

ANANT

Centre for Sustainability

The 4 immediate challenges for battling COVID-19 in India are: Challenge 1: More testing kits and randomised testing of population Challenge 2: More COVID-19 recovery facilities Challenge 3: More ventilators and cheaper ventilators Challenge 4: More healthcare professionals

We at Anant National University have faculty members who are architects, planners, real estate developers, affordable housing experts, and are best placed to solve challenge number 2. And as a solution, we present a complete Implementation Plan as well as offer our services free of cost to rapidly scale up COVID-19 recovery facilities by utilizing existing hard infrastructure – buildings that are government owned, community owned, or private – and refurbishing them to provide COVID-19 recovery facilities with ICUs. The facility would cater to the following categories of COVID-19: asymptomatic, mild symptoms, moderate symptoms, severe symptoms of COVID-19 virus. We have the team, identified equipment suppliers, funding structure, and layouts ready to implement this plan immediately.

Time needed to implement: 15 days.

This is a 'plug and play', highly localised, and scalable model that requires a government- university-private sector partnership.

We rejected the following 2 types of potential COVID-19 recovery facilities:

- 1. Vacant schools In the absence of a vaccine, we need a COVID-19 recovery facility to treat a continuous number of COVID-19 patients, with the possibility of the numbers spiking once in a while in the future. Whereas schools are likely to reopen when the current rate of spread of COVID-19 stabilises.
- 2. Vacant halls for quarantine facility with no ICU This does not work as a moderately infected COVID-19 patient will be needed to be treated immediately at an ICU which needs to be an integral part of the COVID-19 recovery facility itself.

Therefore, this Implementation Plan instead focuses on the following 3 types of vacant infrastructure in order of priority:

Priority 1 (lowest hanging fruit): Government, community, or privately owned Community Halls and Marriage Halls Priority 2: Completed but not occupied private commercial buildings

Priority 3: Newly constructed, completed but vacant government and private residential buildings

Government owned community halls are the lowest hanging fruit. These halls exist in urban and rural parts of all states in India. They can be acquired by the government now as a temporary COVID-19 recovery facility for as long as needed. They can even be dismantled when the current infection spread decreases but quickly refurbished once again if the infection spread spikes.



### CONTEXT

Looking at the increasing numbers of COVID-19 cases (Annexe, Figure 1) and the declining recovery rate of COVID-19 patients (Annexe, Figure 2) in India, there is an urgent need for temporary COVID-19 recovery facilities with ICUs to boost the current capacity of hospitals.

The governments of various states including Gujarat have done a lot of work towards this. However we will need more. The situation is more worrisome in Northern and Eastern states. According to the National Health Profile – 2019, there are only 0.11 government hospital beds in Bihar, while states such as Jharkhand, Uttar Pradesh, Madhya Pradesh, Odisha, Assam, Manipur and Maharashtra are also below the national average of 0.55 government beds per 1000 population. Only 5% to 8% of these are ICU beds.

Census 2011 recorded 330,835,767 houses, of which about 7.5 percent (24,812,682) of the houses are vacant (Annexe, Figure 3). 95 percent of these vacant houses are in good and liveable condition.

This amounts to a massive number of vacant infrastructure readily available across all Indian states that must be used immediately to host the rapidly increasing patients in the current crisis. We therefore propose a solution of rapidly scaling up COVID-19 recovery facilities by utilizing existing hard infrastructure – buildings that are government owned, community owned, or private – and refurbishing them to provide COVID-19 recovery facilities with ICUs.

### **IMPLEMENTATION PLAN**

For the sake of safety and logistics, only spaces and buildings that are completed but not occupied should be considered. Partially occupied buildings have a risk of cross infection to other residents and movement would also be curtailed. Further, people are concerned about being infected from medical personnel/ staff in the same building. The following facilities need to be picked, acquired, and refurbished to transform them into COVID-19 recovery facilities with ICUs.

Here is how the government can use this Implementation Plan:

- 1. Check if the COVID-19 infected city/village has a Priority 1 space (as defined below) and
- follow the guidelines mentioned in this Implementation Plan
- 2. If Priority 1 space is not available then check if the city/village has a Priority 2 and 3 space in that order of priority and follow the guidelines mentioned in this Implementation Plan



### Priority 1: Government/Community/Private Owned Community Halls and Marriage Halls

Most municipal corporations and government housing schemes have a community hall, which can be temporarily converted into a COVID-19 treatment facility. The space can easily be divided into three area sectors i) asymptomatic and mild symptom patients ii) moderate symptom patients iii) severe symptoms patients. Individual cubicles can be created utilizing curtains and temporary barricades. After consultations with several doctors, medical practitioners and the COVID-19 task force for Gujarat, our recommendation is to have 10% of beds in a COVID-19 recovery facility as ICUs.

Items needed for ICUs:

The basic equipment required to set up ICUs

- \* Ventilator
- \* Oxygen Supply
- \* Monitoring equipment with a central monitoring system
- \* Partitioning system with curtains for isolation for each bed

Infrastructure for general ward

- \* Bed depending on what is locally available cost can be minimal
- \* Electric points plug point, light and fan
- \* Movable partitioning system for isolation (5 for 20 beds)

Patients in critical condition will be transferred into ICUs where the ventilators, oxygen supply, and monitoring facilities need to be installed. It will be very easy to create the necessary piped infrastructure in this format.



Costs for ICUs - 20 bed For severe cases	Estimation per bed
General	5,000
Manifold	1,500
Piped oxygen point	5,000
Vacuum machine (1 per 5 beds)	2,000
Ventilator (1 per 2 beds)	2,50,000
Monitoring Machine	1,25,000
Infusion pump	30,000
Sub total	4,18,500
GST between 12-18%	62,775
Total	4,81,275

Not included Beds Tables Housekeeping items Consumables

Costs for General Ward - 180 beds For asymptomatic, mild, moderate cases	Estimation per bed
General & electric points	2000
Vaccum machine (1 per 20, in case a moderate case becomes severe)	500
Oxygen (mobile version, in case a moderate case becomes severe)	2500
Sub total	5000
GST between 12-18%	750
Total	5750

Figure 4: Estimate for ICUs - 20 bed (for severe cases) and General Ward - 180 beds (for asymptomatic, mild, or moderate cases)

Please note that the credit TDR will have financial implications to the GOI only at a time when the developer will develop a new project.



<sup>1</sup> There is precedence when GOI has in the past provided leveraged TDR or provided extra FSI as compensation. Some examples:

In 2008, to facilitate rental housing Mumbai Metropolitan Regional Development Authority (MMRDA) incentivesed developers through extra FSI and free TDR. This is similar in principle to the Public Private Partnership (PPP) model in place but with extra free FSI.

<sup>•</sup> MMRDA in its proposed masterplan for Mumbai in 2018-19 had proposed free FSI of upto 8 near transport hubs such as metro stations.

<sup>•</sup> The Ahmedabad Municipal Corporation (AMC) and Ahmedabad Urban Development Authority (AUDA) have given a free FSI of 4, which is higher by 2.2 to conventional FSI for high rise buildings in the affordable housing corridor

to incentivise developers to opt affordable housing

<sup>•</sup> In case of part acquisition of land in urban areas the government offers the land owners three choices of compensation 1) Payment as per circle rate 2) Land of equal value as per circle rate in alternate locations and 3) Free FSI of acquired land on the balance land

We propose that this is how we can compensate private owners/developers of community halls and marriage halls without the government paying out of pocket:

Strategy	Description	Benefit to builder	Costs to the state
CSR	MCA has already announced that funds spent on measures to tackle the COVID-19 outbreak will be counted towards CSR activity of companies. However please note that as per law, if a company is in losses in any 3 preceding years then they are exempt from spending money on CSR, and there is high likelihood that several private entities might incur financial loss for 2019-2020. The CSR route also does not offer incentive to a company less than minimum net worth of Rs 500 crores.	Value of the expenses incurred by the private entity towards creating the COVID-19 recovery facility	No financial implication. Only opportunity cost of private entity spending on another CSR approved activity.
TDR	The TDR will be given for free for the builder's next project (with a cap equalling the TDR value of the current building used for COVID19 facility). A faster mechanism could also be to give a GST credit equivalent to the TDR equivalent of the space offered as the COVID-19 facility. <sup>1</sup>	TDR will have to be calculated for each project. It is based on circle rate and project size	Giving a builder credit TDR will have <b>no current financial</b> <b>implication to the government</b> . It is a loss of future possible revenue, but it also incentivises the builder to develop his next project.

Figure 5: Options of financial incentives for private entities





Below is an example of a layout of a COVID-19 facility in a community hall.

Figure 6 : ICU layout for patients with severe symptoms of COVID-19 in community halls and marriage halls *Refer annexe (figure 21) for larger sized version* 

These halls have the advantage that their use as COVID-19 recovery facilities can be prolonged until the time required. They can also be quickly dismantled and again set up whenever COVID-19 infection spreads.

### Priority 2: Completed but not occupied private commercial buildings

Several cities in India have an over supply of office spaces. Office spaces offer a lot of advantages for conversion into COVID-19 recovery facilities such as large floor plates, water supply, sanitation, and some also have provision for air conditioning built in.

Items needed for ICUs: The basic equipment required to set up ICUs

- \* Ventilator
- \* Oxygen Supply
- \* Monitoring equipment with a central monitoring system
- \* Partitioning system with curtains for isolation for each bed

Infrastructure for general ward

- \* Bed depending on what is locally available cost can be minimal
- \* Electric points plug point, light and fan
- \* Movable partitioning system for isolation (5 for 20 beds)



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Monitoring Machine	1,25,000
Infusion pump	30,000
Sub total	4,18,500
GST between 12-18%	62,775
Total	4,81,275

Not included Beds Tables Housekeeping items Consumables

Costs for General Ward - 180 beds For asymptomatic, mild, moderate cases	Estimation per bed
General & electric points	2000
Vaccum machine (1 per 20)	500
Oxygen (mobile)	2500
Sub total	5000
GST between 12-18%	750
Total	5750

Figure 7: Estimate for ICUs - 20 bed (for severe cases) and

General Ward - 180 beds (for asymptomatic, mild, or moderate cases)



### We propose that this is how we can compensate private owners/developers *without* the government paying out of pocket:

Strategy	Description	Benefit to builder	Costs to the state
CSR	MCA has already announced that funds spent on measures to tackle the COVID-19 outbreak will be counted towards CSR activity of companies. However please note that as per law, if a company is in losses in any 3 preceding years then they are exempt from spending money on CSR, and there is high likelihood that several private entities might incur financial loss for 2019-2020. The CSR route also does not offer incentive to a company less than minimum net worth of Rs 500 crores.	Value of the expenses incurred by the private entity towards creating the COVID-19 recovery facility	No financial implication. Only opportunity cost of private entity spending on another CSR approved activity.
TDR	The TDR will be given for free for the builder's next project (with a cap equalling the TDR value of the current building used for COVID19 facility). A faster mechanism could also be to give a GST credit equivalent to the TDR equivalent of the space offered as the COVID-19 facility. <sup>2</sup>	TDR will have to be calculated for each project. It is based on circle rate and project size	Giving a builder credit TDR will have no current financial implication to the government. It is a loss of future possible revenue, but it also incentivises the builder to develop his next project.
Waiver of Stamp Duty	Stamp duty of the builder's next project to be waived off when it is registered	5% of project cost	Waiving off the stamp duty will have no current financial implication to the government. It is a loss of future possible revenue. Stamp duty is paid by the buyers of units to the government. Waiver of stamp duty incentivises buyers of units, and makes the developer's project more attractive.

Figure 8: Options of financial incentives for private entities



Below is an example of a layout of a COVID-19 facility in an open office space. The Centre for Sustainability at Anant National University can make the drawings of layout for specific office spaces



Figure 9 : ICU layout for patients with severe symptoms of COVID-19 in community halls and marriage halls *Refer annexe (figure 21) for larger sized version* 

Please note that the credit TDR will have financial implications to the GOI only at a time when the developer will develop a new project



<sup>2</sup> There is precedence when GOI has in the past provided leveraged TDR or provided extra FSI as compensation. Some examples:

<sup>•</sup> In 2008, to facilitate rental housing Mumbai Metropolitan Regional Development Authority (MMRDA) incentivesed developers through extra FSI and free TDR. This is similar in principle to the Public Private Partnership (PPP) model in place but with extra free FSI.

<sup>•</sup> MMRDA in its proposed masterplan for Mumbai in 2018-19 had proposed free FSI of upto 8 near transport hubs such as metro stations.

<sup>•</sup> The Ahmedabad Municipal Corporation (AMC) and Ahmedabad Urban Development Authority (AUDA) have given a free FSI of 4, which is higher by 2.2 to conventional FSI for high rise buildings in the affordable housing corridor

to incentivise developers to opt affordable housing

<sup>•</sup> In case of part acquisition of land in urban areas the government offers the land owners three choices of compensation 1) Payment as per circle rate 2) Land of equal value as per circle rate in alternate locations and 3) Free FSI of acquired land on the balance land

## Priority 3: Vacant Residential Buildings (Government owned OR Private/ Developer owned)

In every city that is severely affected, at least 1 housing society or building with 200 beds can be commissioned. It is a requirement that the society/building must have a club house/community hall.

### 3.1 Government society/ building

Under PMAY, there are projects in nearly all cities of India that have completed projects but not yet occupied. This is because these buildings are formally still in possession of the government and so utilizing them will not be a great challenge.

This option would initially require the following actions:

i) Identify a government housing society/building with 100 or more 1BHK or larger flats, and take note of the condition, functioning of lifts, electric and water supply.

ii) Identify the stakeholders involved in the identified government housing society/building.

iii) The primary costs for the refurbishment, namely a) cost of converting the identified society/ building to a hospital with only ICUs and b) converting the identified society/buildings back to residential units.

The layout will be as follows:

i) For asymptomatic patients and patients with mild symptoms

Each individual bedroom and living room in every apartment of the housing society/building must be transformed in to isolation rooms for COVID-19 patients with mild symptoms and COVID-19 patients who are asymptomatic. Individual rooms decreases the chances of the

rising numbers of re-infection of COVID-19 patients. Asymptomatic patients or patients with mild symptoms require lesser monitoring and no continuous ventilator and oxygen supply, therefore can be housed in individual rooms. We have included the provision of 1 vacuum machine and 1 mobile oxygen supply per 20 patients, to care for a moderate patient who suddenly becomes severe.

Items needed: Light bulbs, fans, and minimum 1 plug point for phone charging needs to be fitted in each room. Asymptomatic patients or patients with mild symptoms will be less frequently monitored by health staff.

ii) For moderate to severe patients

The community hall must be transformed into ICUs for severe cases where the ventilators, oxygen supply, and monitoring facilities need to be installed.



Items needed for ICUs: The basic equipment required to set up ICUs

- \* Ventilator
- \* Oxygen Supply
- \* Monitoring equipment with a central monitoring system
- \* Partitioning system with curtains for isolation for each bed

Costs for ICUs - 20 bed For severe cases	Estimation per bed
General	5,000
Manifold	1,500
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Ventilator (1 per 2 beds)	2,50,000
Monitoring Machine	1,25,000
Infusion pump	30,000
Sub total	4,18,500
GST between 12-18%	62,775
Total	4,81,275



Costs for converted bedrooms - total 180 beds For asymptomatic, mild, moderate cases	Estimation per bed
General & electric points	2000
Vaccum machine (1 per 20)	500
Oxygen (mobile)	2500
Sub total	5000
GST between 12-18%	750
Total	5750

Figure 10: Estimate for ICUs - 20 bed (for severe cases) and General Ward - 180 beds (for asymptomatic, mild, or moderate cases)



Below are examples of layout of how a COVID-19 facility can be established in a 1BHK apartment under the PMAY scheme. The Centre for Sustainability at Anant National University can make the drawings of layout for specific housing layouts.



Figure 11: General ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 1 BHK vacant home. *Refer annexe* (figure 22) for larger sized version





Figure 12: 3D rendering of a general ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 1 BHK vacant home

#### 3.2 Privately/ developer owned society/ building

It is likely that many projects developed by private builders comprising of two, three or four bedroom units are available in the larger cities. Legally, working with a private builder would require a direct 'contract' with the developer and hence would not involve too many stakeholders.

The key aspects to be considered in identifying the buildings

- i) Project needs to be completed but not handed over to owners.
- ii) Must have a community hall or club house
- iii) Direct access from a city road and location that has adequate water supply and reliable electricity supply.

The private developers need to be compensated for two things:

- i) Compensation for the months the buildings and number of units are occupied, and
- ii) Compensation for refurbishing the buildings back to the original condition.



### We propose that this is how we can compensate private owners/developers *without* the government paying out of pocket:

Strategy	Description	Benefit to builder	Costs to the state
CSR	MCA has already announced that funds spent on measures to tackle the COVID-19 outbreak will be counted towards CSR activity of companies. However please note that as per law, if a company is in losses in any 3 preceding years then they are exempt from spending money on CSR, and there is high likelihood that several private entities might incur financial loss for 2019-2020. The CSR route also does not offer incentive to a company less than minimum net worth of Rs 500 crores.	Value of the expenses incurred by the private entity towards creating the COVID-19 recovery facility	No financial implication. Only opportunity cost of private entity spending on another CSR approved activity.
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Figure 13: Options of financial incentives for private entities



The layout will be as follows:

#### i) For asymptomatic patients and patients with mild symptoms

Each individual bedroom and living room in every apartment of the housing society/building must be transformed in to isolation rooms for COVID-19 patients with mild symptoms and COVID-19 patients who are asymptomatic. Individual rooms decreases the chances of the rising numbers of re-infection of COVID-19 patients. Asymptomatic patients or patients with mild symptoms require lesser monitoring and no continuous ventilator and oxygen supply, therefore can be housed in individual rooms. We have included the provision of 1 vacuum machine and 1 mobile oxygen supply per 20 patients, to care for a moderate patient who suddenly becomes severe.

Items needed: Light bulbs, fans, and minimum 1 plug point for phone charging needs to be fitted in each room. Asymptomatic patients or patients with mild symptoms will be less frequently monitored by health staff.

#### ii) For moderate to severe patients

The club house or community hall must be transformed into ICUs for severe cases where the ventilators, oxygen supply, and monitoring facilities need to be installed.

Items needed for ICUs: The basic equipment required to set up ICUs

- \* Ventilator
- \* Oxygen Supply
- \* Monitoring equipment with a central monitoring system
- \* Partitioning system with curtains for isolation

• MMRDA in its proposed masterplan for Mumbai in 2018-19 had proposed free FSI of upto 8 near transport hugs such as metro stations.

- a free FSI of 4, which is higher by 2.2 to conventional FSI for high rise buildings in the affordable housing corridor to incentivise developers to opt affordable housing
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Please note that the credit TDR will have financial implications to the GOI only at a time when the developer will develop a new project.



<sup>3</sup> There is precedence when GOI has in the past provided leveraged TDR or provided extra FSI as compensation. Some examples:

<sup>•</sup> In 2008, to facilitate rental housing Mumbai Metropolitan Regional Development Authority (MMRDA) incentivesed developers through extra FSI and free TDR. This is similar in principle to the Public Private Partnership (PPP) model in place but with extra free FSI.

<sup>•</sup> The Ahmedabad Municipal Corporation (AMC) and Ahmedabad Urban Development Authority (AUDA) have given

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Manifold	1,500
Piped oxygen point	5,000
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Ventilator (1 per 2 beds)	2,50,000
Monitoring Machine	1,25,000
Infusion pump	30,000
Sub total	4,18,500
GST between 12-18%	62,775
Total	4,81,275

Not included Beds Tables Housekeeping items Consumables

Costs for converted bedrooms - total 180 beds For asymptomatic, mild, moderate cases	Estimation per bed
General & electric points	2000
Vaccum machine (1 per 20)	500
Oxygen (mobile)	2500
Sub total	5000
GST between 12-18%	750
Total	5750

Figure 14: Estimate for ICUs - 20 bed (for severe cases) and General Ward - 180 beds (for asymptomatic, mild, or moderate cases)



Below is an examples of layout of how a COVID-19 facility can be established in a 2BHK apartment. The Centre for Sustainability at Anant National University can make the drawings of layout for specific housing layouts.



Figure 15: General ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 2BHK vacant home. *Refer annexe (figure 23) for larger sized version* 





Figure 16: Indian WW1 hospital inside The Dome of the Royal Pavilion, Brighton, 1915



Figure 17: Wuhan Livingroom converted into a hospital, China, February 2020



NEWS / INDIA

## India turns trains into isolation wards as COVID-19 cases rise

About 20,000 coaches and several stadiums across the country to be modified into medical facilities, officials say.



There are worries that India's beleaguered healthcare system may be overwhelmed with the surge in cases [Anupam Nath/AP Photo]

India has begun converting railway carriages and sport stadiums into isolation wards to deal with an anticipated surge in <u>coronavirus</u> cases.

MORE ON CORONAVIRUS PANDEMIC

Trump says will defy US coronavirus mask advice: Live

Figure 18: News Clipping 1 - Indian Railways turn coaches into isolation ward for patients



Figure 19: Parking lot in Surat converted in to COVID-19 care facility



### Call to turn vacant flats into quarantine centres

Realtors welcome idea, officials mull ways of implementation





For representational purposes

### By Bosky Khanna

#### Express News Service

BENGALURU: Many eady-to-move-in flats in the city are lying vacant as there are no takers. So why not convert them into quarantine units, is a suggestion from many people. Realtors from across the city, real estate associations, and even RERA-K officials are now thinking of ways to implement this suggestion. Vishnuvardhan Reddy, member of Real Estate (Regulation and Development Act), Karnataka, told The New Indian Express that many government constructed units like those built by the Bangalore Development Authority and Karnataka Housing Board, are lying vacant.

Figure 20: News Clipping 2 - Call to turn vacant flats into guarantine centres

### **Consultations**

For this Implementation Plan, Anant National University consulted a large number of experts and organizations that specialize in setting up hospitals, equipment manufacturers, doctors.

We especially thank:

- Avant-garde Design Studios for their inputs on design
- Dr. Gourdas Choudhury and Dr Gargi Maitra of Fortis Hospital for their medical advice
- Dr. Mayank Thakker for advice on equipment
- Dr. Rohini Dutta of IIT Kanpur for her contribution to various aspects of this plan

\* To implement the solution (transform a vacant building any where in India into a COVID-19 recovery facility), please contact Anant National University: Dhaval Monani 9898543111 / Dr. Miniya Chatterji 8826410586. Please note that we do not accept any fees.

\* To only get designs, layout plans, and architectural inputs free of cost please contact Anant National University: Jasmine Gohil 9879259819 / Bhavik Mehta 9428892433





### Annexe

Figure 1: Total Coronavirus Cases in India (Source: <u>https://www.worldometers.info/coronavirus/country/india/</u>)





Figure 2: Outcome of Cases (Recovery or Death) in India (Source: https://www.worldometers.info/coronavirus/country/india/)





Figure 3: Percentage of houses vacant per total number of houses in Indian states (Source: Census 2011)





Figure 4 : Estimate for ICUs - 20 bed (for severe cases) and General Ward - 180 beds (for asymptomatic, mild, or moderate cases) (*Refer page 6*) Figure 5 : Options of financial incentives for private entities (*Refer page 7*)

Figure 6 : ICU layout for patients with severe symptoms of COVID-19 in community halls and marriage halls (Refer page 8)

Figure 7 : Estimate for ICUs - 20 bed (for severe cases) and General Ward - 180 beds (for asymptomatic, mild, or moderate cases) (Refer page 9)

Figure 8 : Options of financial incentives for private entities (*Refer page 10*)

Figure 9 : ICU layout for patients with severe symptoms of COVID-19 in community halls and marriage halls (Refer page 11)

Figure 10 : Estimate for ICUs - 20 bed (for severe cases) and General Ward - 180 beds (for asymptomatic, mild, or moderate cases) (Refer page 13)

Figure 11 : General ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 1 BHK vacant home (Refer page 14)

Figure 12: 3D rendering of a general ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 1 BHK vacant home (*Refer page 15*)

Figure 13 : Options of financial incentives for private entities (*Refer page 16*)

Figure 14 : Estimate for ICUs - 20 bed (for severe cases) and General Ward - 180 beds (for asymptomatic, mild, or moderate cases) (Refer page 18)

Figure 15 : General ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 2BHK vacant home (Refer page 19)

Figure 16 : Indian WW1 hospital inside The Dome of the Royal Pavilion, Brighton, 1915 (*Refer page 20*)

Figure 17 : Wuhan Livingroom converted into a hospital, China, February 2020 (Refer page 20)

Figure 18 : News Clipping 1 - Indian Railways turn coaches into isolation ward for patients (*Refer page 21*)

Figure 19 : Parking lot in Surat converted in to COVID-19 care facility (*Refer page 21*)

Figure 20: News Clipping 2 - Call to turn vacant flats into quarantine centres (Refer page 22)





Figure 21: ICU layout for patients with severe symptoms of COVID-19 in community halls and marriage halls (Enlarged version)



Figure 22: General ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 1 BHK vacant home







Figure 23: General ward layout for patients with asymptomatic, mild, or moderate COVID-19 symptoms in a 2BHK vacant home (Enlarged version)



Figure 24: Medical Gases Pipeline System BOQ for ICUs

Sr. No.	Description	Qty	Unit	Make
1	5+5 manifold extendable type complete with middle frame with chain for individual cylinder along with NRV for every cylinder & copper pig tail pipes.	1	Nos	mediline
2	2+2 manifold extendable type complete with middle frame with chain for individual cylinder along with NRV for every cylinder & copper pig tail pipes.	1	Nos	Lifeline
3	Surface mounted front loading gas outlets -for Oxygen System.	100	Nos	a.s.medico
4	Medical VACUUM Surface mounted front loading gas outlets	50	Nos	a.s medico
5	Surface mounted front loading gas outlets - for Medical Air (4 Bar).	50	Nos	a.s.medico
Accesso	ries			
6	Oxygen Flow meter with Humidifier Bottle	50	Nos	mediline
7	Ward Vacuum Unit with Regulator, Collection Jar of 600 ml with bracket.	50	Nos	mediline
8	15mm 0D x 0.9mm thk	700	ft	mexflow
9	22mm 0D x 0.9mm thk	225	ft	mexflow
10	28mm OD x 0.9mm thk (Main Header)	90	ft	mexflow
Area Gas	Alarms			
11	2 Services area Alarm	2	Nos	mediline
12	3 Services area Alarm	2	Nos	mediline
	Valve Boxes			
13	2 Services of 22,22 mm dia pipe	2	Nos	mediline
14	3 Services of 28,28,28 mm dia pipe	2	Nos	mediline
Isolation Valves				
15	15mm	6	Nos	connex
16	22mm	3	Nos	connex
17	28mm	2	Nos	connex

\*Medical grade Copper Pipe Line as per HTM2022 with proper Color-coding \*as per International standards EN-1057 for Oxygen, Air, Vacuum, Nitrous \*Front Loaded Outlet Points( Imported ) as per HTM2022 Standard







The Centre for Sustainability, a think-teach-do-tank established within Anant National University, focuses on low-income and affordable housing, indigenous models of circular economy, and on building sustainable education campuses in India. The research track on housing for low-income groups focuses on research that will throw light on the present scenario of housing availability, including vacant houses, on microfinance and on the nuances of financial product offering in the context of demand and availability of financial products and services as well as the supply side vendors of affordable housing.

Anant National University (AnantU), India's first Design University, is located in an expansive, lush green campus in the World Heritage City of Ahmedabad. It was established as a private university in 2016 by an Act of Legislature of the State of Gujarat. AnantU aims to bridge the gap between contemporary socio-economic challenges and sustainable solutions through design thinking. Its widely acclaimed, international and national faculty facilitate a holistic design education with a liberal arts perspective. The academic experience at the university focuses on developing the self, while simultaneously building domain expertise and providing industry exposure.

https://anu.edu.in

Anant National University Sanskardham Campus, Bopal-Ghuma-Sanand Road, Ahmedabad – 382115, Gujarat, India