

As you complete the SimCity design, remember to choose a meaningful and unique name for your city. This city name will be included on all the forms and files you submit to the regional competition and should not change during the course of the program.

When the students have completed their city design and simulation have them evaluate their work using the Computer City Design Self Evaluation form. Please remember the teacher or the mentor must sign the form to attest to its accuracy.

For other helpful SimCity tips see Appendix D.

REMEMBER YOUR ETHICS
(See Honor Statement in Chapter 6)—*Cheat codes or shortcuts are not allowed and will be cause for point deductions.*

*What a fun way to do school!
What our students gained from this
experience is invaluable.”*

— Joy Brown, Teacher, Alabama Region

Future City Research Essay (70 Points)

Instructions

Essay Assignment:

Students will research and write an essay of not more than 700–1,000 words on: **“Providing an affordable green living space for people who have lost their home due to a disaster or financial emergency.”**

The living space should use sustainable materials, have a low-carbon emissions footprint, and achieve the “Green Ideals” of energy efficient building.

The living space design must consider the social, economic and ecological impact of the manufacturing and construction techniques.

It should be constructed with the ideal of providing affordable homes to those facing disaster, financial crisis, and earning only 50% - 80% of the median income of the surrounding city.

The focus of this essay is meant to be on the green living space design. However, engineering is about more than designing a solution to a problem. The “problem” is often rooted much deeper in a societal need, or other less tangible issue. Engineering, in its purest essence, is about helping others, helping people, and making the world around us a better place. In order for students to see that aspect of engineering, the essay statement includes a societal need for the green building solution. With increasing numbers of people facing a housing crisis, because of homelessness or the recent foreclosure issues, this particular problem of designing a living space is rooted in assisting those facing a housing crisis. Therefore, we wish the student to focus on the living space design, but with the realization that the need was created from this housing issue. It is not meant for the student essay to focus on the housing crisis in depth, or any more than is addressed in the accompanying rubric.

Essay Requirements:

- I. Select and define a living space of their choice (home, pod, orb, high rise, etc) using “green” materials, processes and standards. The living space must be easily expandable to accommodate various living requirements. It should also support the needs of the elderly or persons with disabilities. Students must:
 - Define the living space type.
 - Define the location of the living space within a city as pertains to quality of life, access to city amenities, and the needs of its citizens (e.g. homeless).
 - Explain how the living space can be expanded (or reduced), the style of space created (stand alone, multi-family, clustered, etc.), and the expected life of the housing.
 - Explain the target demographic of the housing.

II. Research and analyze existing green building sustainable processes, materials, and technologies. Current aspects of some of the following topics should be investigated:

- Residential design
- Manufacturing and construction processes
- Materials and technologies for a living space
- Interior and exterior design features
- Processes in each element of the construction that assure a low-carbon footprint
- Innovations to create the living space
- Impact on landfill by the construction materials selected
- Methods to maximize the use of sustainable materials while maintaining a level of comfort or lifestyle quality of the inhabitants
- Locally sourced or recycled materials

III. Develop and investigate a new technology or improvement to a technology researched above to incorporate into the residential space to insure sustainable/green design. The technology or innovation should aim to satisfy the Materials and Resources “Green Ideal” as outlined below. Explain:

- What specific innovation in Materials and Resources is achieved?
- How the innovation will function?
- What key sustainable methods or materials were incorporated in the design?
- How do these material choices enable your building to fit within the community?
- What is the impact of your material on construction waste?

- How does your green material choice impact the appearance (exterior or interior) of your building?
- What makes your material innovation a good economic, efficient and sustainable choice?
- What tradeoffs were made to accommodate the economics of constructing your green living space?
- What is the environmental footprint or impact of your design?

IV. Describe in detail:

- How is the living space easily maintained?
- How does this design improve the quality of life of the occupants?
- How does this design improve the quality of the community?
- What are the key features and benefits of your design and its impact on the community, residents, or environment?

V. Discuss the role of the engineer:

- Identify a discipline of engineering.
- How does the engineer contribute to the development of the living space or some of its components?

VI. Demonstrate written communication skills:

- The essay will be evaluated on written organization, grammar, and spelling.

Background Information

GREEN IDEALS:

Green building and LEED criteria are briefly encapsulated in the “Green Ideals” outlined below.

In general, green building is a far reaching process and methodology that encompasses the location, construction, and functioning of the building. While there are many topics designers, manufacturers and construction professionals of green buildings must consider (listed below), for the purpose of the essay requirement, students are asked to focus on Materials and Resources as outlined below.

Sustainable sites

- Access to public transportation
- Carpooling resources
- Reuse of existing buildings or developed land

Water

- Water use reduction features
- Water-efficient landscaping
- Innovative waste water technologies
- Storm-water management

Materials and resources

- Collection and storage of recyclables
- Reuse and recycling of previously used materials for construction
- Use of local materials
- Use of rapidly renewable materials
- Certified wood
- Zero- or low-VOC (volatile organic compound) paints, resins, glues and other materials
- Construction waste management
- Environmentally preferable materials

Energy and pollution

- Use of renewable energy
- Hot water
- High performance windows and insulation
- Lighting, heating, and cooling
- High-efficiency appliances
- Daylight views
- Reduce heat islands
- Light pollution reduction

Resources that may be used include:

- National Association of Home Builders’ (NAHB) model green home building guidelines (www.nahbgreen.org).
- Leadership in Energy and Environmental Design (LEED) from the U.S. Green Building Council (www.usgbc.org).
- World Business Council for Sustainable Development (www.wbcsd.org).

Essay Tips and Examples:

For information and tips about researching and writing the essay, view the Future City Competition Tutorial CD-ROM. You can also review winning essays from previous years on the Future City Web site, www.futurecity.org.

Students should use a variety of sources of information, such as interviews, reference books, periodicals, and the Internet. Primary research would include interviewing people directly involved on a first-hand basis. Secondary research would include reading books, articles, and papers authored by experts. Students must attach to their essay a list of at least three sources upon which the students relied. (*Wikipedia should not be used as a source of research.*)

Documentation Details

List the name of your Future City on each page of the Research Essay (NOTE: The name of the city must match the name that was scored on the Computer Design form). **DO NOT INCLUDE THE SCHOOL NAME OR TEAM NAMES ON THE ESSAY.** Place the word count at the end of the essay. Word count does not include the Title and reference list, but does include captions of graphics and illustrations. Be sure to keep a copy of the Essay Form, Research Essay, and Reference List.

The teacher or engineer-mentor must complete the Research Essay Form attesting that the essay was written entirely by the students. This form must be submitted with the students’ essay and reference list as directed by the Regional Coordinator.

The form can be found in Chapter 6 of this handbook.

“Future City brings students together to work in teams, it creates group dynamics and it is cross-curricular touching math, science, engineering, language arts, art, social studies, economics, government, reading, writing and arithmetic. It’s great to be number one but just giving the students this experience causes them to grow and mature in so many ways.”

— Richard Flickinger, teacher at Leo Jr./Sr. High School in Leo, Indiana, the winning school in the 2008–09 Indiana Regional Competition.

Future City - City Narrative (20 Points)

Instructions

Students will write a 300–500 word City Narrative describing their Future City’s key features and design attributes. The purpose of the City Narrative is to give the judges a quick overview of the Future City’s infrastructure and its public services.

The City Narrative Rubric includes scoring criteria. Each page of the City Narrative should have the name of the Future City **ONLY**, do not include the school or students’ names. Place the word count at the end. Word count does not include the Title. Be sure to keep back-up copies of the Narrative.

The Teacher or the Engineer Mentor must attest on the City Narrative Submission form that the narrative was written entirely by the students. The form can be found Chapter 6 of this handbook.

Future City Model (120 Points)

Instructions

Students will select an area(s) that best represents their future city in the model. The model does not have to be an exact building-by-building duplication of the Computer Design. Rather, the purpose of the model is to give a 3-dimensional, creative representation of the students’ vision of their city.

The model will be judged on the following criteria:

- a. Creativity (20 points)
- b. Quality and Scale (20 points)
- c. City Design (50 points)
- d. Moving Part(s) (20 points)
- e. Recycled Materials (10 points)

1. Future City Model Guidelines

- a. The model must be built to scale as determined by the team.
- b. The model must be no longer than 25” (W)x 50” (L) x 20” (H) including all support braces, material hanging below or beyond the tabletop and any fully extended parts, such as access doors or hinged pullouts.
- c. Vertical oriented models are not accepted.
- d. The total weight of the model cannot exceed 75 lbs. (National only.)
- e. The model must contain one or more moving part(s). Any electrical power must be self-contained (e.g. a household battery and a simple circuit.)
- f. Use of electrical floor or wall outlets is not allowed.

Essay Rubric

City Layout Criteria		0 (Points)	1 (Points)	2 (Points)	3 (Points)
I. Selection of Living Space:					
Select and define a living space of their choice using “green” materials, processes and standards to address a societal need.					
1	Does the essay define the living space and its location as it pertains to the citizens in need (e.g. homeless)?	a.	Living space is NOT defined	Living space is defined/named	
		b.	Location is NOT identified	Location is briefly identified	Location is well identified
		c.	Does NOT address the needs of the citizens	Briefly relates to the needs of the citizens	Adequately relates to the needs of the citizens
2	Does the essay explain how the living space can adapt to various sizes and styles, and what is the expected lifespan of the living space?	a.	NO explanation of variation in size, style or lifespan	One of the three characteristics is briefly addressed	Two characteristics are briefly addressed
		b.	NO in depth explanation of any characteristic	In depth explanation of at least one characteristic	In depth explanation of all three characteristics
3	Does the essay discuss the target demographic of the living space/housing?		Living space target demographic is NOT identified	Target demographic is briefly discussed	Target demographic is adequately discussed
II. Research:					
Research of existing green building sustainable processes, materials, and technologies.					
4	Is there evidence of research into existing green building technologies and criteria used today?	a.	NO evidence of research	Research of one green technology	Research of at least two green technologies
		b.	Research is NOT in depth	Research of one green technology topic is in-depth	Research of at least two green technology topics is in-depth
		c.	NO examples are presented	Examples are presented	

Essay Rubric (continued)

City Layout Criteria		0 (Points)	1 (Points)	2 (Points)	3 (Points)	
III. Green Materials and Resources:						
Develop and investigate a new technology or improvement to a technology to incorporate into the residential space to insure sustainable/green design. The technology or innovation should aim to satisfy the “Green Ideals”.						
5	Does the essay describe innovation in “Green” materials and resources and how they function?	a.	A “Green” material/resource innovation is NOT identified	A “Green” material/resource innovation is identified		
		b.	NO description of how the material/resource innovation will function	Material/resource innovation function briefly described	Material/resource innovation function adequately described	Material/resource innovation function well described
		c.	NO examples are presented	Examples are presented		
6	Does the essay describe how the chosen materials will enable the living space to adapt to the community?		NO description of how the living space adapts to the community	Brief description of how the living space adapts to the community	Adequate description of how the living space adapts to the community	How the living space adapts to the community is well described
7	Does the essay discuss the impact of the chosen materials on construction waste?		NO discussion of impact on waste	Brief discussion of impact on waste	Adequate discussion of impact on waste	Impact on waste is well discussed
8	Does the essay describe the impact of the chosen materials on the living space aesthetics (interior and exterior)?		NO description of the living space aesthetics	Brief description of the living space aesthetics	Adequate description of the living space aesthetics	The living space aesthetics are well described
9	Does the essay describe what makes the chosen material an economic, efficient and sustainable choice?	a.	Economy and efficiency are NOT discussed.	Economy and efficiency are briefly discussed	Economy and efficiency are adequately discussed	Economy and efficiency are well discussed
		b.	Sustainability is NOT discussed	Sustainability is briefly discussed	Sustainability is adequately discussed	Sustainability is well discussed
10	Does the essay describe the tradeoffs made between economic, efficient and sustainable in the selection of the chosen building materials?		Tradeoffs between economics, efficiency, and sustainability are NOT discussed	Tradeoffs between economics, efficiency, and sustainability are briefly discussed	Tradeoffs between economics, efficiency, and sustainability are adequately discussed	Tradeoffs between economics, efficiency, and sustainability are well discussed
11	Does the essay discuss the environmental footprint or impact of the living space?		NO discussion of environmental footprint	Brief discussion of environmental footprint	Adequate discussion of environmental footprint	Environmental footprint is well discussed

Essay Rubric (continued)

City Layout Criteria		0 (Points)	1 (Points)	2 (Points)	3 (Points)	
IV. Function and Value of the Living Space:						
Provide in-depth discussion of the function of the living space design or component(s) and its influence on the occupants and community.						
12	Does the essay discuss the durability and maintenance of the living space?	NO discussion of durability and maintenance is provided	Brief discussion of durability and maintenance is provided	Adequate discussion of durability and maintenance is provided	Durability and maintenance are well discussed	
	13	Does the essay provide a description of the improvements to the quality of life of the living space occupants (including elderly and disabled)?	NO description of improvement in the quality of life for the occupants.	Brief description of improvement in the quality of life for the occupants.	Adequate description of improvement in the quality of life for the occupants.	Improvement in the quality of life for the occupants is well described
14	Does the essay discussion include benefits of the living space design and its impact on the community and environment?	a.	NO discussion of benefits to the <u>community</u> provided by the living space	Brief discussion of the benefits to the <u>community</u>	Adequate discussion of the benefits to the <u>community</u>	The benefits to the <u>community</u> are well discussed
		b.	NO discussion of benefits to the <u>environment</u> provided by the living space	Brief discussion of the benefits to the <u>environment</u>	Adequate discussion of the benefits to the <u>environment</u>	The benefits to the <u>environment</u> are well discussed
V. Role of the Engineer:						
Identify an engineering discipline and its role in developing the living space design or components of the living space.						
15	Does the essay discuss the role of one engineering discipline in the development of the living space?	a.	An engineering discipline is NOT identified	An engineering discipline is identified		
		b.	The role of the engineer in developing the living space or its components NOT discussed	The role of the engineer in developing the living space or its components is briefly discussed	The role of the engineer in developing the living space or its components is adequately discussed	The role of the engineer in developing the living space or its components is well discussed

Essay Rubric (continued)

City Layout Criteria		0 (Points)	1 (Points)	2 (Points)	3 (Points)
VI. Written Communications:					
Assessment of the overall written presentation.					
16	Well Written	Poorly written and organized	Satisfactorily written and organized	Exceptionally written and organized	
17	Grammar	Many grammatical errors	Some grammatical errors	No grammatical errors	
18	Spelling	Many spelling errors	Some spelling errors	No spelling errors	
19	Length	Fewer than 700 words or more than 1000 words	Between 700 and 1000 words		
20	List of References	a. Less than three appropriate references	At least three appropriate references		
		b. References are NOT correctly listed	References are correctly listed		
Total Essay Points (0–70 points)					

City Narrative Rubric

Future City Name

The judging teams will compete this section. Judge's will answer these questions and assign a point value for each question.

Criteria	0 pts.	1 pts.	2 pts.	3 pts.	4 pts.	5 pts.	Score
1. Describe the City's physical components & infrastructure. (Physical components of the city could include but are not limited to parks and landmarks, recreation opportunities or attractions, and other highlights.)	No description	Poor description of City and its physical components & infrastructure	Fair description of City and its physical components & infrastructure	General description of City and its physical components & infrastructure meets expectations	Good description of City and its physical components & infrastructure	Excellent description of City and its physical components & infrastructure	
2. Describes the City and its services including information such as an overview of their city's quality of life and issues of health, safety, education, etc.	No description	Poor description of City and services	Fair description of City and services	General description of City and some of its services meets expectations	Good description of City and some of its services	Excellent description of City and many of its services	
3. Description of the City's basic information such as population, year, and location?	No description	Some description	Exceptional description				
4. Organized and well written	Poorly organized and written	Satisfactorily organized and written	Exceptionally organized and well written				
5. Grammatical Errors	Many grammatical errors	Some grammatical errors	No grammatical errors				
6. Spelling Errors	Many spelling errors	Some spelling errors	No spelling errors				
7. Length	Fewer than 300 OR more than 500 words		Between 300 and 500 words				
Total City Narrative Points (0–20 points)							