

Challenge 3 - RED Team

City name: XEC-314!

Intro: XEC-314 is a 46.45 Hectare city plan featuring green infrastructure, with a bustling sustainability industry. Having recently converted our traditional infrastructure to be 100% green powered we.

Infrastructure:

A checklist for items in our model: **Yes** or **No**

REDesign will include the infrastructures that allows the city to revolve in a safer, cleaner, and sustainable environment. Our ->

Healthcare System - will have the opportunity of meeting healthcare professionals with VR headsets and a networking system that allows us to see a full torso check up from home. Increasing accessibility should allow residents to use the healthcare system.

Financial Institutions - will have a major bank with mini branches that can help distribute financial assistance

Education Systems - our city will also have classes/institutions that allow individuals to access content from anywhere in the area to continue their education in conjunction with the REDesign training VR modules.

Other infrastures that are included are:

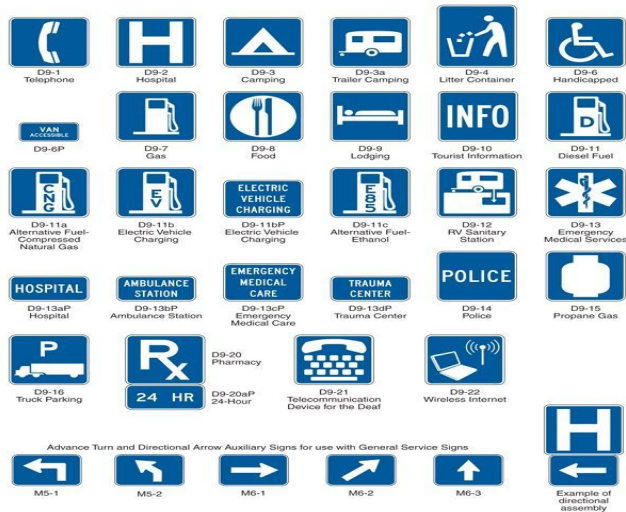
Roads, Transit buses, Telecommunications, Law enforcements, Shelters, and more!

- Soft infrastructure
 - Healthcare system **Yes** or No
 - National **average cost** \$112.5M **Average** range \$60M - \$187.5M
Minimum **cost**\$52.2M Maximum **cost**\$210M
 - Financial institutions **Yes** or No
 - **price** range for a new facility **can** easily range from \$1.0 million to \$4.0 million, depending on size and **many** other variables.
 - Law enforcement **Yes** or No
 - Full Cost of a Police Officer: The average annual cost of a police officer is **\$149,362**. This includes salary, benefits, and supervision.
 - Education systems **Yes** or No
 - Buildings at 2.5 million square feet at \$400/square foot = **\$1 billion** which includes 300,000 square feet in residential housing space and 300,000 square feet of library space.
 - Firefighter training:
 - About \$8,000 per firefighter. We could provide full comprehensive training for about the same cost because of how much better and safer our

method is. And thanks to VR we don't need to spend money on creating fires or wrecks.

- Hard infrastructure
 - Roads **Yes** or No
 - construct a new 2-lane undivided road – about \$2 million to \$3 million per mile in rural areas, about \$3 million to \$5 million in urban areas.
 - Highways Yes or **No** (Small city, thus roads are better)
 - Construct a new 4-lane highway — \$4 million to **\$6 million** per mile in rural and suburban areas, \$8 million to **\$10 million** per mile in urban areas.
 - Bridges Yes or **No**
 - Even a simple pedestrian bridge might cost **\$250,000**. That is a quarter of a **million dollars**! As part of designing and constructing bridges, engineers pay close attention to the cost of a bridge. The total project cost is **\$24.6 million** per lane mile. However, if you look at just the bridge costs, it equates to **\$67.2 million** per lane mile. The bridge cost is comparable to the contractor's bid for a suspension bridge in Oakland, California
 - Transit busses **Yes** or No
 - Diesel buses are the most common type of bus in the United States, and they cost around \$550,000 per vehicle (according to [a 2016 study](#)). [Electric buses](#) are the most expensive on the market, costing around \$800,000 per vehicle. Because of their [low maintenance and fuel costs](#),
 - Vehicles **Yes** or No (Leaning more towards Green, less use of cars)
- Critical infrastructure
 - Facilities for shelter and heatings Yes or No
 - Telecommunication **Yes** or No
 - The average cost to build a cell tower is about **\$175,000**, but the cell tower lease can add **\$600,000** to **\$1 million** or more in value to the property.
 - Public health **Yes** or No
 - More Yes or No

- Logos/Signs representing the major buildings (Examples are the following)



- For the importance of “Emergency Buildings”, a faster/clearer route should be presented.

Utilities:

- Does your city contain water processing, gas, and power facilities?
 - Four step Water treatment which includes coagulation, sedimentation, filtration and disinfection to provide a healthy drinking water supply to all citizens. Stored in water towers; includes water fluoridation to prevent tooth decay.
https://www.cdc.gov/healthywater/drinking/public/water_treatment.html
 - water waste treatment - 150,000 GPD capacity Wastewater Treatment System costing \$500,000 to \$1.5 million for
 - Solar power plants to provide electricity to the city. Photovoltaic power plant farms that span 32 acres to power 1000 homes. \$400k per acre
- Are utilities equally distributed among the entire city?
 - yes ; the small size of our town would make it easy for utilities to be accessed by everyone in the city.

Utilities: Our city contains a four step water treatment which includes coagulation, sedimentation, filtration, and disinfection to provide a supply of healthy drinkable water supply to citizens. The four step water treatment will have a capacity of 150,000 GPD, which will cost approximately \$500,000 - \$1.5 M. We also wanted to implement solar powered plants to provide electricity. Specifically, photovoltaic power plant firms that span 32 acres would power 1000 homes, and the cost of that would be \$400K per acre. Because of the small size of this city, facilities such as these would be evenly distributed among the entire city, making it easier for all citizens to have access to power and drinkable water.

Residential Plans (Henry): 2,700

- Are residential plans structurally-sound (i.e. are they made out of the appropriate material based on your city's characteristics and sustainability goals)?
 - Many windows; meets US green building council standards IN OTHER WORDS
 - Leadership in Energy and Environmental Design (LEED) platinum
 - National average: \$274,000 | \$97.00 per square foot + \$19,000 in one-time costs
<https://www.24hplans.com/cost-build-green-home/#:~:text=Low%20End%3A%20%24193%2C700%20%7C%20%2475.5%20per.%2419%2C000%20in%20one%2Dtime%20costs>
 - 5% more than homes built to minimum code
 - A 2016 report showed that green-certified affordable housing in Virginia leads to developers constructing higher quality housing at a lower cost and allows low-income residents to save more energy and money.
<https://www.usgbc.org/press/about-green-homes>
 -
- Will they provide structural and aesthetic longevity?
 - Structural preferred; aesthetics comes with green design
 - green building award-winners share a style: bland corporate modernism with a small dose of high-tech
<http://solarhousehistory.com/blog/2017/5/19/a-note-on-green-building-aesthetics>
STYLE IS MORE HIGH-TECH (CAUSE VR)
- Are ergonomics being considered in the interior?
 - Green buildings need good ergonomics
<https://pubmed.ncbi.nlm.nih.gov/22934835/> This survey identified a number of ergonomics design issues present in the LEED Platinum (80-110 points) energy-efficient and sustainable buildings that were studied. These results highlight the importance of integrating ergonomics design into green buildings as a component in the US LEED rating system. ERGONOMICS IMPORTANT BECAUSE VR USERS!!!!!!!!!!!!!! More funding in this area
 - Case study of ergonomics in a university
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.984.3460&rep=rep1&type=pdf>

RESIDENTIAL PLANS SUMMARY: REDESIGN builds houses meeting LEED (which is the Leadership in Energy and Environmental Design) Platinum ratings. This meets the green standards for sustainable houses at only 5% higher cost than regular houses. According to a 2012 study, many green designs do not provide adequate ergonomic needs. REDESIGN is the firm that has access to countless research in ergonomic design to meet VR user's physical needs IN ADDITION to high-tech aesthetics. This residential home offers reduced cost in energy and money, thus opening up the market to many working class citizens.

Sustainability (Anais and Daniela):

- **How innovative are your sustainability plans demonstrated in your city (i.e. do you have facilities focused on clean energy and consumables - oxygen, food, and portable water,etc.)?**
 - Implementing the use of solar panels with public buildings, private businesses, and homes(personal expense)
 - Zero emission electric vehicles - includes personal automobiles(discouraged), 18-wheelers, trains
 - Promote the use of public transportation and create walking and cycling paths to promote a sustainable environment.
 - Green infrastructure, which is effective, economical and enhances community safety and quality life. It helps to have a natural environment, provide a system to clean water and conserve ecosystem values.
- **Are your sustainability plans feasible?**
 - With the projected budget, purchasing solar panels for public infrastructure should be feasible, estimating at about \$2,400,000 (20 buildings, 12000 sq ft avg, \$10/sq ft solar panels).
 - For zero emission trains, the cost of having 3 trains is approximately \$4,256,100.00.

SUSTAINABILITY PLAN SUMMARY: For the sustainability of our virtual city we are going to implement the use of solar panels. The VR will have zero emission electric vehicles, which includes personal automobiles, 18-wheelers and trains; this will help to promote the use of public transportation and create walking and cycling paths. The VR will also have a green infrastructure, which is effective, economical and enhances community safety water and conserve ecosystem values. The sustainability plans are totally feasible because it meets the projected budget.

- As for the green infrastructure, the estimated cost would be around \$462,000 per hectare.

As for sustainability, we plan to implement solar panels, zero emission public transportation

Conclusion:

Story: Bob goes through city (Fernando) Narration:

Judges! Put on your imaginary virtual reality goggles and join us for a tour of XEC-314...

The whole city is interconnected with a 5G network, and it is net-zero emissions rated. It combines green energy sources with the latest wireless technology.

The roofs of all buildings are covered with solar panels which provide solar energy during the daytime. The city has tidal energy harnessing. The tide changes move water turbines that generate electricity throughout the whole day. Also, the tides make a light train move up and down the city twice a day. This train goes up and down the main street of the city. It is used to carry people and light cargo.

The water of the city is provided by a water desalination plant that is in the vicinity of the city.

Destination #1: Gas station/charging station.

In this city people come to train and learn how to refurbish traditional gas stations into charging stations for electric cars. They receive training on how to install solar panels. They learn how to handle old gas pumps that need to be properly disposed of.

In order to be environmentally friendly, the “old” pumps are just placeholders for the technician to handle and touch while watching the VR video.

Destination #2: 6 story building with staircase on the outside.

Firefighters put on a full body suit that simulates the heat and smoke produced by a fire in the third floor of a 6 story building. The suit generates more heat and smoke as they get closer to the fire. For safety there is no real fire and smoke, they are harnessed to the top of the ceiling so they would never fall from the building.

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