2018

Work-Homes

Satya Charan Ganesuni
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Work-Homes

by

Satya Charan Ganesuni

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Majors: Architecture & Interior Design

Program of Study Committee:
Frederic Malven, Co-Major Professor
Thomas Leslie, Co-Major Professor
Nicole Peterson

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2018

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CHAPTER 1. INTRODUCTION

Aim

Is to identify the key interior design elements that influence the effectiveness of different categories of work-homes. My major focus is to implement these design typologies on the work-homes and make the place more user friendly and efficient for the person who uses it.

Focus of the Thesis

1. What are the design elements that helps the designer to use them in order to make the work-homes more user friendly and efficient?

Objective

Work-homes have been used by the people since ancient times but, today people are preferring more to use work-home ideology because of technological advantages, time saving, budget savings etc. Advancements in communications have created new ideologies like work from home etc.

I believe work-homes are a broader concept than what's currently existing. Many architects have researched on integrated spaces and defined the typologies of them. That
existing research was about the immobile integrated spaces, but very limited research has been done on the design elements that influence the space in these buildings and no proper research is done on mobile work-homes.

I have seen many people travelling hours every day to reach their work destination and then spend couple more hours to travel back. Through my research I am trying to use the advancements in technologies and work home principles, to create a set of design elements for these typologies, so the person can use that time efficiently without any distractions, providing emotional satisfaction with a space, getting the ‘job’ done quickly and efficiently in the space.
CHAPTER 2. BACKGROUND

Background History

Work-homes are generally considered as a building type that generally combines the workplace to the dwellings. Generally, in this topology there often comes a conflict in terms of public/private, dirty/clean, noisy/clean etc. Work-homes are not defined to a set of people or for people belonging to a specific economic standard, it can be used by various people starting from a small shopkeeper to a large merchant. In simple words work-homes can be defined as houses having an office space to work and home to live.

Work-homes are existing in our societies since many centuries. In ancient times agriculture and trade were the two major professions in the world and people in these professions use work-home concept for their earnings, for instance, many trades store their goods in the basement and sell it to the customers from first floor and the merchant’s family live on the second. In India many trades follow the same concept but also in some cases they refine the material into finer products and sell them Ex - the farmer who produces cotton in his field, sells a part of cotton gets rest to his home because his wife, elders in the families’ weave clothes from the cotton and sell it from home.

Climatology has also played an important role for making the minds of the people to prefer work-homes. Climatic elements like maximum temperature, minimum temperature, insolation, rainfall, snowfall, and average wind speed not only plays a role in designing a
buildings but also play a role for deciding the activities in the building this can be explained with an example - In England during early 1500’s the peasant’s families used to live in longhouses where animals had to be kept indoor due to the cold outside. The shorter side of the building is facing the windward side so that the building is less affected by cold (Holliss, n.d.).

The idea of work-homes continued thought of the industrial revolution era. The idea was widely spread by the people and was used in different ways. During this time (19th century) there was a lot of financial crisis, businessmen sometimes have taken a couple of work-home buildings and ran the industry instead of investing lot of money on a factory. (The worker will be provided accommodation, so he will live and work for nominal pay in the same space). This ideology was used as a business trick because, people cannot afford for basic amenities hence, they gladly accepted the offer to work this leads to the exploration of the weakest and the most vulnerable members of the society. At the same time employers also opposed the work-home system due the degree of control the employer will have on an individual when the worker he/she is working from home which is rented from the employer, instead of working in a factory. During this era new building materials and textures came into the market and these are widely used by the people to differentiate the spaces in the building generally Portland stone and red brick are used to differentiate boardrooms and living spaces. (Holliss, n.d.).

According to Booth’s notebooks - home-based workers are always respected because, live-in people like police officers, firefighters, shopkeepers, caretakers, clergy, restaurants,
funeral directors, school-teachers etc always stays there and keeps a watchful eye on the neighborhood. People also prefer to work-homes to protect the assets from getting robbed or damaged from the chaos produced by the industrial revolution. Ex - In 19th century UK Headmaster's home is built in the premises of the school overseeing the school building and the playground, so that he can protect the building and be available to those who come to school during off hours. At that time there are no sprinkler systems or surveillance, so if he lives close to building he can keep an eye on it, from fire accidents or burglary etc.

Work-homes always created problems when it comes to urban planning in terms of land-use in zoning. Because back in those days because city plans were color coded that separates out residential, industrial, educational and retail use. It was hard for the planners to decide which category suits the work-homes. Due to which in certain cities in Europe have banned the home-based work units because it creates unregulated work practice. Henceforth the cities have been designed to separate home from workplace ever since.

Today’s technological developments have given the advantages for the people to work from home. In many cases, people prefer to have conference phones and, in some cases Video Teleconferencing (VTC) solutions in their homes so that they can contact their clients or fellow employees who is in a far distance.
According the Thomas Dolan’s book and survey of income and program participation (2005), the home-based workers who worked at home are generally older, better educated than people who worked away from home. According and basing on the same survey majority of the people who work at home are women.

**Mobile Work-Homes**

A mobile home is general defined as “a factory-made structure, with a chassis attached to it, this can either being transported to site (either by being towed or on a trailer) or It can also be a vehicular home where one can live/work and travel in it.”. These typologies can be used for many purposes like - a permanent homes, or a holiday or temporary accommodation or a workspace. These mobile living units are placed in a space permanently or semi-permanently but can always be moved whenever user wanted to.

Mobile work-homes share similar historic origins as compared to the travel trailers, but today the two typologies are very different in terms of size and furnishings etc(they could be trailer frames, axles, wheels, and tow-hitches etc). Travel trailers are primarily used as temporary or vacation homes, on the other hand mobile work-homes are used as a residential home, work space.

Over the period of time, due to the advancements in technology, we are able to carry our offices with us. Today’s digital gadgets such as phones, laptops and tablets, has given the ability to allow people freely to move from room to room and office to office and still maintain
productivity. These gadgets can be carried out in our backpacks, messenger bags, briefcases and carry-on luggage etc. Mobile phones have unified the communications and cloud storage, internet have made it just as easy, flexible to work at the farm as compared to the local coffee shop (and in many cases, far more pleasant). As a mobile unit has a limited space one can use furniture or gadgets for multipurpose activities. For example, one can use a custom-built desk/dining table that folds up and stores in a side cabinet of the sofa when not in use, a laptop can also be used as a television, when not used for professional work. Before the introduction of internet people used to communicate by postal services and trunk calls, regarding their professional works or meetings etc.

“The other perspective in the technological advancement is the “Driverless Work-Homes” - While driving, the driverless car uses its computer to make decisions. After each decision the computer makes, it is told if it was right or wrong by a set of rules. These rules are based on instructions the computer was given by people – like “drive through green lights” and “always stop for people”. This makes the driving more flexible have the driver can focus on his work or any other activities” (Living in motion: design and architecture for flexible dwelling).

In today’s world with the help of Solar electrical system, Mobile technology, Lithium ion Batteries, helps to electrify the mobile homes. Electric car is an example of this typology, these cars charges based on the sun and thereby charges the spaces in it.
Fig 1 History of mobile Work home in united states.

1890s
- Automobiles first came into USA market

1910s
- Some motorists formed a group and built a car home

1920s
- Millions of people were on adventurous vacation

1930s
- Created cottage like house trailers, executive trailer parks

1940s - 1950s
- New high ways were paved and multilaned

1960s
- Interstate highways were made, new motor homes were introduced with greater speed (70 miles/hour)

1961 - 1973
- Motor homes have been increased from 200 to 65,300

1990s
- 130,000 motor home owners joined family motor home association

2010s
- Roughly 20 Million people are using motor home buildings
Thousands of people feel going to countryside (they feel like going to home), hence they travel a lot for nature trips and thereby, they came to the concept of combining automobiles and houses. Some people travel the countryside to do photography, documentary or art work hence they prefer mobile homes so that they can live for couple of days and work. One of the major benefit from house cars for the travelers or explorers is that they can take their own domestic comforts to the areas they travel.

During the early 20th century trucks, buses bodies are used by the motorists to create a “house car” as a new type of portable accommodation which is more efficient and comfortable than an automobile, more flexible and less formal than hotels. This widely spread ideas about car homes became famous and eventually lead to the establishments of manufacturing industries for car homes, thereby creating a new American roadside living. With the increase in usage of mobile homes (both production and consumption) and increase in work routines over the period of time, led to the introduction of new ideology in the society “Annual Vacation”. This ideology is mostly spread in the working classes (this was the time during first and the second world war where most of them were employed in war or in factories). Some people have termed the annual vacation as recreational motoring.

One of the major reason for the wide spread of this idea is its cheap. Railways as well as hotels are expensive if a person is travelling to scenic areas, hence many recreational seekers prefer independent travels. People living in this life used to earn money with nomadic
jobs (physical work). But sometimes travelling in a motorhome compared to railways always increase time (days to weeks, weeks to months etc.).

During the Rojer B. White from his book “home on the road” automobiles first came into United States market in late 1890’s Americans were more excited and compared this with cycling. During the late 1910’s motorists built enclosed house car, “motor bungalows” - small version of suburban houses with furniture, plumbing and cooking facilities. Over the period of time based on the feedback from the motorists who travel the countryside, the automobile industry started to incorporate privacy, intimacy and security in the mobile homes. But since the beginning automobiles have served as homes, either by choice or by necessity. Before the introduction of motor homes people used to live in boats, horse carriages (Living in motion: design and architecture for flexible dwelling).

**Reason for Including Mobile Work Home**

When I was in U.K at Foxton locks I met couple of families who live in narrow boats (In U.K people can rent or buy a boat and travel in canals. Parking slots are available on the canals) and travel in canals. Wherever they stop they start up a mini restaurant and thereby earn their living. They used foldable furniture for their restaurant (Tables and chair). They felt it's very flexible for them to use foldable furniture because it's easy for them to move the furniture along with them. One more reason is the foldable furniture is less weight hence it's easy to place and remove them. This gave me an idea or motivation to research about the mobile work-homes.
When I observed the mobile homes, they have limited space and the people living in it use the space for multiple purposes (Personal and professional). This reminds me the live-in typology which has the same exact qualities except it’s an immobile unit.

I believe based on my research on work-homes made me believe it is a broad concept than what’s currently existing. Many architects have researched on integrated spaces and defined the typologies of them. But all those researches were about the immobile integrated spaces, but very limited research has been done on the mobile part.

**Work-home Typologies**

Work-homes is a broad concept, basing on my research. Various architects have done their research on the work-homes and categorized them into three types they are live-in, live-near, Live-nearby. These three typologies are subcategorized into three more types they are Live/work, work/live and dual use. But basing on my research I divided the live-in typology into mobile and immobile. The mobile typology consists of people living in boats, motor homes etc and the immobile typology consists of Live/work, work/live and dual use.
Fig - 2 Work home typologies

**Live-in**

Live-in is the most common typology, but not necessarily the most popular or desirable arrangement. A live-within unit is entirely contained within the confines of one room or “common atmosphere”, there are no permanent physical separation in between personal and professional spaces. Generally, these units consist of a kitchen/dining area, bathroom, sleeping space and a contiguous space with a single entrance.
Fig 3 – Live - In Typology

This typology is generally used by artists, photographers etc. This arrangement offers the flexibility with partition walls or movable walls and furniture configuration. In this typology the amount of space assigned to the living or the work is uncertain, it always varies due to the activity of the person in that space. In this typology the floor height is generally high due to which the resident will have the flexibility to add a mezzanine floor. In this typology the primary delineator of space is not in the walls but in the variations in the roof heights. Ex - Being in the more intimate space below the loft, often where the kitchen and eating spaces are going to be
or Being in the loft, with a view into and a sense of spaciousness. Studio housing come into this typology (Holliss, n.d.). In case of both activities are functioning at the same time in the shared space one can balance it by mutual understanding. Ex - Use headphones for radio, television, and computer when someone is doing professional work.

**Live-near**

In this typology there is some spatial separation between living and working spaces while still meeting the needs. Having workspace is in a different room from the living space is also a form of live-near. The flexibility in this type allows the owner to separate the live part of the unit from the work part. In this typology the two functions are contained in separate compartments next door to each other, above or below, or side by side each with its own entrance to the street, but they have to be in the same building. In this typology the spatial separation between work and home can be by a physical wall or a slab. Even both the typologies share the same entrance or not, there is often an internal linking doorway, which allows movement between the two worlds (some prefer not to have the link). This typology helps the resident to work continuously without any disturbance by family or roommates. Acoustics play an important role in this typology. Live in typology provides flexibility to the owner, he can use both the spaces or rent one of them or both of them separately. This typology is useful where the two functions have conflicting design constraints. Ex - a furniture maker (carpenter) or a welder requires a different work space which cannot be shared with a living space.
In this typology the living and the working spaces are separated by a short walk. The separation can be done by courtyard, garden etc. Walking distance is generally from 2-5 min. In this typology both the work and the dwelling does not have to be on the same property or within the same plot, it can be different.
Fig 5 - Live Nearby Typology

The workspace feels totally to be so disconnected from living. In some cases, home and work are separated and are linked by gardens. There will be different entrances for both home and work. Acoustics doesn't play much role in this space because the buildings are not physically connected. This typology generally exists in the outskirts of the city or in towns. This is an ideal arrangement for professional and family caregivers etc.
Other Classifications

These typologies are classified based on building functions or distances from different activities etc. These are again categorized in various types based on

1. Proximity
2. Dominant Function
3. Patterns in use

Proximity

Proximity is based on the distance between the Work space and the dwellings. There are 3 types of proximities, Live-within, Live-near, Live-nearby. In this typology we see how workspace and residence are physically arranged to each other.

Dominant Function

Dominant function is based on the work-use intensity factor that is dominated by work activity versus family activities. The dominant function is divided into three typologies available they are

1. Live/work (home-dominated),
2. Work/Live (work-dominated),
3. equally dominated (equal-status).

In this typology we see how workspace and residence dominate each other within the space. Ex - Craftworkers, 24/7 artists come under work-dominated, whereas family-caregivers, startup business come under home-dominated. The professional one comes under equal-status. One important note to be made is that live-in or live-near can come into these typologies but not live-nearby.

**live/work**

The major usage of a typical live/work unit is residential activities and the work activity is secondary. In this typology employees and walk-in trade may be permitted, in which case accessibility measures are required in the work portion if public accommodation exists. In many cases, client visits are by appointment only, and employees are sometimes permitted but typically limited in number. Acoustics play a vital role in separating the noise from both the activities.

Flexibility is key in live/work. More than either home occupation or work/live, it is assumed that the dominance of work versus residence in a live/work unit will ebb and flow over time. For that reason, a live/work unit best embodies mixed use within the unit (or property) itself. Flexibility can also be achieved by using movable walls or partition walls etc. For instance, a movable partition allows the artist to vary the size of her work space to suit her needs at any given time.
Due to the lower-intensity of work activities likely to occur there, (compared to living) a separation is unlikely to be required between the workspace and the residence. If there is no partition the workspace can be used as a dwelling once the work is done. This provides the live-work in general to adapt easily to such inevitable change for example - a work area might be given over to a party or reception; or former work space might become a child’s sleeping area. Live/work units can be of any spatial configuration, and their work spaces might be anywhere: in the unit, in the building, or on the same property.

A live/work unit is likely to be located anywhere in the middle range of urban intensity, meaning anywhere except the lowest-density residential areas and moderate- to high-intensity industrial district. live/work buildings tend to take the form of a flex house, a building with a courtyard, or an urban loft project. Renovated live/work tends to occur in former warehouses, factories, and commercial buildings, often located in commercial districts. Home dominated work-homes generally include flats, houses, cottages, a bungalow and a live/work unit.

**work/live**

Work/live is a term which is generally used to describe a work-home unit in which the user needs of the work component are preferred when compared to the dwellings. These spaces are generally affected by noise, odors, employees, walk-in trade, or sales. Acoustics play a vital role in design. Generally, in this typology the primary use of the work/live homes is
commercial or industrial activities whereas the residential is secondary. The residential portion in this typology is generally less when compared to a work space.

The work space in the work/live units are generally in the main or ground floor, and it is often separated from the residence by a wall or floor or ceiling (in this case this typology is similar to the live-near typology). It may also occur in a separate space. A common type of work/homes is the flex house, an ancient urban building that accommodates both the activities. Work/live homes are generally located in commercial, mixed-use, industrial areas. Work dominated work-homes generally include industrial units, funeral parlor, historic house, residential care-home.

**Equally dominated**

In this typology both the living and the work are equally dominated. In this typology both the activities have separate spaces within the same unit. They can have the option of having a single or separate entrance basing on the activities.

**3. Patterns in use**

In this typology Irrespective of the inhabit buildings different people use the space in different ways (sometimes irrespective of their design). The different typologies in this category are –
1. Dual-use space,
2. Dedicated living space,
3. Dedicated workspace.

These are determined based on the personality, the work they do, and the people with whom they live in. This pattern of use aligns more closely with the spatial design strategy employed in their work-homes.

In all these the typologies that we discussed above, building materials always play a vital role in differentiating the space. Materials used ‘flag up the hybrid identity of the building’. Ex - If we use industrial scale steel glazing systems to front and rear combine with steel metal panels on the side elevations to provide a tough, Industrial-chic aesthetic but not residential feel. Internally the finishes can be basic throughout undifferentiated between the dwellings and the workspaces.

**Mobile Work-Homes Typology**

There are no specific typologies in these categories, people either live in a motor vehicle or in a boat.

**Physical Stress Comparison**

Basing on my research and various case studies I tried to compare the amount of physical stress a person has to do in each typology. For instance, in live-in typology one has to
clean the space after his/her professional activities so that the same space can be used for living or vice-versa where as in live-near or live-nearby typology one doesn’t have to do all these additional physical works. In the case of a mobile work home unit, one has to do additional work like filling water, gas/diesel, clearing brown water etc. One should know minimum knowledge on vehicle repairs in case of vehicle breakdown in remote areas.

Figure 6 - Physical Stress carried by a person in each typology.

**Work-Homes at Community Level**

Acceptance of mixed use as an ordinary condition of life is an integral part of live-work. It makes more sense if work-homes exist in mixed-use neighborhood. A set of workhouses in
a community can create a potential level for interactions which can provide a sense of security. The benefits of having work-homes in community level are

1. Create contacts within the neighborhood.
2. Improves social capital.
3. Creates a sense of security in the neighborhood.

Live-work projects that are designed generally provide opportunities for spontaneous interaction among residents at community level as they come and go in (the space could be like an “Interactive Space” like courtyards, atriums, etc). On the contrary by placing live-work projects in pedestrian-oriented communities, or on lively mixed-use streets where there are easy opportunities for the user to step outside and encounter others in a congenial public realm. If there are many work-homes in a neighborhood, all of them can built a community building, or a multipurpose hall which can be used for

- Meetings
- Public gatherings,
- Play areas, including informal spaces, for all spaces.
- Peaceful spaces where old people can congregate outside.
- Storage for bulky items etc
- A clear delineation between the public realm, shared/communal space, private space.
- Effective door-entry/security systems.
- Good lighting is essential for safety and security.
CHAPTER 3. BUILDING NORMS (IBC)

The main aim of the building codes is for the overall building, human life safety and deal the issues that typically arise in a live/work or work/live buildings. As per the International building code section 4.19 - live/work unit is a dwelling unit or sleeping unit in which a significant portion of the space includes a non-residential use which is operated by the tenant. Dwelling units or sleeping units which include an office that is less than 10% of the area of the dwelling unit shall not be classified as a live/work unit. (International building code 2015. (2014). Country Club Hills, IL: ICC.) When building a work-home they generally fall into these categories

- New construction of work-homes
- New Live-work constructions (2-5 stories)
- Renovating buildings for Live-work.

When renovating an old building to a new work-home, one has to check with the local code before building before construction. When a building is built it has to stand against gravity, people living in it, earthquakes, hurricanes etc.

As per the code Live/work units are generally classified as an R-2 dwelling. Based on the typologies in work-homes the rules change a bit. In the case of Live-in unit, the space is meant to be occupied at different times for different activity purposes, fire rated walls play an important role in the design. For these typologies separation requirements found in Section 508.3 shall not apply when the live/work unit follows section 419. High hazard and storage
occupancies shall not be permitted in a live/work unit (Mainly in the Live-in typology). In the other typologies in the Live-work buildings (live-near, live-nearby) include clear separations between living and working spaces based on the type of work because some professions need fire rated walls etc. Ex - Craftsmen’s (carpenter, metal welder) etc profession is hazardous and need a barrier.

The egress capacity of the live/work unit are based on the occupancy load factor per floor. The basic thumb rule is that if the building has sprinkler system then the width of the staircase is defined – number of persons into 0.2”, and if the building doesn’t have sprinkler system then the width of the staircase is defined – number of persons into 0.3”. The minimum width of the staircase has to be 42”. There should be two egress staircases for multi storey work-homes if there are more than ten people per floor. In a work-home if the workspace deals with hazardous materials or dangerous equipment etc then there should be a separate egress staircase for the living and work space.

As the work-homes consists of both residential and work space. The code decides which user group belongs to which work-home typology. Ex - Carpeting, welding etc come into live-near or live-nearby typology because it is dangerous for the live-in typology. The occupant load factor varies from one typology to other, the occupant load factor for the Living dominated work-home is 200sq.feet, whereas occupant load factor for work dominated work-home is 300sq.feet.
Floor opening between floor levels of a live/work unit is permitted without enclosure. (International building code 2015. (2014). Country Club Hills, IL: ICC.) The IBC code also plays a vital role in deciding the, height, width of the building (basically shape of the building). The live-work unit are provided with a fire alarm system, fire sprinkler system for the safety of the users. The International building code also deals with Structure, Accessibility, ventilation of the building.

Other than the rules discussed the code helps to deal with

- Separation between units and between units and a corridor
- Mezzanines and sleeping lofts.

In Certain cities their city development authorities make or modify certain codes for the work-homes. For example, in cities such as Oklahoma, California in a live-work building 33% is given to the residential use, 42% to the work space and 25% to multipurpose use.

Limitations that apply to all live/work units based on International building code 2015 are:

1. The live/work unit is permitted to be a maximum of 3,000 sq. ft;
2. The non-residential area is permitted to be a maximum 50% of the area of each live/work unit;
3. The non-residential area function shall be limited to the first or main floor only of the live work unit; and
4. A maximum of 5 non-residential worker or employees are allowed to occupy the nonresidential area at any one time. (In Live-in and Live-near)
According to Thomas Dolan there was an architecture saying, “If you don't know the code, it can be your worst enemy, but if you know the code, it can be your best friend”.

Parking Requirements

Parking norms for a work-home is different from the norms of a home or an office this is because of its mixed-use nature of the space. The norms also change within the typologies from a live-in to live-nearby or from live/work to work/live and also change based on the user group for that typology. Ex one user might have a vehicle to conduct for their business and another might have many clients visiting him/her in a day. According to Thomas Dolan “People residing in Zero Commute Housing doesn’t require a vehicle” but I believe they need vehicle for their professional work weekend travels, dropping kids at school etc.

Live-work-homes provides an ideal application for car-shearing. The user should consider both on-street and off-street parking for these typologies. Every live/work unit below 3,000 sf can have an independent parking plot and a shared parking plot and the live/work unit above 3,000 sf have two parking, one shared parking plots. This shared parking system only works when users are near each other and operate entirely at different times of the day or week.

International building code (IBC) a work-home unit gets one parking space unit and a maximum of two street spaces. But in some cities like California or Oklahoma the car parking
plots for these units are defined by the area of the work space they have. (One parking plot for every 400 to 800 sq. ft of work space in the unit). According to transportation planner Wade Walker “Parking in proximity means it could be in five minutes walking distance or quarter of a mile”. If there are many work-homes in a neighborhood there can be a common parking area addressing all the units. Loading docks cannot be provided to every work-home unit. They can only be provided if the commercial space in the building is over a certain size. It also based on the type of commercial activity in the work space and the width of the adjacent road.

**Mobile Work-Home Parking Requirements**

Mobile work-home parking requirements differ from immobile work-homes. In this typology in general the code provides two paved spaces per unit for each mobile home. These spaces may be uncovered or covered. One should understand mobile work-home is a moving vehicle and these units can be of different sizes hence the parking lot sizes also varies but this creates confusion for the people. Hence an optimum size is made for these units 10 feet by 30 feet. Driveway requirements for the mobile work-homes also differ from the regular driveways it’s because of the work-homes unit sizes (IBC 2015). Based on the parking type (Perpendicular or parallel or angular parking) the driveway width changes they are -

- When mobile home sites are at a 90-degree angle from a driveway, the driveway width shall be a minimum of 26 feet in width;
- When mobile home sites are at a 60-degree angle from a driveway, the driveway width shall be a minimum of 22 feet in width;
• When mobile home sites are at a 45-degree angle from a driveway, the driveway width shall be a minimum of 20 feet in width.

For the visitor parking services one visitor parking space are provided for every four units. On-street parking may be counted towards the visitor parking requirement. During a combined parking these parking plots can be given within 500-meter walking range distance. Based on this one can create a parking facility and add recreation spaces, laundry areas so that this parking facilities can serve for these purposes.

**Mobile Home Parks Requirements**

When locating the mobile parks, one should keep in mind that the parks cannot be located near swamps, marches or breeding places of insects. When building the mobile parks, one must make sure to provide five major requirements for a park they are –

• Pad for vehicle,
• Parking lot,
• Outdoor living,
• Utilities, storage
• Entrances

In general, Mobile home sites should be big in size with privacy because the unit is generally small hence the user tends to use/spend most of his/her time in outdoors for most of their time. This also solves the issues when there are tall buildings around the mobile home.
CHAPTER 4. USER GROUPS

Work home exists in all the parts of the world, this system is widely accepted by people irrespective of economic standards, age of the person and skill-ness of the user. Work-home user typology has been gathered from varies books but most of the titles has been selected from the Frances Holliss book” Beyond live/work”. He mentions in his book “Home-based workers are usually considered as individuals rather than as a workforce, but to see them as a workforce is both useful and necessary when thinking about designing for this working practice”.

It is difficult to design good buildings without understanding their use and the type of work activity. The home-based workforce consists of people from all walks of life, in diverse occupations. They can be employees or walk in traders or by appointments. These user groups are identified based on their profession type, family considerations, finances etc. The different work home user groups are –

We have made a tabular diagram comprising of all user groups, with its professional groups in it, work-homes typologies etc, which is presented at the end of the chapter. I developed the logo concept which is inspired from the book “Intersections design educations and other fields of inquiry”.
1. Family Caregivers

**Definition** - People in this typology work at home or vice versa so that they can constantly keep a watch on their children or elders.

**Users** - be daughters, wives, husbands, sons, grandchildren, nieces, nephews etc.

**Work-home typology** - live-in or live-near.

**Building Requirements** - Based on the interviews by Frances Holliss - home is combined with workplaces that include office, studio, shop, workshop, consulting room, saloon, kitchen. Basic common reason for an individual to start a home-based business so that he/she can contribute to the care of his severely disabled child or if he/she is a single parent. These people are generally shopkeepers, caretakers etc,

In this typology the design needs to be done by thinking of physical and emotional issues that occur in the space. The user can have a fixed time for the professional work (generally depends on the user or can meet the clients by appointments) but cannot predict fixed time for the caregiving. Sometimes there could be emergency situations, basic medical...
equipment has to be present and the unit has to be ADA accessible. These units can also have elevators for vertical transportation even for one floor when there are old or physically handicapped or sick people in the unit.

In this typology there is someone at the home who needs to be taken care of. The rooms should be well-ventilated so that it freshens the space. Texture on floors or signages colors on wall plays an important role if there is a physically handicap or a mentally retarded person at home.

Other design considerations such as toilets and bathrooms must have rough flooring so that the aged people don’t slip on the floor. Suitable railings should be provided for support. Landscape plays an important role because it helps to bring the fresh air (by bringing outdoor environment into the indoor space) and helps in stress relief.
2. Backbone of the Community

**Definition** - The professions that help for the benefit the neighborhood.

**Users** - Workers who inhabited corner shops (including grocery), beer-houses, funeral parlors and lodging houses, school caretaker etc.

**Work-home typology** - Live-near or live-nearby.

**Building Requirements** - These people sell day to day essentials to the neighborhood. These people are quiet famous in the neighborhood. As their shop and their home is in the same building/property the user gets the flexibility to work for long hours basing on the interest.

All these users that come under this typology have the potential to create jobs and put money back into communities. The users of this group tend to show more creativity than large competitors, when introducing new products and ideas into the market. Most of the buildings in this typology have the professional place in the first floor and residential in the second floor.
3. Professional and Managerial

**Definition** - The title itself defines the user group in this typology the person is generally engaged in a specified activity.

**Users** - Architects, photographers, academics and writers, translators and psychotherapists, a dietician etc.

**Work-home typology** – Live-Near, Live-Nearby

**Building Requirements** - This user group comes under live-near or live-Nearby user typology. This typology doesn’t work with live-in because it’s harder to create appropriate space for a professional work within a live space.

The interiors and furniture of the work space of the work-home vary based on the type of profession. These professionals have mostly had walk-in clients and they meet only by appointments. These people use the help of internet to perform better in their professional life example – architecture, does audio/video conference with the clients and co-workers.
4. 24/7 Artists

**Definition** - A person who produce creative work both formal and informal for their living (Paintings, sculpture, novel etc).

**Users** - Painters, sculptors, photographers, graphic designers, interior designers, writers, comedians etc

**Work-home typology** - Live-in

**Building Requirements** - These people do not generally differentiate between their work and domestic lives. All they generally require in this user group typology are –

- More natural lighting,
- More vertical spaciousness and,
- More accessibility to bring works/equipment (the entrance door should be large than a normal door).
Economy and creative convenience have made the artists to live and work in the same space. Artistic homes are available in exterior parts of the city, or in the city center if they are the top floor of the building, because they need homes that get good sunlight and ventilation and at a cheaper price. The users in this typology need more vertical space in the building so that they can add a mezzanine flooring if required. This user group doesn’t have a fixed time to work in a day, but they meet the clients based on appointment or at a certain fixed time from Monday to Friday. In this typology building materials are to be taken into a consideration, they should be strong and easily cleanable (Sometimes the users might use toxic Substances such as - Oil paint, Spray paint, Airbrush, Resin, Dye etc which can be removed easily so that it avoids health issues).

In some cases, the clients expect to have a small gallery/display space to exhibit the work and earn income. Furniture also plays an important role in this user group, they should be flexible enough, so that they can be used for both activities (light weight and foldable furniture can be used).
5. Craft Workers

**Definition** - The people in this typology were found to be making or mending in a range of trades.

**Users** - Furniture-maker, a costume-maker, a mechanic, a carpenter, a caterer/preserves-maker.

**Work-home typology** - Live-near or live-nearby.

**Building Requirements** - The people in this typology doesn’t have fixed hours, they work based on their convenience, but maintain fixed time for client appointments. They also provide door services by phone calls. Majority of the professions in this user groups also require a loading and unloading docks.

It should not be in Live-in typology because these professions have equipment which is dangerous if there are kids etc. Fire-rated walls, acoustics play an important role in the design.
6. **Top - Up**

**Definition** - The people in this typology uses home-based work to supplement for their income.

**Users** - The user group of this typology must be more specific in their business style. Ex – for a person selling clothes he/she has to be specific weather they sell men’s or women’s clothes, kids or elders clothes etc

**Work-home typology** - Live-in or live-near.

**Building Requirements** - The people in this group(majority) work in the informal sector, as a result hide their home-based work, even from their neighbors (in some occasions).

The uses of this typology have to get approvals from the city urban development authority before starting otherwise it will be considered as illegal.
7. Live-In

**Definition** – People who work with Live-In jobs.

**Users** - Live - in

**Work-home typology** - Manager of a historic building and a residential care worker, school caretaker, curator etc.

**Building Requirements** - In this typology the residencies can be a part of museums, universities, galleries, studio spaces. They stay in the building or in walking proximity so that they can constantly help in maintaining the building. Most of these projects are government projects. In private projects the clients are generally from rich family.
8. Start-Up

**Definition** – People who start the business from home to reduce financial burden.

**Users** – The users could be any one. They can be accounting, consultation, educational services, personal trainer etc.

**Work-home typology** - live-in, Live-near, Live-nearby

**Building Requirements** – Most of the building requirements is similar to other typologies and based on the type of startup. Most of the start-up businesses start from homes so that they reduce the financial burdens. The users living requirements are determined by the client, because the building might have any security protocol or historic significant objects etc.
9. Nomadic Travelers

**Definition** – The users who live/work from “a factory-made structure, with a chassis attached to it”

**Users** – Nomadic travel lovers, Users in transportation business,

**Work-home typology** - Live-In.

**Building Requirements** - More and more people from all ages are deciding to live a nomadic lifestyle. Some choose boats and yachts to explore the rivers and seven seas. Others choose RV’s to full time in – vans, travel trailers, fifth wheels, and motorhomes. This typology allows them to travel full-time, explore new places and parallelly work form that space. The users will be able to bring his/her comfortable home to each location he travels.

People who are unable to invest more money in actual homes prefer motor homes for their living.
Table 1 – Work-home user group typologies.

<table>
<thead>
<tr>
<th>S.No</th>
<th>User Groups</th>
<th>Professional Activity</th>
<th>Work-Home Typologies</th>
<th>Building Design Considerations</th>
</tr>
</thead>
</table>
### User needs for live-work design and considerations to take when designing.

Work-homes serve as a residence/work spaces for various professional groups. Irrespective of their usage or the typologies in it, there are couple of design questions which are commonly asked that have been identified during my research.

- Isolation is one important issue that needs to be dealt in this design. People need social sustenance and stimulation at their workplaces. Clients always question regarding to integrate building with the landscape or safety standards etc.

<table>
<thead>
<tr>
<th></th>
<th>Live - In</th>
<th>Site Structure Enclosure Door/Window</th>
<th>Safety &amp; Security Climate Control Acoustical Control Electrical &amp; Energy Illumination Circulation Communications</th>
<th>Space Division Floor &amp; Ceiling Storage Equipment Finishes Hardware</th>
</tr>
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<tbody>
<tr>
<td>7.</td>
<td>Live - In</td>
<td>Manager of a historic building and a residential care worker, school caretaker, curator</td>
<td></td>
<td>Space Division Floor &amp; Ceiling Storage Equipment Finishes Hardware</td>
</tr>
<tr>
<td>9.</td>
<td>Nomadic Traveller</td>
<td>Travel loves, Unable to afford houses.</td>
<td>Live - In Site Structure Enclosure Door/Window</td>
<td>Safety &amp; Security Climate Control Plumbing/Sanitary Acoustical Control Electrical &amp; Energy Illumination Circulation Communications Information</td>
</tr>
</tbody>
</table>

**Table 1 Continued**
• The unit works for dual purpose. The building should have the ability to change basing on the user needs. These units should have the flexibility to accommodate both live and work. How does flexibility exist when owner decides to change in the future?

• Self-employed people prefer to work at homes if their work is a smaller scale. They would prefer to have an office space (office room) so that they can have formal discussion with clients. How does an architect maintain the privacy for both the activities in the same space or building?

• Heat (air-conditioning in some places), how are the units designed so that there is uniform distribution of heat all over the space or should there be two different set of heating systems which server separately for the activities?

• Hot and cold water. Location of water heater in the unit. Hot water is generally supplied by a central boiler with a pump that circulates it through all the units, should it be as one unit or separate units?

• A toilet and lavatory sink types? Or separate toilets or a shared one? Or a shower or bathtub?

• A kitchen including a sink, a refrigerator, and a range, plus some cabinets and small appliance electrical outlets, dishwasher etc, do we need to separate kitchens or one individual kitchen that acts for both or one kitchen with separate pantry?

• A garbage disposal separates or together? (does it depend on the type of garbage)

• Simple industrial-style ceiling fans in all high-ceilinged spaces or a centralized system.

• Normal or oversized mailboxes and a large package drop box; possibly space for proprietary boxes, such as FedEx and UPS.
● Office amenities: dual phone/data jacks, cables, server location are to be kept separately for live, work units or not?

● The level of finish (flooring, false ceiling, kitchen finishes).

● Secure Parking or a shared parking?

● Nearby neighborhood facilities.

● Percentage of open space to closed space.

● To determine what work activities are permitted.

● Design of landscapes.

● Building materials?

● Flexibility of the furniture and the storages?

● Insulation.

● To determine whether the clients are employees or walk in traders etc.
CHAPTER 5. ADVANTAGES AND DIS-ADVANTAGES

Advantages of Work-homes

One doesn’t need to commute (travel) from home to office every day. Which saves you lot of time, fuel and energy. As the user stays at his/her own home they can prepare their own lunch which is inexpensive and healthy meal in their own kitchen rather than spending money in a restaurant or cafe. These typologies helps to reduce the road traffic and increase the pedestrian/bicycle movements.

Work-home units provide an opportunity for the user as it helps to spent most of your time at home which gives an advantage for “place center trends” which helps to community development or involvement or awareness. work-home’s offers financial advantages to a home office, at the user doesn’t have to rent a separate space for work, thereby it helps to save lot of expenses. Work-homes make people to work from home and thereby creates liveliness and safety to the locality. Coming to the owner’s point of view he/she can rent the work-home as a single unit or two separate units based on convenience.

One of the advantage from work home is that this practice will allow the flexibility for the people to combine their different aspects of live in the best way that suits him/her. (Domestic, professional, economic, political etc). This increases the quality of life. Home-based work also helps people to deal their domestic activities while working. Now one can run a home and parallelly earn money by carrying work.
A home-based worker does not need to meet any client until unless necessary. He/she can work and communicate with the clients with the help of internet. Work-homes helps to save money for the user because one doesn’t have to spend money to rent a space separately for their professional activities.

In many work-homes there is a series of commercial shops towards the road and residences behind them. The commercial shops act as a physical barrier for the residences from the road. This physical barrier helps to provide, safety, privacy and noise barrier for the residence. Work-homes helps to increase ordinary daily contacts between family members, neighbors, shopkeepers, traders etc thereby helping the person engage socially.

**Advantages of Work-Homes In Community Level**

Work-homes create positive impact on the neighborhood it creates social capital. People who live in the neighborhood can gather and start a small-scale industry from home. This stimulates the local economy.

Home based work also increases mixed economy, all the employees in one area can work together, (Ex - buying food from local shopkeeper, or preferring local restaurant) there by creating income to one another
One can achieve identity, recognition and respect for the home-based work as his work can help the community thereby produces income for him (mutual-interest). Shared space is always an appropriated space.

**Advantages in Mobile Homes**

Mobile work-homes are super flexible, you can travel and work from the same unit. This typology generally comes under Live-In typology. These units are cost efficient. No need to spend money on Land, even if spent the amount is less. Rental fees for this typology include water, sewer, garbage, and recycling pickup etc.

Mobile homes are the most reliable and affordable options for low-income groups, this typology allows its users to achieve the dream of homeownership at a fraction of a more typical home’s cost.

There will be minimal maintenance of the building unit. In some cases, only the insurance might be expensive based on the age or size of the mobile-homes. Property maintenance is minimal. There are many land-lease parks or communities, which are economical, and some users have their own resident-owned parks. One flexibility in this typology is that he/she can own a home and move to a park if they want to move to a different place. One doesn’t have to pay property taxes if he rented the land or if he owns the land he will pay minimum taxes.
As the mobile-home are movable hence the location of these units are often times decided by the users, the locations can be – truck stops, parks or any location with an scenic view of ponds and lakes. There will be no restrictions on pets. There are no age and population restrictions or financial status for the people to live in these units, these units are open for all people. This typology helps for the no overly close neighbors. (in some cases, you have neighbors next to each other but not one above the other) One doesn’t have to beat the ceiling with a broom again.

Mobile homes are an economic way to live effectively while staying active. All the mobile homes are not the same size some have small sun rooms and patios etc. One of the major attraction that drives the people to work-homes are - group activities that takes place at park's clubhouse such as social events, card games, bingo, pool, dances, shopping trips, and more. Some of the parks also offer golf, tennis, a swimming pool, golf trails, and bike trails. (What other costs are associated with living in a mobile home? (n.d.).)

Integrating technology in mobile homes, helps the user with many additional benefits such as in both professional and personal life in the space they are -

- One can use smartphones, tablets, laptops other mobile technologies by integrating with internet to do the professional activities. In today’s world technology have already become indispensable for many businesses.
- Technology helps in navigation when travelling.
- Safety and security.
Adding sustainability will create many advantages to the work-home units in terms of economy, environment protection etc. The different advantages of a work home that runs on battery compared to fuel are mentioned below.

- **No fuel consumption:** Electric cars are entirely run on electricity. Driving a fuel-based car always makes the user to spend more money from the user’s pocket as prices are unpredictable but mostly keep on rising all the time. By using electric based mobile-homes, the fuel costs can be saved. Ex- Based on surveys made by many car companies an average American annually spends $4000 – $2000 on fuel which can be saved.

- **Savings:** Currently battery vehicles are cheaper to buy than vehicles run by fuel. In order to protect the environment from greenhouse gasses the government is providing incentives so that people can by this typology of vehicles at a cheaper price. The government incentives are available as tax incentives for the public, which lowers the price.

- **No Emissions:** Electric cars are designed to be 100 percent eco-friendly. These types of vehicles do not emit greenhouse gases into the environment as it runs on pure energy source. This type of vehicle is far more better than hybrid cars because the hybrid cars run on both electricity and petroleum products (in this type there is still a chance for the vehicle to produce emissions). The users will help for the contribution for a healthy and green climate.
• **Safe to Drive:** Electric cars undergo the same fitness and testing procedures tests like the other fuel powered cars. In case any sudden accident occurs, one can expect airbags to open and cut the electricity supply from battery. This helps to prevent the driver and other passengers in the car from serious injuries.

• **Low Maintenance:** Electric cars runs on electrically powered engines and thereby is no need to use lubricates for the engines. Therefore, the maintenance cost of these vehicles is less. One doesn’t have to send it to service station often as he/she does for a normal fuel powered car.

• **Reduced Noise Pollution:** Electric cars are much quieter than an ordinary car because of its engine design. Electric motors are designed to provide smooth drive with higher acceleration for longer distances.

Based on the survey by car companies many electric car owners gave a positive feedback on financial savings and vehicle performance. Keeping in mind that the demand for oil will only be going up as the supplies perish over a period of time. In the future an electric car can most probably become a normal mode for transportation. Currently certain car companies like Nissan and Tesla provide different options of electric car models with a many benefit for people who decide to invest in these typologies. There is no impact on the environmental because of electric car this means we are reducing the carbon footprint and creating an positive impact on environment and economy.
Technology has been changing very swiftly over the period of time. It helps to increase more convenience, security, accessibility, efficiency, ADA aspects of the space. Today we have automated technology that can help the car to drive on its own, while providing the user to focus on professional work while driving. Reduces traffic problems, accidents.

Disadvantages

Moving to a different side of work-homes it also poses different disadvantages. Workaholics always find difficult to stop work when there is no travel time involved or people to interact. If the work-home user has children, then they might have limited places for them to play outdoors as the parents stay at home most of the time.

In many Architecture writing the authors have considered the space, form, and materiality in design but sometimes ignores in regard to of how buildings were used in everyday life. Home based workers face problems when one activity is influencing other. Generally, this issue occurs in work-homes in half of the cases, when the user tries to incorporate functions with conflicting programs in the same space, if we have close observation of their living in these cases one can throw up unexpected issues. One has to be self-disciplined to organize both activities if not it leads to a mess. The issues could be sometimes in regard to the domestic and personal identities which are erased when the user is trying an attempt to imprint professional identity on the building and its spaces. One should remember that for the home-based workers his/her occupational identity is generally embedded in their creative work and thereby that work dominates the work-home.
Work-homes makes the people stay indoor most of the time, this creates an invisible barrier for the resident that makes him to stay away from the exterior environment. Work-homes generally helps to increase social capital only when people get to know about other persons field and when the activities are carried out openly. In some work-home user activities it restricts the user to carry out the profession openly.

One of the negative side effects of work-homes is that it effects the person psychologically when a person is working in secret it creates negative effects of fear and mistrust. Social isolation is always a problem from work home users. A person gets depression when he/she is always working from alone from home. Having a personal space is good but sometimes it also leads to isolating experience. There are ways to fight against isolation they are

• Using digital media

• Develop essential relationship with other people by phone, messages etc.

• Isolation wouldn't be a problem in cases where the work involves working with public, or in large families.

Sometimes work-homes creates tax issues. In some countries these activities come under commercial sector and then they need to pay more tax which creates financial burdens for the users.

In home-dominated typology one finds pretty hard to find appropriate space to work. Occupational identity is not necessarily required for a home-based work. The degree of
necessity depends on the type of work we do in a work home. Visibility is one of the factor that helps to solve the issue. The exterior facade can be used or signages play a vital role.

**Disadvantages in Community Level**

Work-homes will also change the planning of the city. Considering a work-home in a neighborhood setting, when people move from one home to other sometimes they lead to Impromptu interactions.

Categorizing work-homes in zoning maps is an issue for these because it shares both characters of residence and commercial.

In some cities in united states, such as Sunnyvale, California, the city governing authorities have toughened the rules about live-work units, those rules include

- prohibition against renting out part of the unit,
- Employing more than one non-resident,
- having more than three delivery trucks,
- vendors or customers arrive by vehicle at the work-home users location in a single day.

**Disadvantages of Living in a Mobile Units**

Disadvantages that occur in a mobile home is different from immobile home. Mobile homes are a bit harder to sell than compared to a typical house. Home transportation are a bit
difficult. In some cases, in which if homes are too old then the transportation costs of the unit is expensive (sometimes the price can be more than the units price).

Compared to maintenance of a normal building, mobile homes have tire machinery, fuel maintenance. Its hard to navigate in dense cities and in narrow roads with mobile-homes. Mobile homes cause environmental Problems. Environmental destruction and pollution, because this typology depends on fuel to travel. One has to be careful when dealing with waste’s, oil, residual etc.

Many businessmen started camp construction for the mobile homes for business to increase their revenue. Construction of the camps generally takes place in the scenic places (countryside or near any waterbody or in forests or in a valley etc). Construction of fixed or temporary buildings will effect/destroy the existing harmony of the natural ecosystems and thereby causing various environmental pollution like -

- Air pollution
- Water Pollution
- Noise pollution

Not only with camp construction but also activities in the camp also create threat to the environment. Camp activities, such as barbecues, bonfires have the potential to start forest fire and other activities, such as diving, motorboats, boating, surfing, disturbs the life of wild animals in the ecosystems.
Living in a mobile work home unit, causes more physical stress compared to different typologies because he/she has to do additional work like filling water, gas/diesel, clearing brown water etc. One should know minimum knowledge on vehicle repairs in case of vehicle breakdown in remote areas.

Mobile homes can adapt in fairly contours sites but not in sloping sites, it’s hard to drive/hold the vehicle on sloping sites. Based on time savers standards mobile homes can stay on site with 1-5% of slope, for site of 5-8% needs some precautions, for slope of 8-12% mobile home cannot until some adjustments in the contours are done and beyond 12% the mobile home cannot stay. Adjusting the contours for the convenience of the work-homes is quite expensive.

Initial budget to invest on the site selected for mobile home parks is more because one should invest for drainage and other facilities like water, electricity and fuel services. Mobile homes require wider roads than generally required, this is expensive and not eco-friendly. It’s hard for the users of the mobile homes to dispose the waste when they travel to new place because they need to know where to access the sewer system to dispose the waste.
CHAPTER 6. METHODOLOGY

Interior Components

During my research various interior, building and supportive systems are taken into consideration for analyzing the building and deciding the design elements which benefit the work-homes. These systems are taken into consideration in my research so that the design elements can achieve

- Health, Safety and Welfare
- Operational and performance
- Psychological and Emotional
- Physical, Physiological
- Setting, context

Through this methodology I am trying to prove that every design element will work or can satisfy all the interior components or can be designed in 25 ways thereby making the work-home space more efficient.
Table 2 – Interior design Components

<table>
<thead>
<tr>
<th>S.No</th>
<th>Interior Components</th>
<th>Systems Types</th>
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</thead>
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<td>1.</td>
<td>Site</td>
<td>Building System</td>
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<tr>
<td>2.</td>
<td>Structure</td>
<td></td>
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<tr>
<td>3.</td>
<td>Enclosure</td>
<td></td>
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<td>4.</td>
<td>Door/windows</td>
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<tr>
<td>5.</td>
<td>Safety &amp; Security</td>
<td></td>
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<tr>
<td>6.</td>
<td>Climate Control</td>
<td></td>
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<tr>
<td>7.</td>
<td>Plumbing/Sanitary</td>
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<tr>
<td>8.</td>
<td>Acoustic Control</td>
<td></td>
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<tr>
<td>9.</td>
<td>Electrical &amp; Energy</td>
<td>Support System</td>
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<tr>
<td>10.</td>
<td>Illumination</td>
<td></td>
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<tr>
<td>11.</td>
<td>Circulation</td>
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<td>12.</td>
<td>Communications</td>
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<td>13.</td>
<td>Information</td>
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<td>14.</td>
<td>Space Division</td>
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<td>15.</td>
<td>Floor</td>
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<td>16.</td>
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<td>Body Support</td>
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<td>18.</td>
<td>Surfaces</td>
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<td>19.</td>
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<td>20.</td>
<td>Other Furniture</td>
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<td>23.</td>
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<td>24.</td>
<td>Decor &amp; Accessories</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
Site – It is the exterior boundary of the space in which the building can be built. Site can never be a unique piece of land. It can be rectangular or square or parallelogram etc. Other factors that exist in the site is the contours. Sometimes the site can be a part of an existing building in renovation projects (If only part of the building is renovated). There are certain factors that influence the building design on the site is - land use zoning, Building codes, access, circulation, privacy, security, shelter, land drainage etc.

Structure – Structure of the building is that which enables the building to withstand from all the forces like gravity, wind load, live/dead loads of the building. The Structure can be of two types – Load bearing or framed. The structure can be used as an enclosure. Materials play an important role in defining the strength of the structure. The span of the structure can also be defined based on the materiality.

Buildings structural system can be designed based on the shape of the space. The basic structural elements are columns and beams. The column transfers all vertical loads and the beam transfers horizontal loads. The secondary ones are walls, floor, roof etc.

Enclosure – It can be defined as a building part which separate the exterior from interior. These are generally exterior walls, roof, foundation wall system, doors and windows etc.

Today’s world with the help of technology we can design the enclosures that solve the issues of acoustics, temperature, security, fire resistant etc. The enclosure should also withstand against weather, climate, gravity, organic agents and inorganic agents etc.
Door/Window – Doors and windows play an important role in connecting one space to the other. They play a vital role in bringing lighting and ventilation to the indoor space.

Size and location of the door/window plays a vital role in reducing the electrical costs. With today’s technology we have different variety of doors/windows which serve for various climates, security etc Ex – we have double plane or triple plane glasses for cold climate, metallic windows for strength and security.

Safety and security – Safety and security of the building can be checked in four categories they are –

- Occupational safety
- Health
- Fire protection
- Natural Hazards
- Security of the building, occupation and assets.

Climate Control – Here the climatic control is generally divided into two categories, exterior climate and interior climate. Exterior climate cannot be changed by a human but the interior climate, all we can do is take measures to protect the building. Many techniques like air/vapor barrier, water barrier, insulation, helps to protect the building for heat/cold and rain. Interior climate can be controlled by the user one can use natural ventilation/lighting to heat/cool the space or one can use heating and cooling technologies to control the indoor climate. Heating and cooling technologies are effective in usage but highly energy consuming.
**Plumbing/Sanitary** – Plumbing is used to manage water in or out or within the building. One should carefully design the location of the water tank. Drainage lines/sanitary lines are different from plumbing lines as they carry waste/brown water.

**Acoustic Control** – Acoustics control is always important for the user to live peacefully. Acoustics are very important for work-homes. The acoustic problems can be solved by

- Location and construction of the site
- Interior materials used
- Room arrangements
- Location of the entertainment system
- The open concept (connection living, dining and kitchen)

**Electrical and Energy** – Electrical system is one important element in the building, it powers the heating/cooling systems, lighting system in the building. One should decide if the wiring is concealed or exposed. One has to be keen when deciding the location of the switch board and power points.

Coming to energy one can use sustainable techniques to reduce the energy consumption and photovoltaic cells etc to produce energy.

**Illumination** – Lighting is an important factor in the building. Lighting can be divided into two categories natural lighting and artificial lighting.
Natural lighting can be used during the daytime to illuminate the space. This can be done based on position/size of windows/doors according to the sun path. Sky lights can also be used to bring lighting in the space.

Artificial lighting – There are many rules from IBC which talks about the illumination level in the space based on the activities in it. Surface texture always play an important role in determining the illumination level it can also help to create lighting effects. Color of the walls plays an important role, it not only helps in lighting intensity but also helps to reduce the electricity loads.

**Circulation** – Circulation can be in termed in different sects they are

- Air circulation
- Navigating in the space
- Emergency exits
- Public, private, Horizontal/vertical circulations

One has to design the unit in such a way that the rooms of the can be placed so that minimum movement for the user.

**Communications** – This can be divided into two types

The first one is – “how the space is interacting with the user”. Interior design plays a vital role in this case, because based on the design it creates an experience to the user or the
person visiting the space. As a designer one has to know of how people perceive the space and experience interactions within the spaces. One should agree that people interact with the space and other both consciously and unconsciously.

The second - It can be defined of how an individual is communicating other who is in a different space, and sometimes the communications could be in terms of safety, various systems included in this type are

- Intercom system
- Computer networks
- Telephone systems
- Fire alert system
- Security system

**Information** – This is generally related to smart homes (home automation). We have Alexa, Siri, home automation systems that provide information regarding anything that exits on internet.

**Space Division** – In this typology we can see how space can be divided, there are generally two types they are permanent separation and temporary separation. There are different ways for space division they are

- Permanent or sliding Walls,
- Furniture or cupboards as barrier
- Transparent or translucent partition etc
**Floor** – They are generally defined as the lower surface of an interior space, on which users walk. The floor can be made of various materials like wood, concrete, steel, carpet, rubber etc or it can be one-way or two-way slab, but it has to be smooth, strong enough to hold all the live and dead loads on it. Floors has to have certain characteristics, they are –

- Durability, resistance to wear
- Ease of maintenance
- Comfort underfoot
- Sound absorption or reflection based on usage
- Safety
- Aesthetics
- Ageless quality
- Cost effectiveness and functionality
- Non-toxic and environment friendly
- Low water absorption and good resistance from chemicals.

**Ceiling** – It is defined as the upper surface of the room interiors. They plan an important role in shaping the interiors of the space by defining the height they also impact the scale of the space. The ceiling helps to protect the space. There are various types of ceilings they are – High ceiling, low ceiling, coffer ceiling, vaulted or arch or suspended Moisture ceiling etc. ceiling has to have certain characteristics, they are –

- Moisture and chemical resistant
- Durable
• Aesthetics
• Fire resistant
• Installation easiness
• Cost effectiveness etc

**Body Support** – These can be defined as the furniture that helps to attain health, safety and welfare of the user, they can be mattresses, cushions of chairs etc. Anthropometry plays an important role because this furniture is designed so that they can help the users. There are many companies that design custom made chairs and tables based on the client’s anthropometry.

**Surfaces** – It is defined as the outside part or uppermost layer of the object. Certain characteristics of the surfaces are –

• Visual character (generally achieved by material, color, texture, pattern)
• Scale, proportion and location in the space
• Acoustic properties
• Light reflectivity
• Tactile properties

**Storage** – It is defined as the space provided for storing something. Storage has to be visible, convenient, accessible. Storage can used for different items they can be for food or clothing or toys or machinery etc. Size, proportion of the storage are dependent on the amount and
type of items that are to be stored. Storage can be rigid or mobile, in some designs storage is used to divide spaces. Storage is located at the point of most frequently use.

Other furniture – Furniture can be defined as the largest movable equipment in the space, they can be tables, chair, beds etc. Furniture can be used for various types of activities they are – seating, sleeping, entertainment, storage etc.

Equipment – The physical equipment that are free standing or attached to a wall in the interior space of the room. There are various types of equipment that are present in restroom, kitchen, libraries and laboratory spaces etc. The various type of equipment are -

- Residential equipment ex – built-in ironing boards, intercom systems and security systems etc
- Office equipment ex – computers, video equipment, printers etc
- Healthcare equipment ex – equipment depends based on the physician, common equipment includes examination, x-ray equipment etc.
- Retail equipment ex – cash register, display stands, display cases etc
- Institutional equipment – these are the equipment made for museums, churches school etc the equipment are – lockers, vending machine, audiovisual and recreational equipment etc.

Finishes – Finishes are defined as the process of converting raw materials to finished products in other words it is defined as the concluding stage of construction. Plaster, paints, gypsum, wallpapers are generally used as finishes in building industry. These finishes are generally used
for ceiling, floor, wall, furniture finishes. The finishes can be used to provide textures for the surfaces. Generally, the overall quality of the building is defined by its finishes. Characteristics of finishes are –

- Fire, moisture, chemical resistant
- Serviceability and durable,
- Easy to clean,
- Acoustics.

**Hardware** – hardware specially used as protection, decoration, and convenience in buildings. Hardware is used in different parts of the building they are -

- Bathroom hardware
- Door hardware
- Furniture hardware
- Safety & security hardware
- Plumbing hardware
- Cabinet hardware
- Window hardware
- Curtain hardware

**Décor and Accessories** - Decors and accessories are those items which help for the aesthetics enrichment of the space. They are creating visual appeal to the eye and textural interest to the hands. The accessories can be chosen can be – utilitarian, incidental and decorative.
Utilitarian – These are generally the useful tools or objects for the user. The utilitarian accessories are based on the personality of the user and they are available in range of designs. Ex – clocks, spoons, glasses etc come under this type.

Incidental – These help to enrich the space while serving the other functions. Ex – architecture details or they can also be interior furnishing.

Decorative – These help to increase the aesthetics of the space. They could be – Artwork, collections, plants etc.

**Other** - Other aspects include,

- power saving techniques (sustainability)
- Parking requirements
- Fire barriers
- Building codes
- ADA access
- Electrical systems
- Mechanical systems
CHAPTER 7.  DESIGN ELEMENTS

Based on my research and based on the different type of users who are living in it I identified ten primary design elements for the work-homes building units. These elements can be used to design for the user groups mentioned above. The information has been gathered from various sources but most of the titles have been taken from the book “Beyond Live/work” by Francis Holliss.

Work-homes are generally designed for multiple users, and the fact that different groups generally have radically different spatial and environmental requirements. The main aim of the design elements is that, one can design a building which is efficient for the activities in it, sustainable and does follow all the building codes and regulations. These design elements are applicable even to the renovation projects. The design elements help to provide the level of strength to the building and level of safety for the resident. The design elements are chosen based on the understanding the range of home-based workers in terms of their professional work, dwelling requirements etc.

This design elements are similar to the design elements for a normal building, but the difference is that in work-homes two activities co-exist in a single space, hence the design elements has to be flexible enough so that both the activities in the space can function without conflicting each other.
1. Flexibility

Definition – It is defined as the ability to work freely or change or modify based on usage or over the period of time.

Application/Usage - Flexibility is one of the main core design element because it helps for the survival of different activities in the space without friction in between them. This design element helps the live/work unit to adapt all the changes that are done based on the needs of the user and it avoids obsolescence and the cost of reconfiguration and refurbishment.

The extent of flexibility can be increased when the building is flexible for in terms of height. With the flexibility in height the user can add a mezzanine floor or remove it basing on convenience.
The structural grid and the span (the distance between column to column), plays an important role for the strength of the building. With the combination of this grid and the partition walls the space becomes super flexible. The structural grid can be designed in such a way it can survive any natural calamities like earthquakes, floods etc). Basing on the building size, and requirements, the materiality of the structural system can be decided (materials can vary from wood to steel). For clear span - one can use, highly engineered lightweight steel frame structures which are super thin, portable and they are re-usable. The structure’s clear span should be long enough so that the space in between it can be used effectively or can be divided by partition walls without any constrains.

Enclosures can be used to separate people physically with in a space. (Ex - a plywood cube, or a translucent member). This creates a room within a room and this also enables others to occupy the room comfortably without the sense of control being disturbed. By determining the type of slab (wood or concrete) helps to determine the span in between columns (slabs come under dead loads, more the weight of dead loads less the spam). Having light weight walls helps to reduce the slab depth by 10 percent thereby increasing the span between columns and save money.

If the owner decides to move to a new place and rent the old building the old building has to be flexible enough to the new user. This design elements also gives the owner to rent the space together to a single person (live-in typology) or rent it separately (Live-near and Live-nearby typology). When rented separately flexibility is greatly enhanced by separate meters
for gas and electric, and usually not water. This helps even in terms of taxation for the user and thereby saving money.

Signage is one important element that is required to navigate through the space (especially when there are multiple activities). Designing a sensible route for all the internal services in the building, so that they can be renewed, without rehousing the residents.

Objects such as furniture, sculpture or structural elements (such as columns), influence the way people perceive the space. Stationary objects can also be used as a sense of place/focal point of place. The furniture chosen in the building has to be

1. **Adjustable** - The furniture position can be changed easily (for instance the furniture height can be increased or lowered or tilted etc)
2. **Portable** - Things can be easily movable from one place to other, this furniture can be lightweight or foldable.
3. **Multifunctional** - Furniture that can used for multiple furniture, Ex - Modular furniture comes into this category (Couch can be turned into bed, or a bed can have an inbuilt furniture)

The perception of space can also be achieved by materiality in the space. Ex – paints etc.
2. Determinacy/Indeterminacy

**Definition** - Determinacy is used architecturally to refer to buildings designed around a fixed use. Indeterminacy refers to buildings that are designed around an indefinite or uncertain use.

**Application and usage** - Determinacy combines distinct, purpose-designed dwellings and workplace elements or space. These two functions are architecturally expressed and legible from streets.

Indeterminacy buildings are generally considered as enigmatic (difficult to understand). These are designed to the changing patterns of living and working.

This design element is used so that one can design and accommodate both living and working together that to distinguish the two functions in a fixed way. (Holliss, n.d.).
3. Public/Private

**Definition** – Public in indoor is defined as the space where guests or clients can access the space freely when invited (Ex – Living room or waiting lounge in office space). The space that is only accessed by only by the members of the family or closer ones when invited etc. (Ex – Bedroom etc)

**Application and usage** - One must decide to what extent of the space in the building needs to be publicly accessible or not. The level of public/private levels generally depends on one's profession or preference etc. Ex - A music teacher allows her student to use the washroom and kitchen but locks/closes her bedroom to protect her privacy.

**Security** is one important consideration that needs to keep in mind when designing public spaces. One should think about the emergency escape measures of the buildings.
Security in parking. (is the parking outdoor or within the building?). Security can also be considered as personal safety in the space.

Privacy should not be confined only to the internal space of the building, it can be in between the building or from the road to the building. One can design gardens and balconies as usable extensions of a living space addressing both privacy, sunlight and ventilation. Ex - Small gardens, patios or balconies can be used to create a secured, shared semi-private space for the residents. Gardens can also be used as boundary walls, railings etc, which can help in separating properties, increasing privacy and improving security.

Apart from the size, orientation and relationship with the internal living spaces, the effectiveness of balconies and roof terraces is affected by the issues of privacy, wind protection, safety, waterproofing etc. Privacy is not only obtained by physical barriers, but also building material can be used to obtain privacy for instance translucent glass or curtains, shutters can be used etc. Acoustics always help to play a vital role in increasing sense of privacy of that space.
4. Visibility/Invisibility

**Definition** – Visibility is defined as the ability to see or been seen. Invisibility is defined as the inability to been see or been seen.

**Application and usage** - There are three types of visibility/invisibility one is the visibility/invisibility within the building (from one activity to other ex - dwellings to work) second is the visibility/invisibility from the interiors to the exterior and the third type of visibility/invisibility is from the building to the next building or the neighborhood (or it can also be from the property to the road etc). One can generally design gardens particularly front ones because they help in avoiding the space as an eye source for the neighbor or any individual who is passing by that locality.
Visibility is more required for certain user groups Ex- in family caregiver’s rear gardens can help the people who have kids. They can watch the kid playing in the garden while working. One can use transparent, translucent, opaque building materials to decide the level of visibility of a space when viewed from a different space.

Some users run their business secretly, hence these units appear as a residence than a workspace. In this case a person is deceived if he depends on the vision. One should keep in mind of how wayfinding helps to move around the space in terms on visibility/invisibility. This design element helps to increase the privacy levels of the space. Building materials plays an important role in this typology.
5. Noisy/Quite

**Definition** – Noise is defined as the unwanted sound that exists in the space which creates discomfort for the user.

**Application and usage** – Noise is created inside the building based on the user and his activities. Buildings need to be designed with acoustic separation between spaces or between each other activities or from interior to exterior. Landscape around the building plays an important role as the acoustic barrier from outside to the building to the interior.

Live-in and Live-near typologies require acoustic treatment compared to Live-nearby. In these spaces acoustics emerges as an important consideration in all work home design, as a result creates 24 hours inhabitation of building. In Live-in typology one can use earphones or headphones while working thereby not disturbing others. Sound absorbing materials or curtains or partition walls etc helps to play an important role in reducing the noise levels in the
interior space. The designer should also keep in mind that the shape of the space also plays an
important role in increasing or decreasing the noise levels of that space. This design element
plays an important role for some professional groups like - - Furniture-maker, a costume-
maker, a mechanic, a carpenter, a caterer/preserves-maker.

City or town planning authorities have added a set of rules in the building codes for
acoustics so as to regulate the noise levels. There are many building materials that can be used
to reduce the unwanted noise level they are –

- Using massive materials (double brick walls)
- Reflective materials (Plastering the surfaces)
- Using acoustically absorptive materials. (porous materials)
6. Clean/Dirty

**Definition** – It is defined as - making the space dirt free with no marks or stains.

**Application and usage** - Based on the profession that happens in the work-homes they can be dirty, dry or smelly. Proper ventilation plays a vital role in this type. Furniture-makers, costume-props-making, car machines, carpentry, artists etc come under this category. Moisture always creates problems and discomfort to the user.

Clean/dirty issues generally comes in toilets, one should consider that - how are the toilets utilized in the building, are those toilets used separate or combined for both the activities? Mechanical exhaust fans can be used to remove from the space. Exhaust vents must be kept clean and open to function properly.
There are many design strategies and building materials that exist in the market, which eases the maintenance work they are –

- Create Smart Efficient Spaces - open floor plan is an effective way for small footprint feel larger than it is (lesser the floor area less the maintenance).
- Connect with outdoors – this helps to provide natural light and ventilation into the space. This helps to reduce the small and moisture in the indoor space.
- Using easily cleanable materials.

The level of finished quality of the materials also define the cleanliness of the space. Color also plays an important role for this design element; darker colors help to hide the dirt easily compared to lighter colors.
7. Hot/Cold

Definition – It is defined as the amount of hotness or coldness required in the space for the user to continue his activities without any discomfort.

Application and usage - This typology deals with insulation of the building. When designing one does need to consider whether the entire building needs to be insulated or only part of the building?

A high-performance external envelope can be used for residents, to reduce running costs as well as carbon footprint. (U - Values, R - Values can be used for insulating exterior walls and ground floor). Insulation should not be confined to the walls it can also be used for floors and ceiling. The level of insulation generally depends on the activity in the space or the location of the building. These strategies help to reduce electricity bills.
Certain techniques like Combined heat and power (CHP) can be used as an efficiency and energy conservation way to heat the building. Solar energy is used to heat water. Mechanical heat recovery systems from kitchens, toilets can be used to heat up the corridors.

Moisture always plays a vital role in effecting the temperature of an interior space. Active and passive ventilation strategies can be used to reduce the moisture levels in the space. The exterior envelope can be designed with air/water barriers so that it prevents the moisture from entering in.
8. Inside/Outside

Definition – Interiors are defined as the indoor space in the building and outside is defined as the exterior space around the building.

Application and usage - In any design an architect must design of how an indoor space can integrated to outdoor space. Does the activity require outdoor space? Artists, graphic designers etc come under this category. Outdoor spaces in a work-homes helps the user to use it as an interactive space. Ex - The exterior space (ex - in front of the building) can be made as communal gardens with benches and rose beds, this helps for social interaction for the person living in the work home with the neighborhood. Also, by adding glass partitions walls it’s possible to merge indoor and outdoor spaces.

Front gardens are those located in between the street and the building or the rear gardens behind the building, can be used for interaction. They help to increase social capitol.
9. Storage

**Definition** – The space that is used to store items for future use.

**Application and usage** – The user has to know about what type of the storage area are required in the space. He/she can start with a simple question “does the storage in the space has to be rigid or mobile?” The storage spaces can be used combined for both the activities, or separately for the spaces.

One often gets confused regarding the sizes of storage spaces. Do they have to be small or big or medium or a combination of all sizes? I prefer a variety of sizes of storage space is best. In some cases, a wall made of storage boxes, it provides a sense of privacy, invisibility and helps to store stuff.
Storage spaces must be organized properly to create a space that is visually appealing and practical (Horizontal storage spaces or vertical storage spaces) even the office look more organized (using racks and shelves for aesthetics). Maximizing floor-to-ceiling wall space optimizes more space for the storage. One has to know the level of safety for the storage spaces when placing the important items (Ex - when you want to store important documents or cash or jewelry).

Storage can be used to differentiate the activities when they are used as a partition wall. The storage spaces can be located below the staircase, thereby it helps for the efficiency usage of the space. In some instances, the storages can be floating (they can be hung down from the ceiling.)
10. Sustainability

Definition – Sustainability is basically defined as meeting our own needs with minimum resources, providing our future generations to meet their own needs, all techniques are environment friendly. This technique has come into practice from the previous decade.

Application and usage - As a designer we try to provide natural light, ventilation which can be achieved by windows or glazing in doors or skylights or operate-able doors, windows, or skylights. When technology is integrated into these buildings they can be built as low carbon buildings. Energy saving techniques such as solar panels, active or passive cooling systems etc are used to make net-zero buildings. Thereby saving electricity thereby, saving money.

Integrating landscape into the building, helps to produce more oxygen in the space and other techniques like, Rainwater harvesting is used to save water, which can be used for
building and garden. Building materials can be improved in such a way so that they can be reused or recycled to use for a different purpose.

Work-homes are termed as Zero commute housing. This strategy helps the person to travel less thereby reducing the carbon levels in the environment. Ex - If a person is travelling 20 miles per day (one way) to his work, ending up 15,000 miles per year, whereas in work-homes one doesn't have to travel unless for other activities. This helps the family to survive with a single vehicle instead of many.

Coming to mobile work-homes they can be made sustainable by battery car system, instead of depending on petrol/diesel etc. This technique has no harmful emissions.

Sustainability is cannot only have termed as environmental, but this option provides economic sustainability, to the middle and poor families in the society. All housewives can work from home in their free time and can improve their quality of life. One important point to be noted is that these work-home do not require huge investments to start.
CHAPTER 8. APPLICATIONS

In this chapter we are taking two cases, one from mobile work-home and other from immobile work-home. These typologies we will use each design element with one interior component to prove how the space can be made more better and user friendly. Every design element can be explained in 25 ways, but I randomly chose one to explain it.

The purpose of this exercise is to minimize bias and I selected these random with a roll of a dice. But the practitioners choose it based on the priority. This application proves that the design element can help to prove that the design element helps to benefit the interior space in twenty-five ways.

These help to improve the work-homes. This is an approach that can help to design any type of work home (mobile or immobile) and even respond to renovation projects. This strategy will provide the user to explore different ways to design a work home.
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For a Mobile Home

I am taking a typical mobile home (RV) and test how these typologies help to improve it. The outer dimensions of the RV are 2.7X 9.0M. The amenities of this RV include a kitchen, a bathroom, and one sleeping facility, and with some additional luxurious, features like air conditioning (AC), water heaters, televisions and satellite receptors, and quartz countertops etc.

These motor homes are the common one that is sold in the market. By my design elements I can convert if from Mobile home to mobile work home.

![Typical mobile home Plan.](image)

**A-1 Flexibility – Structure**

The structure of the mobile home is generally made of metal. Has to be galvanized to avoid rusting. The structure has to be light weight so that there will be low fuel consumption.
It should include Insulation so that it helps to reduce energy loads. Ex- foam insulation can be used so that it can be light weight and efficient. The structure should be designed to offer views out and allow natural light it.

Figure 8 – Flexibility of the structure.

Technology can be integrating the structure can be made tangible. The structure can be expandable. (the structure can provide additional living spaces that slide out when the vehicle is stopped for camping). This provides flexibility for the programming. Furniture can be attached to the structure so that the furniture can roll over into when the activity in the space needs to be changed, this change can be based on the time or convenience. This strategy helps to expand the indoor space to outdoor.

Figure 9 – Flexibility in terms of extension.
Structure system of an RV is different from a typical home they commonly include floor, walls, ceiling there will be no typical beams and columns. The spacial volume within this mobile unit structure is small, generally consists of only essential spaces – kitchen, bathroom, dining/live/work space.

**B-4 Determinacy/Indeterminacy – Door/windows**

It’s hard to design the unit with indeterminacy with spacial constrains. Doors of an RV can be flexible and easily replaceable. Technology can be added for safety standards Ex - for number locks, fingerprint etc.

Privacy and security are so important it any space. Doors and windows must be of high-quality with blinds, functional and virtually impossible to open without a key. Ex - Windows can be designed with a series of layers like – glass, blinds, mosquito net. The space is small and designed for certain standards, there can be various functions in the space, but the exterior looks the same unless its painted for other activities. Ex – a food truck vehicle is painted with pictures of food etc until then the vehicle looks as a mobile home etc.

**C-14 Public/Private – Space division**

Generally, in an RV there won’t be space division in these units much. The activities co-exist in the same space. One can work and live in the same space. Various ways to increase privacy are –
• Curtains can be used in between the spaces.

• Color tints can be used on the glass to increase the privacy levels from the exterior.

One important thing to be kept in mind is that it's hard to maintain the privacy levels of a space when there are kids in the mobile home.

**D-11 Visibility/Invisibility – Circulation**

Visibility can be from inside to outside or from one interior space to other or from one activity to other. Mobile homes are small units hence the user tries to use/spend most of his/her time in outdoors. Visibility/invisibility comes as an issue in terms of privacy. These can be solved by the following ways:

• Curtains can be used for separating the spaces.

• Color tints can be used on the glass to increase the privacy levels from the exterior.

Electronically adjustable beds can be used so that one activity is invisible to other. (the main purpose of the bed is for sleeping, if the user is not using it we can align it to the wall and use the space for other activities because of this we can make sure one activity is invisible when other activity comes into play)
E-5 Noise/Quiet – Safety and security

Noise level of the space can also define the safety levels. Doormats and flooring can be used for sound absorbing. The main noise sources in the mobile home are generally the engine, the transmission, the exhaust system, the hydraulic system, the cooling fan and the tires. Hush cloth, Whisper Floormat, is one of the acoustic material made for these vehicles. Skirting is an important factor in this typology because it is one of the major source for the sound to enter the space from the machine after the floor hence the skirting material should both a sound absorbing as well as reflecting.

There are many sound absorbing fabrics which comes in a variety of colors, these help in many ways – they are strong enough, reducing the noise levels, increases aesthetics quality of the space, reducing the heat exchange (insulation material).

F-3 Hot/Cold – Enclosure

Hot and cold in the space can be used to create the interiors of the space more user convenient. various ways to achieve it is-

- Water can run in between the engine or in roof with the help of pvc pipes, these can get heated eventually and hear the indoor space. Water retains heat for longer time compared to air which can be a more beneficial for this typology. Pipes are to be insulated so that they won’t get frozen during the winter time.
• Insulation can be added as a layer in the exterior wall so that it reduces the heat exchange. (spray foam insulation)

Figure 10 – Curtains for privacy, acoustics and visibility.

• Opening the closets especially the plumbing ones so that the hot air circulates in and removes the humidity. (humidity is always an issue because the space is small, and we have the kitchen and the bathroom which helps to increase the humidity level there by cooling the space)
• One can use an electric heater or dehumidifier which runs on battery than running the machine all the time.

• Skirting is one important element that helps to maintain the temperature indoors especially winter.

Some non-architecture strategies that can be used to make the space more comfortable they are -

• Prefer to use the campground showers than the one in the unit. This helps to reduce the humidity levels and reduces the energy spent to heat the space. It also reduces the effort to refill it

• Always have warm comforters.

**G-22 Clean/Dirty – Finishes**

The quality of finishes generally describes the level of finishes of the space. Various colors can be used as a final finish quality to increase the richness of space. (Dark colors help to hide the dirt and make the space look cleaner). Dealing with humidity makes the space cleaner.
Compact vacuum cleaner can be used compared to the general one, in terms of saving space. Carpets can be used on floor to hide the dirt.

**H-8 Inside/Outside – Acoustic Control**

Acoustics treatment is hard because of the space constrain. Acoustic treatment can be viewed from one space to other for from inside to outside.

The main noise sources in the mobile home are generally the engine, the transmission, the exhaust system, the hydraulic system, the cooling fan and the tires. Hush cloth, Whisper Floormat, is one of the acoustic material made for these vehicles. Curtains can be used from one space to other which help for sound absorption to some extent.

**I-14 Storage – Space Division**

These units are generally under the beds, small cabinets (generally all unused space can be used for storage). Some cabinets are provided next to the kitchen for the utilities.

A separate set of storage of the mechanical gear of the mobile home is required. One must keep in mind that he/she cannot carry too many equipment due to space constrains.
J-21 Sustainability – Equipment

The structure/outer shell of the mobile home can be used for various sustainable techniques for energy saving. Aerodynamic shape and lightweight design maximize fuel efficiency for tow vehicle.

Water can run in between the engine or in roof with the help of pvc pipes, these can get heated eventually and heat the indoor space. Water retains heat for longer time compared to air.

Figure 11 – Various sustainable strategies in the mobile work home.

Insulation can be added as a layer in the exterior wall so that it reduces the heat exchange. Double/Triple plane glass for the windows. Other techniques like solar panels (it might not work in cold regions or during cloudy days), greywater fed flower boxes, wind
generators. Efficient LED lights and ENERGY STAR appliances reduce the energy consumption. No toxic chemicals or volatile organic compounds (VOCs) should be used to build the unit.

**For a Studio housing**

I have taken a layout done by my class mate Percy who worked on studio housing for her thesis. Studio housing can come into live-in or live-near typology based on the user and the design considerations taken in the building.

The site is from India and designed based on the Indian standards. I am using these plans to test my design elements and make the space more effective. One of the reason for taking an Indian based design is that – I am trying to prove that my design elements are universal and can be applicable for all the culture styles etc.

From her plan in have chosen a unit and then I worked on it instead of working on the whole community. The unit has been chosen at a random with the help of a dice to avoid bias. This attempt helps me to prove that my design elements helps to improve the quality/user friendliness of the space.
Figure 12 – Existing typical layout of the studio housing community chosen for testing the design elements.
Figure 13 – Existing typical studio house unit layout taken for testing the design elements.

**A-1 Flexibility – Structure**

The structure is designed as a framed structure (reinforced steel structure, and brick walls). If they would have used steel frame that helps them to create walls with less thickness. This helps to lessen the dead load thereby increasing the span.

Integrating furniture to structure, will also help the space. They can be folded into the structure when more space is required. The structure should provide the flexibility to have
skylights in the roof (operative by the user I mean like open or close). Artists need more natural light and ventilation. It should have the ability to expand/ dismantle.

The materials in the structure should be selected because they help to solve the issues for temperature, noise etc, they can be dealt by adding insulation, acoustic layers. The floor height of the structure can be made high so that the can feel more spaciousness.

**B-4 Determinacy/Indeterminacy – Door/windows**

Based on the design it was evident that the studio house has large window panels in the dinner and studio space. Allowing natural light and ventilation into home. A typical building looks generally as a home or an office space or commercial building based on how it looks, or sometimes the building is defined based on its location. The exterior façade can be used to define the purpose. Painting the exterior façade or adding different material etc.

One should keep future in mind, todays activities might not exist in the future, the materials used on the exterior can be easily replaceable so that the user doesn’t spend more money or time to do the changes on the façade for the new activity.

Other ways of using this combination is by working on the details on the door to represent the work type of the home. Various types of layers can be added on doors and windows which helps both for safety, privacy and defining the professional activity of that unit. Signages play an important role
As the building has clear spans in the interior that help the user to decide any activities, doors/windows doesn’t affect at all.

**C-14 Public/Private – Space division**

Space division is basically defined/design based on the building plan and the activity in it. The public and private space is divided vertically. The separation should be in such a way the user can deal a visitor from the living room and oversee the living while a visitor cannot.

Figure 14 – Partitions in the studio housing providing the user an ability to add or subtract the space based on the usage.
Partition-walls/curtains are used to divide the space. These can be aligned/blend into to the walls so that they don’t look odd. The partitions can be opaque or translucent or transparent etc sometimes they can be like a mesh that allows natural air through it.

These separations can also be used as a projection scene for the professional activity. One can change the interior colors of the building from one space to other if there is a partition to divide the space. Painting or stickers can be added based on user preference.

**D-11 Visibility/Invisibility – Circulation**

Because the space is compact the studio visibility is transparent. Circulation is smooth one should go through the studio to enter the bedroom. (This is Live-in typology). Circulation for clients and family should be different. Restricting clients to a point and allowing rest for family. In this unit we have a common door for the family/clients and one separate back door only for the family.

Landscape as visibility barrier within the exterior or from interior to exterior or from neighbor to neighbor. Signages in the space helps to navigate in the space. (as the space is not too big one doesn’t need signages) Building materials can be used to define the level of visibility (various materials are available for opaque, transparent and translucent etc).
E-5 Noise/Quiet – Safety and security

The site is pretty secluded and individually. It is designed in such a way that artist has a private balcony and backward. And the entrance is the studio is the only place for possible interaction as the entrances are facing each other.

Noise is generally created based on the type of user and the activity he/she performs. Strong doors/windows, with acoustic barriers can help to improve safety standards.
Work-homes improve the social capital in the neighborhood and makes it feel more secure. Proper lighting in the space creates more safety (natural or artificial). Sense of privacy increases the safety there should be some family space allotted for the family. Landscape can be used as an acoustic barrier and provides safety from the neighborhood.

**F-3 Hot/Cold – Enclosure**

The shape of the structure creates very interesting enclosed space. Enclosure can be used to define the hot/coldness of the space. (Insulation can be added as a part of the layer to reduce the heat exchange). Vents can be placed at the top of the wall exactly below the ceiling which can be used to remove the hot air for the space. Artificial heating and cooling systems.

Humidity is always an issue to maintain the temperature. Natural ventilation helps to cool the space and reduce the humidity especially for the kitchen. (Artificial ways like fan’s and AC’s can be used). Active and passive cooling strategies etc.

**G-22 Clean/Dirty – Finishes**

Most of the finishes that are decided by the architect is exposed concrete. I would say that the overall quality of the building is defined by its finishes. When selecting the finishes, they should have some basic or certain characteristics that benefit the user in the space they are –

- Fire, moisture, chemical resistant
• Serviceability and durable,
• Easy to clean,
• Acoustics.

Skirting is an important architecture element, it helps to maintain the edges clean. we can choose interior which can be dark because those colors are generally dirt proof etc, easily cleanable.

One should understand less the humidity more the cleanliness. Ventilation for the kitchen is required so that it helps to remove humidity, smell and makes the space looks clean. Moisture is dense and stays and tends towards the floor. the Carpets can be used to retain moisture. Other techniques like installing water/air barriers will help the space from exterior calamities and proper care for the plumbing will.

**H-8 Inside/Outside – Acoustic Control**

The acoustic could be a concern because of the compact space and more activities are present in the dwelling. In this case acoustics should be dealt in various cases from space to space or from interior to exterior or from exterior to road. Various types of acoustic materials, carpets etc can be used. The partitions can also have acoustic treatments as their final finish.

Landscape can be used as a sound barrier, If the periphery landscape is dealt properly the user can integrate interior to exterior and extending the space even during the noise time.
I-14 Storage – Space Division

Figure 16 – Storage Spaces in the studio housing.

The storages are not given much preference in the actual design. In this typology the storages can be wall mound. Based on the activity open storage with racks and closed closets for finished works can be used. Add vertical spaces for the storage is more efficient if the structure of the space is tall.

Storages are basically movable/Immovable, or built in. Rigid storages can be used for dwelling and movable storage for the work space. Storages can be used for partitions.
Furnitures, sliding partitions can be integrated with the storage furniture. Floating closets that hang from ceiling this could be an attraction for the space. One can make doors with book cases.

**J-21 Sustainability – Equipment**

The material that are chosen when designing the building are mainly concrete and glass. These materials don’t work in all climate zones the material change based on the location.

Various ways for energy saving techniques can be - active, passive strategies, Natural light and ventilation, double plane glasses to save energy. The door and windows can be designed with a series of layers which can be used for view, temperature control, mosquitoes etc. Solar panels can be selected to heat the water and electrify the home. LED lighting to save energy.
CHAPTER 9. CONCLUSIONS

Currently people are spending money to rent a space and, spend hours of time to travel from home to work. Basing on my research I want to use the design elements and create an efficient work-home unit (mobile or immobile). These units can be made self-dependable by integrating sustainable techniques. This ideology saves time, money, fuel to a person at a micro level but also millions of gallons of fuel, money at macro level. In today's world people are inclining towards work from home or mobile home offices, this idea would take this concept to next stage.

Mobile homes could be cheaper than a regular home hence this can attract all the different economic sections of the society. Mobile-homes can be flexible and can be manufactured at different sizes based on user convenience and budget. Traffic jams will not affect the quality of work in the space.

During my research I have come various books and I have seen various authors representing their work with sketches or images hence that tried to take the logo concept to represent my work and make the user feel more comfortable when reading. I have also studied about various work-homes and the reviews about work-homes given by their users. This helped me to identify the common problems that are existing in this typology. These design elements are identified in the process of solving the problems.
To solve the problems that are existing in the work-homes I have taken a methodology. In this methodology I have taken a set of design components that generally influence the interior space (there are 25 of them) and then I used them to identify the design elements. This proves that every design element that is identified helps to benefit the way in 25 or more ways. As the part of the methodology I created bubble diagrams, to show how the hierarchy of spaces come in these typologies (live-in, near, nearby). I worked on two case-studies to show how these design elements work in the work-homes both mobile and immobile.

When someone asks me what my can my thesis do? I can proudly say with the help of my design elements one can design any typology of work-homes both mobile and immobile. These elements work on both fresh projects, renovation projects etc. I am also proud to say that I have contribute a set of design elements that solve certain general problems exists only in work-homes. My research also makes the building energy efficient and sustainable. This thesis also helps to provide ideas for developing social capitol, improving safety standards, reducing traffic at neighborhood level.

I would like to conclude by saying that by reading this thesis book the reader (does not matter if he has knowledge in architecture or not) can know every minute detail of the work-homes. The reader can identify his/her building requirements based on their user groups.
Figure 17 – Live – In bubble diagram
Figure 18 – Live – Near bubble diagram with separate entrance
Figure 19 – Live – Near bubble diagram with single entrance
Figure 20 – Live – Nearby bubble diagram
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