

## Rebuilding Ramadi in Concept of a Fractured City and Rules of Urban Coherence

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### ABSTRACT

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The suffering and trauma resulting from destruction of cities has generated an intense reaction to citizens, civil organizations and university gathered together and voluntarily to formulate general policies that can restore normal life to work in region and guide and guide reconstruction. Some may press for years for a particular city and regional improvements Such as mass transit, housing, public places, riverfront development, social and economic justice, as well as good urban design. The orientation and guidance of work and reliance on certain principles and rules requires representatives of city to adopt concepts that move from complexity to simplicity and looking for diversity and interdependence and organization within certain limits and hierarchical hierarchy achieves desired urban cohesion and destruction that city has opportunity to apply this within concepts are catalysts for process of interaction among different composites in city, it facilitates occurrence of any gathering can be system-wide. As for urban form, there are no stimulus parts, but every structure or component of urban form is working at least two other components. The various components are interconnected randomly to be integrated into final components of each organic freely interacting between different elements and components. The research deals with formulation of an indicative guide drawn from concept of fractal city and rules of urban cohesion in reconstruction of city of Ramadi "destructive" with community participation at all levels restore city's historical and cultural identity and other aspects that keep it as a living city as a functional, social, environmental and service.

## 1. INTRODUCTION

Throughout The destruction of Ramadi (Figure 1) has been widely echoed, and because city is home to many cultures and university is scattered across its locations, destruction seemed to be on city's identity and history. City is 35 km<sup>2</sup> (Directorate of Urban Planning/Anbar Governorate), a total of its destruction rate of more than 50% (Anbar governorate reconstruction committee, 2016). This act had a shocking impact on lives of people living and working in city, where residential buildings, commercial offices and service buildings with an area of about 20 square kilometers were demolished and nearly twenty thousand of those buildings and houses were damaged with loss of many green areas and destruction of infrastructure and roads. As for employment side, nearly twenty-one thousand jobs (job opportunity) have disappeared in Ramadi and many shops, small factories, workshops, restaurants and residents have left city, and most of those who lost their jobs earn less than five million dinars per person per annum. The number of small businesses has shrunk from 12,000 to only 2,000, while sales of remaining stores have decreased by up to 65% (Compensation Commission/Anbar governorate, 2016), and rest of retail stores that survived, service companies and restaurants are still struggling to survive (field survey). In addition to five bridges, which totally transport thousands of workers, students and shoppers daily to and from administrative areas of Ramadi, and to and from cities of Fallujah and Hit.

The tragic terrorist attacks have damaged urban, economic and social fabric of the city to varying degrees (Figure 2) and this has given an opportunity to reconsider how to build and live in Ramadi.



**Figure 1.** Ramadi city, 2016



small parameter consistency on large scale is due to some positional forces. In coherent system each element affects other elements in some way, elements together create a morphological field that interacts with each individual element, and this interaction is positive or negative [7], and in coherent structure, each single unit for each standard unit is affected by all positional force generated by other element of standard unit and indirectly by external elements of standard unit. Thus, location and body of any element will be affected by all other elements [9, 12].

**Rule VI: Hierarchy**

The small scale is associated with large scale through a hierarchy associated with intermediate scales with scale factor equal 2.7, which appears in fractal cities [4, 5]. The ratios among scales in urban fabric must also be closely matched by forces of this number, which is consistently equal logarithm constant, allowing urban elements to form hierarchically on various scales [13, 14]. The application of concept of fractured city and rules of urban cohesion in reconstruction of destroyed cities results in installation of secondary units that interact with each other strongly and at different levels in terms of size and hierarchy." It can withstand these wars for a longer period (Figure 5).

**Rule VII: Interdependency**

In each part of urban fabric, elements and secondary structures depend on each others; any destruction of any part of this fabric will lead to a malfunction in rest of parts.

**Rule VIII: Decomposition:** The main elements are decomposing into simpler elements. The functionally integrated urban system is composed of components, whole system, if it is decomposable to a simpler point, all secondary systems are fully independent and overall system will lose its complexity [7]. The decomposition helps in decomposing complex system because it shows its internal structure, and city can be decomposed into buildings as basic units and interact through tracks as a stabilizer, oriented by buildings [5] and external and internal space linked by tracks and strengthen by buildings [6].

## **5. THE CONCEPT OF FRACTURED CITY**

Avoid Through looking at mechanism of action for complex life systems, we see need for a variety of different elements correlations, and this variety is through presence of many life components that are correlated together forming a series of reactive components, where some components act as catalysts for interaction process between different components, as they facilitate process of any possible system level gathering. In terms of urban form, there are no parts acts as catalysts, but each structure or component of urban form is connected to at least two other components, where interconnection of different components begins randomly to be incorporated into their interconnections to be final components of each organic that allows free interaction between different elements and components [5].

If we follow definition of a fractured city chronology, drafting of a reconstruction manual guide can be formulated from decisions of urban coherence and from concept of a fractured city. Beginning with definition of [9], cities consist of a major structure with an interconnected secondary coherent structure, and these secondary structures are self-similar; human scale is shown in all its parts. Also they are vial cities

have a larger number of pyramidal links between nodes than in modern cities that appear in these complex cities. While Miller and Sweeney define it as "chaos engineering", based on a form that is varied in volume and direction, containing chaotic structure that regulating itself through self-repetition [15]. The system evolves, relying on initial conditions of system formation. It is similar to anatomy of human body; neurons, blood vessel networks, nerves and fiber are repetitive geometric stereotypes. While Lawrence Wolfgang defined it as cities that adopt repetition and gradient by analogy and employed concept of self-similarity, it is an invitation to inspiration from nature and this does not mean reproduction but translation into architecture through a simulation of rules of generation of their forms, based on multiplicity of measures, and complexity of forms result of its repetition according to a certain pattern and rules, which is reflected from smallest part to whole and this reflects the introduction of these concepts in ancient architecture [16]. Another definition of Salingaros in 2003: "This is most enjoyable city, it is a fractal in tracks, roads, facades and selecting trees [10]. It has a bond structure in all measures and with hierarchy from too big to very small as medieval cities." These concepts imply that " world was fractured. The fractional is an approximate or fragmented geometric form that can be divided into parts, each of which (at least almost) is a low-volume version of whole, and this is subjective similarity. But even more fractured, they are hidden and in harmony with nature that is stand on a form of symmetry, symmetry on a scale, which generally means that through a series of metrics we find in each range complex patterns of system [17].

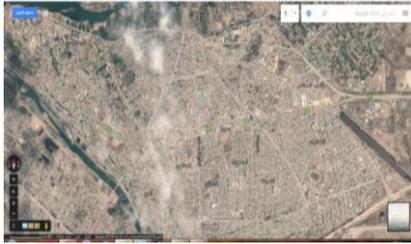
## **6. STUDY STATUS: REBUILDING CITY OF RAMADI, COMPLEX LIFE SYSTEMS**

### **6.1 Civil reaction after disaster**

The city has never been attacked before, so suffering and trauma resulting from event has generated an intense reaction to citizens, civic organizations and university have come together voluntarily to formulate public policies that can restore normal life and conditions for working in region and to direct and guide re-construction, and some may press for several years for a particular city and regional improvements such as mass transit, housing, parks and public places, riverfront development, social and economic justice, as well as good urban design. What was organized in this research is drafting of "Rebuilding City" guide, which gives a community a civil voice including residents of Ramadi, business sector, community advocates, artists, academics and planners, as well as city officials, all have to meet regularly to discuss, research and develop collective visions that could create a new center of town. Through questionnaire, search now represents thousands of votes from people directly affected by destruction of city which can be called "voice of Ramadi".

### **6.2 Historical profile**

Ramadi is administrative and cultural heart of Anbar governorate. This center was identified as a private historical sector by city, narrow streets of Ramadi, which precede era of cars, and gradually entered a mixture of many buildings built in 20th century (Figure 3).



**Figure 3.** Ramadi city centre

**6.3 Economic and social changes**

From previous definitions, Ramadi is a microcosm of relationship between diversity and complexity on one hand and their interdependence in fractured city, that overall needs of city community in twenty-first century differ from those that existed in late twentieth century with economy and social changes resulting from globalization, where knowledge is generated and economic base and gender equality in workforce. The economy requires intellectual and technical skill of service workers, and emergence of service industries is main source of wealth production that has changed characteristics of workforce from basic task to basic knowledge. However, most significant change from a land use point of view may be proportion of women in workplace, with women making up 26% of workforce and wage-earning households totaling 15%, women with a bachelor's degree 23% and 4% of those with a master's degree while increasing Women's ownership of small businesses increased from 1% in 1970 to 4% in 2013. Nearly 64% of married women in workforce have children under age of six Ministry of Labor and Social Security, Anbar Supply Center, [2016].

**6.4 Vision for future**

The widespread devastation of Ramadi provided an opportunity to create a vision of Ramadi based on human values that drew life from its urban cohesion, and that must come back to life as well as its search for a 21st century

lifestyle. The city of Ramadi to new uses of land with changes in urban form, transport and communication between them, region and world in a sustainable way. Reconstruction requires an understanding that motivates individuals and businesses to shape their neighbourhoods, and that it is essential for built environment to attract and serve people who provide culture and creativity, which empowers power over gray society and economy and enriches cultural life.

**6.5 Changing identity and diversity of jobs**

Since 19th century identity of Ramadi city was based on trading, in 19th century many businesses moved to city center, and business mixed use with its new transport and easy access to regional sites and infrastructure for advanced history. Hence, commercial, financial and service services must continue to be an important component of economic components of Ramadi, but its size and function will change significantly after recent events. It should be emphasized that "continued diversification of region to a much economically complementary and socially complementary is probably desirable", we also suggest that identity of city of Ramadi may change with potential birth of knowledge-based industries (for presence of university). Housing in city is like a student on fuel and continues to expand to residential neighborhoods of Ramadi, but rate of growth and installation will depend largely on housing policies and decisions regarding land use," for example, providing low support to middle-income residents to achieve diversity in Income and age.

**6.6 The industry of cohesive city of Ramadi**

Rebuilding means rethinking how urban, social and economic functional context of Ramadi should be in 21st century, and how Ramadi can be reshaped in a coherent and sustainable way. Hence, two documents can be drafted for a report of principles that are a guide that simulates concept of a fractured city and laws of urban coherence (Table 1), and a structure for an urban design that rebuilds city of Ramadi (Table 2 and Table 3).

**Table 1.** Guide of urban coherence from its eight rules

Basic vocabulary	Main vocabulary	Secondary vocabulary
Coherence	Interdependence	Elements
		Scale
	Diversity	Information
		Functions
		Activities
		Facades treatment
	Border	High treatment
		Different patterns
Powers	Different designs	
	The edges	
Organization	Confluence surfaces between:	
	Spaces - Population and Stranger	
Hierarchy	Contrast texture, building materials	
	Contrast color	
Overlapping reliability	Enrichment in confluence surfaces	
	Contrasting units in charts	
Analyzes elements into simpler elements	The Part (place level)	
	All (holistic level)	
	Scale	
	All on parts.	
	Items on each other	
	Buildings as basic units	
	Tracks as a guide by buildings	
	Outdoor and indoor spaces	

**Table 2.** Drafting of guide rebuilding principles to in light of urban coherence

<b>Self-determination:</b> The state and city must abide by processes of transparent planning and give civil and community votes directly from quarter and from neighborhoods and places concerned with target at planning table.
<b>The commemoration</b> of city center, which witnessed death of thousands of its residents and citizens from other cities of innocent people of all cultures and religious beliefs, it is a testimony to surrounding community and to near and distant life that responded to this tragedy. A memorial will be erected in honor of martyrs and their families in celebration of spirit of man and continue to make symbolic sense to him with all world.
<b>The ability to live and balance</b> develops city center with a fresh eye, inviting all residential and commercial elements and places and community services that contribute to role of mixed use and clear connection between other neighborhoods.
<b>Culture and arts</b> i.e., humanizing arts, giving voice, motivation, education, social, building trust, attracting business, and necessary to renaissance center of town and revive it economically.
<b>The productive strength</b> of Ramadi city is in intellectual, technological and creative skills and hard work of city's people, with search for new key sectors, individual entrepreneurs and small businesses as well as large ones.
<b>Decentralized communication technologies</b> now make it possible for many business sectors to spread without losing coherence and making high-density clusters less necessary.
<b>Building sustainability</b> for a healthy and safety neighborhood.
<b>The diversity of historical personality of Ramadi</b> reflects diary of vibrant communities and convergence of cultures of workforce and energies of local colleges with multicultural student bodies that are preparing to inherit an equal share in city's future.
<b>The efficiency of transportation</b> characterized city of Ramadi as a surface and under surface needs axis of transportation subway, buses, water transport, features of external scene and links of pedestrians links, equipment, sanitation and security, provided that these services support future needs without burdening other neighborhoods.
<b>The foreground of architecture of place</b> is popular art, which is a measure of values and education.

**Table 3.** Drafting of design engine in developing of fractural city

<b>Urban Engine Design of Urban coherence</b>	
Symbolic identity	Memorial statue Museum Financial Center Historical Centre Easy access to riverfront Water vision
Economic/social diversity	Mixed use (80% of housing with low and medium incomes) Mixed-income Different cultures Different age groups Training of the disadvantaged (non-beneficiaries)
Economic development strategies	Funding Technology Higher education (currently three universities, 30,000 students) Health care Biotechnology Small enterprise Tourism and hotel Management Cultural and documentary places Street-level retail sales uses Flexibility for future development
Easy access and communications for Ramadi and other neighborhoods and region	Train (Track) Subway Light rail Ferries
Mobile Communications Easy Access and Communications - Mass Transit	Public transport stations and assembly areas Facilitate pedestrian traffic to and from transport Fixed and electrical safety standards Disposal of multi-fare transfers Facilitate transport
Navigating through street surface	Use of administered street Re-dominating network streets in center Arterial roads (6-lane highway) Maintaining historic streets Street surfaces, lighting, signaling boards and sanitary designs Easy Access – Streets Sufficient space for vehicles and pedestrians, including pavements Security Pedestrian level of service standards Connecting neighborhoods Bus spaces Easy access to riverfront
Urban form	Scale Mass volume

	<p>Assembling buildings, configuration and height</p> <p>Street width</p> <p>Street Network</p> <p>Various architectural styles</p> <p>Building's diverse style</p> <p>Waterways</p>
Open spaces	<p>Stadiums (open and covered)</p> <p>Networks and communications for open spaces</p> <p>Semi-private patios</p> <p>High on roof.</p> <p>Ferry platforms</p> <p>Arcade</p>
Nature and buildings sustainability Nature	<p>Set up parks and trails (for jogging, cycling, skiing), seating</p> <p>Successive buildings that allow daylight and use of towers for wind, river vision and identification of communication shadows (Lascelli, internet and broadcast) heating and cooling</p> <p>Solar heating Construction, heavy green structures, green roofs, shade sites, groundwater for cooling, heating and water collection for green areas (reuse of wastewater)</p> <p>Wastewater disposal</p> <p>Co-generation within buildings</p> <p>Waste and recycling capacity</p> <p>Communication devices (reception and transmission)</p>
Social services and civic comfort	<p>Personal services (food, treatment storage, cleaners, etc.)</p> <p>Professional (doctor, lawyer, teachers, etc.)</p> <p>Restaurants, cafes, etc.</p> <p>Identity</p> <p>Schools General</p> <p>Special Colleges</p> <p>Mixed-use schools culture and recreation</p> <p>Open and closed art and practice spaces</p> <p>Programming comfort and general pleasure</p> <p>Museums</p> <p>Movies</p> <p>Health</p> <p>Clinics</p> <p>Medical offices</p> <p>Hospitals (Educational)</p>
Urban issues Cars and trucks	<p>Parking</p> <p>Traffic</p> <p>Air pollution (CO<sub>2</sub> emissions)</p> <p>Noise</p> <p>Safety on road</p>
Laws and application	<p>Make existing environmental legislation binding</p> <p>Patre Park City residential and commercial use as a green guideline</p> <p>Imposition of an assessment certificate (LEED)</p> <p>Incentives for sustainable development</p>

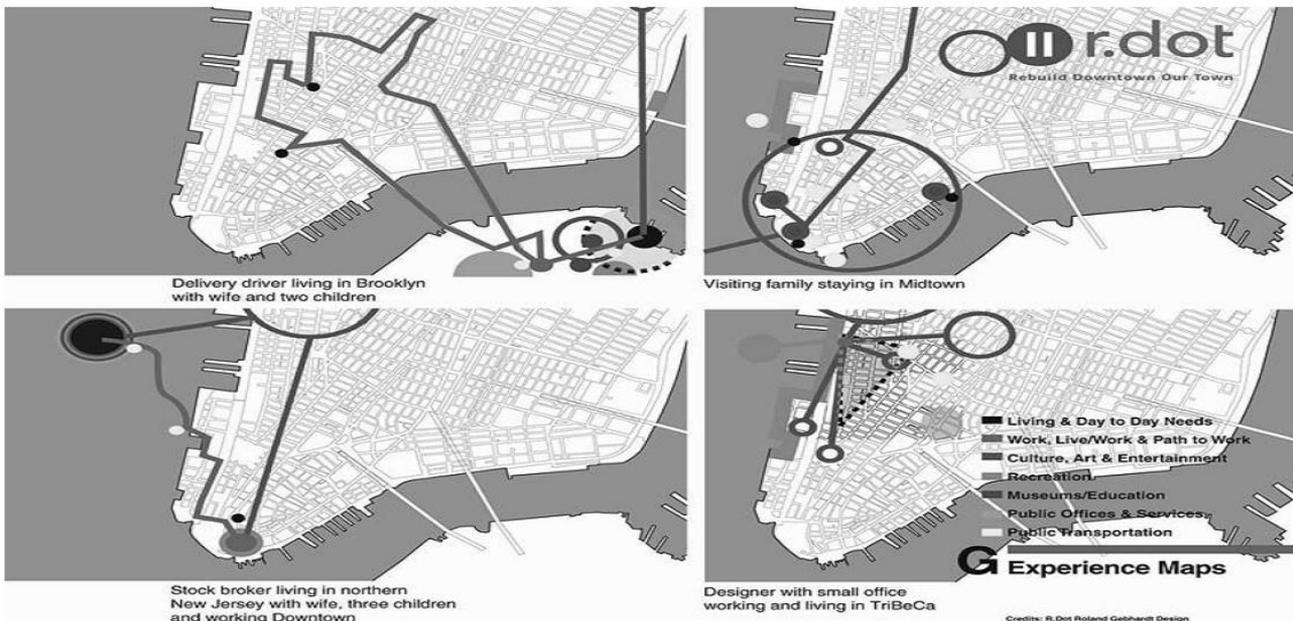


Figure 4. The maps for different types of individual uses of city center region [24]

## 7. DRAFTING GUIDE

Williams et al. referred in 2000 that "prerequisite for achieving a sustainable urban form is by figure out what it is," and to achieve a sustainable city must be clear and common, complementary to concept of what it will look, how it will work and how it will change over time [18]. In a review of several books on sustainability, Stephen Moore wrote in "The Architectural Education magazine" in 2000 and noted that there were significant differences in use of word, where he did not explain "use of terms "green" and "renewal" and "environmental" or "bio-climatic" architectural which gives meaning more accurate. Stephen Moore gave examples from a variety of perspectives, such as Katherine Slyseur in term eco-friendly in 1997, where idea of environmental hypothesis was introduced as a model [19]. As for Steele in term sustainable architecture in 1997, believed that environmental hypothesis is a political and economic doctrine [20]. While David Lewis-Jones introduces study which it argued that environmental hypothesis requires a recovery from essence or fundamental margin. In environmental construction technology, Klaus Daniel Alam 1997 focused on a series of experimental tests of construction practices [21]. The term sustainability has been used in this research based on several of above meanings and ideas of a group of civil activists, including many city planners who insist on making city a more livable and sustainable place for life, thus including concepts: people, buildings, pollution and Urban form, transport, communications, legislation and public investment (Table 3, Figure 4).

## 8. SEQUENTIAL STEPS TOWARDS RECONSTRUCTION

It requires research into main concepts that have been reconfigured from laws and principles in forms (4, 5, 6) as a key stage to guide re-establishment of business:

First: Human sustainability

As a result, human sustainability has set tone starting with recovery efforts in Ramadi, and reached its peak in discussions with workers, residents and staff of those affected, and so were also issues such as sustainable economy and carbon dioxide emissions. Strict environmental guidelines for pollution are caused by debris transportation and rescue efforts over a nine-month period.

Second: Population infrastructure

The city of Ramadi is a city within city. That's because people are consumers of infrastructure. Alliance for Downtown NY (2002), types of infrastructure needed by Ramadi must come from customs and values of those who will use it as residents, employees, employers and visitors, and infrastructure must be able to accommodate current needs and be flexible enough to change with future needs [22]. To revive area, this definition is based on belief that infrastructure functions are managed through human activities such as eating, sleeping, communicating, interacting, business procedures, having fun, creating art and sharing, or watching shows, thinking, playing, sports, traveling and recreation. And to show how ideas of these activities affect infrastructure and land use, industrial designer Roland Gephardt, co-chair of City Infrastructure Commission like Manhattan, created a series of From empirical maps showing how people in their different lines of work are using infrastructure (Table 3), which showed

that "cities must be places where people want to live unless cities are seen as high-quality environments and there are no opportunities to remember that they will be sustainable forever [23].

Third: Transport

Ramadi is one of most business-focused areas in Anbar governorate, but its transport infrastructure has not improved significantly in nearly four decades. The most important factor will be size of city's work base and office markets, and extent to which this web can be restored and improvement and expansion will largely determine how many workers region will support. "Civic groups also express that improved mobile infrastructure should be a multi-model hub with long distances for rail, subway, bus and water ferries, as well as construction of subways and tram tracks that must be built. All of this is crucial to successful economic future of Ramadi.

The unexpected consequences of destruction were now a development of something, and city of Ramadi as an existing island and bridges in use, which could build facilities for metro bus system station at least. Now, outer neighborhood where period of 25-35 minutes is not crowded and ride without hesitation. The typical street coverage in Ramadi includes single-level walk and streets that span with retail shops, restaurants and cafes with little traffic by proposing overhead bridges or tunnels. Thus, we must believe that street level of vitality of pedestrians should be given highest priority to encourage individuals and companies to stay in area and attract business, and this also means taking measures to provide road safety (especially for children), low noise, air pollution, dirt and congestion. Many areas of Ramadi interfere with pedestrian traffic with cars on streets, where pavements are not wide enough to accommodate pedestrians, double truck parking and traffic obstruction as well as few off-street parking spaces. This is why this research suggests that managed streets (programmed for use of car) within narrow and winding roads of historic area besides parking lot outside ring street of center (Public Street and 17th Street), and urban scheme to reduce use of vehicles by reducing and Parking and high parking fees with extensive taxi processing and promotion of mass transit are alternative forms of missing surface traffic (e.g. small vehicles and pedestrian traffic solutions), which must also be intertwined in overall transport planning.

Fourth: Urban shape and buildings

The attractiveness and design of Ramadi depend on its character in urban form and scale, such as size of its blocks and diversity of its building types and architectural styles. Not less than public investment in allocation and design of civil facilities (schools, health, culture): symbolism, scale, diversity of parks and land, access to riverfront and axes of vision that attract private development (housing, offices, retail stores and entertainment).

Reconstruction provides an opportunity to rebuild using best techniques in sustainable planning, building design and energy efficiency. Other changes can be made on a broader scale, such as recognizing importance of riverfront in Ramadi as gardens, entertainment and boating while reducing carbon neutral zone, and assuming that carbon dioxide emissions are radically compensated by carbon-absorbing plants. Highly efficient centralized systems use cogeneration technology that can support mixed uses and actively 24 hours a day, and can reduce dependence on oil and fossil fuels.

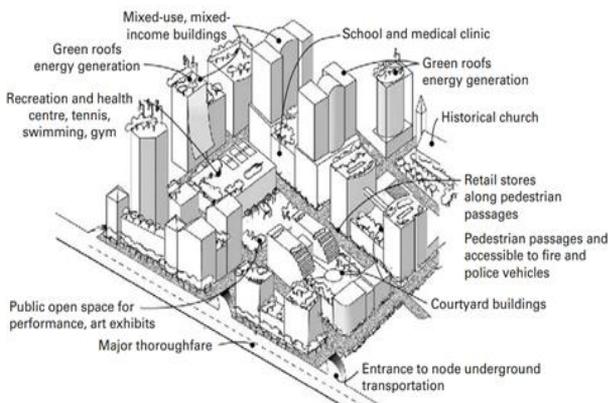
Fifth: Sustainable legislation

The redevelopment of city center site must be accomplished with a net zeroing of carbon dioxide emissions from energy

used on site and platinum rating under Energy and Environmental Design Leadership Program (LEED) of U.S. Green Building Council, and these legislators own Regulatory powers to delegate to application of guideline and guideline principles for environmental design. Today, LEED authority for these principles is required for all buildings in it.

Sixth: Organizing complexity of society

The neighborhood complex grows organically and largely, and is a unique phenomenon for those cities, these nodes tend to grow naturally around intersections in public transport networks, and as a result it can be planned as part of dual planning strategy for planning and urban transport combined. The large transport network with a large population and diversity in neighborhoods is likely to form, and these intersections have become areas requiring public investment for civic amenities. The neighborhood complex has a large enough population to form a free-standing community, qualified for schools, health care, police, fire protection, postal and banking services, open spaces for playgrounds and parks. These complexes are small and sufficient at same time for professional and commercial services to be available within walking distance and provide services such as grocery stores, fast food restaurants and laundry shops. In vertical urbanization of Ramadi, neighborhood complex is high and medium height and usually includes offices, apartments or hotels, and all retail shops on ground floor with limited parking services. Some of these buildings may contain schools and health services. The high height of buildings is result of desire of many people to live and work in same place, and choice of people for these places of diversity of most important reasons: mixing of people who participate in same work, cultural and recreational interests, living near forests, mountains or beaches, or enjoy a certain kind of climate.



**Figure 5.** A conceptual idea for mixed, self-sufficient use of ability to walk for secondary unit [24]

In urban areas there are small things related to quality of life that make life acceptable and livable such as trees, plants and flowers on pavements, small gardens and cultivation of buildings, which have become essential such as safety, cleanliness and preserved streets. The city of Ramadi should be easily accessible to personal services for a maximum of ten minutes by walk, and mass transit should provide access to museums, art centers, sports stadiums and government services that may be located across city from neighborhood complex. Market management with private investment must be organically linked to itself as a generator (transport, housing, schools, health services, safety, open space and access to riverfront) is created by public investment, this

concept of organic mixed use differs from idea of post War for multiple planned uses in a single or assembled building, such as internally mixed organic uses on many cluster areas (Figure 5). Social, economic and environmental justice depends heavily on combined transportation in order to integrate a percentage of households with low and medium income in each living node, and lesson learned from events is in disaster situations and when public transport is disrupted, services of low- and middle-income families will be low-income and middle-income families. It is urgently needed, firefighters, police, health care workers, workers and food supplies must coexist close to them in order to provide immediate assistance, and this interconnection briefly addresses issue of multi-income and diverse neighborhoods alike.

**9. CONCLUSIONS**

It is the civil (academic) work that introduced all forces in achieving interdependence and effectiveness of diversity and organization within a hierarchy has stimulated to help shape policy of reconstruction, and to be participated from beginning as an embodiment of mutual reliability in revitalizing affected neighborhoods of Ramadi. The population was rational and indulged in aftermath of tragedy and contributed to analysis of main elements to simpler elements, and one of main reasons of writing research was to prove that much of democracy, globalization, creativity, social integration and productive economic production in coming period of city Gray can grow organically from rubble.

**10. RECOMMENDATIONS**

By 2020, all concepts mentioned in research that have been conceived are still under consideration, and there is strong evidence that concepts discussed above will become public policy, and that policy-making process will be slow and disabling if difference of objectives among decision makers remains. The policy and planning decisions will guide future development of Ramadi to test and have not yet been finalized. There is a recommendation by researchers as an invitation to an international design competition that can be addressed to a team of architects and engineers specialized along with university in achieving various elements of site within decisions of urban coherence and concept of fractured city.

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