

# Feasibility of Temporary Structure in a Case of Pandemic Outbreak or a Catastrophic Disaster

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**Abstract**— In case of a pandemic outbreak or a catastrophic disaster, many of the time proper infrastructure is not available for the people affected by it. Currently, government-owned buildings are used like schools, town halls etc. in the case of the recent COVID-19 pandemic but the issue is it makes people skeptical for the future use of the structure. Many of the time government erect new structures for a pandemic or a disaster but it takes time and money and these structures are crucial to prevent the outspread of the pandemic or the disaster. Also, there is no future use of these building which makes a lot of construction waste. To overcome these conditions one of the ways which save time and money is the use of temporary structures. These structures can be built anywhere as and when required and they can be used as temporary housing or as patient care centers. They can also build far away from where it can prevent the outspread of the pandemic or the disaster. It also reduces the construction waste and uses reusable materials which makes them environmentally friendly. This study discusses the feasibility of the temporary structure and how they are useful for the people and the environment in the case of a pandemic outbreak or a catastrophic disaster

**Index Terms**— Temporary Structure, Pandemic, Disaster

## I. INTRODUCTION

Even though technology has come a long way over the centuries, but the effect of the Pandemic and Disasters has not changed on human beings. The recent events of COVID – 19 have shown that technology is not capable enough to stop the outspread but the problem that arises from this is that there are no proper structures available for the people affected by it. As we know China was able to build a health center for the patients affected by the COVID – 19 in just 10 days but this type of construction requires a lot of labor and money. The alternative available to overcome this is to use temporary structures. The biggest advantage of these types of structures is they can be built in any shape and size; they are cheap, and they are made from reusable materials. Around 11.5 million people are affected by the COVID – 19 worldwide till June 2020 and around 200 thousand cases are added daily due to which there is a constant requirement of proper facilities for the people affected by it. In case of a disaster like an earthquake or a flood, hundreds of thousands of houses are destroyed due to which many families are left homeless and it takes sometimes to set up a new colony with proper housing till then they are left to live in tents instead of this use of temporary structure will be very convenient. It will provide proper shelter to the survivors for an ample amount of time. In 2001, an earthquake of a magnitude of 7.9 was encountered in Bhuj, Gujarat due to which hundreds and thousands were left homeless (fig. 1) [1]. Hurricane Katrina was the biggest and

the deadliest hurricane ever to hit in the United States of America. In August 2005 there were around 2000 fatalities and damage of \$125 billion (fig. 2). In 2011, an earthquake of a magnitude 9.0 was encountered in Japan that not only disturbed Japan but also the entire world and every country have started to take necessary precautions for any other future disaster that can occur unpredictably (fig. 3). All these disasters and pandemics have caused a major problem of proper housing facilities for the people. Therefore, there is an urgent need for a proper housing solution and to overcome this problem is to use temporary structures. These structures are very cheap to build and can be used to provide shelter to the people affected by these dreadful conditions. In the situation of COVID – 19 many countries faced a problem of providing a proper location to keep the patients in quarantine. In India, the government tried to use many public properties due to which people get petrified for future use. Therefore, there is an urgent need for a solution for today and the coming future



Fig. 1 Bhuj Earthquake, 2001 [5] Fig. 2 Hurricane Katrina, 2005 [6]



Fig. 3 Japan Earthquake, 2011 [9]

## II. RESEARCH SIGNIFICANCE

The purpose of this study is to maintain a proper housing solution that can be provided in any post – disaster scenario. Using temporary structures will save a lot of manpower, time, and money in situations where there is a shortage of time, money, or manpower. The main advantage of using these structures is they are portable, and they can be designed as per the requirements. These structures will be able to provide a good shelter until the damages are restored which can take months or a couple of years

## III. CONTENT

### 1. Use of shipping containers or prefabricated materials

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Shipping containers can be used as a temporary structure for accommodation. These containers can be designed in such a way that they can accommodate on to two people easily. These containers can be used where they are readily available, or they can be transported easily. They do not acquire a lot of area or if there is a paucity of land, in that case they can be stacked on top of each other. Apart from these, prefabricated structures can also be used. These structures can be fabricated as per the need. The disadvantage of using these types of structures in a post – disaster situation is that these structures should be prepared ahead of time [2,4 (5)].



Fig. 4 Simple Design for Converting Shipping Container[4]

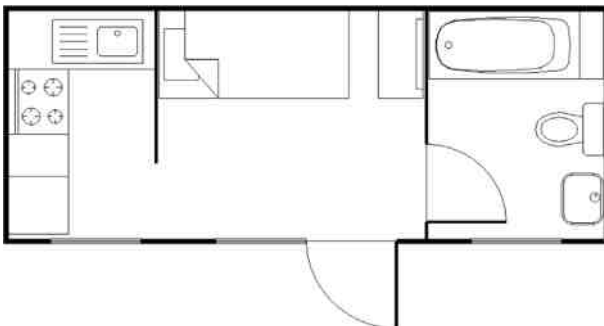


Fig. 5 One Room Plan [4]

### 2. Use of Movable Trailers

Movable trailers can be easily transported from one point to another by using any four wheelers. These trailers are produced in bulks and they are light weight and easily available. They can be designed and constructed as and when required. In 2005, one of the biggest hurricanes ever to be recorded in USA, Hurricane Katrina destroyed about 8 lakh houses were destroyed. To overcome the housing problems, use of movable trailers. They can be transported by trains or by road. India has the one of the biggest railway networks in the world so, to transport these structures will be very easy. The disadvantage of using these is they need to be of small sizes of that they can be easily transported from one place to another [3].



Fig. 6 Trailers on Train [3]

### 3. Readily Available Materials

In any case of a disaster if there is no possible way of using any type of temporary structures. The best option available is to use materials already available. Materials like bricks, stones, timber etc. can be used for the construction of these structures. These materials are available in large quantities and they can be readily available. The disadvantage of these structures is that they require a long time to construct but these structures are very stable, and they can be built in such locations where they can shift the entire colony of people.

### 4. Earthy Material

Using mud bricks and mud mortar makes the construction eco-friendly and they can be built anywhere. These structures can be built expeditiously, and the materials required are easily available. These structures have very little strength and can be demolished easily. Use of these structures can be done to reduce the construction waste and places where these structures can be feasible.



Fig. 7 House made using mud bricks [7]

### 5. Steel frames and steel sheds

Steel frames and sheds are used mainly for storage purposes. These structures are very large to provide a good space to store the materials. These types of structures can be used in case of a post – disaster situation and one such structure can provide accommodation to a lot of people due to which the cost of construction of these structures is very low. These structures are very durable, and they can be used for a long period of time. In the recent case of COVID – 19, these structures can be used for the people affected by it and all these patients will be under one roof due to which proper care and check-ups can be done [4].



Fig. 8 Steel Shed [8]

### 6. Help from Government

All these solutions are only possible when proper guidance and pre-requisites are given. Government can use these solutions so that people can have proper shelter and can stay there safely and these structures can be made available to the

people as fast as possible due to which any other government building is available for people and they can be used easily and not making people skeptical for the future of the building

## 7. Location

These structures can be provided in those locations where all the affected people can easily stay and they can share their experience and have a proper human interaction to communicate which give them emotional support which is required the most in these cases. These structures should also be located where rations can be delivered easily so that there is no shortage of food and water.

## CONCLUSION

This study various alternatives available that can be provided as a temporary structure in case of a pandemic outbreak or a catastrophic disaster. These solutions can be used easily and are readily available. The materials used in structures are also reusable which reduces the construction waste and they provide a proper housing solution stuck in a pandemic or a disaster. Apart from these structures, government should also be ready to provide these solutions to the people. This type of housing solutions will also help in making a community of the people and they can share their experience and have normal interaction to overcome the trauma caused due to disasters and have an emotional support. There are also other solutions available, but this study is done to provide a proper and durable structures to the people affected by it and selecting locations where they can temporarily settle will provide an emotional support of each other. In future, any country can provide these solutions as per there requirements for providing proper infrastructure in case of pandemic outbreak or a catastrophic disaster.

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