will be judged for the competition. Deliverables are like assignments that you hand in. For this project there are five deliverables:

- **A Project Plan**—you will create a Project Plan to help you plan and organize your project.
- **A Virtual City**—you will design a city using SimCity software and present your city’s progress via a slideshow presentation.
- **A City Essay**—you will describe the unique attributes of your city and share your two engineered solutions for keeping older people active and independent.
- **A City Model**—you will build a scale model of your city using recycled materials and incorporating at least one moving part.
- **A City Presentation**—you will present your city to a panel of judges at the regional competition.

Know, Want to Know, Learned

The kids may have a lot of questions at this point. You can help them organize their thoughts by asking the team to make a chart with three columns: Know, Want to Know, Learned. (You may recognize this as the classic K-W-L chart.)

<table>
<thead>
<tr>
<th>Know</th>
<th>Want to Know</th>
<th>Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cities have large populations of older adults.</td>
<td>What issues keep them from being active and independent?</td>
<td>Many older people have difficulty remembering to take their medicine and this affects their health.</td>
</tr>
</tbody>
</table>

Ask the kids to write down everything they know about the project in the first column; this will help them retain what you just told them and what they’ve learned about cities. Then have them write down every single question they can think of. Once it looks as if the team has lots of questions, hold a discussion in which some of the questions are answered. Tell kids to write down any answers in the third column, across from the question.

Many of their questions will be answered in the very next phase of the engineering design process: Learn the Specs. Tell kids to keep their charts handy so they can keep filling in answers to questions (and thinking up more).
Learn the Specs

In the Learn the Specs stage of the engineering design process, students carefully review the competition requirements and learn about the specific characteristics that each deliverable must meet. They’ll also identify resources, constraints, assumptions, and goals as part of their Project Plan.

Future City Deliverables

The following five items are all required deliverables of the Future City Competition (detailed information about all of the deliverables can be found in Appendix: Deliverables starting on page 40).

Deliverable 1: Project Plan

Made up of four parts, the Project Plan will help students stay organized, focused, and on schedule as they complete their other Future City project deliverables. The four parts are:

- **Part 1: Set Goals**
  - Completed during the Define: Learn the Specs stage, students describe what they hope to achieve by the end of the project.

- **Part 2: Create a Schedule**
  - Completed during the Plan: Design It stage, students plan how they’ll complete each deliverable.

- **Part 3: Conduct Check-Ins**
  - Completed during the Do: Build It & Test, Improve, Redesign stage, students monitor their project’s progress to keep on schedule, meet their goals, and see where the plan needs tweaking.

- **Part 4: Reflect on the Project**
  - Completed in the Review: Share it stage, students reflect on what they did and how they did it.

Unlike the other Future City deliverables, there is no rubric for the Project Plan. Teams that complete and submit all four parts receive ten points. Teams that submit an incomplete plan will receive five points. Teams that do not submit a plan will receive zero points.

Further instructions and four easy to complete project plan templates can be found in the Appendix: Deliverables starting on page 40.
**Deliverable 2: Virtual City**

Completed in the Plan: Brainstorm stage, students design a Virtual City using SimCity software. They begin by choosing two goals they want to achieve in their virtual city (i.e., developing a fully green city, designing a city that is a safe place to live and work, etc.).

At two points during the development of their SimCity, students will:
- document their city’s development;
- assess their progress toward meeting their stated goals; and,
- share the strategies they are using to achieve their goals.

Students will insert their city’s details in the Virtual City Presentation Template. This deliverable is worth 48 points and is due before the competition. Further instructions, a list of online resources, and the rubric can be found in the Appendix: Deliverables starting on page 50.

**Deliverable 3: City Essay**

Begun in the Plan: Design It stage, students write a 1,500-word essay that describes the unique attributes of their city and provides a solution to this year’s challenge—The Age-Friendly City.

Students’ challenge: Identify an age-related challenge that exists in today’s urban environments and engineer two innovative solutions that allow your future city’s senior citizens to be as active and independent as they want to be.

This deliverable is worth 60 points and is due before the competition. Further instructions, student handouts, and the rubric can be found in the Appendix: Deliverables starting on page 56.

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**Deliverable 4: City Model**

Begun in the Do: Build It stage, students build a physical model of their city. In addition to showcasing their city of the future, the City Model must also show the solution to this year's challenge.

The model:
- should be made primarily out of recycled materials;
- must have at least one moving part;
- needs to be built to scale; and,
- may not exceed the $100 expense budget.

This deliverable is worth 70 points and is presented at competition. Further instructions, student handouts, and the rubric can be found in the Appendix: Deliverables starting on page 67.

**Deliverable 5: City Presentation**

Completed in the Review: Share It stage, students present their future city, solution to this year’s challenge, and model to a panel of judges at competition. The seven-minute presentation is followed by a question and answer period of 5–8 minutes with the judges. (Check with your Regional Coordinator for exact competition time limits.) Many regional competitions also provide the opportunity for teams to give brief presentations to additional judges to earn special awards.

Presentations are made by the three presenting students and includes the model and may also include:
- Display boards
- One handout or one brochure
- Costumes

Costs of the presentation materials must be included in the maximum $100 budget. This deliverable is worth 70 points and is presented at competition. Further instructions and the rubric can be found in the Appendix: Deliverables starting on page 74.

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**IT’S NOT A STRAIGHT LINE**

Although each deliverable is designed to stand on its own, students may find that they are working on them concurrently and will quickly realize that each deliverable informs the other in critical ways. For example, once they start experimenting with city design in SimCity they may want to refine how they are describing their city in the City Essay.
Project Plan: Set Goals

Setting project goals occurs in the Define phase of the project management cycle. Students deciding what they hope to achieve is also the first step of their Project Plan. As part of goal setting, students also think about any project constraints, what resources are available to them, and any assumptions they may have.

Hand out Part 1 of the Project Plan located on page 42 and at futurecity.org/resources (filter for Competition Forms & Project Plan). Tell students that the first team goal is the same for everybody and is already listed:

- Our team will identify an issue older people have in our city and engineer two solutions.

Before they start creating more goals, have them start to identify available resources, constraints, and assumptions. The Project Plan template has useful explanations of these terms as well as questions to get the kids thinking. Let students know that thinking about what they want to do before they do it is critical to their success!

Now it’s time to guide your team to think up several more goals. Explain that their goals are what they plan to achieve by the end of the Future City Competition. They can be about their city, like the goal above. And they can be about their team, how they will work together, and how they will handle the project itself. For example, “stick to the deadlines we set” or “work well together as a team” can be goals.

What people are saying about Project Management:

“We created an awesome city because we took the time to think about our goals and come up with a clear plan.”

– Student Participant

“We have totally embraced project management, which is a first for us.”

– Sue Mellon, Allegheny Valley School District, Pittsburgh, PA
Brainstorm Solutions

During the Brainstorm Solutions stage of the engineering design process, students use their Project Plan to schedule how they’ll complete each deliverable. Then they steep themselves in research, create their Virtual City, and brainstorm various solutions to the age-friendly city challenge and their overall city design. Project managers refer to this second stage of the project cycle as the Plan stage.

Project Plan: Create a Schedule

Explain to students that since they now have a better understanding of the project, it’s time to start making a schedule and identify what needs to be done, by whom, and in what order. The schedule will help them keep track of time and the tasks they must do to successfully complete their deliverables.

Creating Schedules

There are many ways to make a schedule. Create a schedule using the process outlined below or let your students come up with their own.

Sample Process: On index cards or sticky notes, write down the tasks required to complete each deliverable. Color code them so that every task related to a particular deliverable is easy to see. The great thing about cards is they can easily be moved as the project and timeline evolves.

If you are using a bulletin board for index cards or a whiteboard or wall for sticky notes, you can make a master schedule by forming columns of tasks for each deliverable. Then you can superimpose a timeframe to see which tasks for which deliverables can happen at the same time, or which ones actually depend on something else getting done first. Finally, team members can decide who is in charge of which tasks.

If a task winds up taking longer than the teams thought it would, they can move that sticky note or index card to a later spot in the schedule. They can also mark completed tasks with big X’s or another symbol so they can clearly see what tasks remain.

The most important thing is for the students to use a process that works best for them.
Research Solutions

Before students begin their research, it’s a good idea to review everything they’ve learned to date and reorient themselves to their mission of creating a city that exists 100 years in the future.

STARTING YOUR RESEARCH

Adapt this script to launch your students’ research. The handouts mentioned below can be found starting on page 58 or downloaded at futurecity.org/resources (filter for Program Handbook & Student Handouts).

A fun part of Future City is dreaming up where our city is located, who lives there, where they work, how they get around. We’ll even create our city’s history and culture. But before we do that we need to understand cities of today and research topics like:

- housing options
- energy sources
- transportation systems
- utilities (like water, sewer, waste management, and internet)
- pollution controls, and
- social services (like education, health care, and fire/police protection)

Let’s look at the City Design: Questions to Consider Student Handout. These questions are designed not only to help us think of practical and innovative ideas for creating an age-friendly city, but also to think about our city from all angles. The questions on this sheet are only starting points. As we do our research and learn more about cities, we’ll want to add our own questions to the list.

We’ll also need to start researching this year’s topic—The Age-Friendly City. Let’s look at The Age-Friendly City Overview and Research Questions Student Handout and The Age-Friendly City: Real-World Case Studies Student Handout. Again, the information and questions are only starting points. We’ll need to add our own as we work.

For more tips on creating schedules, visit the Plan section of Leading Your Team at futurecity.org.

A collection of Age-Friendly City Research Resources are available at www.futurecity.org/resources (filter for Research Resources & Websites)
**Research Tips**

- **Use the Research Cards** as a way for students to document and organize the information and relevant sources that they find. Download and print copies of the Research Cards for teams, as needed, at futurecity.org/resources (filter for Research Resources & Websites).

- **Create an electronic project archive.** The project archive could contain file folders that can hold information produced and collected throughout the project. Basic folders could be titled: Project Plan, Expense Information, Research, Virtual City, City Essay, City Model, City Presentation. The project archive should be accessible to all team members.

- **Refer to the Research Strategies** document at futurecity.org/resources (filter for Activities & Background Information) for more research strategies and information on citing sources.

**Design a Virtual City**

Engineers often use simulation tools, like SimCity, to research different designs to determine which solution works best. The competition’s Virtual City deliverable gives students the chance to try out their city planning ideas and explore various city development strategies using SimCity. Remind kids that they aren’t designing their future city using this tool: its purpose is to see what the possibilities are. Then they will have a better sense of what could work well when it is time to design their future city.

Share with your students that designing a Virtual City is another form of research that gives them practice designing a city. This step will help them pull together what they’ve learned and prepare them for brainstorming solutions for their own future city.

**Virtual City Resources**

Future City has developed resources to help students create their Virtual City. Below are a few highlights. Find them and more in Appendix: Deliverables starting on page 50, or download them at futurecity.org/resources (filter for SimCity).

- **The Virtual City Requirements**: Make sure students are familiar with the requirements.

- **Sample Virtual City Presentation**: This will give students a great understanding of what is expected.

- **Virtual City Presentation Template**: Enter your screen shots, goals, and strategies directly to this template.

- **Virtual City Rubric**: Learn what the judges will be assessing.

**STAYING ON SCHEDULE**

The Virtual City is the first deliverable to be submitted for judging. Have you checked with your Regional Coordinator about when the Virtual City is due?

**ENGAGING THE WHOLE TEAM**

If only one or two students are developing the Virtual City, you can still engage the whole team in selecting the city goals and brainstorming various development strategies to test. At each reporting stage, the Virtual City team leader(s) can present the city’s current status so the full team can see how the strategies are working and then together they can make any adjustments.
Brainstorm Solutions

Using what they learned from their research and from developing their Virtual City, it’s time for students to begin brainstorming what their future city will look like. Now is the time to encourage creativity, problem solving, and futuristic thinking. Remind students that their city will exist 100 years from now.

Students can revisit what they came up with in the student handout City Design: Questions to Consider (see page 58). Discussing these questions and their research with teammates can yield lots of new ideas.

It is also time for the students to select the one age-related issue seniors face in cities today that they want to address in their future city. While they only need to present two engineered solutions, identifying multiple solutions in the brainstorm phase and recording the pros and cons of each will help students identify the best ideas possible, which is all part of the Planning stage. They should also measure possible solutions against the rubrics. How well they match up might help students select the best solutions.

Choose Solutions Before Designing City

Before students move into the Design It stage, they should have a solid idea of the two innovative solutions they want to design to allow their future city’s senior citizens to be as active and independent as they want to be.

Check the Schedule

Students will probably need to make some changes to their project schedule, now that they have decided on their solutions. Give students time to add tasks, move them around, and make sure everybody is sharing the workload.

TEAMBUILDING BOOSTERS

If you find that students could use a teambuilding booster, refer to the Teambuilding document at futurecity.org/resources (filter for Activities & Background Info).
Design It

This stage of the engineering design process is where ideas take shape and visions grow. Students draw from their research and brainstorming to plan how they will create their age-friendly city. Encourage students to ask their mentor for feedback on their chosen design. Their mentor may have expertise in this area or be able to call upon other colleagues to help evaluate the students’ designs.

Draft the City Essay

The City Essay is the first place where students share their vision of their future city. Here they will answer the question: What makes your city special, futuristic, and innovative? They will also describe their solutions to The Age-Friendly City challenge. Drafting their essay helps students synthesize their research, finalize key elements of their future city, and reflect upon their age-friendly solutions.

The City Essay and the students’ research lay the groundwork for building the City Model and preparing the City Presentation. Students will refer to their research and their essay frequently in order to build the model of their future city and decide what to say in their presentations. This is an example of how the engineering design process works: what they accomplish in one stage informs what happens next.

Remember, the essay is due before the Regional Competition. Make sure you have checked with your Regional Coordinator for the exact due date.

TEST IDEAS WITH PROTOTYPES

A draft is kind of like a prototype: it’s the version in which you work out the kinks. The draft of the City Essay is the prototype that helps students evaluate ideas, plan resources, and anticipate possible roadblocks before they create their final version of both the City Essay and the model of their city.
Suggested City Essay Outline

Most middle school students have had a little practice creating outlines before they write rough drafts of essays. But they’re still beginners at it, and it never hurts to go over the basics.

Part 1: The Introduction
Briefly introduce your future city by including basic information about it. Your city’s name, how old it is, where it is, and how many people live there all go in the introduction.

Part 2: A Closer Look
Paint a picture of life in your city, as if you are describing it to someone who has never been there. Share details about:
• The climate and any natural features (like rivers, mountains, or a nearby ocean)
• Who lives in your city and what kind of work they do
• Any innovative or futuristic aspects of your city’s infrastructure (like housing, transportation, energy, pollution control, etc.)
• What services your city provides (such as education, healthcare, etc.)
• The average age and life span of your citizens, and your city’s definition of senior citizen
• Briefly share the features and services that make your city age-friendly

Part 3: Define the Problem
Describe the typical challenges older adults in 21st century cities faced in remaining active and connected. Then identify one challenge in particular, describe its impact, and why your city decided this was the most important problem to address (with your two innovative solutions).

Part 4: Describe Your Solutions
Here’s where you get to detail the two innovative solutions (to the problem you identified) that make your future city more age-friendly. Be sure to:
• Describe your two engineered solutions and how they work
• Emphasize the innovative, futuristic features of your two solutions
• Explain how your solutions improve your citizens’ ability to remain active and independent
• Describe some of the risks connected with using the solutions and how the solutions reduce these risks
• Provide examples of how both solutions benefit other members of your future city (not only senior citizens) and/or enhance the quality of life in general
• Explain why you made the choices you did and what tradeoffs, if any, were involved
• Explain what types of engineering were involved and what kinds of engineers were most helpful

Conclusion: The Impact of The Age-Friendly City
Summarize how your age-friendly solutions make your city a great place to live, especially for older adults, and how they keep your citizens active and independent in your future city.

Review the City Essay Rubric
Before students begin their drafts, tell them to review the rubric. It is on page 64 and at futurecity.org/resources (filter for Rules & Rubrics).
Build It

During the Build It stage of the engineering design process, students create their project deliverables. They finalize their City Essay, build their City Model, and write and practice their City Presentation. As they work, students use the Project Plan to conduct check-ins to make sure their project stays on track. Project managers refer to this third part of the project cycle as the Do stage.

Project Plan: Conduct Check-Ins

As students move into the Build It stage, they should review the requirements for the Future City deliverables and make sure they’re working towards meeting them. They may find it necessary to change responsibilities among team members as some tasks are completed and new ones begin.

Conducting regular check-ins will help students monitor their work. Ask each team for a quick verbal check-in every time you meet, so that students keep an eye on their schedule and tweak it frequently. Check-ins will also encourage students to become adept at summing up their progress across deliverables for you and the other teams.

For more tips on conducting check-ins, visit the Do section of Leading Your Team at futurecity.org.
### Finalize the City Essay

It’s time for students to look at the rough draft of their essay and to turn it into the final, polished version. Guide students through this important phase of writing according to your own methods. If you don’t have a favorite way of helping students work in groups to complete essays, you can use the following approach.

If each team member wrote the rough draft of one section of the essay, tell the team to put the sections in order and read through them together.

Next comes a group editing process. Students are likely to find repetition and will need to decide where to cut and where to keep content. They will also need to add connecting sentences so that each section flows logically to the next. If they see any errors in spelling or grammar, they can catch them now. Remind students to check their essay against the City Essay Rubric on page 64 or download it at futurecity.org/resources (filter for Rules & Rubrics).

Once they have a near-final draft, you or your mentor should read it to give the students feedback. Together, students can decide how to make changes to their essay based on this feedback. Then one student should be in charge of writing the final version. Everyone on the team should read it one last time and make sure their essay is in great shape.

### Explore Scale

Before students begin their City Model, introduce the concept of scale.

Scale is a very important requirement for the City Model. Teams should think carefully about the most appropriate scale for their model, but which scale to use is up to the students. Factors to consider include the geographical location and terrain of their city, its layout, the level of detail they wish to include, and cost. If students choose too small of a scale, they may have trouble finding objects to build with; too large of a scale may prevent them from including all the areas and city zones that they would like to display.

Tell students engineers use scale models to test their design ideas at an early stage of development without the risk of creating a full-sized model. If you have access to your school’s blueprints, compare these drawings with familiar school buildings and rooms to illustrate the concept of scale.

Share the following terms:
- “Scale” is the ratio between two sets of measurements.
- “Scale drawing” is a drawing that uses scale to make an object smaller or larger than the real object.
- “Scale model” is a proportional model of a three-dimensional object.

### RESOURCES FOR EXPLORING SCALE

Visit futurecity.org/resources (filter for Activities & Background Info) and continue exploring scale:

- Scale: Background Information
- Scale: Key Terms & Concepts
- Introduction to Scale: Learn how to use ratios to create a scale drawing.
- Plan and Elevation View: Architects and engineers use sketches as a way to communicate and convey their design ideas to others. This activity introduces students to how to create scaled drawings.
- Proportions, Ratios, and Scale Drawings Activity: Apply learning about proportions, ratio, and scale to create a scale drawing of a room.
- Scale Map Activity: Plan the City Model by creating a two-dimensional city map.
Build the City Model

Building the model is one of the most exciting aspects of the competition. Start your students off by handing out and reviewing the Build Your City Model handout on page 69 and at futurecity.org/resources (filter for Activities & Background Info). It’s full of valuable information about ways to create different parts of the model, questions to keep in mind, and tips for the moving-part component.

City Model Resources

Future City has multiple resources to help students develop their model. Below are a few highlights. Find them and more at Appendix: Deliverables starting on page 67.

- City Model Requirements: Make sure the team is familiar with the requirements (go to page 67).
- Build Your City Model Student Handout: This handout offers questions to consider and model building tips.
- Past Models: Get Inspired! See models that teams have created over the years at futurecity.org/gallery.
- Moving Parts Video: Get ideas about different kinds of moving parts at futurecity.org/resources (filter for Webinars & Videos).
- City Model Rubric: Review the rubric on page 71 and at futurecity.org/resources (filter for Rules & Rubrics).

EXPLORE FURTHER: MODEL CONSTRUCTION

Visit futurecity.org/resources (filter for Activities & Background Info) and continue exploring strategies for constructing models.

- Model Construction: Key Terms & Concepts
- Model Construction: Background Information
- What is a Model? Activity: Examine different types of models and discuss why they are useful.
- Plan-Relief and Architectural Models Activity: Create and compare two-dimensional floor plans and three-dimensional models of a classroom.
- Building Strong Activity: Build a paper structure that will support a book.

Remind students that as they work toward completing the deliverables, they will be moving back and forth between the different phases of the design process. This is natural. Engineers go back and reevaluate or refine their solution as the need arises; sometimes the best ideas are those that are not selected first!
Create the City Presentation

The City Presentation gives students an opportunity to showcase all that they have accomplished and learned in the Future City Competition. Set a celebratory tone for students! That way their presentations will convey their enthusiasm for, and pride in, their future city.

Start your students with a review of the Future City objectives: to design and create a city that exists 100 years in the future and addresses this year’s challenge: The Age-Friendly City.

Help students visualize what they will be creating by watching presentations from last year’s winning teams at futurecity.org/gallery. Then discuss the videos by asking the following questions:

- What made the presentation engaging?
- What features made the city appealing, unique, and futuristic?
- How did the city incorporate last year’s challenge into the design?
- If you had to change one thing about the city’s design, what would it be?
- What will you need to do to prepare for your own presentation?

City Presentation Resources

Future City has multiple resources to help students create fantastic presentations. Below are a few highlights. Find them and more at Appendix: Deliverables starting on page 74.

- **City Presentation Requirements**: Make sure students understand the requirements.
- **City Presentation Rubric**: go page 76 and at futurecity.org/resources (filter for Rules & Rubrics).
- **Past Presentations**: Watch prior year’s winning teams presenting at Finals at futurecity.org/gallery.

Another resource to use is the City Design: Questions to Consider student handout that the team used when writing their City Essay. Encourage students to revisit their answers to these questions and pick out what’s most important and interesting to say in their presentation. They can’t say everything; they have to pick and choose. In addition, you can suggest that the students consider these questions:

- What visual aids and props will you use to enhance your presentation?
- How did the engineering design process and project management help you plan your city?
- How can you show the way you use teamwork? (For example, do you share presentation tasks, do you support each other during the presentation, do you display equal amounts of knowledge?)

GETTING READY FOR THE COMPETITION

Regional Competitions are fast approaching. Make sure you’ve got things covered by reviewing the Finals Checklist (page 80).
PREPARE FOR YOUR PRESENTATION

Students may not know how to prepare for the presentation. Share the tips below with them. They’ll gain confidence as they talk it through and decide what to say about their future city.

1. **Create an outline of main points.** Your City Essay outline is a good starting point.

2. **Write a script based on your outline.** The script is what each member of the team will say during the presentation. It needs to sound natural and not as if you’re reading your essay out loud.

3. **Decide which team member will say which part of the script.** Write each person’s lines on note cards and practice at home. Get really comfortable with your part, so that you don’t spend the whole presentation staring at your note cards! They’re just there if you forget something. Mostly you’ll be looking at your audience, because you know what you want to say.

4. **Take advantage of moments to be especially creative.** These are at the beginning and the end of your presentation. In the beginning, you want to grab the attention of your audience. At the end, you want to make the audience wish they could live in your city!

5. **Use your City Model.** It’s your most important visual. Point out key features and interesting landmarks. You can also use pointers, display boards, costumes, and brochures during your presentation. (Remember that there are specified size limitations for these materials.)

6. **Dress appropriately for your presentation.** You can wear costumes that work with the role that you’re playing.

7. **Review the special awards that your region offers.** This is a great opportunity to show off your knowledge in these areas. Refer to your regional website for specific special awards categories.

8. **Think about the questions that the judges (and special award judges) may ask.** The Practice Questions student handout available in October is a great resource (futurecity.org/resources filter for Handbook & Student Handouts). Have parents or your mentor act as judges and ask the practice questions.

LEARN FROM OTHERS

Share one or more of the following presentations: NineTalks by Impressive Kids at: blog.ted.com/2012/10/17/9-talks-by-impressive-kids/

Discuss what made these presentations engaging. What did students notice about the speaker’s body movements and voice? How does the speaker use research, stories, and questions to hook the audience and convey a message? Encourage students to emulate effective public speaking techniques in their own presentations.
Test, Improve, & Redesign

In the Test, Improve, and Redesign stage of the engineering design process, students evaluate their solutions, get feedback from others, and make improvements based on this feedback. They’ll continue to monitor their project’s progress through frequent check-ins with you and their teammates. The goal is to make sure their project is the best that it can be.

During this stage, students carefully review the rubric for each deliverable to ensure they have met all of the requirements. They should also get as much feedback from you and their mentor as possible on each competition deliverable. At this point, feedback should be specific and actionable—students should understand exactly what they need to do to implement your feedback.

Practice the Presentation

Effective presentations are the result of thorough preparation. Share these tips with your students to help them prepare.

- Rehearse your presentation (including all stage movements). If possible, video your team delivering your presentation. Ask friends, family members, and your mentor to be your audience.
- Practice your presentation in front of your class or other students. Encourage classmates to ask you questions about your city and its unique features. They can use the rubric to help give good feedback.
- Practice answering the Practice Questions, which are available in October at futurecity.org/resources (filter for Handbook & Student Handouts).

- Know the material well enough so that you don’t have to rely on notes.
- Take turns being coach and presenter. After each presentation, have peer coaches discuss the following:
  - What parts of the presentation were clear and informative?
  - Were there any points they didn’t understand?
  - What was one thing they liked about how their peers presented?
  - Did the presenters make eye contact? How were their gestures, posture, tone of voice, and pace of the delivery?
  - How did the presenters use the model?
Final Preparations

When students are satisfied that they have met the requirements for each deliverable, they should prepare their deliverables for online submission or presentation at the competition.

Make a copy of the Final Checklists for each student. See page 80 or download at futurecity.org/resources (filter for Handbook & Student Handouts). Give the team time to look through every line on these lists. Then check in with the team to see what they still need to finish. Make sure students have a concrete plan for tying up loose ends.

Now is also a good time to fill out the competition forms. You can review the forms starting on page 91 or download them at futurecity.org/resources (filter for Competition forms & Project Plan):

- Media Waiver
- Honor Statement
- Competition Expense Form

ONLINE SUBMISSION PROCEDURES

All teams must submit their Virtual City, City Essay, and Project Plan via the online submission center at futurecity.org. Submission instructions are available from your Regional Coordinator or at futurecity.org/resources (filter for Competition Forms & Project Plan).

DUE DATES

Each region sets its own schedule. Regional due dates can be found at the online submission center or by contacting your Regional Coordinator.
Share It

The Review stage is where students look back and reflect on all that they have accomplished—an important step that both engineers and project managers take in any project. Here students will complete the final step of the engineering design process—Share It—by presenting their work to others and celebrating their accomplishments. Now is the time to reflect on everything they’ve done and complete their Project Plans.

Project Plan: Reflect on Your Project

During this final stage, students reflect on their Future City experience by reviewing and assessing the process and end products. They consider both how well the project succeeded and any lessons learned.

Let students know that reflecting on their project allows them to consider what worked and how they might do things differently—information that can help make their next projects easier. Reflection is also a great way to prepare to answer the judges’ questions at the competition. You can find the Project Plan Part 4 template on page 48 or you can download it at futurecity.org/resources (filter for Competition Forms & Project Plan).

For more tips on reflection, visit the Review section of Leading Your Team at futurecity.org.
Present Your City

The presentation is a very exciting moment for students and the culmination of months of work. Although presenting at Regionals or Finals is a wonderful experience, sharing can also be done in class in front of a group of educators, parents, friends, and mentors.

Performance Tips

Here are a few final tips to share with your students:

- Sleep well the night before the competition.
- Eat a healthy breakfast.
- Remain calm; no one knows your city better than you do.
- Be poised and confident; there are no wrong answers.
- Maintain eye contact with the judges.
- Use signals or gestures so that you will know which teammate will answer a judge’s question.
- Project yourself. Put energy in your voice, be confident, move with purpose, face the audience, and smile!

All team members will receive a certificate of participation at the Regional Competition.

Congratulations on completing your city of the future!
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DELIVERABLE #1:

Project Plan

Students work with their team to complete a four-part project plan that will help them stay organized, focused, and on schedule as they complete their other Future City project deliverables.

Visit Leading Your Team at futurecity.org to learn more about how the Project Plan will help your team successfully complete their future city.

What Is a Project Plan?

A project plan is a tool engineers use to manage their work. It’s where students record their project goals, plan how they’ll complete the competition deliverables, and monitor their project’s progress. A well-crafted project plan will help students stay on track as they use the engineering design process to design and build their solution. It’s like a roadmap that students refer to as they move through the competition, but it is also changeable. Decisions made at the beginning of the project may turn out to need revising!

Project Plans Take Many Forms

What a Project Plan looks like depends on the project and the team; a plan needs to work with the needs of the project and the style and preferences of the team. For this competition, students start with the Project Plan template starting on page 42. It has four parts that align with the project management cycle stages: Define, Plan, Do, and Review. Within each section, students have the leeway to make the plan work for them. In fact, we encourage students to make the Project Plan their own, in whatever ways it will best meet their needs for the competition.

NO RUBRIC FOR THE PROJECT PLAN

Note: There is no rubric for the Project Plan, but you still need to hand it in. Fully completed plans (with all four parts) earn 10 points. Partially completed plans may earn 5 points.

An editable Word version of the Project Plan template can be downloaded at futurecity.org/resources (filter for Competition Forms & Project Plan). You can also see examples of Project Plans from previous years in the Gallery section of futurecity.org/gallery.
As the team puts together its Project Plan, team members need to keep the four parts in mind. You can copy this chart on the board or chart paper so the kids can see which stage of the competition each part addresses.

### Project Plan Parts

<table>
<thead>
<tr>
<th>Project Plan Parts</th>
<th>Project Management Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART 1: SET GOALS</td>
<td>DEFINE: LEARN THE SPECS</td>
</tr>
<tr>
<td>Students describe what they hope to achieve by the end of the project. They also ensure that goals are realistic by identifying resources, constraints, and assumptions.</td>
<td></td>
</tr>
<tr>
<td>PART 2. CREATE A SCHEDULE</td>
<td>PLAN: DESIGN IT</td>
</tr>
<tr>
<td>Students plan how they’ll complete each deliverable.</td>
<td></td>
</tr>
<tr>
<td>PART 3. CONDUCT CHECK-IN SESSIONS</td>
<td>DO: BUILD IT &amp; TEST, IMPROVE, REDESIGN</td>
</tr>
<tr>
<td>Students monitor their project's progress to keep on schedule, meet their goals, and see where the plan needs tweaking.</td>
<td></td>
</tr>
<tr>
<td>PART 4. REFLECT ON THE PROJECT</td>
<td>REVIEW: SHARE IT</td>
</tr>
<tr>
<td>Students reflect on what they did and how they did it, a great way to prepare for the competition and make their next projects easier.</td>
<td></td>
</tr>
</tbody>
</table>

### Project Plan Requirements

- All four parts of the Project Plan are included in one document that is saved as a PDF.
- Teams submit their Project Plan document (containing Parts 1–4) via the online submission center at futurecity.org. Submission instructions are available from your Regional Coordinator or at futurecity.org/resources (filter for Competition Forms & Project Plan).

### Project Plan Resources

- **Project Plan template:** The template includes instructions for what the Project Plan has to include as well as space for students to complete each of the four sections. It starts on the next page or can be downloaded at futurecity.org/resources (filter for Competition Forms & Project Plan).
- **Training for Leaders:** If you would like guidance on how to lead your team, see Leading Your Team online training at futurecity.org.
- **Final competition checklist** on page 80.

### Competition Scoring

Teams who submit their completed Project Plans on time will receive 10 points. Teams who submit incomplete Project Plans will earn 5 points. Remember, there’s no rubric for this deliverable. Teams that do not submit a Project Plan will receive zero points.

### Scoring Deductions

5–10 points

Late submissions may be accepted with a penalty. Check with your Regional Coordinator before the deadline to find out if this is an option in your region.
INSTRUCTIONS

First, think about the resources, constraints, and assumptions you have about this project. Use this information to help you come up with your goals. Write all of them down in the table on the next page.

**Project Resources** are what you can use to research, design, and create your city. People to ask for advice; skills you, your team, and your mentor can offer; and equipment and supplies from school or home go in this section.

**Constraints** are what limit your options on this project. You only have a certain amount of time, money, and expertise, for example. Do you have enough computers? Are the competition rules posing restrictions? What about the requirements of each deliverable? The size of your group? List constraints in this section, and include ways to work around as many of these constraints as you can think of.

**Assumptions**: What are you pretty sure is true about this project? In this section, you write down things like how much time you think you have, what materials you know you can get ahold of, how you think your group will work together, and what you assume will be difficult to accomplish.

**Project goals** describe what you hope to achieve for the project (rather than for your city). Knowing what your resources, constraints, and assumptions are can help you pick project goals. Project goal examples include coming in under budget, hitting our due dates, working well as a team.

Use the space below to brainstorm ideas, and write your final thoughts in the chart on the next page.
### List resources, constraints, assumptions, and goals for your project below

#### Our project resources:

<table>
<thead>
<tr>
<th>Our project resources:</th>
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<tbody>
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#### Constraints on our project:

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<tr>
<th>Constraints on our project:</th>
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<tbody>
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</table>

#### Assumptions we have about our project:

<table>
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<tr>
<th>Assumptions we have about our project:</th>
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<td></td>
</tr>
</tbody>
</table>

#### Our goals for this project (pick at least two more goals):

1. Our team will successfully create an age-friendly city.

2.

3.

4.
INSTRUCTIONS

To create your schedule, figure out what needs to be done and in what order. Follow the process outlined here or use your own.

Step 1: List Tasks for Each Deliverable.

Begin by brainstorming tasks for each deliverable. Write them on index cards or sticky notes. You can color code them so that everything to do with one deliverable, such as the City Essay, is one color, whereas everything to do with the City Model is another. If each task is on its own card, it’s easy to move them around as the schedule changes.

Step 2: Put Tasks in Order

Now it’s time to think about the sequence in which things should be done. Arrange the cards for each deliverable in a logical order.

Step 3: Estimate Time Each Task Takes

Think about how much time tasks will take. You can’t know exactly, but make your best guess. Write this in pencil on each task card, so that it’s easy to erase and change if the task takes less or more time than you thought.

Step 4: Assign Roles

Next decide who will get the work done. Assign team members to be responsible for each task and record their names on the cards.

Step 5: Make a Schedule

On a bulletin board, white board, or chart paper on the wall, create a giant schedule that you can tack the cards on. Things will change along the way—so make sure you can make changes easily in order to revise your schedule.

Show Us Your Style!

An image of your schedule is part of your Project Plan deliverable. What does your schedule look like? Is it a large wall calendar, shared online calendar, something else?
FUTURE CITY TEAM NAME:

ORGANIZATION/SCHOOL:

EDUCATOR:

Instructions: In the space below, insert a photo, drawing, sample planning text message—anything that captures how your team scheduled your project.

TEAM SCHEDULE
INSTRUCTIONS

Check-ins with teammates and your educator help you monitor progress and ensure that you’re meeting deadlines. Most of these check-ins can be quick conversations. But one of them needs to be written down as part of your Project Plan deliverable. Part 3 of your Project Plan is where to put this written check-in.

You can also make copies of the Check-In Report template and use it to update all project stakeholders (team members, educator, mentor) on the status of your Future City project as often as you want.

TIP: BEFORE EACH CHECK-IN

• Review your schedule and the requirements for each deliverable.

AFTER EACH CHECK-IN

• Make changes to your schedule as needed.

Show Us Your Style!

Submit one report that illustrates an important point in your project, such as when you solved a problem, made a critical revision, or reached a major milestone.
TEAM CHECK-IN REPORT

Date: ____________
Team Members: ________________

<table>
<thead>
<tr>
<th>What have you completed recently?</th>
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<td></td>
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<table>
<thead>
<tr>
<th>What are you working on now?</th>
<th></th>
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<table>
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<tr>
<th>When do you think the current task will be done?</th>
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<table>
<thead>
<tr>
<th>What do you need to keep your work on track?</th>
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</tbody>
</table>
INSTRUCTIONS

Part 4 of your Project Plan is a place to reflect on what you learned from the experience of participating in Future City. Each project teaches us a lot, and your thoughts now can make your next project go more smoothly.

Working as a team, record your responses to the questions on the next page.

TIP: PREPARE FOR THE COMPETITION

Judges ask questions just like these. Reviewing your project and answering these questions are a great way to prepare for your presentation!
**TEAM REFLECTION**

1. **Look back at your original project goals from the Define stage.** Did your team fully meet your stated goals for the project? Were there some goals that were met more completely than others?

2. **Look back at your original ideas for your city.** Did any of the ideas change as you went through the process of creating your final city? Describe one way your city changed and why.

3. **Consider your team.** How well did your Future City team work together? What do you know now about being part of a team that you didn’t know before?

4. **What was the most valuable experience** you gained from the Future City Competition?
DELIVERABLE #2: Virtual City

Students design a Virtual City using SimCity software and present their city’s progress via a slideshow.

SimCity is a great learning tool for students to understand the complexities of city design as they develop their future city. They will see how decisions (like where they place roads, power plants, or industrial zones) affect their city’s growth and development.

For this deliverable, students choose two goals that they want to achieve in their Virtual City. At two points during the development of their Virtual City, students will document its development and their progress toward meeting their two goals. This emphasis closely follows the engineering design process. It also concentrates on students demonstrating their learning and sets them up to apply that learning to their City Essay, City Model, and City Presentation.

Creating a Virtual City

Before your team begins to build its city, it needs to select two goals from the Sample Goal List on page 52 or set their own. Next, the team should brainstorm strategies on how they might achieve those goals. After that, they can begin building their city.

PROGRESS REPORT #1

When the Virtual City reaches a population range of 8,000 to 20,000 Sims, the team needs to pause to record their city’s progress in the Virtual City Presentation Template. When the team reaches this point, we recommend saving the SimCity. This allows the students to compare how their city is developing over the two phases. Instructions on how to save a SimCity game are available in the SimCity Download Instructions at futurecity.org/resources (filter for SimCity).

SIMCITY SCREENSHOTS

“How to Take a Screenshot in SimCity” offers step-by-step instructions for taking screenshots on both a PC and Mac. Download it at futurecity.org/resources (filter for SimCity).

Progress Report #1 includes the following items.

1. Four screenshots of their city including:
   - One bird’s-eye view of the city to give an overview of the layout. Establish a fixed location where the team will take their screenshots from. This fixed location will be the same for progress report #1 and #2.
   - One screenshot showing the budget panel details. These include expenses, income, and taxes.
   - Two screenshots showing the population panel details. These include one screenshot showing “workers” and “shoppers” and a second screenshot showing “students,” “tourists,” and “homeless.”

2. A completed Benchmark Chart
   The information here is a simple reporting of the status of the city. Download the Benchmark Worksheet, which includes tips on how to locate the required information, from futurecity.org/resources (filter for SimCity).

3. A completed Progress Toward Goals Chart
   The team will list its two goals, report on the status of each, and provide evidence that supports the status it has selected. The team will also provide two screenshots that illustrate the progress they are making toward each goal.

4. Strategies. The team will share what strategies worked and didn’t work, and share strategies they will try in the next stage of development.

PROGRESS REPORT #2

Once the city’s population reaches 20,000+ Sims, the team can complete the Virtual City Presentation Template. They’ll fill out Progress Report 2 as well as address lessons learned about city planning and how they will apply this to the other Future City deliverables.
Virtual City Requirements

Teams will:
• Use SimCity software to design their virtual city
• Name their city after their team (the city name and the team name have to be the same)
• Complete the Virtual City Presentation Template using Powerpoint, Word, or Google Slides
• Not add slides to the template
• Choose a region in which to build their city (any region is acceptable)
• Record their city’s progress at two different points in time by taking screenshots that capture the layout of the city, the population size, and budget details
• Turn off random disasters
• Try to build a city without using cheat codes
• Submit their final slideshow as a PDF

Virtual City Resources

• SimCity codes: If you haven’t requested your SimCity codes yet, log in to your Future City account at futurecity.org and click on Update Your Program Details under the Educator Pages tab. Once completed, your codes will be available on your Educator Page (after July 15, 2017).
• Virtual City Presentation Template: Insert your city details in this template downloadable at futurecity.org/resources (filter for SimCity).
• Sample Virtual City Presentation: This slideshow gives students an example of what they’re trying to do and shows them what information to report. Download at futurecity.org/resources (filter for SimCity).
• SimCity Benchmark Worksheet: Students use this worksheet to record their Virtual City’s details before entering them into the template. It also contains helpful tips on how to locate the necessary information. Go to futurecity.org/resources (filter for SimCity).
• Virtual City Rubric: Students should refer to the rubric to make sure they’re satisfying all of the criteria for this deliverable. See page 53 or go to futurecity.org/resources (filter for Rules & Rubrics).

Competition Scoring

Teams can earn up to 48 points for their Virtual City. Make sure they have thoroughly covered these categories in the rubric to maximize points:

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specs</td>
<td>12</td>
</tr>
<tr>
<td>Test It, Improve It</td>
<td>18</td>
</tr>
<tr>
<td>Conclusion</td>
<td>3</td>
</tr>
<tr>
<td>Judge Assessment of Design &amp; Process</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48</strong></td>
</tr>
</tbody>
</table>

Scoring Deductions

5–10 points
Late submissions may be accepted with a penalty. Check with your Regional Coordinator before the deadline to find out if this is an option in your region.
Sample Virtual City Goals

Before developing the city, teams need to choose two goals and two corresponding pieces of evidence from the list below or set their own:

<table>
<thead>
<tr>
<th>SimCity Goal</th>
<th>SimCity Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is a green city</td>
<td>• Power source is wind or solar only</td>
</tr>
<tr>
<td></td>
<td>• Sewage treatment plan is operational</td>
</tr>
<tr>
<td></td>
<td>• Water filtration system in place (if needed for water pollution)</td>
</tr>
<tr>
<td></td>
<td>• The city has a wave generator</td>
</tr>
<tr>
<td>Healthy, active, engaged citizens of all ages</td>
<td>• Excellent health facilities with low sickness, injury rates</td>
</tr>
<tr>
<td></td>
<td>• 0 unemployment</td>
</tr>
<tr>
<td></td>
<td>• At least two interconnected public transit options, used by citizens, with wait times less than 20 minutes</td>
</tr>
<tr>
<td></td>
<td>• Happy citizens (100% satisfaction, green)</td>
</tr>
<tr>
<td>The city’s population is highly educated</td>
<td>• Education level = 4 or higher</td>
</tr>
<tr>
<td></td>
<td>• All students enrolled in school</td>
</tr>
<tr>
<td>The city is free of pollution</td>
<td>• No water, air, ground, or radiation pollution</td>
</tr>
<tr>
<td></td>
<td>• High-tech or manufacturing industry only</td>
</tr>
<tr>
<td></td>
<td>• Sewage treatment plan is operational</td>
</tr>
<tr>
<td></td>
<td>• Water filtration system in place (if needed for water pollution)</td>
</tr>
<tr>
<td>The city is well managed</td>
<td>• Mayor rating at least 75%</td>
</tr>
<tr>
<td></td>
<td>• Balanced budget with no loans, cheats, or gifts</td>
</tr>
<tr>
<td></td>
<td>• Tax rates no more than 10%</td>
</tr>
<tr>
<td>Public transit available to all Sims</td>
<td>• At least two types of public transit systems</td>
</tr>
<tr>
<td></td>
<td>• Integrated transit systems (working together to get Sims where they want to go)</td>
</tr>
<tr>
<td></td>
<td>• At least 50% of low- and medium-wealth Sims using the public transit systems</td>
</tr>
<tr>
<td></td>
<td>• Wait times no more than 20 minutes</td>
</tr>
<tr>
<td>City is a happy, healthy place to live and work</td>
<td>• Excellent health facilities with low sickness</td>
</tr>
<tr>
<td></td>
<td>• Injury rates = 0 deaths</td>
</tr>
<tr>
<td></td>
<td>• Less than 10% of population is sick/injured</td>
</tr>
<tr>
<td></td>
<td>• Parks and recreation facilities (20% of Sims visiting)</td>
</tr>
<tr>
<td></td>
<td>• Park with walking distance (4 to 5 blocks)</td>
</tr>
<tr>
<td>City is a safe place to live and work</td>
<td>• Excellent police coverage across entire city (0 crimes committed)</td>
</tr>
<tr>
<td></td>
<td>• Excellent fire coverage across entire city (0 buildings burned down)</td>
</tr>
</tbody>
</table>
# Virtual City Rubric

## I. Specs (12 points)

<table>
<thead>
<tr>
<th>1. Presentation quality and content</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spelling, grammar, neatness</strong></td>
<td>Didn’t follow template. Sloppy, with errors. Used Sandbox mode.</td>
<td>Some errors. Followed the template. Missing some of the required information or not using the same city throughout.</td>
<td>Few errors. Followed the template. Missing some of the required information. Same city throughout.</td>
<td>No errors. Adheres to template and all requirements for assessments and goals. Same city throughout.</td>
</tr>
<tr>
<td><strong>Followed template</strong></td>
<td>- Slide count didn’t exceed 23</td>
<td>- Did not use sandbox mode</td>
<td>- Complete goals, benchmarks, and required screenshots</td>
<td>- Same city throughout</td>
</tr>
<tr>
<td></td>
<td>- Did not use Sandbox mode</td>
<td>- Did not use sandbox mode</td>
<td>- Complete goals, benchmarks, and required screenshots</td>
<td>- Same city throughout</td>
</tr>
<tr>
<td></td>
<td>- Complete goals, benchmarks, and required screenshots</td>
<td>- Complete goals, benchmarks, and required screenshots</td>
<td>- Same city throughout</td>
<td>- Same city throughout</td>
</tr>
<tr>
<td></td>
<td>- Same city throughout</td>
<td>- Same city throughout</td>
<td>- Same city throughout</td>
<td>- Same city throughout</td>
</tr>
</tbody>
</table>

## 2. Goals

| • Set two goals                     | No goals. | Fewer than 2 goals, or goals change from one phase to the next. Or, goals not measurable or challenging. | Good selection of goals that are measurable and somewhat challenging. Same goals throughout. | Excellent selection of challenging and measurable goals. Same goals throughout. |
| • Goals are challenging and measurable |          |                               |                                      |                                    |
| • Same goals used throughout slideshow |          |                               |                                      |                                    |

## 3. Two reporting stages

| • Virtual city assessment (bench-marks) and reporting at two points | No reporting phases. | Fewer than 2 reporting phases. | 2 reporting phases. But little progress between phases. | 2 reporting phases showing excellent progress between each. |
| • Each stage exhibits enough development to show progress |          |                               |                                      |                                    |

## 4. Screen shots

| • Screen shots show zoning, budget details, population details, and goal progress | No or few screen shots. | Some of required screen shots, but not consistent orientation or time point. | Most of the required screen shots. Consistent orientation and time. | All required screen shots. Consistent orientation and time. Includes shots and detail to illustrate important goal progress points. |
| • Bird’s-eye shots are from a consistent point/orientation in both phases |          |                               |                                      |                                    |
| • All of the screenshots documenting a phase are taken at same point in time |          |                               |                                      |                                    |

## II. Test It, Improve It (18 points)

<table>
<thead>
<tr>
<th>5. Benchmark assessment and analysis of progress</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Accurate and fair assessment of features in city</td>
<td>None or inaccurate assessments.</td>
<td>1 assessment that is relatively accurate, but incomplete.</td>
<td>Benchmark assessment complete at each phase. Relatively accurate assessment of city features.</td>
<td>Benchmark assessment at each phase. Extremely accurate and complete assessment of city development.</td>
</tr>
<tr>
<td>• Include information to support goal progress</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Analyzing strategies</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• For both reporting phases, report on strategies tested during the simulation</td>
<td>No report on strategies.</td>
<td>1 report on strategy analysis. Incomplete analysis.</td>
<td>Reports on strategy analysis for each phase. Analysis somewhat incomplete.</td>
<td>Reports on strategy analysis for each phase. Excellent and complete analysis toward meeting goals.</td>
</tr>
<tr>
<td>• What worked and what didn’t work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### II. Test It, Improve It (18 points)

**7. Progress toward achieving stated goals**
- For each reporting phase, city should show steady progress toward achieving stated goals
- Actually achieving goals is not required

<table>
<thead>
<tr>
<th>No Points</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements missing.</td>
<td>1-2 reports on goal progress. Not much advancement toward goals.</td>
<td>Reports on goal progress for each phase. Good advancement, but could be better or more consistent.</td>
<td>Reports on goal progress for each phase. Excellent and consistent advancement toward meeting goals.</td>
</tr>
</tbody>
</table>

**8. Refine design**
- Using results of assessment, determine updates to plans and measurements as needed to make further progress toward goals in the next phase(s) of the simulation

| No progress toward achieving goals. | Updates to plans not addressed. | Plan updates are unrelated to goals. | Detailed plan updates and measurements for next phase are reasonable, appropriate and address most goals. |

**9. Implement design changes and continue testing**
- Adjust or change the virtual city as planned to further goal progress
- Test changes with the simulation and assess results

| No changes and no further goal progress. | A few changes added to further goal progress. Not much testing of changes. | Some of planned changes were added to the simulation and tested. | All planned changes were added to the simulated city. Thoroughly tested and measured for effectiveness. |

**10. Budget manipulation**
- Includes use of cheat codes, gifts or other budget manipulation techniques
- Allowable if:
  - Recognized in benchmarks and analysis
  - Strategies developed and implemented to eliminate dependence on budget help

| Cheats or other manipulation used, no admission. | Budget manipulation used throughout simulation. No effort to stop. | Budget manipulation used. Good effort and progress to eliminate dependence on assistance. | No budget manipulation or excellent and successful efforts to eliminate dependence on assistance. |

### III. Conclusion (3 points)

**11. Conclusions & lessons learned**
- What team learned from the simulation about city design and operation
- What lessons will the team apply to their essay, model, and/or presentation?

| No lessons learned about city design/operation. No lessons to apply to other deliverables. | Brief summary of city design/operation lessons. Brief description of how team plans to use simulation lessons in the rest of the project. | Good summary of city design/operation lessons. Good description of how team plans to use simulation lessons in the rest of the project. | Excellent summary of city design/operation lessons. Excellent description of how team plans to use simulation lessons in the rest of the project. |
### IV. Judge Assessment of Design & Process (15 points)

<table>
<thead>
<tr>
<th>No Points</th>
<th>1 Poor</th>
<th>2 Good</th>
<th>3 Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements missing.</td>
<td>Poor-Fair quality. Fulfills less than 50% of requirements.</td>
<td>Average-Above average quality. Fulfills at least 85% of requirements.</td>
<td>Excellent quality. Fulfills 100% of requirements with additional distinctive features.</td>
</tr>
</tbody>
</table>

#### 12. Goals, city operation and design
- **Goals** are significant to a well-designed, well-operated city.
- **Overall well-designed, vital city showing significant growth, development and progress toward goals**
- **Good city management as reflected in strong budget**

| Poor goal choice. Poor city development. | Good goals, but city is immature or underdeveloped. Poor budget management. | Good goals. City somewhat well-developed, but could have made better progress toward goals. Good balanced budget management. | Excellent goals and city development. Significant progress toward achieving goals. Strong positive cash flow budget. |

#### 13. Quality of analysis
- **Analyzing and understanding results of simulation**
- **Fair and honest assessment of what works and what doesn’t**

| No analysis or complete misunderstanding of simulation results. | Little analysis or understanding of simulation results. | Good analysis and insight of simulation results. | Excellent analysis and insight into city operation and design as result of simulation. |

#### 14. Got It: strategic thinking
- Developing reasonable and appropriate strategies for design changes/refinements from the information in benchmark analysis

| No reasonable or appropriate strategies. | Strategies somewhat reasonable or appropriate, but not effective in advancing toward goals. | Strategies reasonable and appropriate and somewhat effective in advancing toward goals, but could be better. | Strategies reasonable and appropriate and highly effective in advancing toward goals. |

#### 15. Got it: design-test-refine process
- Using the simulation, applying the strategies, analyzing results
- Lessons to apply to other Future City deliverables (essay, model, presentation)

| No evidence of understanding the process or lessons to apply. | Some evidence of understanding the process. Lessons listed but could be improved. | Good understanding of the process. Team learning and adapting to simulation and testing. Good lessons to apply. | Excellent understanding of the process. Team learning and adapting to simulation, and testing. Significant lessons to apply. |

#### 16. Got it: city design and operation
- Conclusions & lessons learned about city design/operation are significant and appropriate based on information given.
- Team learned lessons beyond the two original stated goals.
- Conclusions are thorough and illustrate understanding of simulation process.

| No significant or appropriate conclusions. No lessons learned beyond stated goals. | 1-2 somewhat significant conclusions. One learned beyond stated goals. | Conclusions are significant, but missed some important areas. Two lessons learned beyond stated goals. | Excellent, thorough list of significant, appropriate conclusions. Three or more lessons learned beyond stated goals. |
**DELIVERABLE #3:**

**City Essay**

*Students write a 1,500-word essay that describes the unique attributes of their city and provides a solution to this year’s challenge.*

The essay asks students to imagine what it would be like to walk down the main street of their city 100 years in the future. What would someone hear, see, smell, feel? How would the people who live in this future city describe it? How is this city futuristic and innovative?

As students draft their City Essay, they explore questions like these and more to develop their future city. Students will think deeply about their city, its population, geographical location, culture, unique characteristics, and community’s needs. In addition, the City Essay asks students to thoughtfully address this year’s challenge: The Age-Friendly City.

---

**The Age-Friendly City Overview**

*"We have to stop building cities as if everyone is 30 years-old and athletic."*

Gil Penalosa, Executive Director, 8-80 Cities

What does it mean to be a senior citizen? The official definition in most countries is a person who is more than 60 or 65 years old. Beyond that, there is little else that seniors have in common. Today, a revolution in the “culture of aging” is underway, and timeworn notions of the elderly no longer fit. Older adults are living longer, staying in the workforce longer, and contributing to their communities in myriad ways.

But aging can have its challenges. As people get older, they may experience physical and cognitive changes. Loss of mobility, visual and hearing impairments, slowed reflexes, illness, and memory loss are a few examples of changes that can create barriers to independent living and sometimes lead to isolation and loneliness.

Because the number of older adults will exceed the number of all children under the age of 14 by 2050, the World Health Organization (WHO) developed a framework to help cities become more age-friendly. This entails designing and adapting a city’s natural and built environment to create accessible and safe transportation options, barrier-free access to homes and public buildings, and health care support and services so that people can maintain their health and independence for as long as possible. Such features do not just benefit the elderly, but people of all ages.

**The students’ challenge:** Identify an age-related challenge that exists in today’s urban environments and engineer two innovative solutions that allow your future city’s senior citizens to be as active and independent as they want to be.
City Essay Requirements

- Students should identify one age-related challenge older citizens have and engineer two solutions.
- The essay cannot exceed 1,500 words and should be free of grammatical and spelling errors.
- The essay can include a maximum of four graphics.
- The essay must cite at least three sources of information used during the idea development process. (MLA style is preferred; download guidelines from futurecity.org/resources (filter for Handbook & Student Handouts.)
- Students should use a variety of sources of information, such as interviews with experts, reference books, periodicals, and websites. (Note: Wikipedia is not accepted as a source of research.)
- The essay must be submitted as a Word document via the online submission center at futurecity.org. Check with your Regional Coordinator for the exact date.

City Essay Resources

Use these resources to help your students develop their essay. The first four items in this list are in the Appendix: Deliverables City Essay starting on page 58. They can also be downloaded at futurecity.org/resources (filter for Handbook & Student Handouts).

- City Design: Questions to Consider: These guiding questions will help students remember to research all the different aspects of their future city.
- The Age-Friendly City Overview and Research Questions student handout: This resource provides background information on creating age-friendly cities and guiding questions for student research.
- The Age-Friendly City Real World Case Studies student handout: Students will find these real-life examples of problems that were solved via innovative solutions both inspiring and instructive.
- City Essay Sample Outline: This outline explains what students should include in each section of their essay and how to organize their essay as well.
- The Age-Friendly City Age-Friendly Research Resources: Start your students research with this pre-selected set of websites, books, and videos. Download the list at futurecity.org/resources (filter for Research Resources & Websites.)
- City Essay Rubric: Review this rubric with students so that they understand how their essays will be evaluated. See page 64 or futurecity.org/resources (filter for Rules & Rubrics).
- City Essays from past Finals Winners: Analyzing essays from prior years will give students a strong sense of what they are aiming for in their own essays. Go to futurecity.org/gallery.
- Research cards help students track and organize the information they want to use in their essays. Go to futurecity.org/resources (filter for Research Resources & Websites).
- Final competition checklist: see page 80.

Competition Scoring

Teams can earn up to 60 points for their City Essay. Make sure they have thoroughly covered these categories in the rubric to maximize points:

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce City &amp; Define Problem</td>
<td>15</td>
</tr>
<tr>
<td>Specs and Solutions</td>
<td>21</td>
</tr>
<tr>
<td>Judge Assessment of Solution</td>
<td>12</td>
</tr>
<tr>
<td>Writing Skills</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

Scoring Deductions

- 5–10 points Late submissions may be accepted with a penalty. Check with your Regional Coordinator before the deadline to find out if this is an option in your region.
- 10 points Be sure to check your word count and do not exceed the 1,500-word limit.
City Design: Questions to Consider

As you start to research today’s cities and brainstorm what your future city might look like, discuss these questions with your teammates. Remember, no city can provide everything. What are the most important elements in your city? What tradeoffs do you have to make?

City Features
- Where is your city located?
- When was your city founded? What problems has your city had to overcome?
- Who lives in your city?
- Does your city have any distinctive natural features (e.g., mountains, oceans, rivers)?
- What is the weather like in your city?
- How do your citizens relax? What do they do for fun?
- What makes your city futuristic and innovative?

Zoning & Budget
- How is your city zoned? Are the zones separate or are there mixed-use zones (e.g., commercial and resident or commercial and industrial) in your city?
- How does your city fund its operations (i.e., utilities, infrastructure, and public services)?
- SimCity connection: How did zoning impact your SimCity’s growth and development?

Industry & Jobs
- What drives the economy in your city? (e.g., tourism, manufacturing, education)
- What types of jobs are available to your citizens?

Transportation
- How do your citizens travel around your future city? Is there more than one way for citizens to get around?
- Is your city accessible for citizens with mobility issues related to aging or a handicap?
- How are goods and services delivered in your city?
- SimCity connection: What did you learn from how your Sims moved around your Virtual City?

Environment & Energy
- How does your city prevent/reduce water or air pollution?
- Where does your city get its energy? What are the costs and tradeoffs of different power sources?

Utilities & Services
- What types of services does your city provide (e.g., police, fire, medical, education)?
- How does your city provide various utilities (water, sewer, waste management, electricity, Internet, etc.)?
- SimCity connection: How did you power your SimCity? Were your Sims happy with the level of services available to them?

Health & Recreation
- How does your city help support a healthy lifestyle?
- How does your city design ensure equal access and opportunities for people with disabilities or older citizens?

Housing
- Where do your citizens live? Individual houses, apartments, a mix? Where is housing located?
- Are there any special features in your city’s housing options?

Age-Friendly Cities
- What does an age-friendly city look like? Are there special features, policies or practices that make a city age-friendly?
- What issues keep older citizens from living active and independent lives in today’s cities?
- How do today’s age-friendly cities engage their older citizens?
- Many recommendations for creating age-friendly cities focus on policy or providing services. What role does engineering play in making a city more age-friendly?
- What engineering disciplines might help you create an age-friendly city?
- What innovative or futuristic solutions are being explored today to help seniors stay active and independent?
The Age-Friendly City Overview and Research Questions

The Age-Friendly City Overview

“We have to stop building cities as if everyone is 30 years-old and athletic.”

Gil Penalosa, Executive Director, 8-80 Cities

What does it mean to be a senior citizen? The official definition in most countries is a person who is more than 60 or 65 years old. Beyond that, there is little else that seniors have in common. Today, a revolution in the “culture of aging” is underway, and timeworn notions of the elderly no longer fit. Older adults are living longer, staying in the workforce longer, and contributing to their communities in myriad ways.

But aging can have its challenges. As people get older, they may experience physical and cognitive changes. Loss of mobility, visual and hearing impairments, slowed reflexes, illness, and memory loss are a few examples of changes that can create barriers to independent living and sometimes lead to isolation and loneliness.

Because the number of older adults will exceed the number of all children under the age of 14 by 2050, the World Health Organization (WHO) developed a framework to help cities become more age-friendly. This entails designing and adapting a city’s natural and built environment to create accessible and safe transportation options, barrier-free access to homes and public buildings, and health care support and services so that people can maintain their health and independence for as long as possible. Such features do not just benefit the elderly, but people of all ages.

Research Questions

As you do your research you’ll see that many of the issues affecting seniors can be addressed through public policy, social welfare programs, or via small infrastructure changes (i.e., building better sidewalks, having working elevators in subway and train stations, etc.).

For the purposes of the Future City Competition, we would like your team to identify an issue seniors face in 2017 that can be addressed through engineering. Remember your seniors live 100 years in the future. Your engineering solutions should reflect this and be innovative, futuristic, and scientifically plausible.

Senior Citizens

Engineers need to know as much as they can about the people for whom they are designing solutions. Start your research by learning more about senior citizens:

• At what age do you consider someone a senior citizen? Is being a senior citizen purely a factor of age or something else?

• What stereotypes are associated with the label “senior citizen”?

• Are there differences in the abilities of someone who is 65 and someone who is 85? Or differences between someone who is 75 and someone who is 95?

• What are some of the typical physical and cognitive issues a senior citizen may face?

• What might keep a senior citizen from being active and independent in their community?

• How might these limitations affect their ability to live independently and engage in the activities of your city?

• What are the consequences now, and in the future, when large numbers of people reach their senior years—and, thanks to modern medicine, live as senior citizens for 30, 40, or more years?
Challenges Seniors May Face

This next section highlights some areas where seniors may face challenges. This is not a complete list. As you do your research you may find another issue your team would like to address. This is okay.

1. LIVING INDEPENDENTLY

Where to live is a critical element that can have an impact on our happiness and sense of security. But seniors may need extra assistance or have different requirements than younger people. As you do your research look into the following:

- Many seniors want to “age in place,” which means they want to stay in their own homes for as long as possible. Why do you think some seniors want to stay in their homes?
- Other seniors look forward to living in senior communities. What features of independent living or assisted living residences are attractive and helpful to seniors?
- What factors could make a typical home difficult to live in for a person with physical or cognitive issues?
- What existing technologies can you point to that help seniors live more independently?
- What adaptive technologies would make it easier/possible for seniors with health issues to live independently?

2. TRANSPORTATION

Moving freely and safely around a city is often a challenge as people age. If this is an area of interest, consider:

- What does “impaired mobility” mean, especially in regard to older people?
- How might mobility issues affect an older person’s ability to get around their city?
- Why do you think it is hard for a senior to give up driving? What can be done to make public transportation an attractive alternative to driving?
- What are the various modes of transportation available? How do they interconnect or work together? What are the advantages and disadvantages of each in regard to senior citizens, especially those with mobility issues?
- How important is a robust public transportation system to the life and economy of a city?
- In addition to the transportation mode itself, what other features are important considerations in a successful public transit system for senior citizens? (Remember to consider the various physical and cognitive issues seniors deal with including vision problems, hearing loss, mobility issues, slowed reaction time, and memory loss.)

3. STAYING HEALTHY

As people age, they may begin to experience various health challenges. Start your research here:

- Seniors often have issues that affect their physical mobility. How can engineers or specialized technologies help seniors maintain their mobility?
- Cognitive exercise, which basically means using your brain, has been shown to play a role in helping seniors’ brain fitness. What role can technologies play in helping seniors continue to learn new things and exercise their brain?
- Smart technology and sensor systems are two types of technology that hold great promise in helping seniors live more independently. How can these two technologies:
  - Help seniors stay healthy?
  - Help seniors with physical and cognitive disabilities (such as arthritis, stroke, low vision, or memory loss) carry out necessary tasks of daily life?

THE AGE-FRIENDLY CITY RESEARCH RESOURCES

Start your research with a suggested set of websites, books, and videos. Download the list at futurecity.org/resources (filter for Research Resources & Websites).
Case Study: Sensors for Seniors

Imagine a “magic” carpet that can sense when someone has fallen and summon help. Or a “smart” pill bottle that can sense when it hasn’t been opened and send a reminder to a patient to take her medication. In the future, entire houses can be wired with sensors to alert caretakers if the heat isn’t working, or if a door opens in the middle of the night, or to alert a senior that his oven has been on for more than an hour. Sensors can also be wearable, and they can even be scattered throughout a city sending warnings and safety information to fire, police, or health officials. Do sensors hold the key for elderly independence? Or are they too intrusive—putting seniors under a surveillance that invades personal privacy?

Case Study: Tubeless London

In 2014, NBBJ, an architectural design firm, submitted a radical plan to improve transportation within the city of London and make it more age-friendly. Their idea was to get rid of the subway cars that served London for more than a century and replace them with moving walkways. This is the way NBBJ imagined the new London transit:

The track is divided into three lanes. A “slow” lane travels at 5.5 miles per hour, a “medium” lane at 7.45 mph, and a “fast” lane at 9.3 mph. As the walkways enter tunnels, they pick up even more speed. When people enter the underground, instead of boarding a train they’ll immediately hop onto one of the three tracks. Accommodations for elderly and disabled riders will include benches to sit on, and easy methods to get on and off the moving belts. According to the designers, much of the cost of totally gutting the existing tube system would be recouped in revenue from cafes and food carts located on the side of the tracks.
Case Study: The Virtual Senior Center

At 93 years old, Rose Binder of Queens, NY lives alone and is house-bound. There are no stores in her neighborhood, and taking an accessible taxi service makes her “very nervous.” “Sometimes they come late,” she says, “or they don’t show up and I have to keep calling.” Even speaking on the telephone is difficult for her. For many people in Rose’s circumstances, life would be lonely and isolating. But Rose’s time is filled with intellectual and cultural riches and friends that she gathers with regularly thanks to the Virtual Senior Center. Each week, the Virtual Senior Center offers some 30 online classes to homebound clients, from tai chi and exercise to contemporary history discussions and gallery talks with museum curators, as well as music appreciation, singing, and even foreign language classes. Participants use a simple touch-screen computer to join in, play games, or use the Internet. “I especially like any classes that give you information like history or art, so I try to do as many as I can,” says Binder. “But unfortunately I have to eat lunch and I skip something. Where else can you get such a wonderful array of classes without going to class?”

Research has found that loneliness contributes to many physical ills, among them heart disease, poor immunity and Alzheimer’s. To help counter loneliness, the Virtual Senior Center is all about participation and relationships. Unlike other distance learning where people often sit anonymously at their computer screens, participants engage here not only with the instructor but with each other, and friendships form.

Case Study: Human Factors Engineering

Most young people are very comfortable with technology. They usually have an easy time learning to use new products and technologies. Older people, on the other hand, sometimes have a hard time with new or unfamiliar tools and technologies, such as a new smartphone, an ATM, a new parking meter, or a self-checkout stand at the supermarket.

Human Factors Engineers help design tools and technologies that are easy to use. The field of Human Factors Engineering helps ensure that new products and technologies are a good match for people’s abilities and the environments where the products and technologies will be used. Human factors engineers consider human strengths and weaknesses, both physical and cognitive, when designing new technology. Human factors engineers consider the skills a person needs to perform tasks with a new product. For example, when human factors engineers help design an inhaler, they ensure that all users, including elderly users, are strong enough to push down on the inhaler button to release a dose of medicine. When human factors engineers help design the dashboard of a car or a plane, they make sure that the buttons and indicator lights are clearly labeled so that users don’t have to spend extra time interpreting vague symbols or colors. It is also important to make products as intuitive and “user-friendly” as possible to reduce the chance that people make mistakes when using them.

Overall, human factors engineers focus on how technology works in actual practice, with real human beings at the controls. They try to design products that maximize safety, reduce the chance of mistakes, and are satisfying to use.
City Essay: Suggested Outline

Tell your students to ask questions and take notes as you review the competition’s suggested city essay outline and discuss how they can use it to draft their essay.

Part 1: The Introduction

Briefly introduce your future city by including the basic information about it. Your city’s name, how old it is, where it is, and how many people live there all go in the introduction.

Part 2: A Closer Look

Paint a picture of life in your future city—as if you are describing it to someone who has never been there. Share details about:

• The climate and any natural features (like rivers, mountains, or a nearby ocean)
• Who lives in your city and what kind of work do they do
• Any innovative or futuristic aspects of your city’s infrastructure (like housing, transportation, energy, pollution control, etc.)
• What services your city provides (such as education, healthcare, etc.)
• The average age and life span of your citizens, and your city’s definition of senior citizen.
• Briefly share the features and services that make your city age-friendly.

Part 3: Define the Problem

Describe the typical challenges older adults in 21st century cities faced in remaining active and independent. Then identify one challenge in particular, describe its impact, and why your city decided this was the most important problem to address (with your two innovative solutions).

Part 4: Describe Your Solutions

Here’s where you get to detail the two innovative solutions (to the problem you identified) that make your future city more age-friendly. Be sure to:

• Describe your two engineered solutions and how they work.
• Emphasize the innovative, futuristic features of your two solutions.
• Explain how your solutions improve your citizens’ ability to remain active and independent.
• Describe some of the risks connected with using the solutions and how the solutions reduce these risks.
• Provide examples of how both solutions benefit other members of your future city (not only senior citizens) and/or enhances the quality of life in general.
• Explain why you made the choices you did and what tradeoffs, if any, were involved.
• Explain what types of engineering were involved and what kinds of engineers were most helpful.

Conclusion: The Impact of The Age-Friendly City

Summarize how your age-friendly solutions make your city a great place to live, especially for older adults, and how they keep your citizens active and independent in your future city.
# City Essay Rubric

## I. Introduce City and Define the Problem (15 points)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Basic city information: population, age, location</td>
<td>No description of city.</td>
<td>Brief description of one type of city infrastructure.</td>
<td>Good description of two different types of infrastructure.</td>
<td>Detailed description of two or more types of infrastructure.</td>
</tr>
<tr>
<td>• Climate and/or natural features</td>
<td>No description of city services.</td>
<td>Brief description of one type of city service.</td>
<td>Good description of two different types of city services.</td>
<td>Detailed description of two or more types of city services.</td>
</tr>
<tr>
<td><strong>2. Infrastructure</strong></td>
<td>No description of city infrastructure.</td>
<td>Brief description of one type of city infrastructure.</td>
<td>Good description of two different types of infrastructure.</td>
<td>Detailed description of two or more types of infrastructure.</td>
</tr>
<tr>
<td>• Types of infrastructure could include: housing, transportation, energy, pollution control or others.</td>
<td>No description of any present-day challenges.</td>
<td>Brief description of present-day challenges.</td>
<td>Good description of present-day challenges.</td>
<td>Detailed description of present-day challenges.</td>
</tr>
<tr>
<td><strong>3. City services</strong></td>
<td>No description of city services.</td>
<td>Brief description of one type of city service.</td>
<td>Good description of two different types of city services.</td>
<td>Detailed description of two or more types of city services.</td>
</tr>
<tr>
<td>• Types of city services could include: education, healthcare, fire or police protection, elder services, etc.</td>
<td>No description of city infrastructure.</td>
<td>Brief description of one type of city infrastructure.</td>
<td>Good description of two different types of infrastructure.</td>
<td>Detailed description of two or more types of infrastructure.</td>
</tr>
<tr>
<td><strong>6. Describes the selected problem</strong></td>
<td>No description.</td>
<td>Brief description of only one solution or describes two solutions but lacks details on how innovative or futuristic.</td>
<td>Good description. Clearly outlines two solutions and how they are innovative and futuristic.</td>
<td>Excellent description. Thoroughly describes two solutions and how they are innovative and futuristic.</td>
</tr>
<tr>
<td>• One problem selected (i.e., housing, transportation, health, other)</td>
<td>No description of challenge city addressed.</td>
<td>Brief description of problem city decided to address. Clearly states impact on seniors and why important.</td>
<td>Good description of problem city addressed. Clearly states impact on seniors and why important.</td>
<td>Excellent description of problem city addressed. Thoroughly details impact on seniors and why important.</td>
</tr>
<tr>
<td>• Why problem is important to solve</td>
<td>No description of challenge city addressed.</td>
<td>Brief description of problem city decided to address. Clearly states impact on seniors and why important.</td>
<td>Good description of problem city addressed. Clearly states impact on seniors and why important.</td>
<td>Excellent description of problem city addressed. Thoroughly details impact on seniors and why important.</td>
</tr>
<tr>
<td>• Importance to city to address</td>
<td>No description of challenge city addressed.</td>
<td>Brief description of problem city decided to address. Clearly states impact on seniors and why important.</td>
<td>Good description of problem city addressed. Clearly states impact on seniors and why important.</td>
<td>Excellent description of problem city addressed. Thoroughly details impact on seniors and why important.</td>
</tr>
</tbody>
</table>

## II. Specs and Solution (21 Points)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
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<td>No description.</td>
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<td>Excellent description of problem city addressed. Thoroughly details impact on seniors and why important.</td>
</tr>
</tbody>
</table>

**DOWNLOAD THIS RUBRIC** at futurecity.org/resources (filter for Rules and Rubrics).
## II. Specs and Solution (21 Points) (Continued)

### 8. Discusses the impact on senior population
- Ability to remain active and independent
  - **0** No discussion.
  - **1** Brief discussion of impact. Few details on how seniors’ ability to be active and independent improved.
  - **2** Good discussion on impact. Provides some details on how seniors’ ability to be active and independent improved.
  - **3** Excellent discussion on impact. Provides many details on how seniors’ ability to be active and independent improved.

### 9. Discusses futuristic technology involved in solution
  - **0** No discussion of technology.
  - **1** Some discussion of technology involved.
  - **2** Good discussion of technology involved.
  - **3** Excellent discussion of technology involved.

### 10. Describes risks and tradeoffs of solutions
  - **0** No discussion of risks or tradeoffs.
  - **1** Briefly describes one risk and/or tradeoff.
  - **2** Good description of one risk, how it was reduced, and one tradeoff or compromise.
  - **3** Excellent description of two risks, how they were reduced, and two tradeoffs or compromises.

### 11. Describes solutions’ benefits to citizens
- Other citizens (not just seniors)
- Enhances quality of life in general
  - **0** No description of how solutions benefit other citizens and/or enhance quality of life.
  - **1** Short description of how solutions benefit other citizens and/or enhance quality of life.
  - **2** Good description with two examples of how the solutions benefit other citizens and/or enhance quality of life.
  - **3** Excellent description with three or more examples of how solutions benefit other citizens and/or enhance quality of life.

### 12. Engineering disciplines involved and role of 1-2 engineers
  - Engineering disciplines are not identified.
  - Discusses one engineering discipline or role of one engineer.
  - Discusses more than one engineering discipline and role of engineers.
  - Good discussion of more than one engineering disciplines and roles of the engineers.

### III. Judge Assessment Of Solution (12 points)

### 13. Effectiveness and quality of solution
- Effective solutions to stated problems
- Clever design and application of technology
- Ability to remain active and independent
  - **0** Not effective.
  - **1** Solution is somewhat effective, technology and design can be improved, with fair impact on seniors’ ability to remain active and independent.
  - **2** Solution is effective, but technology and design could be improved, with good impact on seniors’ ability to remain active and independent.
  - **3** Solution is highly effective, with excellent technology application, with high impact on seniors’ ability to remain active and independent.

CONTINUED ON NEXT PAGE
## City Essay Rubric

### III. Judge Assessment Of Solution (12 points) (Continued)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Innovative and futuristic solution</td>
<td>Not innovative or original.</td>
<td>Somewhat original or innovative. Not futuristic. Little engineering involved.</td>
<td>Solution is innovative, original and somewhat futuristic. Some engineering involved.</td>
<td>Solution is highly innovative, original and futuristic. Extensive engineering involved.</td>
</tr>
<tr>
<td></td>
<td>• Reasonable extrapolation and application of technology</td>
<td>• Degree to which solution involves engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Plausibility of solution</td>
<td>Implausible or not scientifically sound.</td>
<td>Solution is not very plausible (science fiction).</td>
<td>Solution is somewhat plausible.</td>
<td>Solution is highly plausible and scientifically sound.</td>
</tr>
<tr>
<td></td>
<td>• Based on sound scientific principles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Accounting for risks and tradeoffs</td>
<td>• Assessing consequences and making logical decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. Writing Skills (12 Points)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. Writing skills</td>
<td>Poor writing.</td>
<td>Fair writing.</td>
<td>Good writing.</td>
<td></td>
</tr>
<tr>
<td>20. Maximum number of graphics</td>
<td>Exceeds maximum of 4 graphics, illustrations.</td>
<td></td>
<td>Does not exceed maximum of 4 graphics and/or illustrations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If used, max of 4 (does not include tables)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. List of references</td>
<td>No references.</td>
<td>Less than three acceptable references.</td>
<td>At least three acceptable references.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• At least three acceptable references</td>
<td>• Wikipedia not recognized as an acceptable reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Word count</td>
<td>No word count at end of document or inaccurate count.</td>
<td></td>
<td>Accurate word count at end of document.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Does not include title, references</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Appendix: Deliverables

- City Essay
DELIVERABLE #4:

City Model

Students build a physical model of a section of their city using recycled materials. In addition to showcasing their city of the future, the City Model must also show the solution to this year’s challenge. The model must have at least one moving part, be built to scale, and may not exceed the $100 expense budget.

Explain to students that engineers, architects, scientists, and city planners all use models to help them communicate their ideas, share their research, and predict the success of their design. Emphasize that the ideas represented in their City Model should be in alignment with their City Essay and reflect what they learned as they designed their Virtual City. Students must decide upon an area of their city that will best showcase their solution to this year’s challenge as well as the overall vision that they have for their city.

Collect Recycled Materials

Remind students that they only have a $100 budget and need to think creatively about their building and presentation materials.

- Flea markets and garage sales are excellent sources for old toys, bottles, tins, and buttons.
- Old toys, such as Lego pieces, gears, Tinker Toys, and blocks, are also excellent sources for materials.
- Builders and plumbers may have discarded pieces of pipe, wire, and wood.
- Home improvement companies and remodelers may be willing to part with obsolete materials from houses they are remodeling. Old parts from stoves, cabinets, and plumbing fixtures may be sources for moving parts or may provide unusual shapes for your buildings.
- Obsolete or outdated electronic equipment may be recycled and reused and can provide visual interest in your city.

Note: All of these items have value and need to be listed on the Competition Expense Form.

TRANSPORTING YOUR MODEL

It’s never too early to start thinking about how you will transport your model to the regional competition. Think about how to create a sturdy base and ways to protect the model while it is being moved.

City Model Requirements

- Must be built to scale as determined by the team.
- Must be no bigger than 20” high, 50” long, and 25” wide, including all support braces, material hanging below or beyond the tabletop, and any fully extended parts, such as access doors or hinged pullouts.
- Vertical-oriented models are not accepted.
- Must contain one or more moving part(s). Any electrical power must be self-contained (e.g., a household battery and a simple circuit).
- Use of electrical floor or wall outlets is not allowed.
- Use of live animals, perishable items, or hazardous items (e.g., dry ice) is not allowed in the model.
- Use of audio or sound is not allowed as part of the model.
- Although a small number of individual pieces from previous competition models may be reused, models must be a new representation of a future city and built from the baseboard up.
- The total value of the materials used in the model, as well as those used in support of the presentation and special awards (including color copying/printing, three-dimensional printing, visual aids, costumes, and other demonstration aids) may not exceed $100 and must be reported on the Competition Expense Form.
- A City Model Identification Card must be submitted. This 4” x 6” index card is used by the judges to identify your team’s information. The card should include:
  - City name (has to be the same as the team’s name)
  - Scale used for the model
  - School/Organization name
  - Names of the three presenting students, educator, and mentor.
REVIEW THE COMPETITION EXPENSE FORM
Students must list the costs of all items used for their model, presentation, and special awards. Common recycled materials, such as plastic tubs and glass jars may be assigned a zero cost value. Other used, donated, or borrowed items must be assigned a fair market or salvaged value, which may be determined by pricing found at a yard sale, auction, classified ad, or surplus store, for example. For more details, see the Competition Expense Form in Appendix: Competition Information and at futurecity.org/resources (filter for Competition Forms & Project Plan).

City Model Resources
Use the following resources to help your students create their City Model.

- **City Design: Questions to Consider:** This student handout helps students focus as they design their cities. See page 58.
- **Build Your City Model:** This student handout includes practical tips for building city models. See page 69.
- **Model-building activities:** Give students plenty of practice by having them do these activities: What Is a Model?, Plan-Relief and Architectural Models, and Building Strong, all at futurecity.org/resources (filter for Activities & Background Info).
- **Building Scale Models:** Students also need practice working with scale. These activities will build students’ understanding: Introduction to Scale; Plan and Elevation View; Proportions, Ratios, and Scale Drawings; and Scale Map and are all at futurecity.org/resources (filter for Activities & Background Info).
- **Moving Part video:** Give students ideas for what moving part to include in their City Model by showing them this video at futurecity.org/resources (filter for Webinars & Videos).
- **City Model Rubric:** Remind students to check their model against the criteria that the judges will use to evaluate their work. See page 71 and futurecity.org/resources (filter for Rules & Rubrics).
- **City Model Video Tutorial:** This video at futurecity.org/resources (filter for Webinars & Videos) helps students understand how to create their model.

- **Examples of other City Models:** Having previous examples to examine can give students lots of ideas. See them at futurecity.org/gallery.
- **Final competition checklist** on page 80.

**Competition Scoring**
Teams can earn up to 70 points for their City Model. Make sure students have thoroughly covered these categories in the rubric to maximize points:

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Design</td>
<td>20</td>
</tr>
<tr>
<td>Build It: Quality &amp; Scale</td>
<td>15</td>
</tr>
<tr>
<td>Build It: Materials &amp; Moving Part(s)</td>
<td>15</td>
</tr>
<tr>
<td>Judge Assessment of Model</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>70</strong></td>
</tr>
</tbody>
</table>

**Scoring Deductions**

1–5 points Remember your City Model Identification Index Card and proofread it to make sure it includes all of the required information.

5 points Not including your receipts with your Competition Expense Form will result in losing points.

15 points A missing, incomplete, or inaccurate Competition Expense Form will lose points.

15 points Models that exceed the competition’s stated model dimensions of 20” high, 50” long, and 25” wide will lose points.

15 points There is a budget of only $100 for the city model and presentation materials, and special awards combined.
Build Your City Model

Questions to Consider

• What scale works best for your model?
• What recycled materials could you use? How could you use them in creative ways?
• If there were funding for only 20 buildings, which buildings would city planners be sure to construct first?
• Buildings are one of the most visible parts of a city. Where are the hospitals? Where are the retail centers? Where are the residences? Are there colleges? What about government buildings?
• Identify the infrastructure. How are roads and highways connected? Where are the energy production facilities? Do the water delivery systems and waste management systems have water treatment plants?
• How will you incorporate this year’s age-friendly city challenge into your city?
• What makes your city innovative and futuristic? How can you show your futuristic ideas are based on science and engineering?
• What will the moving part(s) do? How does it represent an important age-friendly element in the city?
• How will the moving part be powered? Can you easily repeat the movement?
• How can the engineering design process help you build your model?

Tips for Creating the City Model

• Check out the Gallery at futurecity.org/gallery to see models from past competitions.
• Pick an area of the city that best showcases the competition criteria and your concept for the city. The model should highlight the thought process behind the city.
• Remember to choose a scale that works best for your city design. The team members decide the scale based on their design. They will need to create a scale key, such as 1 inch = 5 feet.
• Be sure your model includes a physical representation of your team’s solution to the age-friendly city challenge.
• Remember to add at least one moving part. Designing your own moving part, or creatively modifying an existing item, will earn more points than using a prefabricated or purchased item. The moving part is an excellent opportunity to explore the physics of simple sources of power, such as rubber bands, weights, heat, springs, pulleys, simple circuitry, light and/or solar power.
• Think about how you will transport your model to the regional competition. Ask yourselves,
  – How will we protect the model while we are moving it?
  – What materials will we use to protect the model?
  – How much thickness and bulk will the packaging materials add to the model?
  – Does it weigh more than 75 pounds? If our team advances to the Finals no model can exceed 75 pounds due to shipping constraints.
• Create a solid base for your model by using plywood or particle board. You want to save on weight, but your base has to be stiff enough to carry the model without flexing.

SCALE MEASUREMENTS

Consider a scale that works for both large items, such as buildings, as well as smaller items such as windows within buildings and traffic signs. These measurements below can be used as a general guide for scaling basic city features. Research dimensions for other features that you plan to include in the model.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 feet</td>
<td>Width of traffic lane</td>
</tr>
<tr>
<td>8 feet</td>
<td>Height of stop sign</td>
</tr>
<tr>
<td>10 feet</td>
<td>Height of a building story</td>
</tr>
<tr>
<td>4 feet</td>
<td>Minimum width of residential sidewalk</td>
</tr>
</tbody>
</table>
Model Enhancement Ideas

- **Trees:** These can be made from twigs and sticks with cotton balls (can be painted green), lichen from a hobby store, dried flowers or weeds, or sponges with food coloring.
- **People:** These can be made from sticks, toothpicks, mat board, pins, dowels, pipe cleaners, and so on.
- **Cars:** These can be made from layers of mat board or cardboard glued together, toy cars that are the right scale, Styrofoam, and so on.
- **Glass:** You can use clear plastic dividers, sleeves, sheets. Remember to put this on last so that it doesn’t get scratched.
- **Bricks/Pavers:** You can use a colored paper or other colored material that matches what you want it to look like and then draw on the pattern or you can take a white paper or material and color it with markers, crayons, or similar, remembering to show the pattern.
- **Asphalt:** You can take black paper or color a white paper black and then draw on the lane markers with a white and/or yellow colored pencil or crayon and then cut to size.
- **Cement:** You can use a gray paper or color a white paper and then cut to size.
- **Grade changes:** You can use Styrofoam that is cut/shaped to what you want and use layers of cardboard or mat board to form contours or slope the model.
- **Water:** You can use blue colored paper or color white paper blue. For added affect, you can put clear plastic or plastic wrap (the kind you use for foods) over it.
- **Building material look:** To make something look realistic, you can draw on joint lines.
- **Sand/beach:** You can use sand paper (very fine grit).
- **Grass:** Use green colored paper or color white paper green, green felt or fabric, or you can use a grass material from a hobby store.

### MOVING PART MECHANISMS

Your moving part must be able to have the motion repeated and must be related to a function of the city or your age-friendly solution. Ideas for moving part mechanisms include:

- Rubber bands
- Heat
- Light/Solar
- Weights
- Springs
- Pulleys
- Batteries
- Simple circuitry

Creatively engineered or innovatively modified moving parts garner more points. For example: a store bought, electric, hand-held fan that is glued to a model is technically a moving part, but it will not receive as many points as a moving part whose team put time, effort, and engineering thought into its construction or development.
## City Model Rubric

### I. City Design (20 Points)

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No evidence of zoning. No variety of structures.</td>
</tr>
<tr>
<td>1</td>
<td>Zoning unclear. Little variety of structures.</td>
</tr>
<tr>
<td>2</td>
<td>At least one zone; small variety of structures.</td>
</tr>
<tr>
<td>3</td>
<td>1–2 zones; some variety of structures.</td>
</tr>
<tr>
<td>4</td>
<td>2 or more zones and some variety of structures. Could be more comprehensive.</td>
</tr>
<tr>
<td>5</td>
<td>All 3 zones; excellent variety of recognizable structures.</td>
</tr>
</tbody>
</table>

### City representation
- Includes all zones: residential, commercial, industrial
- Clearly recognizable elements, identifiable structures, zones

### City infrastructure and services
- Includes essential infrastructure (water, roadways, power, utilities, etc.)
- Includes variety of essential city services (public safety, health, education, etc.)

### Interconnectivity within city
- Interconnectivity of zones and infrastructure
- Transportation modes: pedestrian, public, goods and services

### Model demonstrates theme: The Age-Friendly City
- Essay topic/theme incorporated into model
- Shows solution for theme

### II. Build It: Quality & Scale (15 Points)

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Poor quality.</td>
</tr>
<tr>
<td>1</td>
<td>Mediocre quality.</td>
</tr>
<tr>
<td>2</td>
<td>Fair to good quality.</td>
</tr>
<tr>
<td>3</td>
<td>Good quality. Age appropriate.</td>
</tr>
<tr>
<td>4</td>
<td>Very good quality. Age appropriate.</td>
</tr>
<tr>
<td>5</td>
<td>Excellent quality. Age appropriate.</td>
</tr>
</tbody>
</table>

### Quality workmanship and age appropriateness
- Age appropriate for 6th, 7th, 8th grades
- Quality construction
- Reasonably durable
## City Model Rubric

### II. Build It: Quality & Scale (15 Points)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6. Appearance</strong>&lt;br&gt;• Use of color, graphics, shapes, etc.&lt;br&gt;• Realistic elements (flora, fauna, landscapes)&lt;br&gt;• Good use of available space</td>
<td>No aesthetics.</td>
<td>Poor aesthetics.</td>
<td>Fair aesthetics.</td>
<td>Good aesthetics, enhance the model.</td>
<td>Very good aesthetics, enhance the model.</td>
</tr>
<tr>
<td><strong>7. Model scale:</strong>&lt;br&gt;• Appropriate scale chosen to create a good city model&lt;br&gt;• Consistent scale throughout model&lt;br&gt;• Applied horizontally and vertically</td>
<td>Scale not used.</td>
<td>Inconsistent scale for majority of model.</td>
<td>Fair scale choice; Some scale inconsistences.</td>
<td>Good scale choice; city elements easy to identify. Scale consistently applied over majority of model.</td>
<td>Very good scale choice; city elements easy to identify. Consistent application.</td>
</tr>
</tbody>
</table>

### III. Build It: Materials and Moving Parts (15 Points)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8. Innovative construction materials, techniques</strong>&lt;br&gt;• Variety of materials, imaginative or unusual materials&lt;br&gt;• Creative modification and application of recycled materials&lt;br&gt;• Building materials primarily recyclables to comply with $100 budget</td>
<td>No creativity or innovation.</td>
<td>Few recycled materials. Not within budget. Very few creative materials or materials used without modifications.</td>
<td>Recycled materials. Little creativity, variety. Little attempt to modify.</td>
<td>Recycled materials. Some variety of innovative materials. Some creatively modified recycled materials.</td>
<td>Recycled materials. Good variety of innovative materials. Many creative modifications and applications.</td>
</tr>
</tbody>
</table>
### III. Build It (Continued)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Moving part</td>
<td>No moving part</td>
<td>Moving part cosmetic, not relevant to city function</td>
<td>Moving part not relevant to city function</td>
<td>At least one moving part somewhat related to city function</td>
<td>At least one moving part intrinsic to city function</td>
<td>More than one moving part essential to city function</td>
</tr>
<tr>
<td>• At least one moving part</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Related to design or function of city</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### IV. Judge Assessment of Model (20 Points)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. City Design</td>
<td>No planning</td>
<td>Little planning, Little consideration of livability concepts</td>
<td>Some planning is obvious. A few livability elements included</td>
<td>Planned design. Incorporates some livability concepts</td>
<td>Well-planned design. Incorporates several livability elements</td>
<td>Excellent planning. Excellent design Highly livable</td>
</tr>
<tr>
<td>• Well planned. Considers livability concepts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Neighborhoods, green spaces, mixed use zones</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>– Interconnectivity</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Sustainability and environmental elements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Accessibility</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Innovative solutions</td>
<td>No solutions</td>
<td>One solution, not innovative</td>
<td>One solution. Somewhat innovative</td>
<td>More than one solution. Somewhat innovative and plausible</td>
<td>More than one solution that is innovative</td>
<td>Several innovative and plausible solutions</td>
</tr>
<tr>
<td>• Innovative solutions to problems (power, environment services, transportation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Technologically plausible</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Application of futuristic, advanced technologies</td>
<td>No futuristic examples</td>
<td>1–2 futuristic examples. Artistic, but not technologically or scientifically sound</td>
<td>Few futuristic examples. At least 1 technologically or scientifically sound</td>
<td>Some futuristic examples, most of which are technologically and scientifically sound</td>
<td>Several futuristic examples, many of which are technologically and scientifically sound</td>
<td>Highly futuristic and based on sound technological and scientific principles</td>
</tr>
<tr>
<td>• Includes futuristic technologies, components, infrastructure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plausible extrapolations of technological/ scientific advancements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Model effectiveness</td>
<td>No effective representation</td>
<td>Fair representation of a city. But for many elements, one asks “What is this and why is it here?”</td>
<td>Good representation of a city, however the function and purpose of many of the elements is not evident</td>
<td>Good visual representation of a city, but purpose/function of some elements not evident</td>
<td>Very good visual representation of a city. A few elements not obvious</td>
<td>Extremely effective visual representation of a future city. Function and purpose of elements easy to understand</td>
</tr>
<tr>
<td>• Functions as stand-alone representation of city design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Function and purpose of model elements and relationship to each other is evident on visual examination</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
DELIVERABLE #5:  
City Presentation

Students give a 7-minute presentation discussing features of their future city and their solution to the challenge followed by a question and answer period of 5–8 minutes from the judges. Check with your Regional Coordinator for exact competition time limits.

Engineers communicate with a variety of professionals every day. Being able to talk about their ideas and solutions clearly and succinctly is a very important skill that engineers and technical professionals use throughout their careers. For this deliverable, students develop these communication skills by creating and delivering a presentation that describes their future city and their innovative solutions to the age-friendly city challenge.

City Presentation Requirements

- **Time allowed:** The presentation can be up to 7 minutes, followed by a question and answer period of 5–8 minutes.

- **Use visual aids and props.** While the model is the primary demonstration aid, students may use pointers, display boards, flip charts, costumes, handouts, and brochures during the presentation. With the exception of a handout and costumes, any visible item that is not part of the City Model will be deemed a visual aid and subject to the following size limitations:
  - **Display boards**—Visual aids, such as flip charts, foam boards, poster boards, etc. must adhere to these parameters: the display(s) must be standard size (24”x 36” for poster boards, 25”x 30” for flip charts) and up to two boards may be displayed concurrently. Note: signs created with a matte finish look better in photographs.
  - **Flip Charts**—If you are using prepared flip charts, make sure your writing does not show through to the next page. Make your lettering BIG AND DARK. (Use blue, black, brown, purple, or dark green markers.)
  - **Costumes**—These include anything the presenters wear or carry that enhances the role they are depicting in their presentation (e.g., team t-shirts, cell phones, briefcases).

- **One handout and small mock-ups**—All items in this category must collectively fit within a 6” x 6” x 12” volume (e.g., a shoe box).

- **One brochure**—This is limited to one 8.5” x 11” sheet of paper.

- **Expense Limit: Stay within $100.** The total value of ALL the materials used in support of the presentation and special awards, including the city model and costumes, may not exceed $100. All materials must be documented on the Competition Expense Form found in Appendix: Competition Information and at futurecity.org/resources (filter for Competition Forms & Project Plan.)

- **Audiovisual equipment:** Audiovisual equipment, including laptop computers, overhead projectors, DVD/video players, iPods, iPads, and mp3 players, is not allowed.

City Presentation Resources

Use these resources to help students create their presentations and practice them.

- **Practice Questions:** Students can get a sense of the kinds of questions the judges may ask. Available in late October, download at futurecity.org/resources (filter for Handbook & Student Handouts.)

- **Videos of Presentations:** These videos from past Champions and Runners-up show students what to expect at the competition. They are found online at futurecity.org/gallery.

- **Competition Forms:** Teams must complete these forms and bring them to the competition. They are found online at futurecity.org/gallery.

- **Final Competition Checklist** on page 80.
Competition Scoring

Teams can earn up to 70 points for their City Presentation. Make sure students have thoroughly covered all of these categories in the rubric to maximize points:

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content &amp; Delivery</td>
<td>35</td>
</tr>
<tr>
<td>Engineering and Technology</td>
<td>20</td>
</tr>
<tr>
<td>Judge Assessment</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>70</strong></td>
</tr>
</tbody>
</table>

Scoring Deductions

2 points  Don’t forget the Honor Statement.
15 points Remember, there is only a $100 budget for the model, presentation materials, and special awards combined.
15 points Pay attention to the official presentation dimensions (e.g., display sizes).
20 points Mind your manners, or points will be deducted.

DISQUALIFICATION

Anyone caught destroying another team’s model is automatically disqualified.
# City Presentation Rubric

## 1. Content & Delivery (35 Points)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Points</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
<td>Very Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Requirements missing.</td>
<td>Poor-Fair quality. Fulfills at least 20% of requirements.</td>
<td>Fair-Average quality. Fulfills at least 50% of requirements.</td>
<td>Good quality. Fulfills at least 85% of requirements.</td>
<td>Very Good quality. Fulfills 95% of requirements.</td>
<td>Excellent quality. Fulfills 100% of requirements. Additional distinctive features.</td>
</tr>
</tbody>
</table>

### 1. Presentation content, organized
- Major elements: intro, body, and conclusion.
- Logical flow, Transitions between elements
- Supporting info (definitions, examples, statistics, quotes, etc.)
- Concise, relevant
- Poorly organized and no major elements addressed.
- Poorly organized and missing some major elements. Little relevant information.
- Fair organization. Contains most major elements. Some relevant, supporting information. Some transitions.
- Fulfills all requirements (major elements, transitions, supporting info that could be more relevant, concise). Could develop ideas more thoroughly.
- Well organized, creative, and contains all major elements. Supporting info is relevant, concise, but could be better.
- Extremely well organized and creative. Excellent variety of effective supporting information providing credibility. Concise, relevant.

### 2. Overall city design & features
- City features, benefits, and aesthetics
- Geography, demographics or distinctive characteristics
- Unique infrastructure and services (e.g., transportation, energy, waste or pollution control)
- No description of city.
- Very brief or incomplete description of the city. Few benefits or innovations discussed. Little explanation or not believable.
- Fair description of the city. Some distinctive benefits and innovations explained. Somewhat futuristic and believable.
- Good overall description of the city. Many distinctive benefits and innovations explained. Somewhat futuristic and believable.
- Very good description of city. Many benefits and innovations explained. Futuristic and believable.
- Excellent description of city. Highly innovative technology applied throughout. Explained in detail. Futuristic and believable.

### 3. Essay topic The Age-Friendly City
- Discusses essay topic
- Explains how the theme influenced the city design or development
- Essay theme not addressed.
- Refers to essay briefly; little or no discussion of other program components.
- Briefly discusses essay topic and solution. No real supporting facts. Little explanation of how their city design incorporates the theme.
- Discusses the essay topic and solution; some supporting facts. Solution is adequate, somewhat innovative. Somewhat explains how their city design incorporates the theme.
- Discusses the essay topic and solution. Good supporting facts. Solution innovative or futuristic. Fully explains how their city design incorporates the theme.
- Discusses the essay topic and solution with excellent supporting facts. Excellent explanation of how their city design incorporates the theme.
## City Presentation Rubric

### I. Content & Delivery
(35 Points) (Continued)

<table>
<thead>
<tr>
<th>4. Presentation skills</th>
<th>0 No Points</th>
<th>1 Poor</th>
<th>2 Fair</th>
<th>3 Good</th>
<th>4 Very Good</th>
<th>5 Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fluent, clear, audible delivery</td>
<td>Requirements missing.</td>
<td>Poor skills throughout.</td>
<td>A few verbal and nonverbal skills are fairly well done but needs more practice to improve in most areas.</td>
<td>Fair to good skills for the majority of the presenters.</td>
<td>Good verbal and nonverbal skills for most presenters; somewhat confident and direct.</td>
<td>Very good verbal and nonverbal skills by most of team throughout most of the presentation.</td>
</tr>
<tr>
<td>• Correct grammar and appropriate language use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Upright posture with practiced use of visual aids</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Overall confident, direct, and animated delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### 5. Use of model and other demonstration aids
- Model is the key element of entire delivery
- Model is not referenced. No other visual aids.
- Model is not used effectively. Other demonstration aids poor or non-existent.
- Model is partially effective at enhancing the presentation. Other visual aids fair-good.
- Good use of the model as an illustration of city design and function. Other visual aids effective and generally add to presentation.
- Model used effectively to illustrate city design, function and innovations. Other visual aids very good and enhanced the presentation.
- Extremely creative, integrated use of model; contributed to the understanding of city design, function and innovations. Other visual aids excellent.

### 6. Teamwork during presentation and Q&A
- Team members supported each other
- No evidence of teamwork.
- A small amount of collaboration among team members but more support of one another is needed; one or two tend to dominate during both presentation and Q&A.
- Some collaboration; some support and sharing among some team members. Amount of knowledge appears unequal. One or two tend to dominate during either presentation or Q&A.
- Good collaboration; support and sharing among most members. Full complement of three team members. Some team members have more knowledge and dominate.
- Very good collaboration, support and sharing among the team on both Q & A and presentation. Equivalent knowledge level for most of team. Full complement of three team members.
- Students fully, accurately, and confidently answer all questions with many supporting details.

<table>
<thead>
<tr>
<th>0 No Points</th>
<th>1 Poor</th>
<th>2 Fair</th>
<th>3 Good</th>
<th>4 Very Good</th>
<th>5 Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements missing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirements fulfilled at least 20% of requirements.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirements fulfilled at least 50% of requirements.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirements fulfilled at least 85% of requirements.</td>
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<td></td>
</tr>
<tr>
<td>Requirements fulfilled 100% of requirements.</td>
<td></td>
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</tr>
<tr>
<td>Additional distinctive features.</td>
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<td></td>
</tr>
</tbody>
</table>

CONTINUED ON NEXT PAGE
## City Presentation Rubric

### I. Content & Delivery (35 Points) (Continued)

<table>
<thead>
<tr>
<th>7. Questions and answers</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Answers questions with confidence</td>
<td>Unable to answer questions coherently.</td>
<td>Answers a few questions accurately. No supporting facts.</td>
<td>Students answer at least 50% of the questions accurately, few supporting facts.</td>
<td>Students answer 85% of questions with accuracy and some supporting facts.</td>
<td>Answers 95% of the questions accurately with supporting detail.</td>
<td>Students fully, accurately, and confidently answer all questions with many supporting details.</td>
</tr>
<tr>
<td>• Accurate, complete answers</td>
<td>No supporting facts.</td>
<td>Students answer at least 50% of the questions accurately, few supporting facts.</td>
<td>Students answer 85% of questions with accuracy and some supporting facts.</td>
<td>Answers 95% of the questions accurately with supporting detail.</td>
<td>Students fully, accurately, and confidently answer all questions with many supporting details.</td>
<td></td>
</tr>
</tbody>
</table>

### II. Engineering and Technology (20 Points)

<table>
<thead>
<tr>
<th>8. Technologies used in city</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Discusses solutions to problems: transportation, utilities, services, etc.</td>
<td>Little or no discussion of engineering design process.</td>
<td>Briefly discusses engineering design process</td>
<td>Discusses engineering design process and application to FC project.</td>
<td>Good discussion and understanding of engineering process. Discusses application to FC project.</td>
<td>Excellent discussion and understanding of engineering design process and application to FC project.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. Engineering design process</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Discusses the application of engineering design process to the Future City project.</td>
<td>No discussion.</td>
<td>Little or no discussion of engineering design process.</td>
<td>Briefly discusses engineering design process</td>
<td>Discusses engineering design process and application to FC project.</td>
<td>Good discussion and understanding of engineering process. Discusses application to FC project.</td>
<td>Excellent discussion and understanding of engineering design process and application to FC project.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10. Engineering and engineering roles</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Demonstrates a knowledge of engineering roles in city design and operation</td>
<td>No mention of engineering roles.</td>
<td>Mentions engineering, but little discussion of roles.</td>
<td>Briefly discusses and shows limited understanding of engineering.</td>
<td>Discusses and shows understanding of engineering.</td>
<td>Good discussion and understanding of engineering role.</td>
<td>Excellent discussion and understanding of engineering roles in city design &amp; operation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11. Tradeoffs</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>
## III. Judge Assessment Of Knowledge and Understanding (15 Points)

### 12. Gets It: engineering, technology and innovation
- Demonstrates an understanding of technology used in city.
- Solutions proposed are innovative.
- Technologies are futuristic, but plausible extrapolations of current state-of-the-art.

### 13. Gets It: city design and requirements
- Demonstrates an understanding of city issues, requirements and operation.
- Excellence in city design.

### 14. Gets it: Future City and design process
- Understands the integration of the Future City process from initial design, virtual city, research, model and presentation.
- Applies lessons learned from various phases of Future City project to solution.

### Rubric

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Points</td>
</tr>
<tr>
<td>1</td>
<td>Poor</td>
</tr>
<tr>
<td>2</td>
<td>Fair</td>
</tr>
<tr>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Very Good</td>
</tr>
<tr>
<td>5</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

#### 0: No Points
- Requirements missing.

#### 1: Poor
- Poor–Fair quality. Fulfills at least 20% of requirements.

#### 2: Fair
- Fair–Average quality. Fulfills at least 50% of requirements.

#### 3: Good
- Average quality. Fulfills at least 85% of requirements.

#### 4: Very Good
- Above average quality. Fulfills 95% of requirements.

#### 5: Excellent
- Excellent quality. Fulfills 100% of requirements. Additional distinctive features.
Final Checklists

These checklists are in order of when your team deliverables are typically due. Make sure you have the correct due date from your educator or mentor for each deliverable.

Virtual City

☐ Your Virtual City must have the same name as your team. Pick one that is meaningful and unique! The city/team name will appear on all team deliverables and must not change during the competition.

☐ Check the number of slides. It cannot exceed 23 slides.

☐ Convert the slideshow to a PDF document before uploading.

☐ Upload your Virtual City slideshow at the online submission center at www.futurecity.org.

City Essay Checklist

☐ Include the name of your city on each page of your City Essay. Remember that the name of your future city needs to remain the same throughout the competition.

☐ Check the word count: 1,500 words is the maximum number allowed. Word count does not include the title and reference list, but it does include captions of graphics and illustrations. Place the word count at the end of the essay.

☐ Count the graphics. A maximum of four graphics/illustrations are allowed.

☐ Cite your sources. Use the Modern Language Association (MLA) format.

☐ Spell check and grammar check your City Essay.

☐ Convert the City Essay to a Word document if it isn’t already in that format.

☐ Upload your City Essay to the online submission center at futurecity.org.

Project Plan Checklist

☐ Make sure all four parts of the Project Plan are in one document and then save it as a PDF document.

☐ Upload your Project Plan to the online submission center at futurecity.org.

City Model Checklist

☐ Double check your City Model against the Competition Requirements on page 67.

☐ Complete a City Model Identification Index Card. This 4” x 6” index card is used by the judges to identify your team’s information. The card should provide:
  – City name
  – Scale used for the model
  – School/Organization name
  – Names of the three presenting students, educator, and mentor.

☐ Verify how the model will be transported to the competition. Models may sustain damage in transit. Teams are encouraged to bring repair kits (containing tape, glue, etc.) to reattach or fix any broken parts. The model needs to be sturdy and substantial enough for staff to move during the course of the competition without incurring damage. Note: There can be no structural changes made during or after the Regional Competition.

City Presentation Checklist

☐ Time your presentation. Remember, it can be no longer than 7 minutes. Although there is no penalty for taking less time, the more detailed the information you provide, the higher the potential score.

Think of the presentation as a chance to tell your city’s story.

☐ Fill out the Competition Expense Form with all of the materials used to build the model and the presentation/special award materials. Remember that you cannot exceed a combined total of $100.
Regional Competition Checklist

Bring the following items to competition:

☐ Competition Expense Form
☐ Honor Statement
☐ Media Waiver Form
☐ The City Model Identification Index Card
☐ The City Model
☐ Any props or costumes

COMPETITION FORMS

These forms are located in the Appendix: Competition Information section of the Handbook (pages 91–93) or you can download a writeable PDF version at futurecity.org (filter for Competition Forms & Project Plan).
Competition Rules

Official Competition Rules

General

1. The Future City Competition is for 6th, 7th, and 8th grade students only, who are enrolled in a public, private, parochial, or home school environment, or are members of a nationally, regionally, or state-recognized organization, such as the Boy or Girl Scouts, Boys and Girls Clubs, 4-H, etc. (If you are not sure if your organization will qualify, please contact info@futurecity.org). The Future City program has sole authority to determine whether an organization constitutes a nationally, regionally, or state-recognized organization.

2. Student team members must be from the same school or organization.

3. A student cannot be on multiple teams (e.g., a team at school and a team from a recognized organization).

4. Organizations may register in only one region or sub-region per year. If they wish to transfer to a different region, they must petition and obtain the approval of the Regional Coordinator and the Program Manager. Teams must commit to a specific region by October 31, 2017.

5. You may have as many students working on the project as you wish, but only three students can represent your educational institution or organization by giving their team’s presentation and answering questions at the Regional Competition and Finals Competition. In addition, one educator (any educational professional) and one mentor (because of the nature of the competition a mentor from the engineering community is preferred, but a mentor can be anyone involved in a technical profession) are recognized as part of the official team of five members but may not participate in the competition presentation or answer questions from judges.

6. The team members that compete in the Finals Competition must be the same team members that won the Regional Competition. At the time of registering your team(s) for the Regional Competition, you may select one student who can act as an alternate for both the Regional and Finals Competitions. The alternate can only be utilized if one of the original three presenters cannot compete due to illness or family emergency. The alternate can only compete upon the approval of the Regional Coordinator and the Program Manager.

7. At least 20 schools/organizations must be registered in a region by October 31, 2017 in order for that region’s winner to advance to the Finals Competition.

8. Home school parents must submit a home school affidavit to their Regional Coordinator stating that the students are covering material in the 6th, 7th, or 8th grades.

9. If deadlines are missed at the Regional or Finals level, points will be deducted from the score.

10. At regional competitions, only one team from a school or organization can advance to the final round of judging. At competitions with a single judging round, only one team from a school or organization may be awarded a place in the top five overall teams.

11. Winners of a sub-region’s competition will advance to compete at the Regional Competition.

12. All team members must sign the Honor Statement and submit it in accordance with the schedule set by the Regional Coordinator.

13. Judges evaluate each deliverable in accordance with the rubrics. The score a judge assigns is final.

14. Decisions are final. Teams will not receive raw scoresheets or be able to review scores from individual judges.

15. At the Regional Competition, the Regional Coordinator has the final word on any dispute. There is no appeals process.

16. In the event of a dispute at the Regional Competition, the Regional Coordinator will lead an investigation and render a decision. This decision is final. There is no appeals process.

17. Actions or comments from team members or team supporters that malign, disparage, or harass regional coordinators or volunteers will result in the team’s disqualification.

18. Any complaints must be lodged by the official team educator.

19. For the Finals Competition: Each Future City participant is solely and exclusively responsible for his/her health insurance coverage. Future City provides no coverage prior to, during, or following any Future City event and Future City assumes no responsibility or liability in connection with the provision of any health insurance coverage.

20. In the case of a tie at the Regional Competition, the team with the higher presentation score will be awarded first place. If the tie still remains after that, the team with the higher model score will be awarded first place.

21. Educators can see their team’s average scores by logging into futurecity.org following the Regional and Finals competitions. Teams will not receive raw score sheets from judges or further breakdown of scores. Educators may download their team’s score information by following instructions at www.futurecity.org/resources before February 28, 2018. After February 28, 2018 scores will be erased from the database.

22. A person who volunteers in the capacity of a judge (at any level) during the competition cycle may not serve as a mentor nor an educator during that same cycle. Nor may
they provide guidance, coaching, tips, etc., to any active
team member, teacher, engineer mentor, etc., during that
same competition cycle. If violated, that judge’s scores will
be invalidated.

Virtual City Design (SimCity)

23. Teams are not allowed to create their cities using SimCity’s
Sandbox mode.

24. Cheat codes are discouraged but not forbidden. If used,
codes must be recorded in the slideshow according to the
deliverable’s instructions.

City Essay

25. Students must submit a reference page citing at least three
sources of information with the essay. (NOTE: Wikipedia
cannot be cited as a reference.)

26. The City Essay maximum word count is 1,500 words. Total
words will be determined by the “word count” tool within
the word processing software. Word count does not in-
clude the title and reference list, but does include captions
of graphics and illustrations. A maximum of four graphics/
illustrations are allowed. A 10-point penalty will apply if
word count exceeds 1,500.

27. Upload your team’s City Essay file as a word processing
document, not as a PDF.

28. If any part of a team’s City Essay is determined to be pla-
giarized, the team will earn zero points for the deliverable.

City Model

29. Teams must design a new model each year that represents
original work. Teams are not allowed to use previous
years’ models. However, previous models may be broken
down and scavenged for materials including the model
platform. Any previously-used materials must be reconfig-
ured in a new and original manner and assigned a current
market value.

30. No perishable or food items may be used for building
materials. Use of live animals is also prohibited. If water is
used on the model, it must be self-contained or drainable.
No drones are allowed in the model.

31. Due to shipping constraints, the city model must be no
larger than 25” (W) x 50” (L) x 20” (H), including all support-
ing braces, materials hanging below or beyond the table-
top, and all fully extended parts, such as access doors and
hinged pullouts. Failure to comply with the physical model
dimensions will result in a 15-point penalty.

32. Vertically oriented city models are not accepted.

33. The city model must contain one or more moving parts.

34. Any power source must be self-contained, (e.g., a house-
hold battery and simple circuit). Use of electrical wall or
floor outlets is not allowed.

35. The total value of the materials used in the city model,
city presentation, and special awards (including visual
aids, costumes, color copying/printing, 3-D printing, and
other demonstration aids) may not exceed $100. Failure to
comply with valuation of model and support materials will
result in a 15-point penalty.

36. All materials used must be listed on the Competition
Expense Form and their value documented for the model,
presentation, and special awards. This includes donated
and borrowed items at fair market value.

37. A team may use two distinct scales if they are clearly
defined, easily determined by sight and indicated on their
index card. A maximum of two scales may be used.

38. Rotating city models are acceptable. The model will be
measured from the tabletop up, including dimensions of
any turning device below the model itself.

39. Use of 3D printers for any model materials must be as-
essed using the following values – which account for the
cost of filament and the hardware/printer:
• Regular (white) 3D printing: $2.00 per cubic inch
• Color 3D printing: $5.00 per cubic inch
• All 3D printed materials used in the model – whether
new and reused - must be reported on the competition
expense form using these values.

City Presentation

40. Regional Competition: Student presentations may not
exceed 7 minutes. When the timer signals time, the team
must stop their presentation. Question and answer ses-
sions immediately following the presentation will be 5 to 8
minutes as determined by the Regional Coordinator.

41. Finals Competition: Student presentations may not exceed
7 minutes. When the timer signals time, the team must
stop their presentation. Presentations are followed by a
5-minute Q&A session. If the team’s presentation is under
7 minutes, the Q&A will be extended until a total time of 12
minutes is reached.

42. Laptop computers, overhead projectors, DVD/video
players, battery-operated audio equipment, any mobile
devices, and drones may not be used in the presentation.

43. Visual aids, such as flip charts, foam boards, poster
boards, etc. must adhere to these parameters: the
display(s) must be standard size (24”x 36” for poster
boards, 25” x 30” for flip charts) and up to two boards may
be displayed concurrently. Note: signs created with a
matte finish look better in photographs.

44. With the exception of a handout/brochure (limited to one
8.5” x 11” sheet of paper) and costumes, any other demon-
stration aids including pointers, small mock-ups, musical
instruments, etc. used to assist with the presentation must
collectively fit within a 6” x 6” x 12” volume (e.g., a shoe
box).
# Scoring Deductions

To compete in the Future City Competition, teams must complete the five program deliverables and can earn up to 258 points. Judges evaluate each deliverable in accordance with the rubrics. The score a judge assigns is final. At the Regional Competition, the Regional Coordinator has the final word on any dispute. At the Finals Competition, the judges’ decisions are final. There is no appeals process at either level of competition.

<table>
<thead>
<tr>
<th>Penalty</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–10 points</td>
<td>Missing the submission deadline for Virtual City or City Essay</td>
<td>The Virtual City and City Essay must be received in accordance with deadlines set by the Regional Coordinator. Check with your Regional Coordinator to determine if they accept late submissions.</td>
</tr>
<tr>
<td>10 points</td>
<td>Exceeding City Essay word count</td>
<td>Maximum of 1,500 words.</td>
</tr>
<tr>
<td>15 points</td>
<td>Exceeding City Model dimensions</td>
<td>The maximum dimensions of the model are 20” high, 50” long, and 25” wide. Height and width dimensions include all supporting structures, such as braces, and any model materials hanging below the tabletop.</td>
</tr>
<tr>
<td>15 points</td>
<td>Competition Expense Form is missing</td>
<td>The Competition Expense Form, with receipts attached to the back, must be brought to the competition.</td>
</tr>
<tr>
<td>5 points</td>
<td>Receipts missing from back of Competition Expense Form</td>
<td>Receipts must be attached to the back of the Competition Expense Form. Follow instructions on the form.</td>
</tr>
<tr>
<td>15 points</td>
<td>Exceeding the $100 limit or misrepresenting the values of materials used in the city model and/or presentation/special awards</td>
<td>The total value of the materials used in the model, as well as those used in support of the presentation and for special awards (including visual aids, costumes, color copying/printing, three-dimensional printing, and other demonstration aids) may not exceed $100.</td>
</tr>
<tr>
<td>1–5 points</td>
<td>Missing all or part of the Model ID card</td>
<td>The Model ID card is a 4” x 6” index card with city name, organization name, team members’ names (three students, educator, mentor), and scale used.</td>
</tr>
<tr>
<td>15 points</td>
<td>Exceeding visual aid display size</td>
<td>Support materials must adhere to the size restrictions listed in the Competition Rules on page 82.</td>
</tr>
<tr>
<td>2 points</td>
<td>Missing Honor Statement</td>
<td>A properly filled out Honor Statement Form must be submitted. Follow instructions on the form.</td>
</tr>
<tr>
<td>20 points</td>
<td>Unsportsmanlike conduct</td>
<td>Rude behavior or disruption of judging by any team member or guests.</td>
</tr>
<tr>
<td>0 points earned for deliverable</td>
<td>Plagiarism</td>
<td>If a team’s City Essay is determined to be plagiarized, the team will earn zero points for the deliverable.</td>
</tr>
<tr>
<td>Disqualification</td>
<td>Destruction of another team’s model or presentation materials or actions or comments from team members or team supporters that malign, disparage, or harass regional coordinators or volunteers</td>
<td></td>
</tr>
</tbody>
</table>

**QUESTIONS?**

Check out the Frequently Asked Questions at futurecity.org/resources (filter for Handbook & Clarifications). Don’t see your question there? Email your Regional Coordinator or info@futurecity.org.
Prizes and Awards

Future City Competition Finals

Teams that win their Regional Competition* go on to represent their region at the Finals. Finals takes place from February 17 to 21, 2018, in Washington, DC. Future City will provide roundtrip transportation (most economical airfare), hotel accommodations at the Hyatt Regency Washington on Capitol Hill, and two meals for the team’s three student presenters, educator, and mentor. All other expenses are the responsibility of the team. Note: Students from a mixed gender team may be placed in a room with a student from another team or opt to pay for a single room.

The Future City Competition Finals are generously sponsored by Bechtel Corporation, Bentley Systems, Inc., Shell Oil Company, and DiscoverE.

Finals Prizes

The top prize at the Finals is $7,500 for the organization’s STEM program and a trip to U.S. Space Camp in Huntsville, AL for the official team members, awarded by Bentley Systems, Inc.

The first runner up is awarded a $5,000 prize for the organization’s STEM program, provided by the National Society of Professional Engineers.

The second runner up is awarded a $2,000 prize for the organization’s STEM program, provided by IEEE-USA.

Honorable Mention—the 4th and 5th placed teams will receive $750 for their organization’s STEM program, provided by Ohio University and NCEES.

Regional Prizes and Special Awards

Teams that compete are also eligible for a number of special awards. For a complete list of the prizes and awards offered by your region, visit www.futurecity.org and click on Find My Region.

*Note: Students from a mixed gender team may be placed in a room with a student from another team or opt to pay for a single room.

*Region must have registered a minimum of 20 schools/organizations by October 31, 2017 to be eligible to send a winning team to the Finals. Note: Winners of a subregion’s competition will advance to compete at the Regional Competition. Regional eligibility is determined solely by the Future City Office. Prizes are not transferable or exchangeable. Prizes are subject to the discretion of the awarding organization.
## Finals Special Awards

Unless otherwise noted, these special awards are specific to the Finals held in Washington, DC. Visit your region’s website at www.futurecity.org to see what special awards are available in your region.

<table>
<thead>
<tr>
<th>Award Name</th>
<th>Award Criteria</th>
<th>Sponsor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best Use of Aerospace Technology in a Future City</strong></td>
<td>Teams should develop a clear statement of the use and benefits of aviation and/or space technology in their projects. Projects can be on, in, or above the earth, in space or on other celestial bodies. Special consideration will be given to aviation and/or space technologies used in the displays.</td>
<td>American Institute of Aeronautics and Astronautics (AIAA) National Capital Section (NCS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The AIAA is one of the oldest and largest aerospace-related associations, with the National Capital Section (NCS) being the largest section. The mission of the AIAA National Capital Section is to serve the profession, by acting as a catalyst for information flow and creative exchange. AIAA-NCS supports the educational process that promotes future generations of aviation and space professionals by nurturing interest among students.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.aiaa.org">www.aiaa.org</a></td>
</tr>
<tr>
<td><strong>Most Sustainable Food Production System</strong></td>
<td>Design that provides the best sustainable food production system while conserving soil, water, and energy.</td>
<td>American Society of Agricultural and Biological Engineers (ASABE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The American Society of Agricultural and Biological Engineers is an educational and scientific organization dedicated to the advancement of engineering applicable to agricultural, food, and biological systems. Founded in 1907 and headquartered in St Joseph, Michigan, ASABE comprises 9,000 members in more than 100 countries. Agricultural, food, and biological engineers develop efficient and environmentally sensitive methods of producing food, fiber, timber, and renewable energy sources for an ever-increasing world population.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.asabe.org">www.asabe.org</a></td>
</tr>
<tr>
<td><strong>Best Use of Renewable Energy</strong></td>
<td>Innovative and efficient use of renewable resources in energy systems.</td>
<td>American Society of Agricultural and Biological Engineers (ASABE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The American Society of Agricultural and Biological Engineers is an educational and scientific organization dedicated to the advancement of engineering applicable to agricultural, food, and biological systems. Founded in 1907 and headquartered in St Joseph, Michigan, ASABE comprises 9,000 members in more than 100 countries. Agricultural, food, and biological engineers develop efficient and environmentally sensitive methods of producing food, fiber, timber, and renewable energy sources for an ever-increasing world population.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.asabe.org">www.asabe.org</a></td>
</tr>
<tr>
<td><strong>Most Innovative Design of Infrastructure Systems</strong></td>
<td>Design that accommodates the most innovative systems (e.g., transportation, water and wastewater) for a community.</td>
<td>American Society of Civil Engineers (ASCE)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Founded in 1852, ASCE represents more than 123,000 civil engineers worldwide, and is America’s oldest national engineering society. ASCE advances professional knowledge and improves the practice of civil engineering as the lead professional organization serving civil engineers and those in related disciplines.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.asce.org">www.asce.org</a></td>
</tr>
<tr>
<td>Award Name</td>
<td>Award Criteria</td>
<td>Sponsor</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Best Indoor Environment</td>
<td>Indoor environment that encompasses occupant comfort, productivity, energy efficiency, or air quality.</td>
<td>ASHRAE is an international organization of 50,000 persons with chapters throughout the world. The Society is organized for the sole purpose of advancing the arts and sciences of heating, ventilation, air conditioning, and refrigeration for the public’s benefit. <a href="http://www.ashrae.org">www.ashrae.org</a></td>
</tr>
<tr>
<td>Most Sustainable Buildings</td>
<td>In recognition of energy efficient buildings that minimize their impact on the outdoor environment and provide indoor environmental quality for building occupants.</td>
<td>ASHRAE is an international organization of 50,000 persons with chapters throughout the world. The Society is organized for the sole purpose of advancing the arts and sciences of heating, ventilation, air conditioning, and refrigeration for the public’s benefit. <a href="http://www.ashrae.org">www.ashrae.org</a></td>
</tr>
<tr>
<td>Best Futuristic City</td>
<td>Use of futuristic engineering concepts in the city’s communications, energy, or transportation systems.</td>
<td>ASME Founded in 1880, ASME International is a nonprofit educational and technical organization serving a worldwide membership and sets many industrial and manufacturing standards. <a href="http://www.asme.org">www.asme.org</a></td>
</tr>
</tbody>
</table>
| Best Management of Water Resources | • Efficient design of water treatment and distribution for human consumption, agriculture, industry, recreation, and fire protection.  
• Responsible sewage collection and treatment for environmental protection and community aesthetics.  
• Innovative stormwater collection, treatment, reuse and/or discharge back into the environment. | Bentley Systems, Inc. Bentley is the global leader dedicated to providing architects, engineers, constructors, and owner-operators with comprehensive software solutions for sustaining infrastructure. Founded in 1984, Bentley has nearly 3,000 colleagues in more than 45 countries, $500 million in annual revenues, and, since 1999, has invested more than $1 billion in research, development, and acquisitions. www.bentley.com |
<p>| Best Residential Zone              | Strategic placement of residential zones that allow maximum return for quality of life issues. | Chinese Institute of Engineers/USA (CIE-USA) The Chinese Institute of Engineers–USA is a professional nonprofit and non-political organization founded in 1917 in New York by a group of talented and forward-looking Chinese engineers who graduated from American colleges. Chinese-American engineers in the US have played a significant role in the rapid growth of technology and communications throughout the United States. The total membership is around 10,000 nationwide. <a href="http://www.cie-usa.org">www.cie-usa.org</a> |
| The City of the Future that Best Incorporates Cultural and Historical Resources | The city whose design best incorporates historical and cultural sites, buildings, infrastructure and customs. | Cuban-American Association of Civil Engineers, Inc. The Cuban-American Association of Civil Engineers Inc. is a non-profit corporation whose purpose is to: assist members in maintaining and retaining the highest professional engineering skills; support the highest principles of professional engineering achievements; and advance the engineering profession. <a href="http://www.c-aace.org">www.c-aace.org</a> |
| People’s Choice Award             | This award is given to the team that is voted by their peers to have the best model. Voting is done by ballot during the Public Viewing of Models. | DiscoverE DiscoverE is leading a growing volunteer movement that inspires present and future generations to discover engineering. <a href="http://www.discoverE.org">www.discoverE.org</a> |</p>
<table>
<thead>
<tr>
<th>Award Name</th>
<th>Award Criteria</th>
<th>Sponsor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Virtual City Design</td>
<td>This award is given to the team with the highest overall score as judged by the Future City judges.</td>
<td>Electronic Arts Inc.</td>
<td>Electronic Arts Inc. is a leading global interactive entertainment software company. EA develops, publishes, and distributes interactive software worldwide for Internet-connected consoles, personal computers, mobile phones, tablets, and social networks. <a href="http://www.ea.com">www.ea.com</a></td>
</tr>
<tr>
<td>Most Advanced Smart Grid</td>
<td>Best incorporation of Smart Grid technologies for the safe, efficient and reliable delivery of electricity throughout the city. A Smart Grid is the modernization of the electric power system by applying advanced software tools, computer controls, automation and two-way communications. Benefits include improved reliability, lower energy bills, more energy choices (including renewables such as wind, hydro and solar), and fewer and shorter power outages.</td>
<td>IEEE-USA</td>
<td>IEEE-USA advances the public good and promotes the careers and public policy interests of more than 215,000 engineers, scientists, and allied professionals who are U.S. members of the IEEE. IEEE-USA is part of IEEE, the world's largest technical professional society with 375,000 members in 160 countries. <a href="http://www.ieeeusa.org">www.ieeeusa.org</a></td>
</tr>
<tr>
<td>Excellence in Systems Integration</td>
<td>Demonstration of excellence in the design of integrated systems of people, material, information equipment, and energy.</td>
<td>Institute of Industrial and Systems Engineers</td>
<td>Systems world view. Productivity. Efficiency. These are words that describe the distinctive attributes of industrial engineering, and IISE is the world's largest professional society dedicated solely to the support of the industrial engineering profession and individuals involved with improving quality and productivity. <a href="http://www.iise.org">www.iise.org</a></td>
</tr>
<tr>
<td>Best Land Surveying Practices</td>
<td>The design that employs the best land surveying practices, taking into consideration the high standards used by surveyors to help protect the public’s safety and welfare.</td>
<td>NCEES</td>
<td>NCEES is a national non-profit organization composed of engineering and land surveying licensing boards representing all U.S. states and territories. <a href="http://www.ncees.org">www.ncees.org</a></td>
</tr>
<tr>
<td>Mission Possible: Positively Impacting the Community</td>
<td>This award is given to the team whose Future City design promotes the best overall quality of life and demonstrates the greatest potential to positively impact the community for a sustainable future.</td>
<td>National Society of Black Engineers (NSBE)</td>
<td>The mission of the National Society of Black Engineers is to increase the number of culturally responsible Black Engineers who excel academically, succeed professionally and positively impact the community. <a href="http://www.nsbe.org">www.nsbe.org</a></td>
</tr>
<tr>
<td>Protecting the Public’s Safety and Welfare through Competent and Ethical Engineering Practices</td>
<td>In planning, designing, building, and maintaining your city and its many critical systems, processes, structures, utilities, and equipment, please explain and give examples of steps Licensed Professional Engineers will undertake to: • Enhance their professional knowledge; • Be honest, objective and truthful; • Comply with engineering safety codes and standards; and • Reject behavior that misleads or deceives the public.</td>
<td>National Society of Professional Engineers</td>
<td>NSPE is the only engineering society that represents individual engineering professionals and licensed engineers (PEs) across all disciplines by promoting engineering licensure and ethics, enhancing the engineer image, and advocating and protecting PEs’ legal rights. <a href="http://www.nsbe.org">www.nsbe.org</a></td>
</tr>
<tr>
<td>Award Name</td>
<td>Award Criteria</td>
<td>Sponsor</td>
<td></td>
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<tr>
<td>------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
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<tr>
<td>Most Sustainable Environmental Practices</td>
<td>• Citizens are educated about sustainability.</td>
<td>North American Association for Environmental Education</td>
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<td></td>
<td>• Citizens actively engage in and promote sustainable environmental practices.</td>
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<td>For more than four decades, NAAEE has promoted excellence in environmental education throughout North America and the world. We are dedicated to strengthening the field of environmental education and increasing the visibility and efficacy of the profession.</td>
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<td></td>
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<td><a href="http://www.naaee.org">www.naaee.org</a></td>
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<tr>
<td>Best Future City Project Plan</td>
<td>Teams should be able to explain how they followed the project cycle, including how they created their project schedule, assigned responsibilities, and monitored and controlled their work. Teams should be able to discuss their answers to the Team Reflection questions. Samples of work that highlight teams’ project management activities are encouraged.</td>
<td>Project Management Institute</td>
<td></td>
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<td>With nearly 220,000 members in more than 150 countries, Project Management Institute (PMI) is the leading membership association for the project management profession. PMI is actively engaged in advocacy for the profession, setting professional standards, conducting research, and providing access to a wealth of information and resources.</td>
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<td></td>
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<td><a href="http://www.pmi.org">www.pmi.org</a></td>
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<tr>
<td>Best City Essay Award</td>
<td>This award is given to the team with the overall highest score as judged by the City Essay Judges.</td>
<td>DiscoverE</td>
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<td></td>
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<td>DiscoverE is leading a growing volunteer movement that inspires present and future generations to discover engineering.</td>
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<td><a href="http://www.discoverE.org">www.discoverE.org</a></td>
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<tr>
<td>Best City Model</td>
<td>This award is given to the team with the overall highest score as judged during the Model Judging at Finals.</td>
<td>Shell Oil Company</td>
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<tr>
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<td></td>
<td>Shell Oil Company is an affiliate of the Royal Dutch Shell plc, a global group of energy and petrochemical companies with 93,000 employees in more than 90 countries. In the U.S., Shell operates in 50 states and employs nearly 20,000 people working to help tackle the challenges of the new energy future.</td>
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<td><a href="http://www.Shell.us">www.Shell.us</a></td>
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</tr>
<tr>
<td>Best Use of Fire Protection Engineering, Science &amp; Technology</td>
<td>Fire protection engineers use science and technology to make our communities safe from fire. Fire protection engineering features may include structural fire resistance, detection and notification systems, suppression systems, egress systems, and smoke management systems. The fire protection engineer ensures that these features all work together to protect people, property, and the environment from fire.</td>
<td>Society of Fire Protection Engineers</td>
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<td>The Society of Fire Protection Engineers was established in 1950 and incorporated as an independent organization in 1971. It is the professional society representing those practicing the field of fire protection engineering. The purpose of the Society is to advance the science and practice of fire protection engineering and its allied fields, to maintain a high ethical standard among its members, and to foster fire protection engineering education.</td>
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<td><a href="http://www.sfpe.org">www.sfpe.org</a></td>
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<tr>
<td>Best Use of Innovative Construction Materials and Techniques</td>
<td>Use of innovative construction materials and techniques; overall construction of design.</td>
<td>Turner</td>
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<td>Turner is a North America-based, international construction services company and is a leading builder in diverse market segments. The company has earned recognition for undertaking large, complex projects, fostering innovation, embracing emerging technologies, and making a difference for their clients, employees and community.</td>
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<td></td>
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<td><a href="http://www.turnerconstruction.com">www.turnerconstruction.com</a></td>
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</tbody>
</table>
Home School Affidavit Form

FUTURE CITY TEAM NAME: ________________________________

ORGANIZATION/SCHOOL: ________________________________

EDUCATOR: ___________________________________________

I verify that (print the names of students participating in the competition)

1. ___________________________________________________

2. ___________________________________________________

3. ___________________________________________________

are currently enrolled in the 6th, 7th or 8th grade at a home school in (state) ________________________

Further, I verify that the home school attended by the above named students is in compliance

with all home school laws in (state) ____________________________________________

Signature of Home School Administrator __________________ Date __________

All Future City Competition Forms are available as writeable PDFs. Note: You need Adobe Reader installed on your computer and acting as your default PDF reader. Download the forms and a free version of Adobe Reader at futurecity.org/resources (filter for Competition Forms & Project Plan).

Action Item for Home School Administrators

Mail or email the signed form back to your Future City Regional Coordinator no later than November 1, 2017.

Locate your Regional Coordinator’s contact information at www.futurecity.org under Find My Region.
Media Waiver Form

FUTURE CITY TEAM NAME:

ORGANIZATION/SCHOOL:

EDUCATOR:

Please make a copy of this form for all members of the team who will be attending and/or presenting at the Regional or Finals. (This includes the educator and mentor as well). All team members must submit a copy of the Media Waiver Form to their Regional Coordinator.

Student Media Waiver

By signing below, we give our consent to DiscoverE and Future City and any of its official sponsors or affiliates to use the student’s name, photograph, likeness, and all work products including City Essay, City Model and City Presentation in order to promote the Future City® Competition. We understand that the student may be called upon by journalists to answer questions about his/her involvement in the Future City® Competition, and we will also allow the student to speak to any media via phone or television.

Date: Future City Region:

Student Name (Please Print):

Guardian Name (One Only):

Guardian Signature:

Guardian’s Email*:

City: State: Zip:

*Your email will be added to our database for future evaluation studies. If you’d like to opt out, please send us an email at info@futurecity.org.

Educator/Mentor Media Waiver

By signing below, I give my consent to DiscoverE and Future City and any of its official sponsors or affiliates to use my name, photograph, and likeness in order to promote the Future City® Competition. I understand that I may be called upon by journalists to answer questions about my involvement in the Future City® Competition, and I will also speak to any media via phone or television.

Date: FC Region:

Name (Please Print):

City: State: Zip:

Signature:

All Future City Competition forms are available as writeable PDFs. Note: You need Adobe Reader installed on your computer and acting as your default PDF reader. Download the forms and a free version of Adobe Reader at futurecity.org/resources (filter for Competition Forms & Project Plan).
Honor Statement

This form needs to be signed by the full team. Please make additional copies to accommodate full team.

FUTURE CITY TEAM NAME:

ORGANIZATION/SCHOOL:

EDUCATOR:

NUMBER OF STUDENT TEAM MEMBERS:

Future City is, at its core, an educational program. As a program participant, I will conduct myself in a positive manner throughout the competition cycle and abide by the competition rules and judges’ decisions. The project represents the ideas and original work of the students. The adults acted only as advisors.

Student Name (Print): ____________________________  Date: __________  Signature: ____________________________

Student Name (Print): ____________________________  Date: __________  Signature: ____________________________

Student Name (Print): ____________________________  Date: __________  Signature: ____________________________

Student Name (Print): ____________________________  Date: __________  Signature: ____________________________

Student Name (Print): ____________________________  Date: __________  Signature: ____________________________

Student Name (Print): ____________________________  Date: __________  Signature: ____________________________

Educator Name (Print): ____________________________  Date: __________  Signature: ____________________________

Mentor Name (Print): ____________________________  Date: __________  Signature: ____________________________

All Future City Competition forms are available as writeable PDFs. Note: You need Adobe Reader installed on your computer and acting as your default PDF reader. Download the forms and a free version of Adobe Reader at futurecity.org/resources (filter for Competition Forms & Project Plan).
Competition Expense Form

FUTURE CITY TEAM NAME:

ORGANIZATION/SCHOOL:

EDUCATOR:

Quick Checklist

Check the boxes below to indicate the completion of each item.

☐ Review official competition rules and the instructions for this form.

☐ List all materials used in the building of your city model AND materials used to support your city presentation and special awards. Easels do not need to be included as a competition expense. If necessary, add an additional sheet of paper.

☐ Mark the appropriate field (purchased, donated, or recycled) to indicate the origin of your materials.

☐ Staple receipt copies to the back of this form.

☐ Photocopy the form and receipts for team records. Bring this completed form to the Regional Competition.

☐ Regional winners are required to submit their Competition Expense Form before Finals.

<table>
<thead>
<tr>
<th>Description of City Model Materials</th>
<th>Purchased</th>
<th>Donated</th>
<th>Recycled</th>
<th>Expense/Value</th>
</tr>
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</table>

Subtotal A—City Model Expenses:

<table>
<thead>
<tr>
<th>Description of City Presentation/Special Award Materials</th>
<th>Purchased</th>
<th>Donated</th>
<th>Recycled</th>
<th>Expense/Value</th>
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</tbody>
</table>

Subtotal B—City Presentation/Special Award Materials Expenses:

Subtotal A _____________ + Subtotal B _____________ = Total Expenses _______________

Verified for Accuracy

Signed by either educator or mentor ____________________ Date ______________

All Future City Competition forms are available as writeable PDFs. Note: You need Adobe Reader installed on your computer and acting as your default PDF reader. Download the forms and a free version of Adobe Reader at futurecity.org/resources (filter for Competition Forms & Project Plan).
Competition Expense Form Instructions

Provide a complete list of all items your team used to construct your model and create your presentation materials. Include actual cost if items were purchased or a reasonable cost estimate if items were donated or recycled. Strive for accuracy and fairness when estimating costs. Misrepresenting the values of your materials will result in a 15-point penalty.

Commonly Asked Questions

1. Why is there a $100 limit?
This rule was established to ensure equity among teams and to encourage students to creatively use recycled materials.

2. When can we assign a zero value?
Items that are allowed in a home or school recycling bin (such as paper, plastic bottles, glass jar, or metal cans) or items bound for the trash (like used up batteries, bottle caps, or used plastic utensils, etc.) can be assigned a zero value.

3. How do we figure out the fair market value?
Items that are donated or have been previously used but can’t be recycled (such as mirrors, foam core, dowels, wood, magnets, holiday ornaments, old toys, lab coats, etc.) need to be assigned a fair market value. Fair market or salvaged value may be determined by pricing found at a yard sale, auction, classified ad, surplus store, e-recycling service, etc.

4. What about items we take apart?
Many teams take apart computers, electronics, or other items to ‘harvest’ interesting parts. These items need to have a value assigned. Scrapmonster.com is an easy place to start.

Examples

<table>
<thead>
<tr>
<th>Description of City Model Materials</th>
<th>Purchased</th>
<th>Donated</th>
<th>Recycled</th>
<th>Expense/Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4’ x 8’ plywood sheet – $20 (but only used half)</td>
<td>•</td>
<td></td>
<td></td>
<td>$10.00</td>
</tr>
<tr>
<td>Assorted paint from parent’s garage</td>
<td></td>
<td>•</td>
<td></td>
<td>$2.00</td>
</tr>
<tr>
<td>Two one-liter soda/pop bottles</td>
<td></td>
<td></td>
<td>•</td>
<td>$0.00</td>
</tr>
<tr>
<td>Egg carton</td>
<td></td>
<td>•</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Toy train</td>
<td></td>
<td></td>
<td>•</td>
<td>$0.50</td>
</tr>
<tr>
<td>Motherboard from scrapped computer</td>
<td></td>
<td></td>
<td>•</td>
<td>$2.50</td>
</tr>
<tr>
<td>Green LED lights</td>
<td></td>
<td></td>
<td></td>
<td>$4.50</td>
</tr>
</tbody>
</table>

Subtotal A—City Model Expenses: $19.50

<table>
<thead>
<tr>
<th>Description of City Presentation/Special Award Materials</th>
<th>Purchased</th>
<th>Donated</th>
<th>Recycled</th>
<th>Expense/Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foam poster board</td>
<td>•</td>
<td></td>
<td></td>
<td>$9.00</td>
</tr>
<tr>
<td>5 pages of color printing</td>
<td>•</td>
<td></td>
<td></td>
<td>$5.00</td>
</tr>
<tr>
<td>Top hat (Costumes)</td>
<td></td>
<td></td>
<td>•</td>
<td>$3.00</td>
</tr>
<tr>
<td>Lab coat (borrowed from teacher)</td>
<td></td>
<td></td>
<td>•</td>
<td>$2.00</td>
</tr>
</tbody>
</table>

Subtotal B—City Presentation/Special Award Materials Expenses: $19.00

Subtotal A $19.50 + Subtotal B $19.00 = Total Expenses $38.50
Regional Coordinators List

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pennsylvania_philadelphia@futurecity.org

* denotes a sub-region
Regional Coordinators

The Future City staff would like to thank and acknowledge the dedication of our tireless Regional Coordinators and their committee members. The countless hours that they contribute as they answer every question (big and small), match mentors to schools, fundraise, and host wonderful Regional Competitions is the foundation on which Future City rests. Thank you!

To contact your Regional Coordinator, visit www.futurecity.org and click on Find My Region.
We would like to thank our generous sponsors for their continued support of the Future City program.

Finals Sponsors

Program Sponsors

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