

Design Summative Criteria C

Selected Area: Zone 3 | Ward H east | Dharavi | Sector 3 | Complex 1

Summary of Haritdhara project:

Dharavi is known as one of Asia's largest slums. It has few sources of drinkable water, no proper waste disposal system, a great lack of any open or green space, a lack of any good infrastructure and countless tiny, cramped houses, the number of which is ever-growing. These conditions cause countless problems for the citizens, such as various rapidly-spreading diseases and it is so crowded that in some parts, there is even a lack of sunlight. But this project aims to bring Dharavi from being one of Asia's largest slums to a sustainable green city. I've done this by not only building the missing infrastructure, rebuilding an organised residential area which allows for plenty of open and green spaces and introducing green solutions such as solar-energy and vertical gardens, but also further strengthened Dharavi's existing industries, such as leather-making and recycling, all so that *Haritdhara* can raise to its full potential.

Model size: A2

Scale: 1:3000

Strand i. - Constructs a detailed and logical plan, which describes the efficient use of time and resources.

Gantt Chart:

https://docs.google.com/spreadsheets/d/1E3Q-R18yJvRtqp07bccUGBK0Zv6NF-PMaRVyD_uv8f8/edit?usp=sharing

Strand ii. - Demonstrates excellent technical skills when making the solution.

Front view



Right view



Back view



Left view



Top view





New Skill acquired: AutoCAD

I learned basic AutoCAD during the spring break from my mother, who has a background in architecture, interior design, AutoCAD and 3D-Max and throughout the past month designed the buildings on AutoCAD and made the model under her mentorship.

Details of the model

- Medium: software AutoCAD 2025 & 180 GSM paper
- Model size: A2
- Scale - 1:3000
- I have made sure to stick as close to the design specifications as possible, only adding elements based on the got throughout the process. More on that in strand iii.

Residential Infrastructure

- Firmly-built vertical 20 floors buildings/towers for people to live in, with vertical parking spaces spanning 2 floors enough for 2 and 4-wheeler vehicles.
- All homes have access to clean water and washrooms.
- Buildings have gardens in several spaces, including vertical gardens located in the balconies.
- Each residential tower will have solar panels and a farm for fruits, vegetables and other useful plants. Seeds are provided by the government to promote farming.
- Residential buildings are spaced and positioned to allow for a large amount of free space.

Public Infrastructure

- A large amount of greenery and free space throughout the city.
- Trash cans beside every building and no-littering signs throughout the city.

- Proper water pipeline.
- Proper sewage system.
- Places like the residential complex, workspace and garden have an adequate amount of parking space outside them, while places like the hospital and school have no-parking signs outside them.
- A large hospital sized to be able to accommodate a very large amount of patients.
- A large school, college and public library.
- A sports complex for various sports such as football, tennis and swimming and 2 fields outside of the school.
- There is a public garden and a private garden in the residential complex with a playground for kids, and a botanical garden with various useful plants, all complete with jogging tracks.
- A multi-floor police station.
- A proper grocery marketplace.
- A community center
- A skill-development center
- A large commercial complex with workspaces.
- Work spaces for small-scale businesses such as leather-making and pottery.
- A local market selling everyday groceries such as fruits and vegetables.
- A supermarket for all kinds of goods that people may need.
- A shopping mall that puts special emphasis on sustainable products.
- Dedicated areas on the side of some roads for shops, commercial spaces and amenities such as gyms, restaurants, etc.

Transportation

- A 36m wide road wide enough for multiple vehicles to travel side by side complete with a wide footpath and cycling track spanning the entirety of the city.
- Sufficient E-bus stops connect major locations, such as the residential complex, hospital, school and workspace.
- E-buses will be affordable and well-maintained to encourage usage of public transport.
- Affordable bicycle renting stations connecting major locations, such as the residential complex, hospital, school and workspace.
- Dedicated underground and vertical parking for private and commercial vehicles spaces in several areas.
- Skywalks installed throughout the area to make more room for pedestrians.
- Zebra crossings and traffic lights installed at road intersections.
- Petrol pumps and EV charging stations throughout the city.

Sustainable Policies

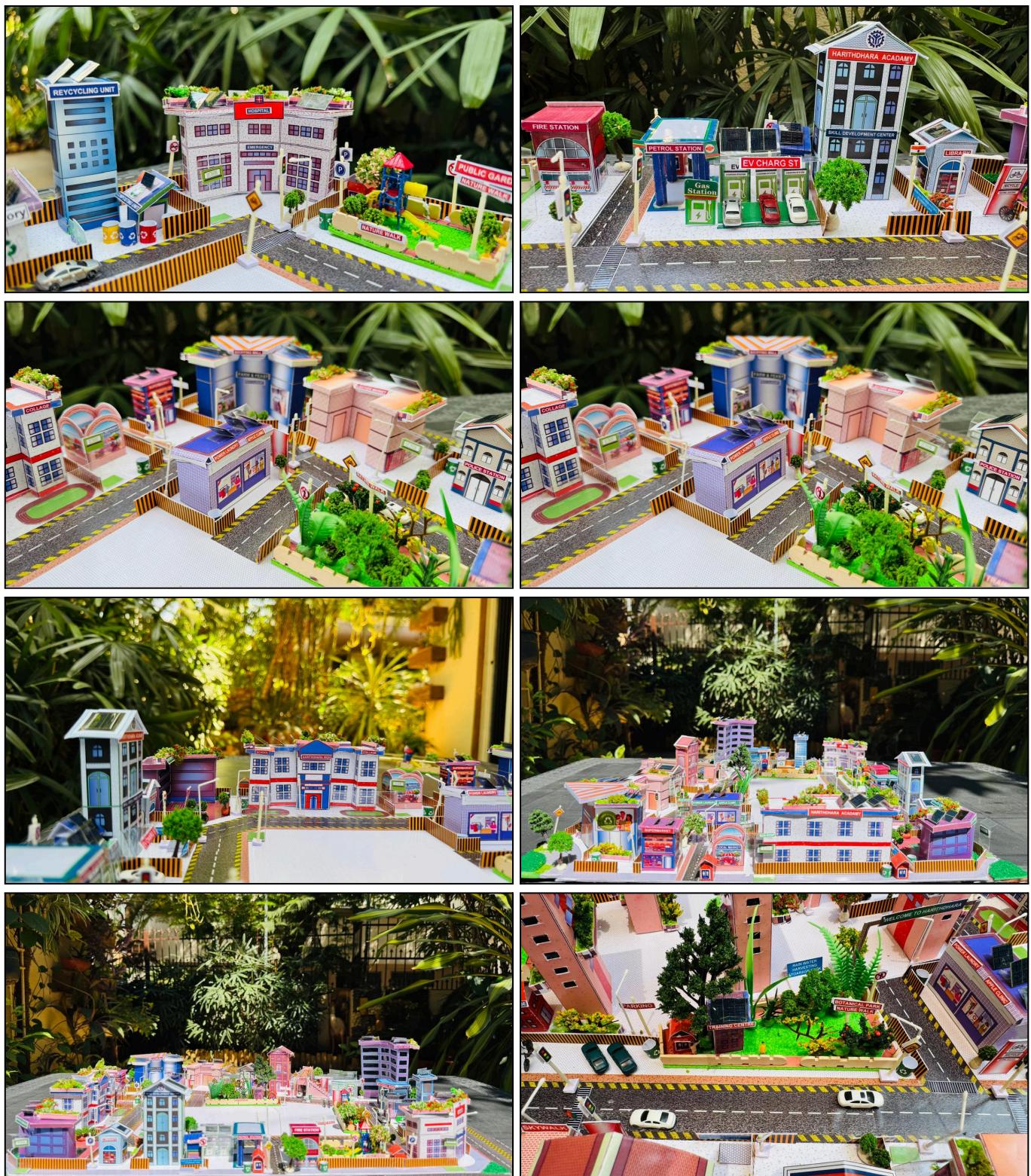
- A recycling unit.
- A waste-composting center
- Different types of waste are collected throughout the city in differently-coloured trash cans. The waste eventually goes to either the recycling unit or waste-composting center.
- An opportunity Dharavi has is to increase its already significant recycling industry. Recycling jobs could be paid higher in order to give people an incentive to participate in sustainable practices such as recycling.
- The government could set policies to promote sustainability. For instance, the government could pay the people who contribute to the cleanliness and sustainability of the area. They may also set certain anti-littering laws and fine individuals who don't follow the sustainability rules, starting from small amounts, and increasing it every time the offence is repeated.
- The government provides seeds, soil and equipment for, and promotes terrace farming.
- The Mithi river and the sewers will be cleaned prior to every monsoon.

Energy-Efficiency

- Primary source of energy is solar energy.
- Rain-water harvesting tanks throughout the city.
- Borewells will be dug in several locations which can be used for sanitation and commercial purposes.
- Streetlights turn on only when there are passers by.

Important close-up shots of my model:







Strand iii. - Demonstrates excellent technical skills when making the solution.

Process Journal

Note - While I have split the steps into 3 stages and individual steps for the sake of simplicity, in reality I had to work on all 3 stages and many steps simultaneously, constantly having to go back and continue making more buildings and elements or edit and change things.

Materials and tools

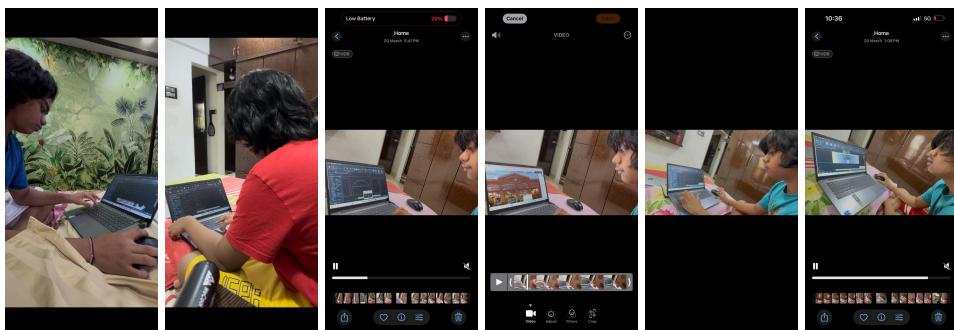
3 Colour glossy printouts A1,Mdf, sunboard,green velvet paper, furniture glue,cutting tools, miniatures, etc

Model size: A2

Medium: Autocad 2025, 180 GSM paper

Stage 1: Designing structures on AutoCAD

- Collecting reference images on the internet
- Finding stock images to use for: Street signs, traffic lights, etc.
- For the base layout: Drawing on AutoCAD
- Designing exterior nets for each structure on AutoCAD.
- Designing miscellaneous elements: bus stop, bicycle renting stand, skywalk staircase and solar panels.



Sped-up video of me designing structures on AutoCAD

- [Net Drawings - PDF 1](#)
- [Net Drawings - PDF 2](#)
- [Net Drawings - PDF 3](#)
- [Net Drawings - PDF 4](#)

Visiting a builder's office to collect pre-used miniatures

- Playground slide setup, people, cars and bicycles, street lights, trees

Stage 2: Assembly and fit

- Getting a total of 3 colour printouts of size A1
- Cutting out all individual structures
- Folding and assembling each building
 - Cutting out windows, creasing using a tool, applying translucent film for windows, folding
 - Cutting out all miscellaneous elements
 - Folding and assembling miscellaneous elements -bus stops, cycling stands,



Stage 4: Pasting printed base layout onto a thick sunboard sheet and MDF sheet

- Installing paper roads stickers and cycling track onto land layout



Stage 5: Final installation

Installing structures and elements onto the layout:

- Balconies, vertical gardens, solar panels onto buildings
- Placing all structures on their designated spots
- Bus stops and cycling stands on roadside
- Installing road stickers, street signs, traffic lights, zebra crossing, street lights, fences, onto layout



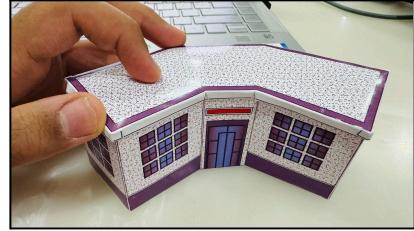


I received a lot of feedback throughout this project, which I have documented below.

Peer	Feedback	Implemented
Peer 1	Residential buildings are too small to fit the probably large population of the place with a few floors of parking. Make them taller.	Implemented <input checked="" type="checkbox"/>
Peer 1	Parking and no parking should be clearly marked.	Implemented <input checked="" type="checkbox"/>
Peer 2	All similar facilities should be grouped in one place. Like all educational facilities and all shopping spots.	Implemented <input checked="" type="checkbox"/>
Peer 3	A bank is a very important component of a city that is missing here.	Implemented <input checked="" type="checkbox"/>
Peer 3	There is no space for smaller shops and vendors. Add a row of structures where such small shops can be opened.	Implemented <input checked="" type="checkbox"/>

Strand iv. - Fully justifies changes made to the chosen plan and design when making the solution.

Change Made	Reason for Change
Plan	
My plan went from spanning 2 months to 1 month	I initially was going to make each building on paper from scratch, which would take a lot of time. Only later did I decide that it would be much better to design each building digitally on AutoCad for it to be easier for me to make changes and corrections over time.
Design	
Increasing the height of the residential towers	I intended to make the residential towers really tall, keeping in mind that in my plan I would like to accommodate Dharavi's large population while

	<p>making sure not to relocate a lot of them. And so after realising that the residential buildings came out much smaller than I would have wanted, I upsized them. But after printing out a sample of the newly-sized version, I saw that they were unrealistically large in comparison to the rest of the buildings. I then printed out a few slightly smaller residential buildings. At the end, I used the third size of buildings in a formation where there are enough buildings to house the population while making sure the area does not look too crowded and still has a large amount of free space.</p> 
Changing the design of the hospital	<p>For the same reason as for the residential towers, I wanted the hospital to be larger. For that reason and because the hospital looked aesthetically very different from the rest of the buildings, I redesigned it by stacking two u-shaped buildings on top of each other, the general design of which was more in line with the other buildings, such as the residential towers and school. Later, I removed the top half of the hospital to scale it down, since at this point the newer buildings I had designed had been smaller.</p> 
Addition of a line of shops	<p>My initial specifications mentioned only the following spots for shopping: local market, supermarket, sustainable shopping complex, leather market. I later realised that there needs to be a space for smaller shops that wouldn't fit into the structures mentioned above, leading me to add a structure representing a line of smaller shops such as a laundry shop and clinic.</p>
increasing the width of the footpath and cycling track	<p>Including a city-spanning footpath and cycling track were elements that I had in mind for my design ever since I saw the street map view of Dharavi for the first time, where there was barely any space for people to walk. It was while realising the model and doing further reflection about what should be the ideal width of the cycling track and footpath in my design that I resized the paths that would connect the entire city should be wider.</p>
Addition of public toilets	<p>I added public toilets in places like gardens and markets as that was something that was not in my specifications.</p>

In conclusion, this prototype model of Haritdhara has come out just as I had imagined, with all the features that a top-level sustainable city should have. The redevelopment of areas like Dharavi into their full potential is the first step in the development of a green India.