

Vacant to Vibrant: Infill and Urban Renewal of Gateway District

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Vacant to Vibrant: Infill and Urban Renewal of Gateway District

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Master of Urban Design

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Abstract

Influenced by the Interstate 10 freeway, Gateway district began to decline in the 1960's, and became further isolated from the rest of the city due to additional freeway development. With 300 acres of vacant land, the Gateway neighborhood has become a place lacking of service and livability, with low economic investment and poor living conditions. This project explores strategies for infill, and urban renewal and vibrancy, turning the Gateway district into an attractive place for investment and living. The vacant is infilled with new development, providing more open space, housing and services, and improving the environment and living conditions in this area. The goal is to transform Gateway district from vacant and decline into a new vibrant community.

Key Word: Vacant, infill, renewal, Gateway District, vibrant, lively community, investment

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1 Introduction

“In the urban planning and development industries, infill has been defined as the use of land within a built-up area for further construction, especially as part of a community redevelopment or growth management program or as part of smart growth.”—Dunphy Robert (2005)

Urban infill is a design strategy that focused on the redevelopment of vacant land and brown field to make a compact city, thus to reduced human carbon footprint and automobile use. Urban renewal usually refers to land redevelopment in areas of moderate to high-density urban land use.



Fig. 1

Urban sprawl started in United States from 1950s, is the main factor that caused problems like global climate change, environmental problems like water pollution and air pollution. As the progress of urban sprawl in the past, many vacant lands have been left in urban areas, which have many negative impacts to the neighbor and city. Vacant lands caused low investment and low tax; also create many social problems, for example, safety issues and lacking of sense of community. There is urgent need for redevelopment of vacant lands, as it is a way to confront urban sprawl, and also, redevelop vacant lands could bring social, environmental, and economic benefits. The following article will pick Gateway District in Phoenix as an example, to discuss the opportunities and barriers of infill and urban renewal, and the strategies to use infill and urban renewal to transfer Gateway District- a declined neighborhood- into a vibrant and lively community.

**Fig. 2**

2 History and background



Fig. 3

2.1 Overview

Gateway District located in the southeast corner of Phoenix (see figure 4), is the birthplace of Phoenix. For more than 1000 years ago, the ancient Hohokan people lived in what is now Phoenix, the culture center of their city, known as Pueblo Grande, was located in what we now call the Gateway District. This district has been gateway to Phoenix for many years, with Van Buren serving as the major connection to Phoenix and Sky Harbor Airport; Van Buren emerged as a tourist corridor accommodating newlyweds and auto-tourists.

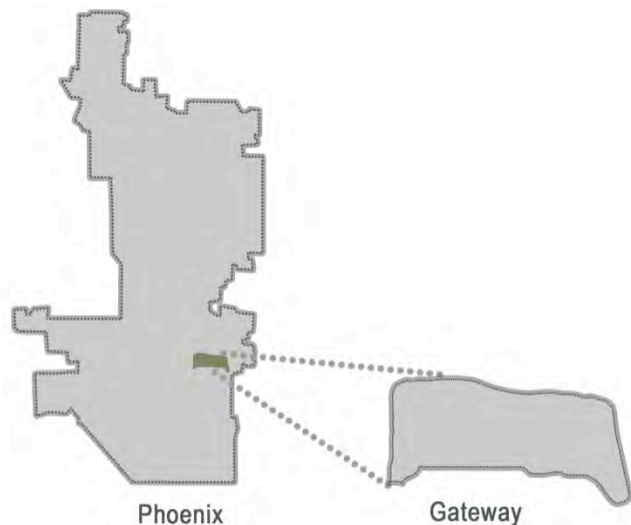
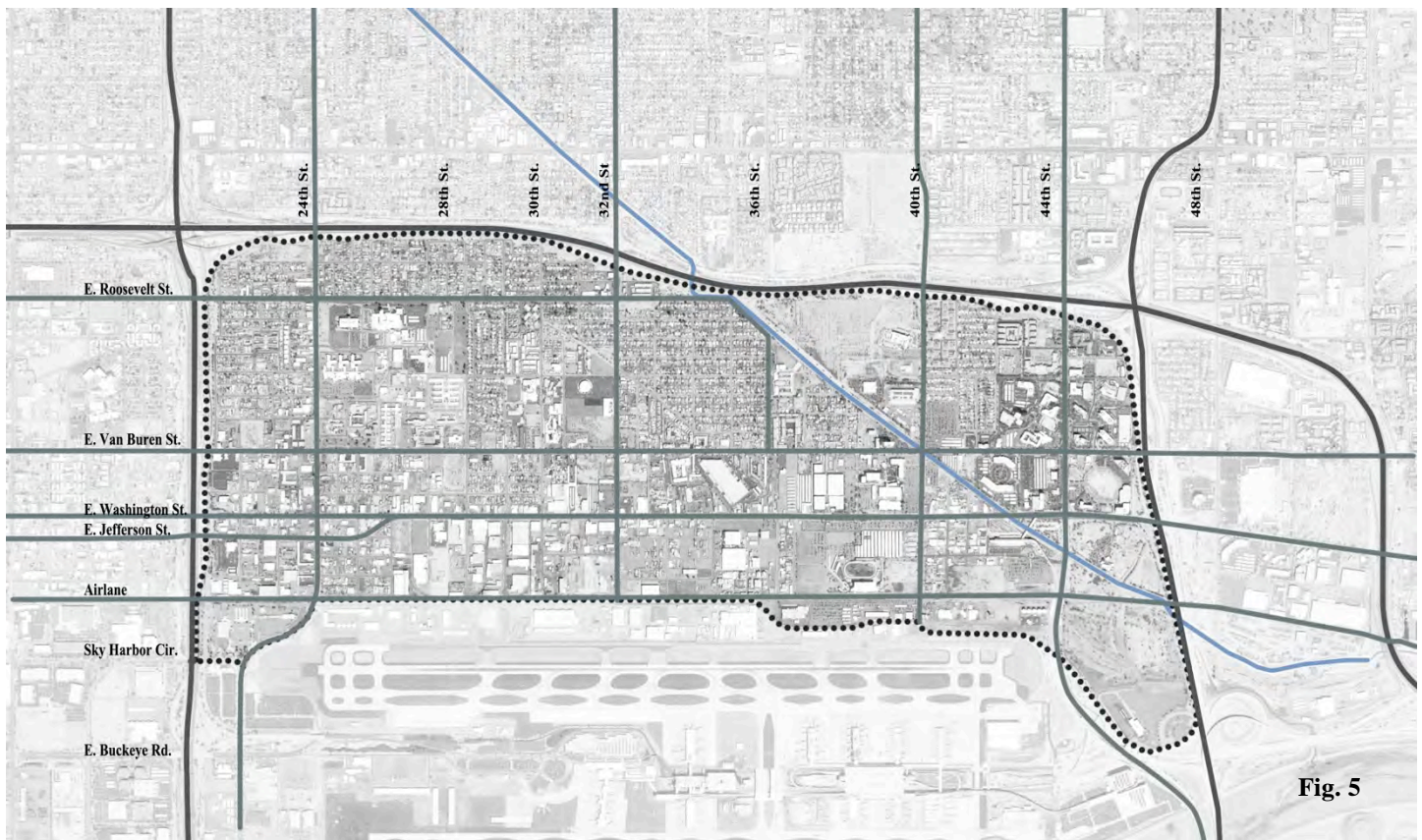


Fig. 4



Influenced by the Interstate 10 freeway, the expansion of the airport and the industrial development, Gateway district began to decline in the 1960's, Van Buren Street lost its importance, tourists were attracted to newer shopping malls and hotels; the commercials along Van Buren corridor declined, the used to be stylish and modern motor courts became cheap, temporary housing and hourly motels. Gradually, due to the additional freeway development, Gateway District became further isolated from the rest of the city; and eventually, commercials died and removed, results in 300 acres vacant land remain in Gateway districts. As the result, the Gateway neighborhood has become a place lacking of service and livability, with low economic investment and poor living conditions.

2.2 Opportunities and Barriers

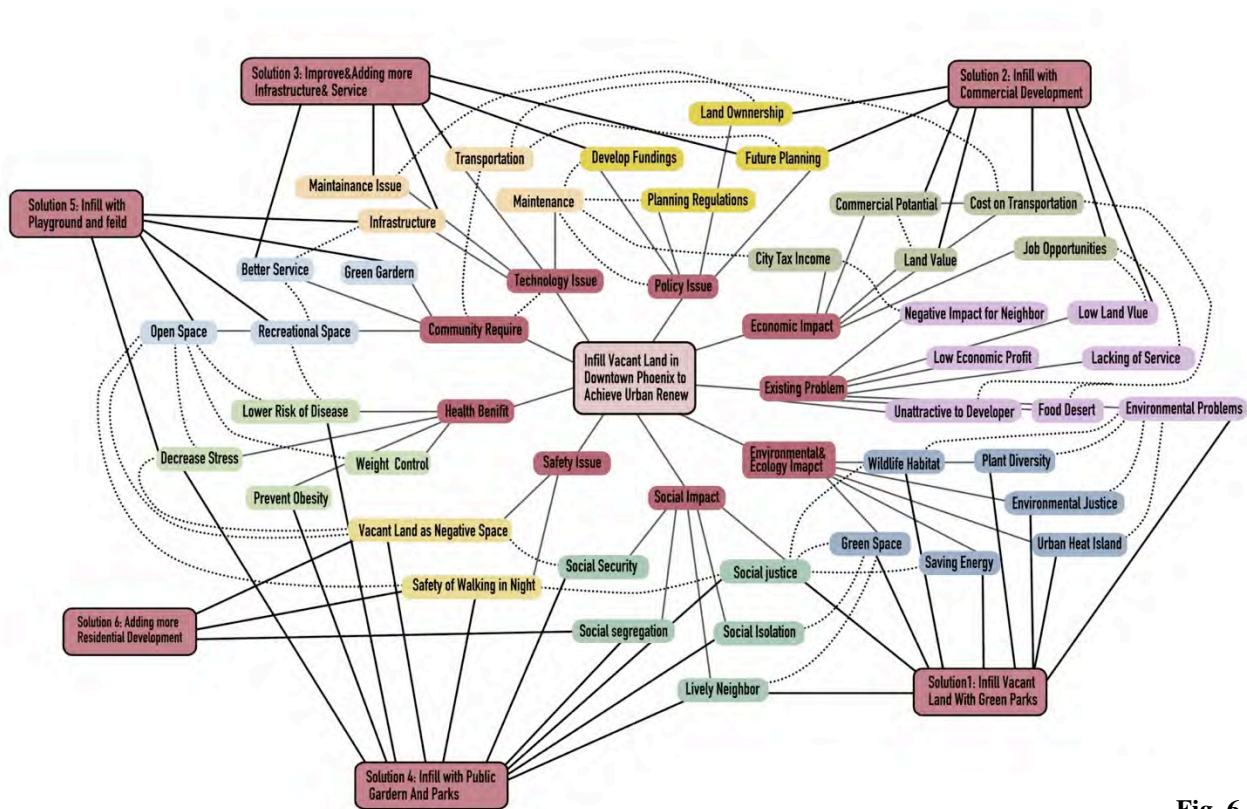
2.2.1 Opportunities

The first one is social opportunity. There is an urgent need for urban infill. As the negative outcome of urban sprawl, there are a lot of vacant lands in downtown Phoenix and Many districts and communities are declined. There are many social negative impact of vacant land, such as social isolation, as vacant land divided communities apart. And creates a lot of safety issues, residents has low sense of secure to walking in the night. Also, as the declination of community with large amount of vacant land, the sense of community is low. Therefore there is a call for urban infill and redevelopment of vacant land in social aspect.

Secondly, there is economic value of urban infill. Infill and redevelopment make good economic sense, both for developers and the public. Vacant land and brown fields means low investment, and low tax income. Infill development of vacant land and brownfield will benefit the public no matter what they had been developed into. Open space or green space been developed into vacant land, they benefit public with more open space and better community environment. Both commercial and residential can create more job opportunity and more service for public, and also could increase the property value of the community and tax income. As for the developer, compare to green field in suburban are, there are already infrastructure and amenities constructed around the urban vacant land, they can save money on them. And also, mature community could provide stable customer and attract new customers. Closer to downtown is also a huge location advantage that will increase the property value. Being close to town is an amenity, ensuring shorter travel times o services and allowing for multiple modes of travel including walking and cycling. Reduces infrastructure costs and improves the town's economy and vibrancy. Reduces costs for providing services such as fire, police and infrastructure maintenance. Meaningful rural

open space is protected

Finally is the environmental value. As Sierras said in the book “In communities across America ‘sprawl’—scattered development that increases traffic, saps local resources and destroys open space—is taking a serious toll.” The global climate change affects everyone, as the temperature in summer is getting higher than past, made the desert city, which is already too hot for human even worse. People are suffering from air pollution due to the over use of automobile, There are an urgent need for all citizens to have a better environment to live, with more open space and clear air. Moreover, in the perspective of protecting ecological balance, there is a call for stop taking over green space and preserve wildlife habitat. “A key challenge in achieving the dual goals of climate change planning is that the land-use policy options to address adaptation and mitigation many conflict... The key land-use pattern implication of climate change mitigation is concentrating development so that car travel and building energy use is reduced; it brings a strong new impetus to the existing anti-sprawl/smart growth campaign.” (Hamin & Gurran, 2009) According to the U.S. Environmental Protection Agency in “The Transportation and Environmental Impacts of Infill Versus Greenfield Development: A Comparative Case Study Analysis” cases studied suggest that “in the right conditions, infill development can make travel more convenient by reducing travel time, lowering travel costs, and lessening congestion. Infill development can also cost significantly less, in total public dollars, in private transportation dollars, and in externalities. Finally, the results suggest that infill development can improve community environmental quality and inputs to quality of life such as accessibility. This study concludes that infill can produce non-trivial transportation, environmental, and public infrastructure cost benefits.” Communities can create incentives and design standards for compatible infill development in existing urban centers adjoining commercial areas, strip centers, or neighborhoods.



2.2.2 Barriers

Although there are many opportunities as discussed above, there also some barriers existing and impeding the urban infill.

Firstly is the economic issue from developers' point of view. Infill and redevelopment projects often cost more to build than raw land projects. "Hard costs, such as land, site preparation, construction, and parking vary widely but generally run more for infill and redevelopment. Typically soft costs, such as survey, architecture, engineering, legal, permitting, and marketing, also run more due to design challenges and public process requirements inherent to infill and redevelopment projects. The marginal cost of infill may be greater than for development on the

edge of the urban area.”(Otak, 1999) Thus the profit is relatively small for developer. Another economic issue is the reduced marketability, as in most declined communities, the situation is low quality of education and crime, and those factors could possibly lead to the poor quality of infill development, and reduced the marketability of redevelopment.

DEVELOPMENT COSTS (per s.f. of floor area)	INFILL	SPRAWL
Land	\$15-20+	\$8-12
Site and Off-Site Preparation	\$5-10+ (toxics)	\$5-10+ (infrastructure)
Hard Costs: Construction (wood frame only)	\$60-65	\$45-55
Parking (infill-structured parking; sprawl- included above)	\$15-18	\$0
Soft Costs (40% of hard costs)	\$32-37	\$20-26
Contingency (5%)	\$6-7	\$4-5
SUBTOTAL	\$133-157	\$82-108
Profit (15%)	\$20-23	\$12-16
Marketing	\$10-11	\$6-8
TOTAL COST	\$163-191 / s.f.	\$100-132 / s.f.

Source: *Building Livable Communities: A Policymaker's Guide to Infill Development*, Local Government Commission (1995).

Fig. 7

Secondly, there are problems about land ownership and scale limitation. As the vacant lands in urban area often has different ownership, this situation creates a lot of coordination works and difficulties for developer to buy the lands from several owners. Moreover, compare to green field in the edge of city, the scale of vacant land is relatively small, and limits the projects that can be developed inside, which eliminate large scale development out, and push them to the green fields.

Finally, there maybe some negative impacts of the infill development in urban area. Although a

more impact city could reduce the global climate change, however the consequence of urban infill development could have the possibility to influence the microclimate. “It is equally possible to conceptualize scenarios in which mitigation and adaptation goals are in conflict with each other. For instance, urban containment through higher density often results in a loss of permeable surfaces and tree cover, intensifying storm water and flood risks associated with changed climatic scenarios, and in some climatic conditions exacerbating the discomfort and health impacts of hotter summers. Strategic planning processes are intended to provide a way of resolving competing goals.” (Hamin & Gurran, 2009) Which means, in the same time of positive impact to the global climate change, urban infill will possibly increase the negative impact of urban heat island and other problems in smaller scale.

“Factors that influence the choice to use motorized or no motorized transport are based primarily on two fundamental aspects of the way land is used: (a) proximity (distance) and (b) connectivity (directness of travel) (16). Other factors, such as travel cost, environmental quality, and aspects of convenience and access (e.g., parking availability) are also likely influential. Proximity relates to the distance between trip origins (i.e., where one is) and destinations (i.e., where one is going). Proximity is determined by two land use variables. The first is density...the second is land use mix. “(Saelens& Sallis& Frank, 2003) Coordination between settlement and transportation is necessary, and it is important to built city in smart growth strategy, and there is urgent need of urban infill development in cities like Phoenix. Rather than grow horizontal, Phoenix should grown more vertical, and become a compact city to seek further development.

To sum up, the barriers are most about the input and revenue—whether the interests are good enough to worth all the trouble developers go through? And the answer is positive, Gateway District has a lot of opportunities and advantages to earn the investments.

3 Methodologies

3.1 Site Analysis

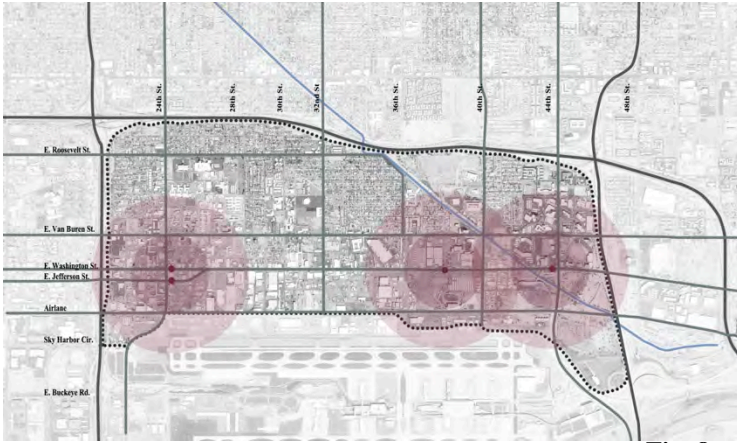


Fig. 8

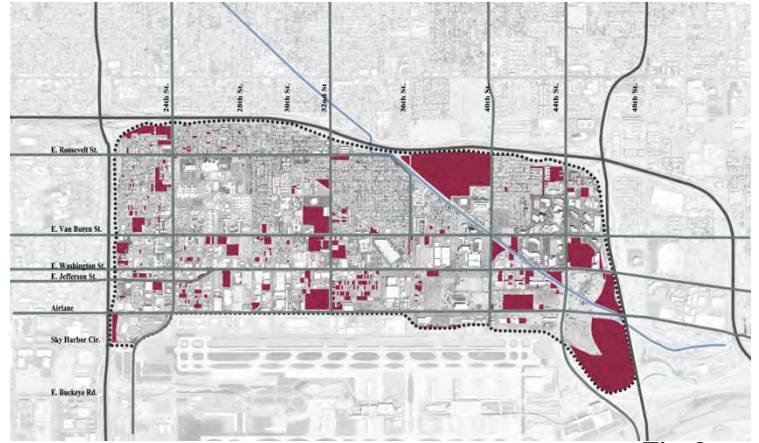


Fig. 9

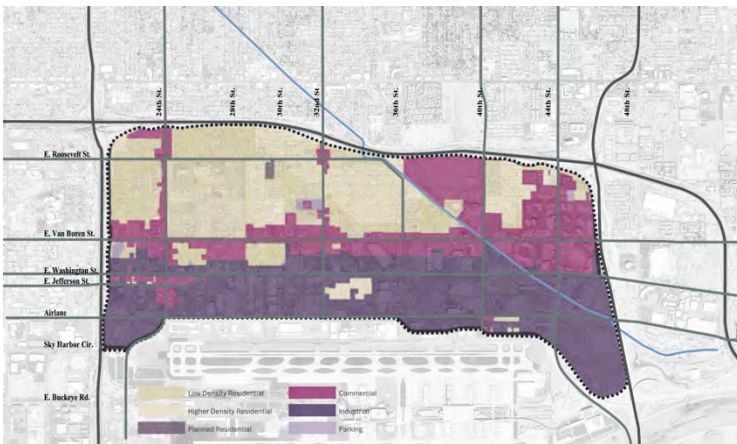


Fig. 10

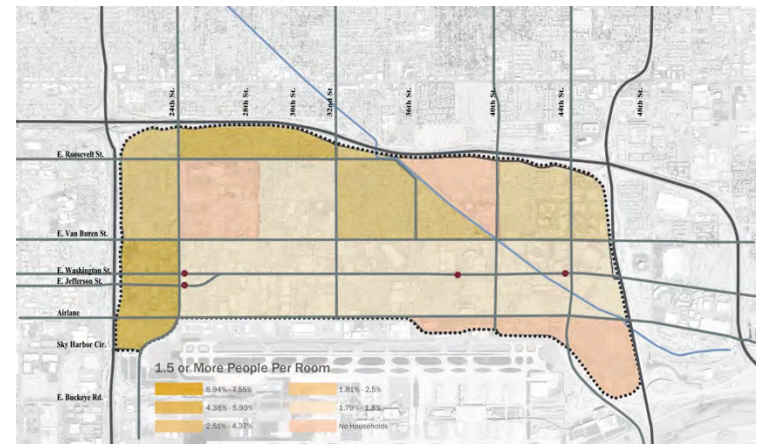
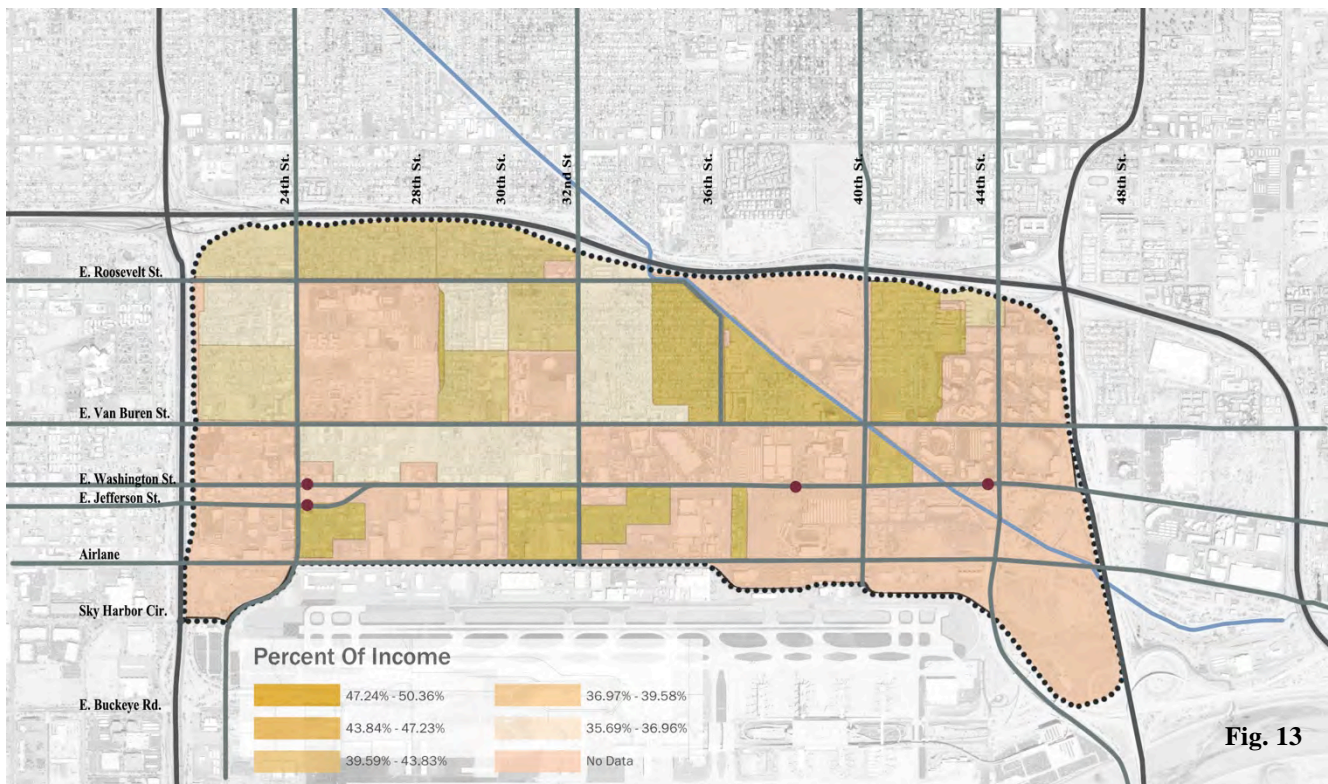
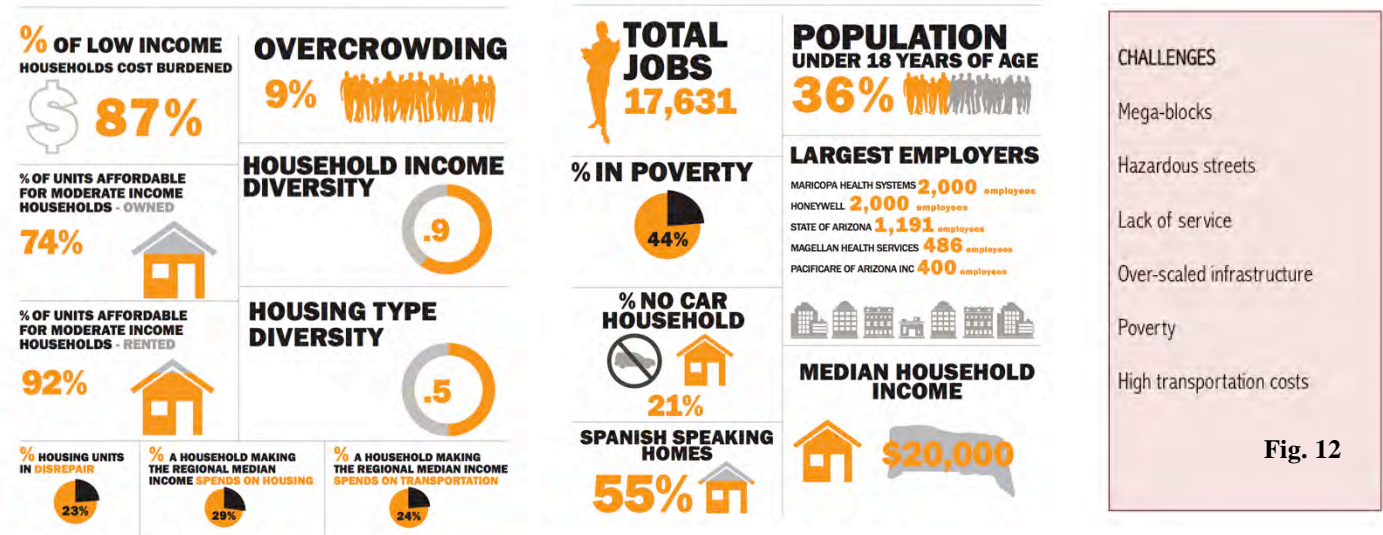


Fig. 11

There are 300-acre vacant lands in total in this site (see Fig 9), and a light rail corridor passing through, results with 3 light rail stations along Washington Street (see Fig 8). There mainly three kinds of land use inside this site. Along the East Washington Street and to the south of it is industry use; there are commercial and retail along East Van Buren Street and 24th Street; and rests of lands are mostly residential neighborhood (see Fig 10, 11).

3.1.1 Challenges

There are three main challenges existing in Gateway District: poverty, lacking services, and infrastructure; and they formed into a vicious cycle.



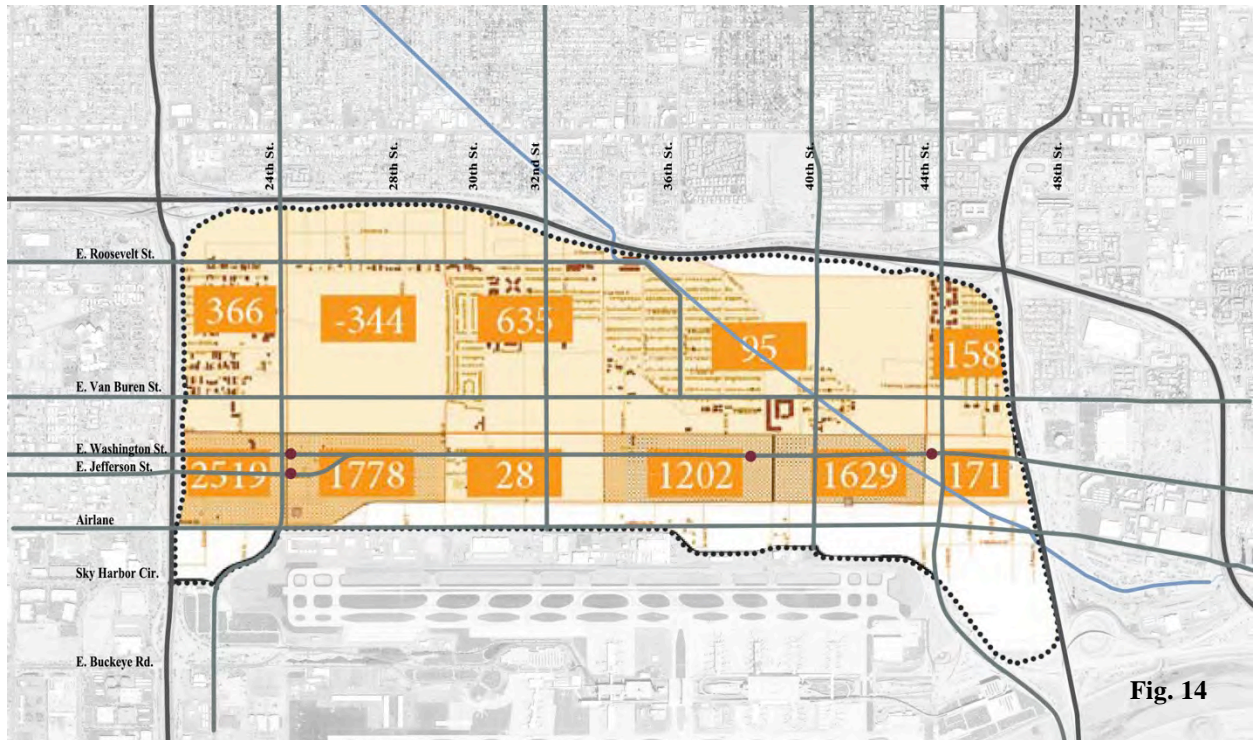


Fig. 14

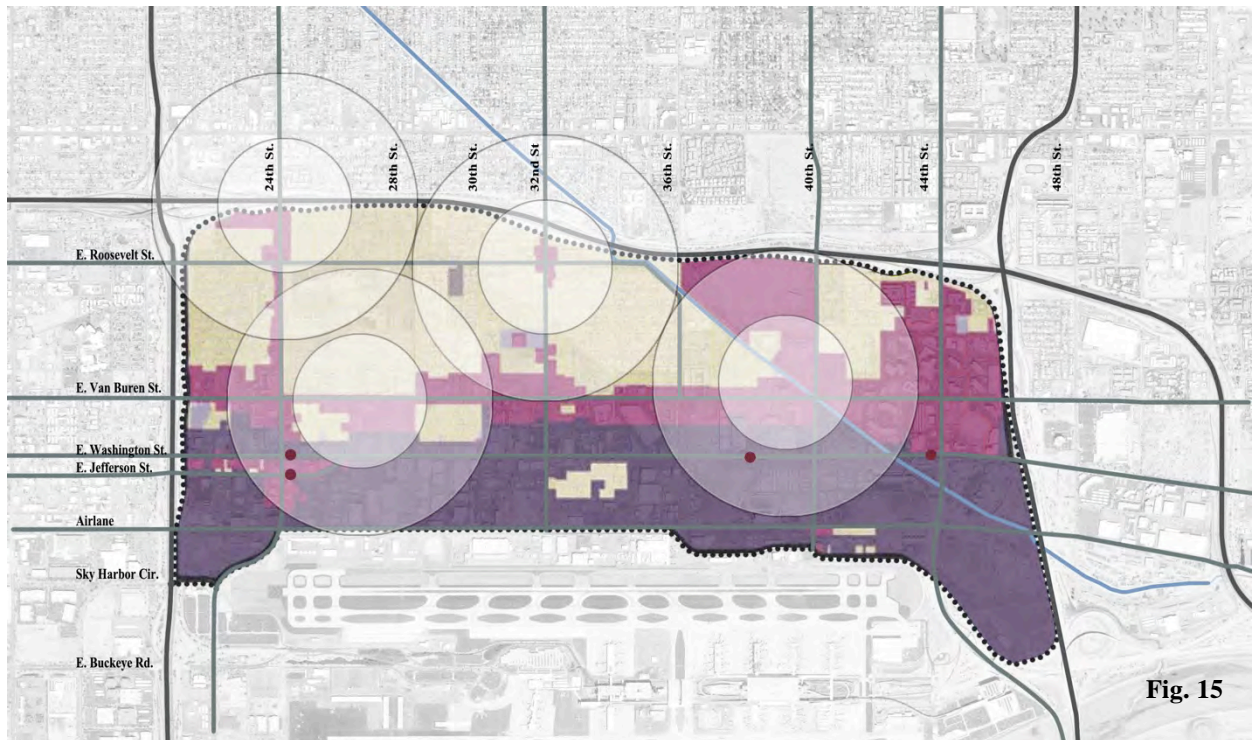


Fig. 15

To start with poverty, as the declined condition of the whole district together with the 300 acres vacant lands, which results in low investment and low tax income in this area; (according to Reinvent PHX GATEWAY TOD policy plan) 44% population in this district are under poverty, leading to the situation of crowded households and poor housing conditions, 21% of household without cars, and the residents lacking of purchasing power, it is hard to bring in new services. The lacking of purchasing power and low tax income led to the result of lacking service and infrastructure. Gateway District is a food desert, a recreation desert. The public transportation is not enough for residents, and the mega-blocks and hazardous streets are not suitable for people to walk or biking, spatially in summer. All those bad living conditions together made the district even less attractive for investment, and the vicious cycle went on and on.

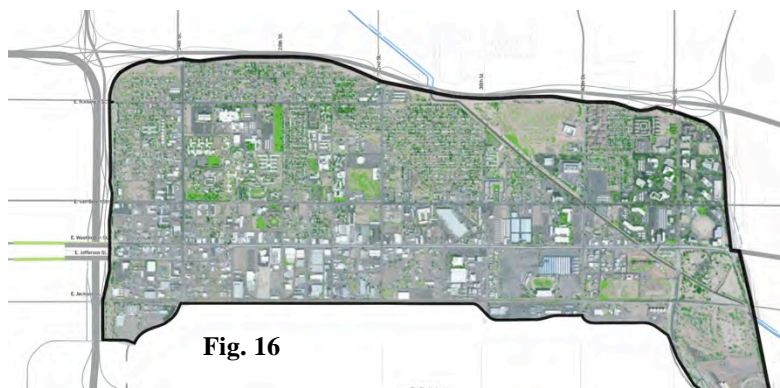


Fig. 16

As has discussed above, what is needed in this district are: better living conditions, more services, better infrastructure, more amenities, better traffic conditions, more open space and green space, and a better traffic system to help

with the poverty and also help with the environment, better public transportation for people who don't own cars, and TOD could be a solution.

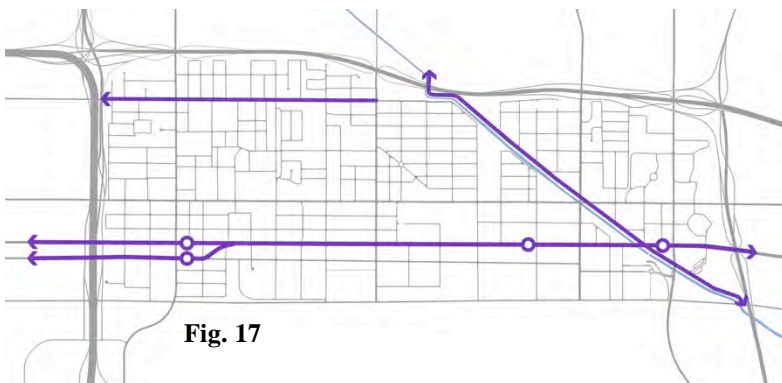


Fig. 17



Fig. 18

How to make those needs become true? As we know space and land is not a problem, because we have 300 acres of vacant land, which dispersed all over this district. However, the most important factor needed to make the infill and renew happen is, we need money or in other words investment, to build what are needed. This could be a problem.



Fig. 19



Fig. 20

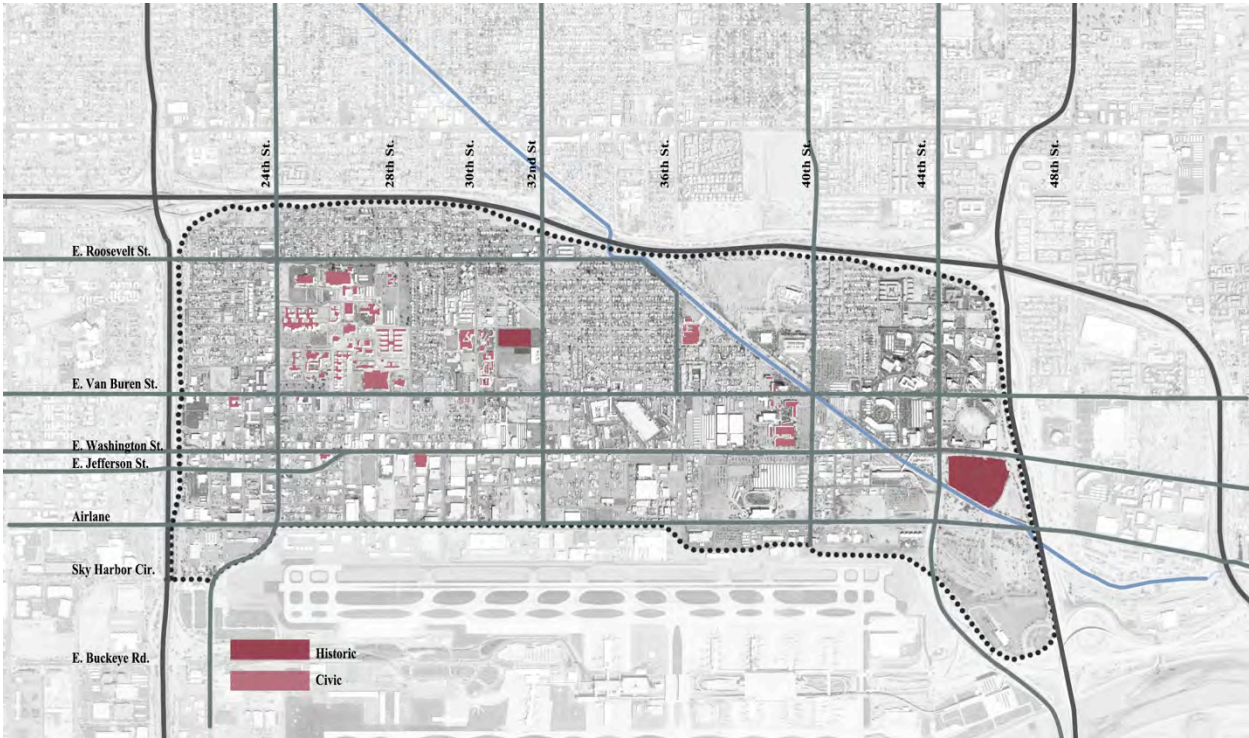
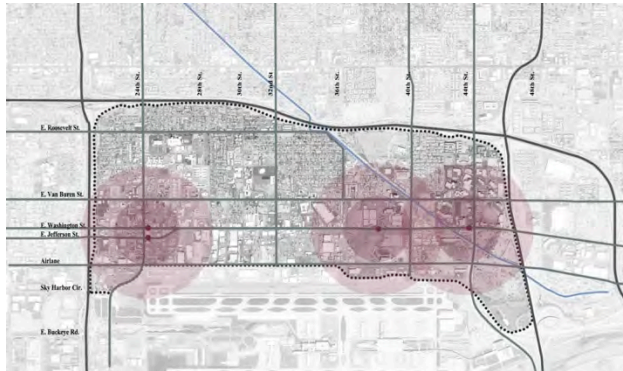


Fig. 21

3.1.2 Advantages

Gateway District has many opportunities and advantages that had been ignored and need to be excavation. First of all, the location of Gateway (see Fig. 20) and the existing institutions provide this district a huge housing potential (see Fig. 21). Gateway located in the southeast corner of Phoenix, and near the edge of Tempe (see Fig. 20), which made Gateway approximately in the center of downtown Phoenix and downtown Tempe, this could attracts many new residents into Gateway. For example, a young faculty of ASU working in Tempe campus, and living in a rented apartment in Downtown Phoenix, if there are new housing development built in Gateway, with nice amenities and relatively low price, it could be a possible option for this faculty to move to Gateway to save money and also save half travel time everyday. Moreover, the institutions and hospital inside this district have also provided many potential residents to housing development.

Secondly, the approaching to Sky Harbor International Airport provides great possibilities to have a business-commercial employment center in that area (see Fig. 20). For example, more hotels and office complexes could be built in that area for businessmen, and also headquarters of International Corporation (for example Amazon).



Thirdly, the light rail corridor passing through, with 3 light rail stations inside Gateway District, bring potential passengers into this district, as the three existing light rails station could serve as transportation nodes, thus leading to the possibility of commercial development around each nodes. Moreover,

the light rail and light rail station provide a fine foundation for TOD development inside this district, which could provide a better mobility network to this area.

3.2 Research on Infill and Vibrant community

What is a vibrant community? There are many different answers from different people focusing on different levels, the main factors to shape a vibrant community are as follows:

According to Jane Jacob's four tenets of vibrant neighborhoods are, in short form:

1. Mixed primary uses that creates traffic/vibrancy throughout the day.
2. Short blocks to make neighborhoods more walk able.
3. Mixed age and overhead buildings to enable a diversity of businesses.
4. Population density. (Jacob, 1961)

In a report titled Reclaiming Our Humanity, Sherri Torjman, vice-president of the Caledon Institute of Social Policy, says a vibrant community is one that:

1. Provides support that meets the basic needs of all members.
 2. Promotes inclusion to enable all members to participate actively in social, economic, cultural and political life.
 3. Promotes opportunities for the lifelong acquisition of knowledge and skills by all members.
- (Torjman, 2001)

According to a record of an event held in Santa Barbara Foundation, to the residents there, a vibrant community should have following qualities:

1. ARTS AND CULTURAL EXPRESSION are encouraged and celebrated.
2. LIVING & DYING WITH DIGNITY are community values.
3. LIFELONG LEARNING is encouraged and available.
4. SAFETY is both a community and a personal responsibility.
5. CIVIC ENGAGEMENT is considered a duty

6. SUSTAINABLE ECONOMIC GROWTH is cultivated

7. PROTECTION OF OUR ENVIRONMENT and HISTORICAL PLACES is a shared value that benefits human health and our local economies.

Learn from those representative points mentioned above, together with other points, there are similarities between each point of view, to sum up, a vibrant community should have qualities as follows:

1. A sense of safety and security.
2. Walk able neighborhoods and sustainable environment.
3. Easy accessibility and mobility
4. Certain population density.
5. Sustainable economic growth.
6. Mixed primary uses that creates traffic/vibrancy throughout the day.

To make the Gateway District a vibrant community, we should make sure the infill and urban renewal development fulfill those qualities to ensure the community became a vibrant space.

Fig. 22



3.3 Solutions

Combine the site analysis and vibrant community qualities together, here we came the solutions of the direction of how to infill and renew this district to make a vibrant community. Firstly, to infill the vacant land inside this district, we should seize the opportunities of the location advantages, infill mixed-use and mixed income housing and retail first along the light rail corridor. Add more public transportations to form TOD development mode (see figure 4) inside the site. Then step by step (see figure 3), have more development along main road.

Assuming all the development discussed above could be successfully introduced into Gateway District, as new residents and users and consumers being brought in, the income composition of this district will be totally different, and the purchasing power of whole residents has been improved, which will ends in more services like retail and commercial investment into this district. Thus more tax income could be created for the district to put into infrastructure and amenities, which could leading to a better environment and living condition, and increase the land value. And finally could turn the vicious circulation into a virtuous one.



Fig. 22



Finally, infill some of the vacant lands with parks and pocket parks; adding green spine and green path to provide residents better walking and biking environment; build green street along main streets, for example, Van Buren Street, to act like the linkage of each retail store and commercial complex, and also provide better walking street.

“Factors that influence the choice to use motorized or no motorized transport are based primarily on two fundamental aspects of the way land is used: (a) proximity (distance) and (b) connectivity (directness of travel) (16). Other factors, such as travel cost, environmental quality, and aspects of convenience and access (e.g., parking availability) are also likely influential. Proximity relates to the distance between trip origins (i.e., where one is) and destinations (i.e., where one is going). Proximity is determined by two land use variables. The first is density...the second is land use mix. “(Saelens& Sallis& Frank, 2003) Coordination between settlement and transportation is necessary, and it is important to built city in smart growth strategy, and there is urgent need of urban infill development in cities like Phoenix. Rather than grow horizontal, Phoenix should grown more vertical, and become a compact city to seek further development.

3.4 Case studies

a. Infill with mixed- income & mixed-use housing



Gracie's Thrift Store, Mixed use- low-income apartment



Fig. 23

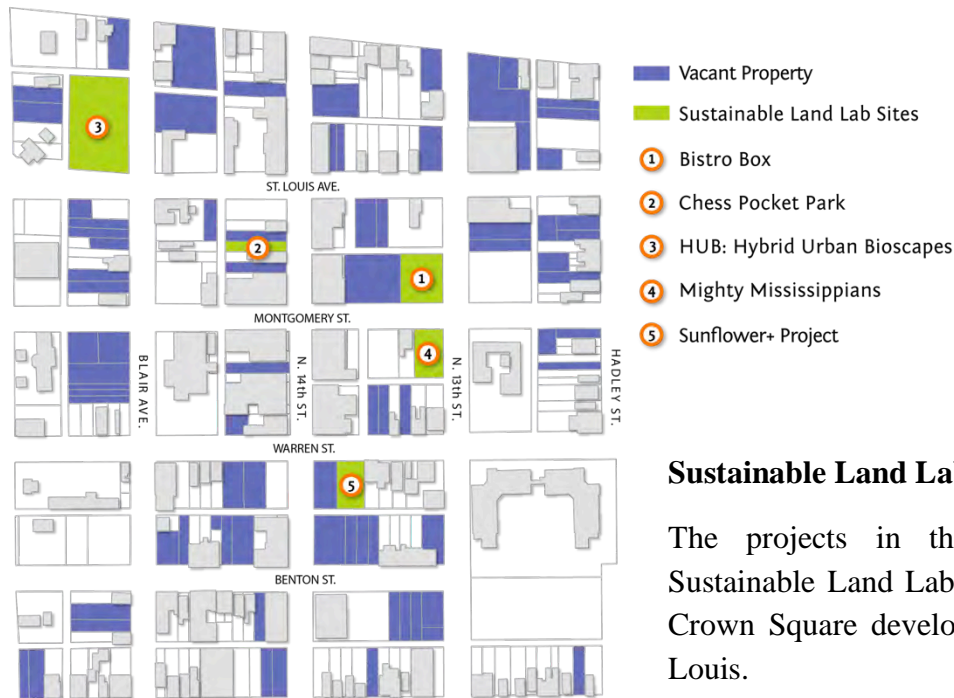


Grigio Metro Apartments, Mixed use- mixed income apartment



Fig. 24

b. Infill with green space and commercial



Sustainable Land Lab

The projects in the first phase of the Sustainable Land Lab are all located near the Crown Square development in Old North St. Louis.



Sunflower+ Project: Turning into a community asset through the planting of sunflowers. With a goal of eventually spurring redevelopment of these vacant parcels, the sunflowers will improve soil quality, remove soil contaminants and eventually produce a marketable set of products from flowers to seeds to biodiesel.



Chess Pocket Park: An outdoor community chess venue for residents with a permanent location that supports our primary community asset – people.



Mighty Mississippians: A modern agricultural and sustainable living model, Using concepts of permaculture, the site will demonstrate the interdependent relationships that work efficiently and sustainably in nature and that worked for previous civilizations, from the soil to the birds, to humans.



Bistro Box: The Bistro Box concept is a small business incubator that transforms surplus cargo containers into a compact restaurant and culinary destination.



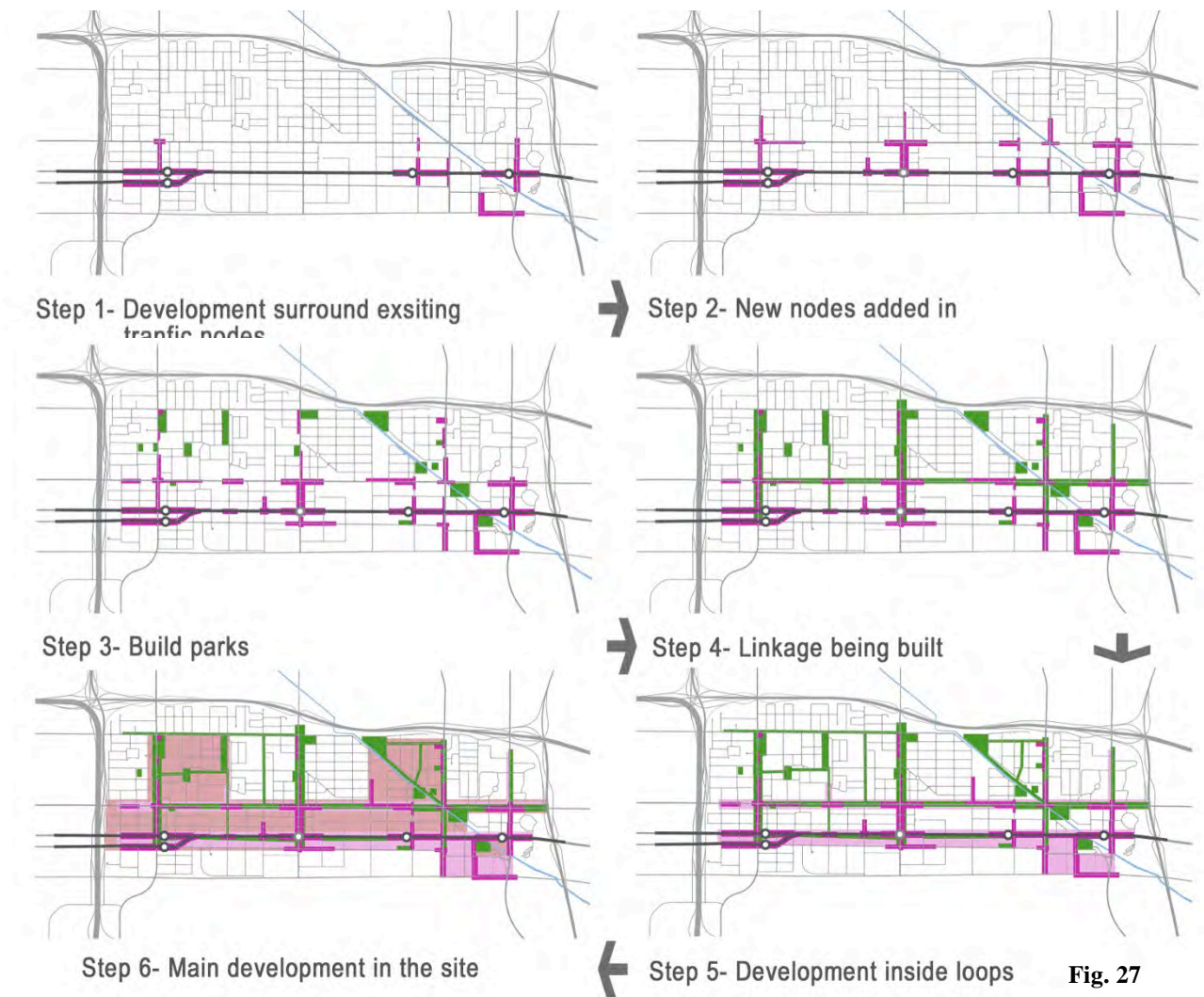
The HUB: Hybrid Urban Bioscopes project is testing a palette of landscape and leisure/recreation strategies that can be used to improve the community.

Fig. 26

4 Design Proposal

4.1 Concept Phasing

There are three light rail stations inside this site, according to the rules of urban development and constructions, developments for example commercial and residential and retails happen most usually start from the traffic nodes, which in this case, are the three light rail stations. By analyzing the opportunity of each road surface, and following certain opportunities, this site could infill and renewed as the following (see Fig. 27)



4.2 Design Proposal

4.2.1 Overview

This design proposal takes full advantages of existing site condition:

1. Location advantages: Passing through by light rail corridor
 - Easy access to well maintained freeway
 - Close to Sky Harbor Airport
 - Located in-between Downtown Phoenix and Downtown Tempe
2. Existing building advantages: Existing institutions
 - Existing industry
 - Existing communities

Which will end in excellent housing opportunity and potential attractions for commercial and retail development in Gateway District. This proposal designs Gateway District into community

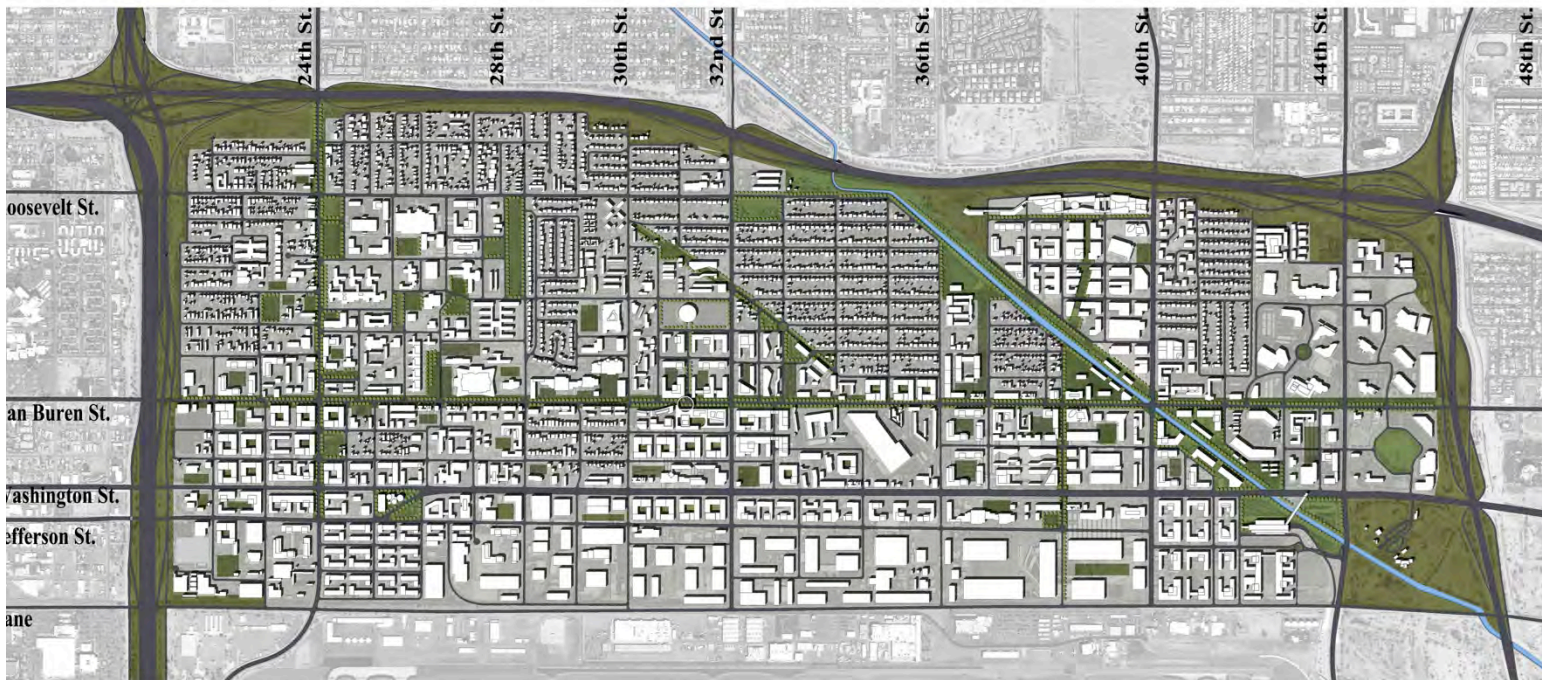


Fig. 28

with commercial& retail& housing development along Washington Street and influence Van Buran Street with the vitality, to bring Van Buren from declined street back to life into the new main street of Gateway district.

4.2.2 Land Use Proposal

This proposal infill some vacant land into housing and commercial, and renew some of the poor condition existing buildings including residential and industry into new development, mainly housing complexes and commercial. By doing so, this proposal trying to provide enough housing and commercial for the future demands, and by increasing the development density and creating more destinations and services to this district to revitalize the whole district, thus to reach the goal of making Gateway District a vibrant community.



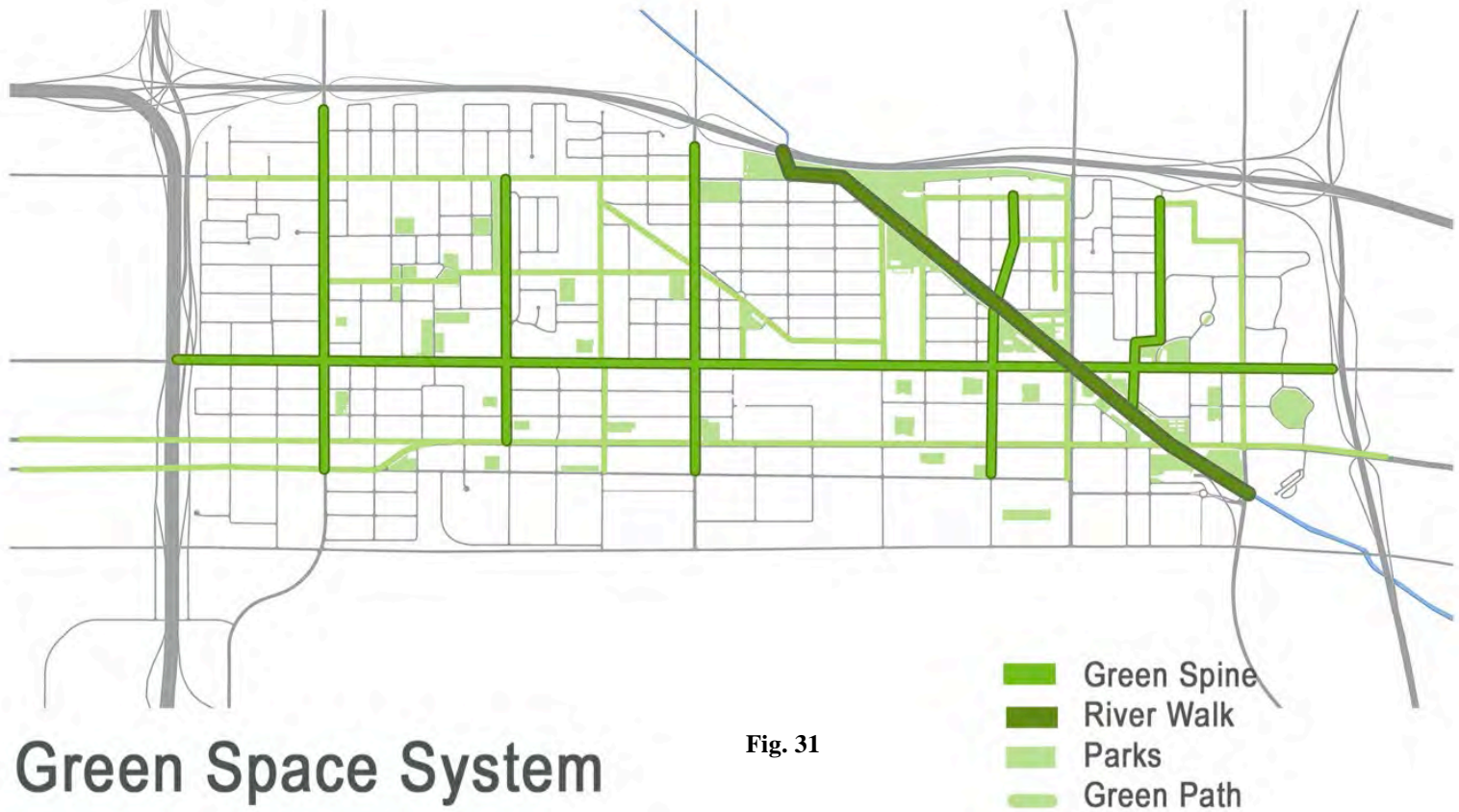
As shown in the land use map, this proposal designed new commercial& housing development along East Van Buran Street and East Washington Street, made the area in-between those two street a new development band for the whole district. According to the population and income analysis mentioned above, the new housing development will mainly be mixed-income housing complex, with retails in the 1st floor, to provide service for neighborhood.

There are several types of different types of housing, including mixed-income apartment, and mixed-use housing complex, and also new middle income residential neighborhoods. Commercial and retails are mostly designed in the 1st floor of housing complex, along street surface and corner. Because firstly, the street surface and corner always bring more customers in. And secondly, retail stores and restaurant always play important role in making a lively street atmosphere, thus make a friendly and vitalized environment for the community



Fig. 30

4.2.3 Green Network Proposal



The key point to design a vibrant community is to provide walkable neighborhoods and sustainable environment. Which means, the community needs to provide more amenities to residents to maintain a walkable neighborhood. Moreover, as large amount of residents inside this community is in poverty, it is important for them to have a better walking friendly environment.

This design proposed 3 green systems (see Fig. 31)

- a. Green Spine-** will be built along main street, connecting retail stores and pocket parks and small urban plazas together, the street will be covered with trees and green path on the sidewalk, and also provide bike lane in the same time.
- b. River Walk-** To take full advantages of the existing channel, river walk could be building along the both side of it. Provides shading for joggers and bikers, and also for walk.

- c. Parks-** Infill some of the vacant land into pocket park or public parks, to provide more amenities to the residents and also, parks along street could add more attraction and attract potential customers. And parks are also an effective way to increase the sense of community and safety.

Fig. 32

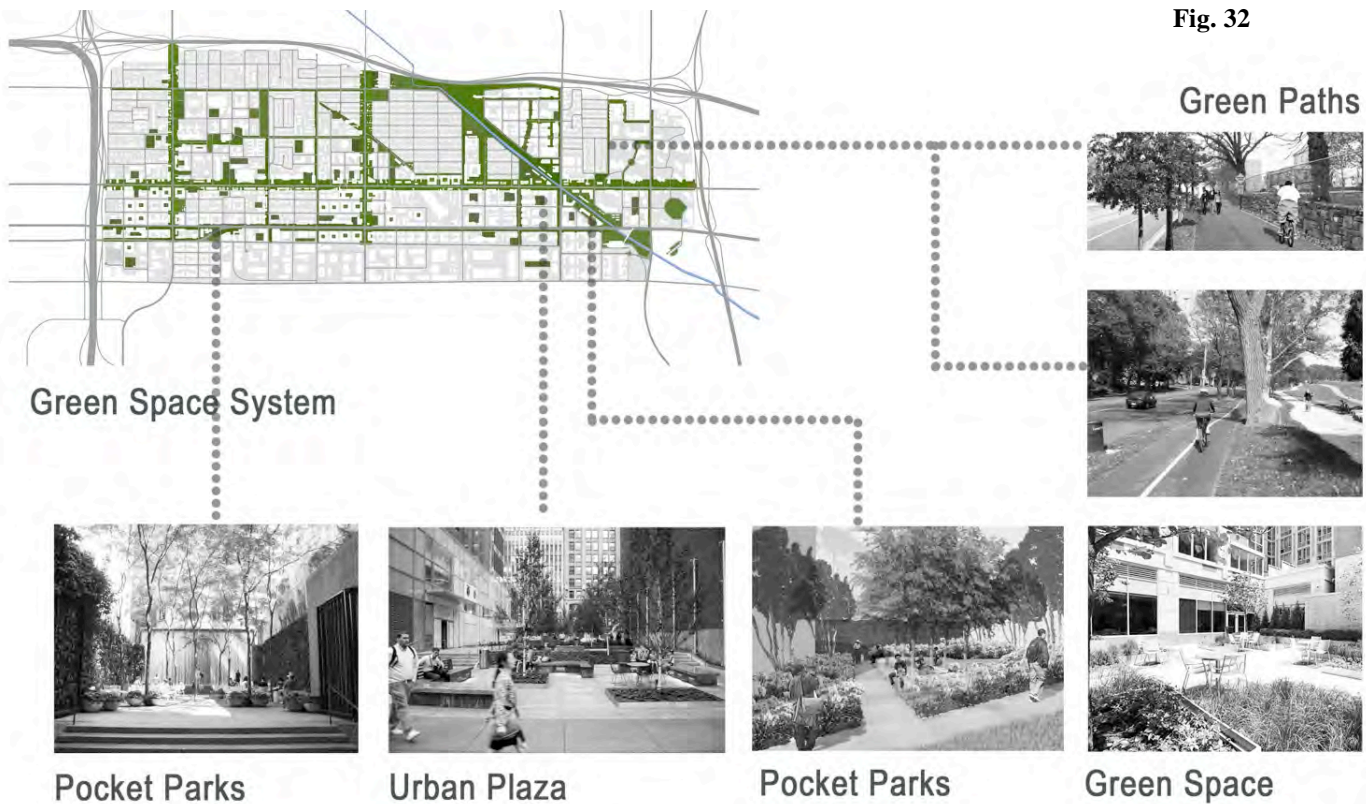
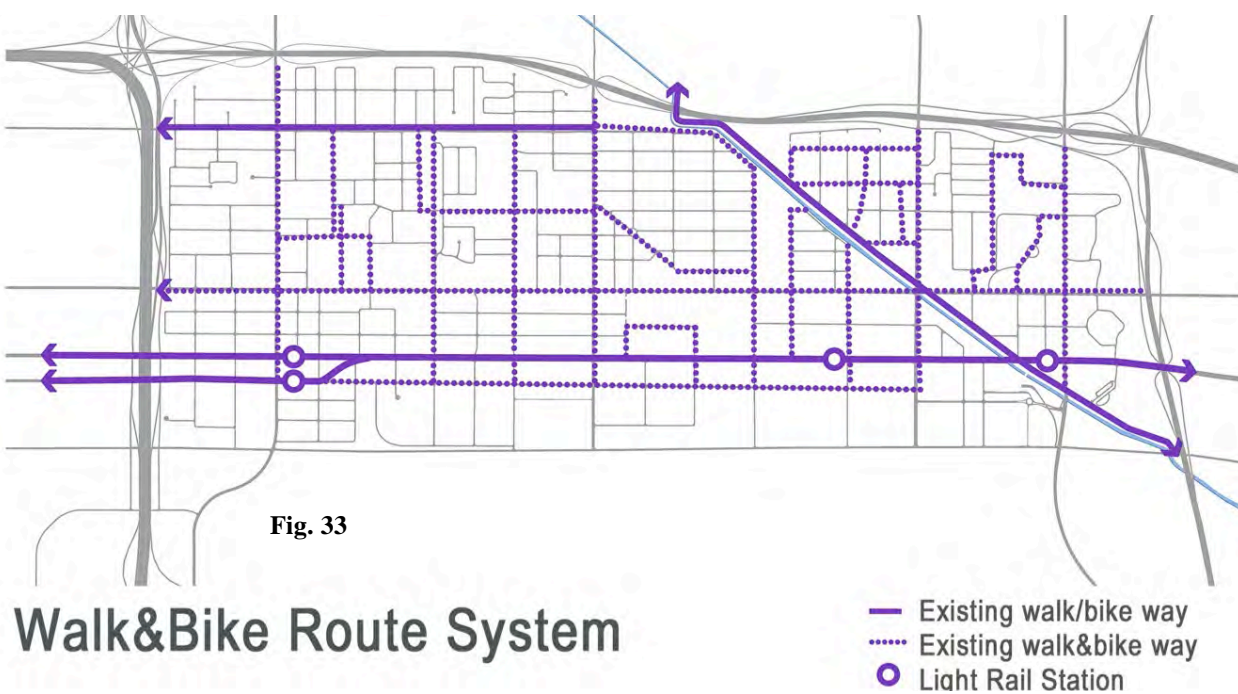


Fig. 33

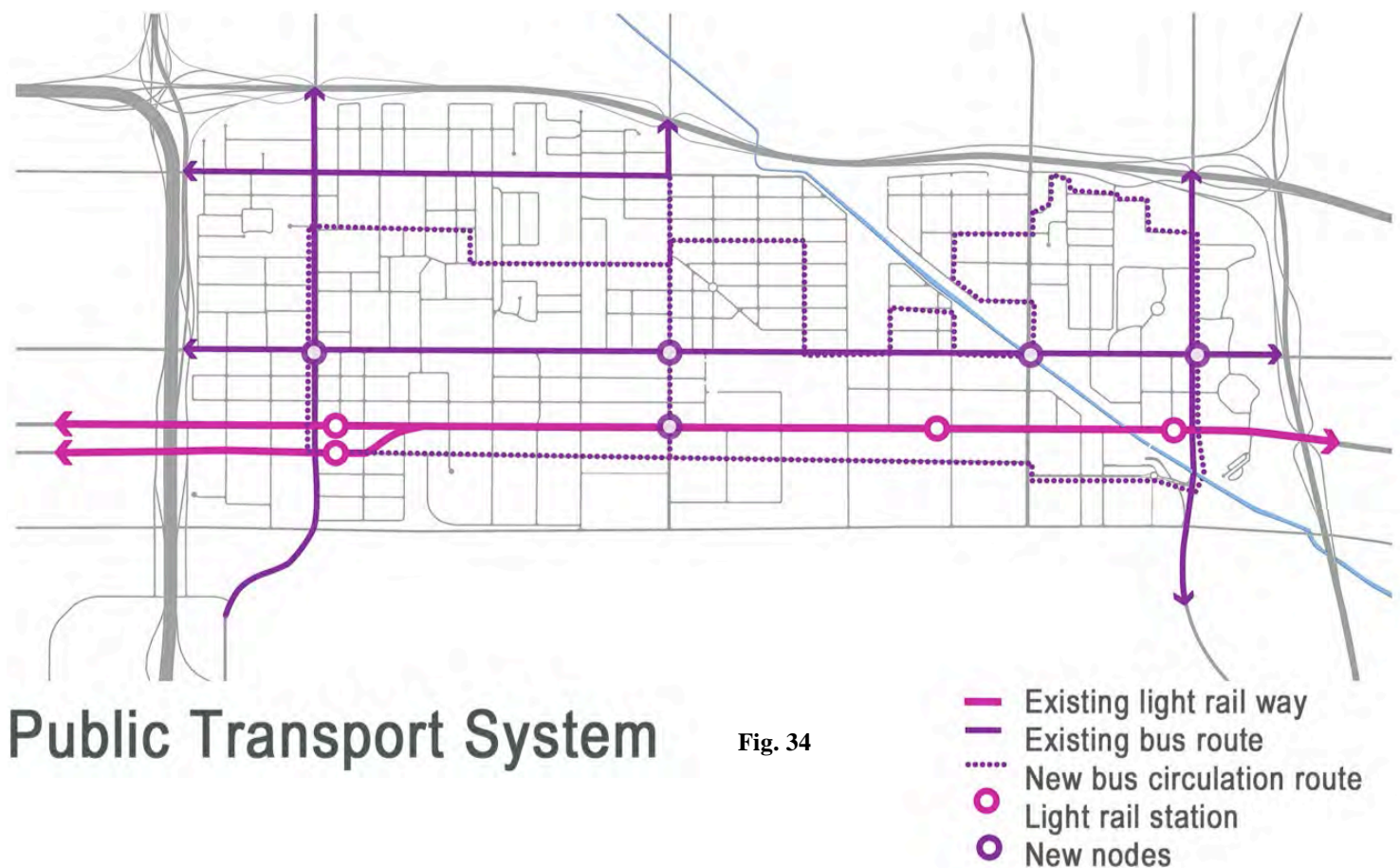


4.2.4 Public Transportation

Another key point to design a community into vibrant neighborhood is easy accessibility and mobility. There are many problems inside this site that decreased the mobility; low percentage of car ownership, mega-blocks make the distance not suitable for walking, large amount of residents in poverty, and unfriendly walking streets.

As the design will add shading and Green Street and pathways, the walking condition will be better than ever. Moreover, this proposal is using TOD development modes to help this district becoming a community with easy accessibility and mobility.

New circulation bus and new transportation nodes has designed. And to combine the bus line with the green streets and green pathways, to create friendly and easier way for people to walk and to take bus and light rail.



4.3 Detail Demonstration

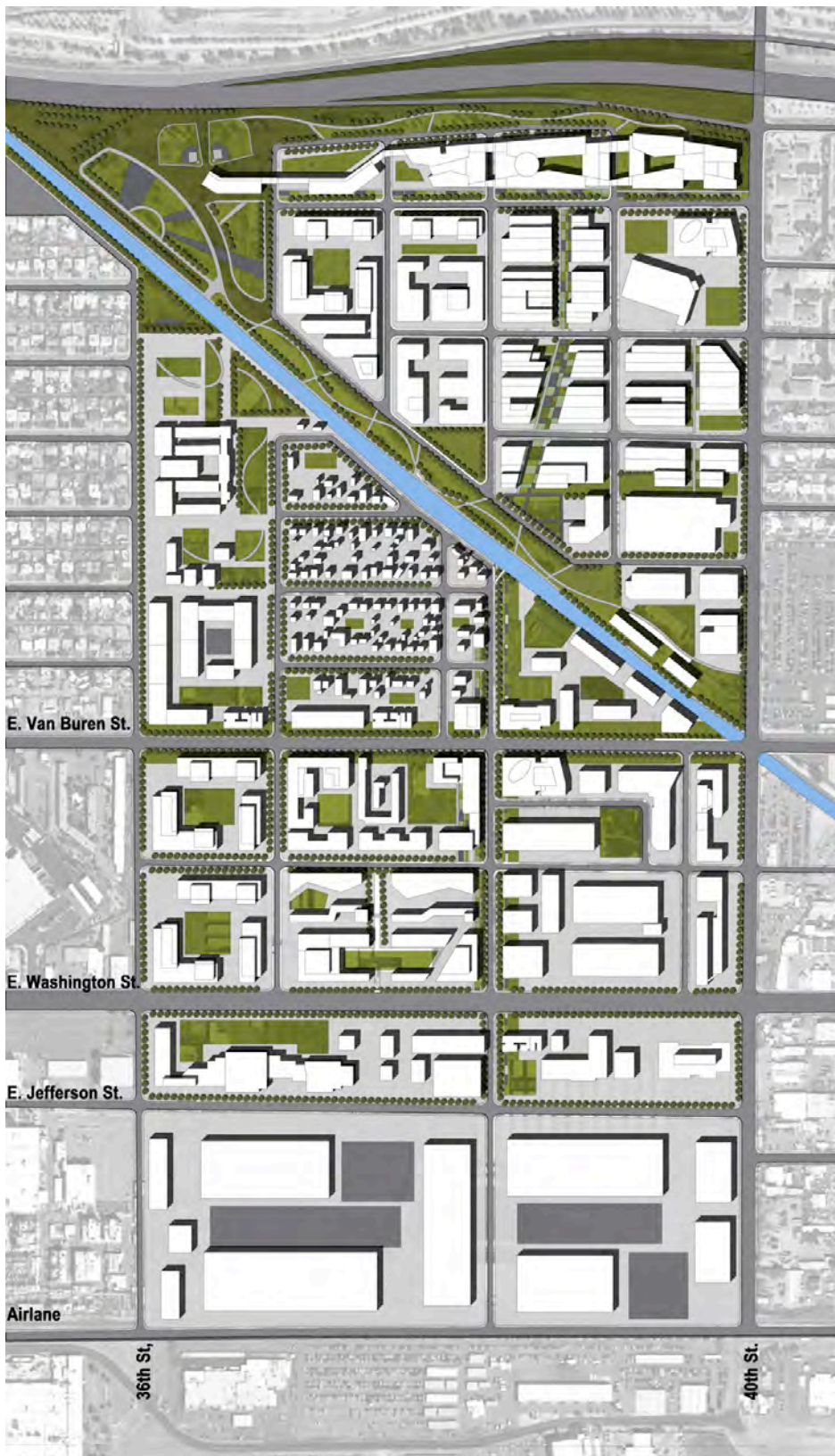
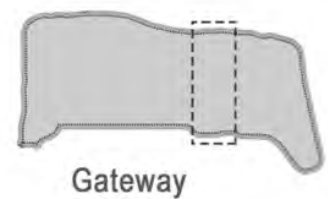


Fig. 35



4.3.1 Detail and Examples of parks

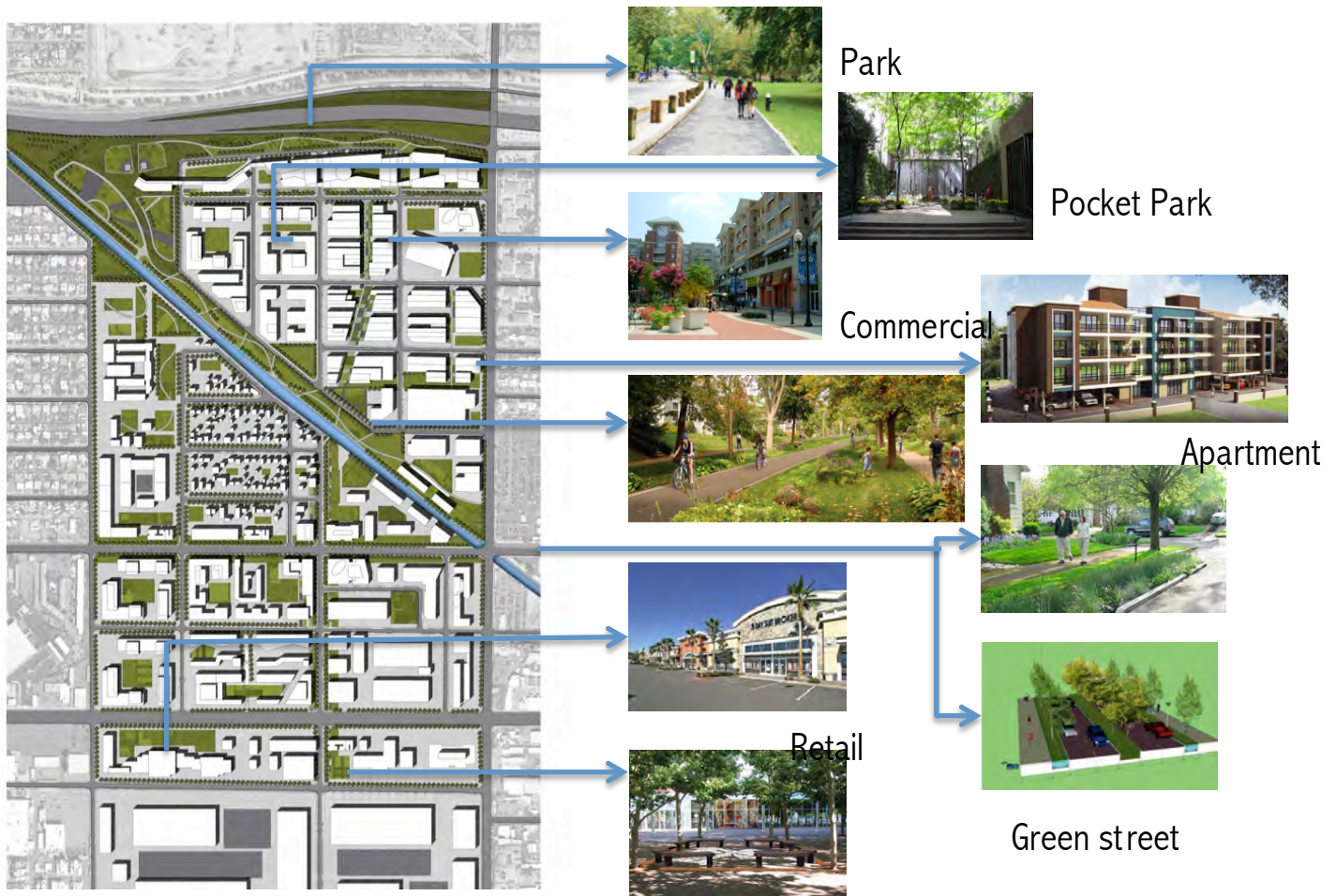
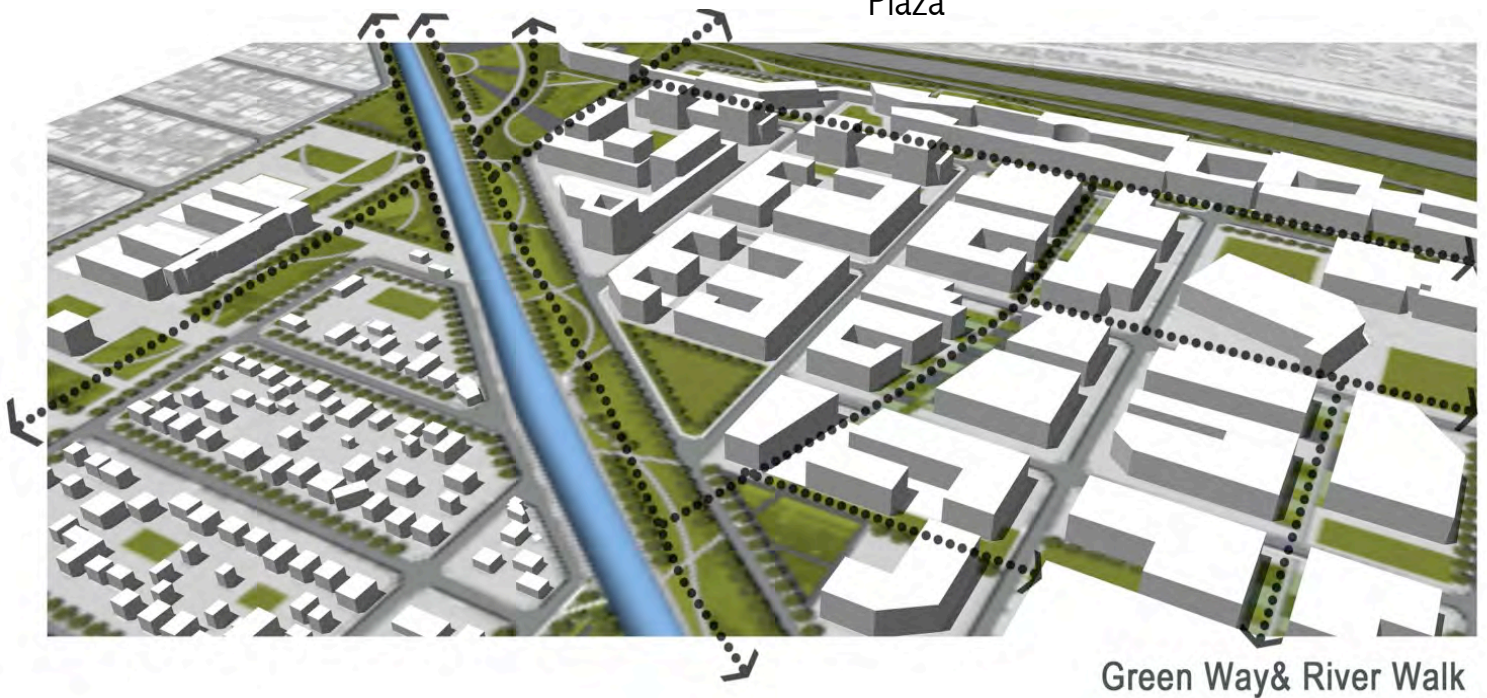


Fig. 36



4.3.2 Van Buren Street- New Green Street

Van Buren Street Plan



Van Buren Street Perspective



Van Buren Street Section



Fig. 37

The current Van Buren Street is composed with five traffic lanes and two sidewalks. No shading or vegetation exists on the street, which made the walking condition on this street terrible. According to this proposal, Van Buren will act as a new main street in Gateway District, and the connection between each south-north street, the walking condition is extremely important. This design proposed Van Buren Street into a Green Street, traffic lanes will be reduced into four lanes, and spare a lane for green lanes for biker. Moreover, trees and vegetation will add on the sidewalk and bile lane.

4.3.3 River Walk



Canal River Walk Before

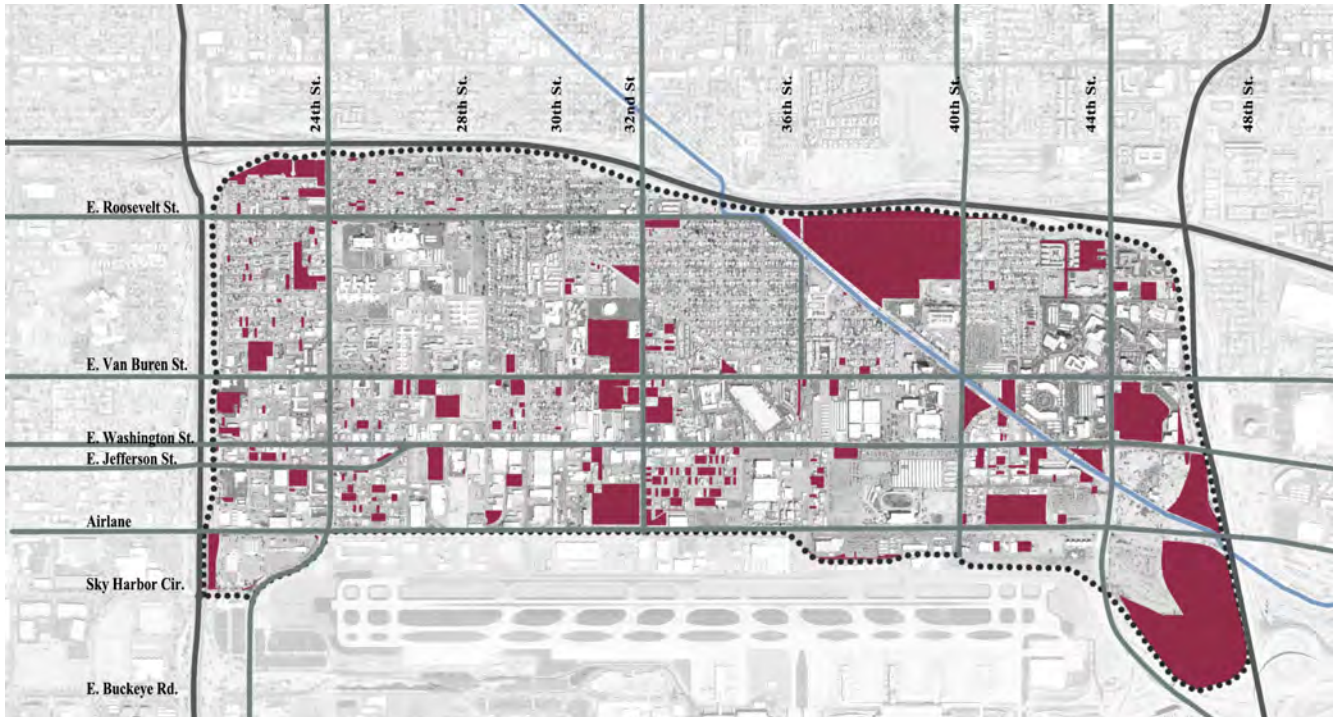


Canal River Walk After

Fig. 38

5 Design Evaluations

5.1 Vacant Land Infill Evaluation



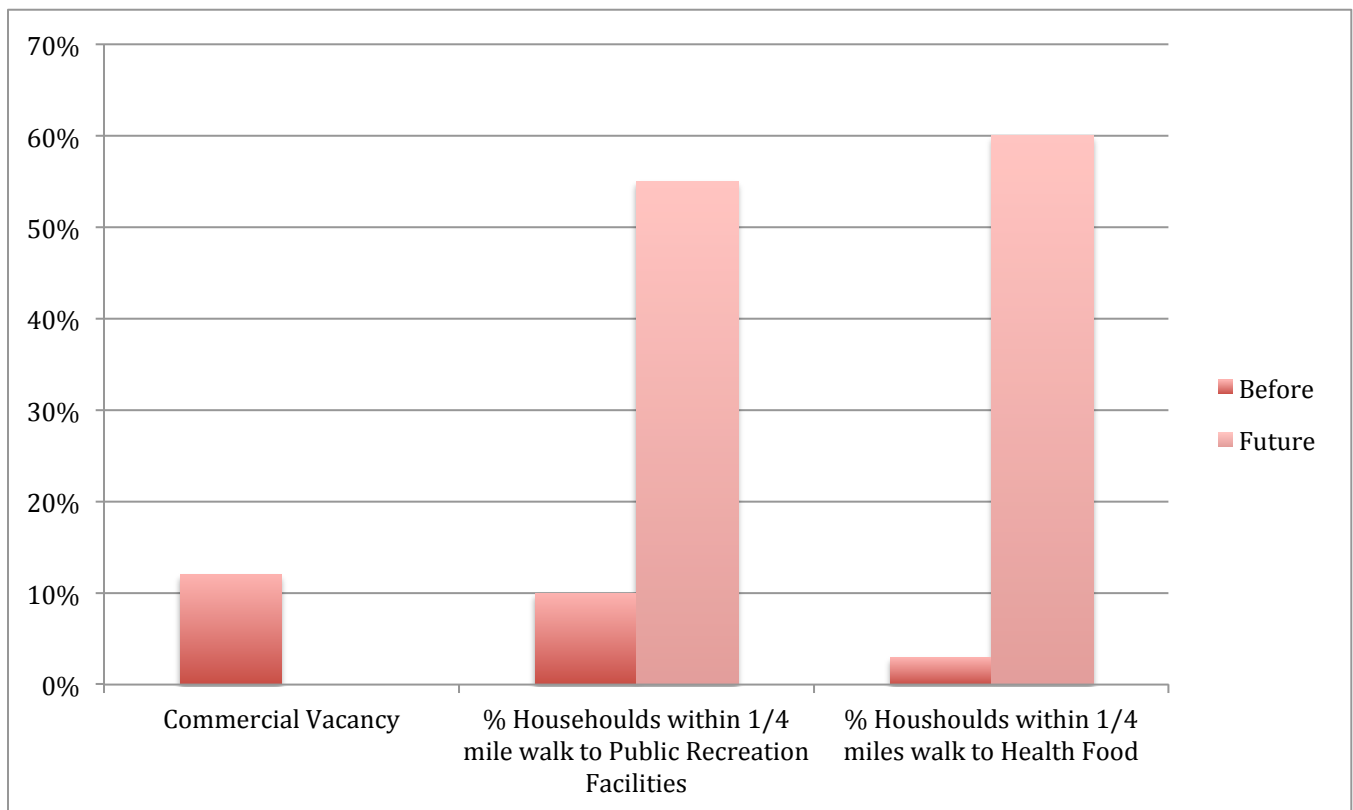


Fig. 39 Service Comparison Before& After

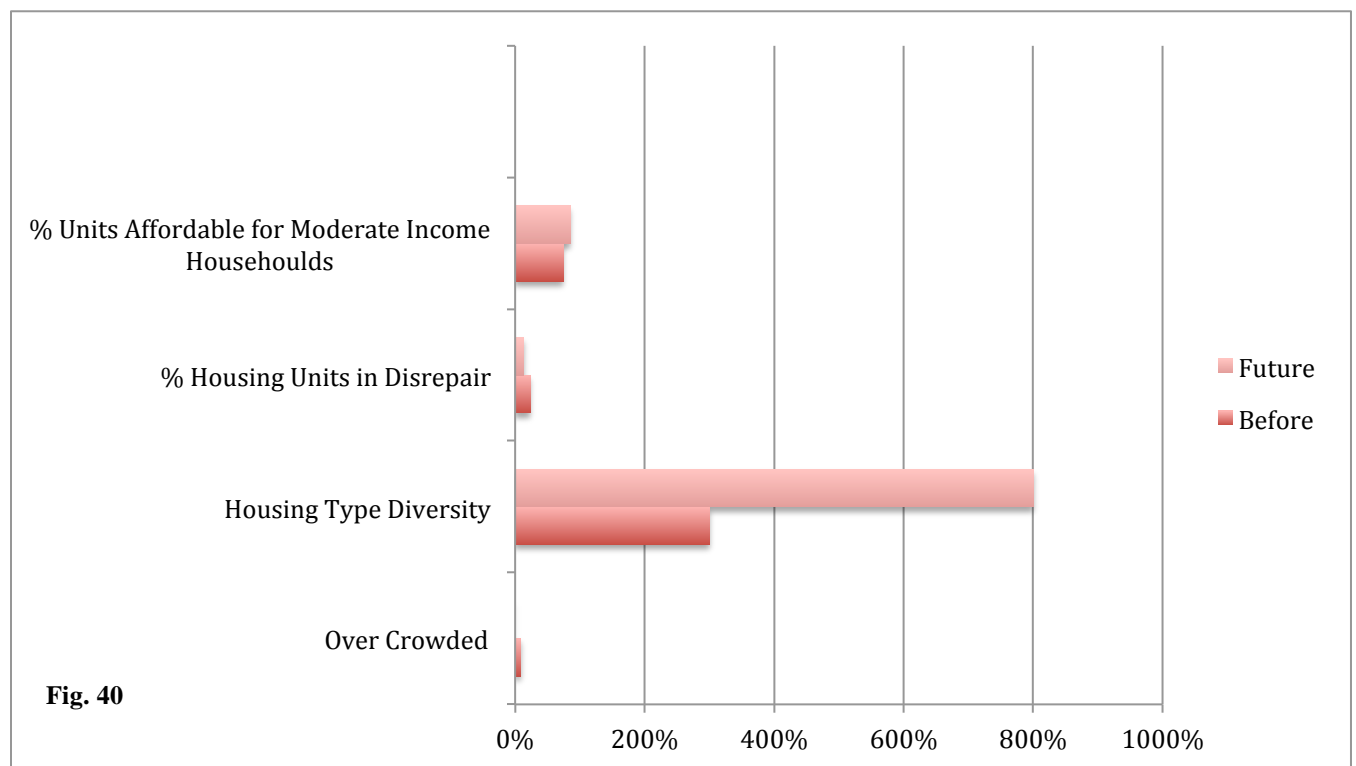
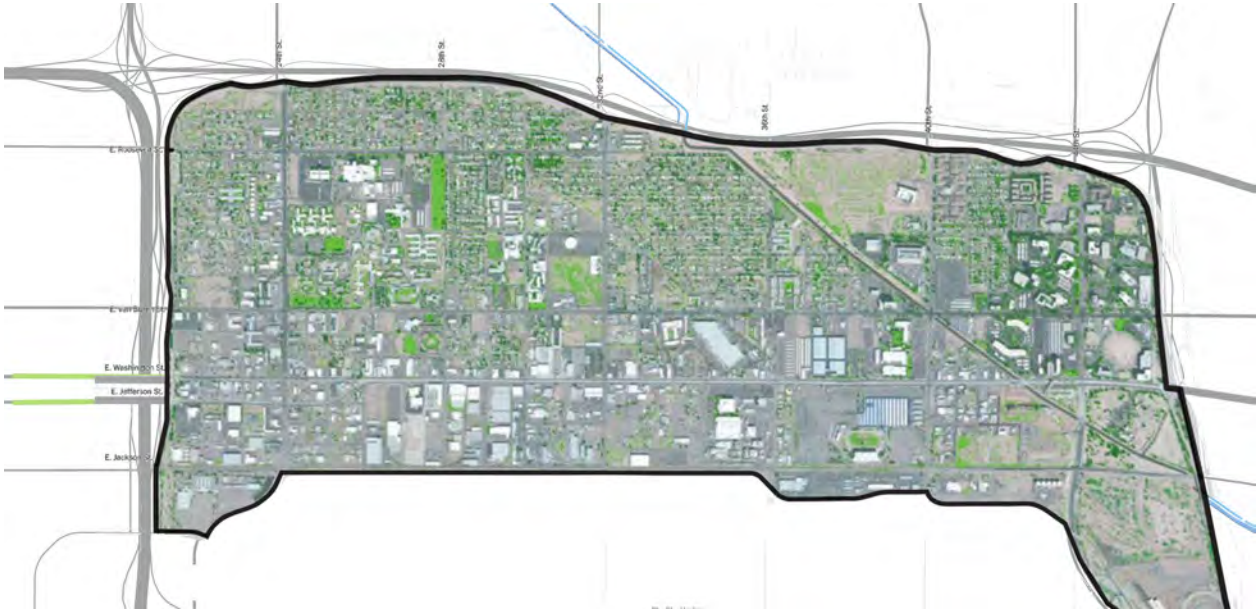


Fig. 40

Housing Condition Comparison Before& After

5.2 Green Space Evaluation



Green Space Before

Fig. 41



Fig. 42

Green Space After

Green Space Comparison Before& After

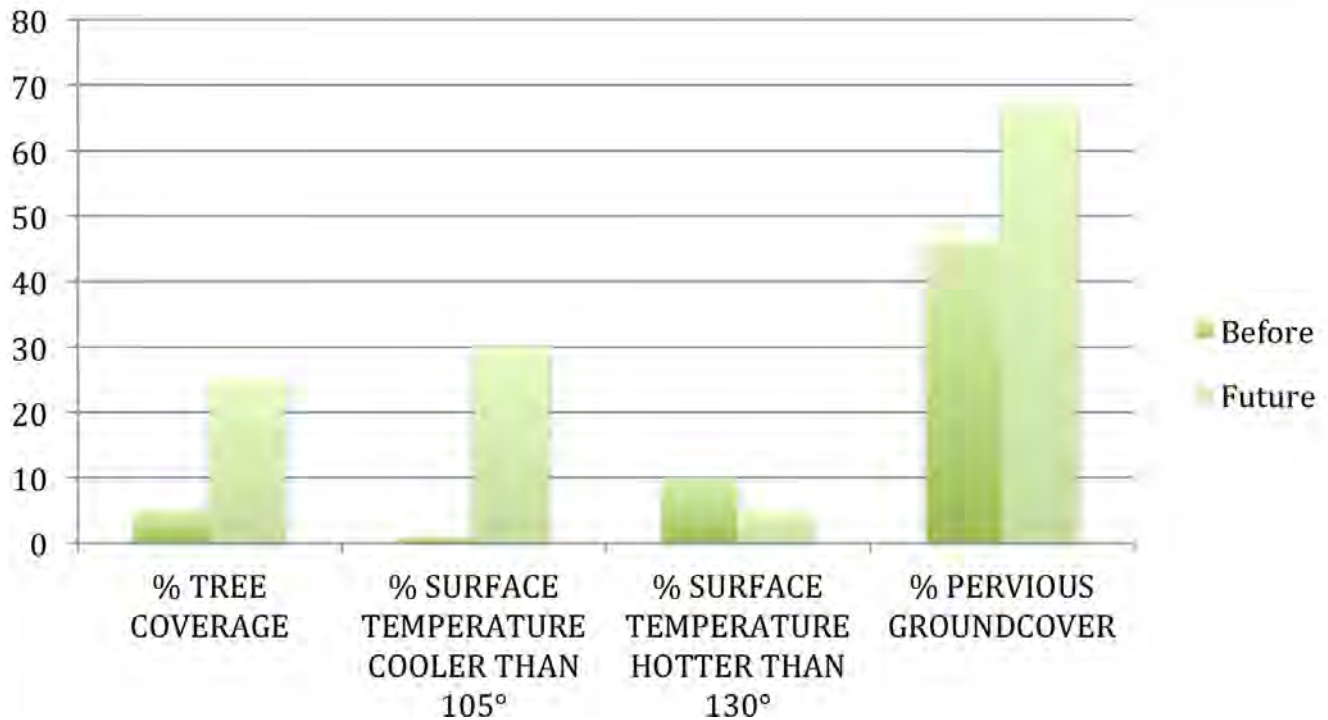
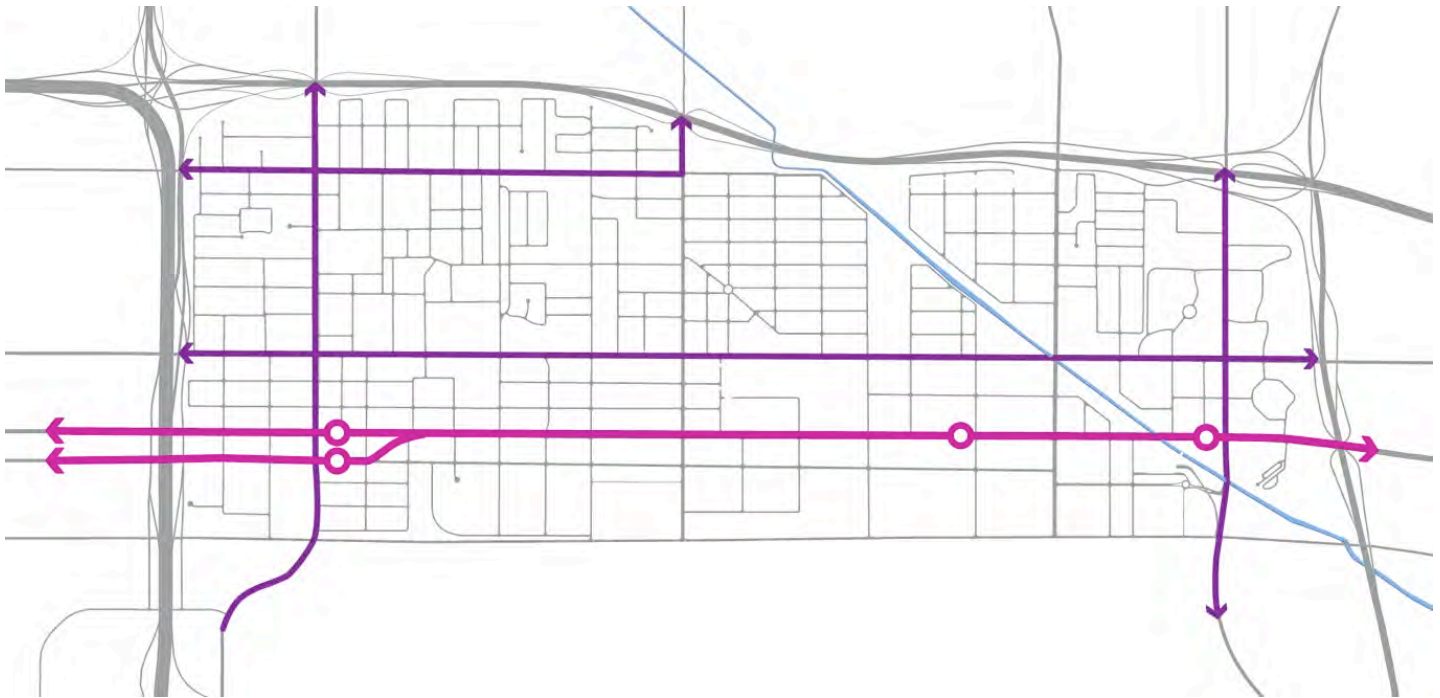


Fig. 43

Compared to existing condition, more trees and vegetation had added to street and sidewalk. Moreover, by infill some vacant land with pocket parks and public parks and urban plazas, the tree coverage increased, which could lead to cooler surface temperature thus provide people better living condition and environment, and also, is more environmental friendly.

5.3 Public Transportation Evaluation



Public Transportation Comparison Before& After

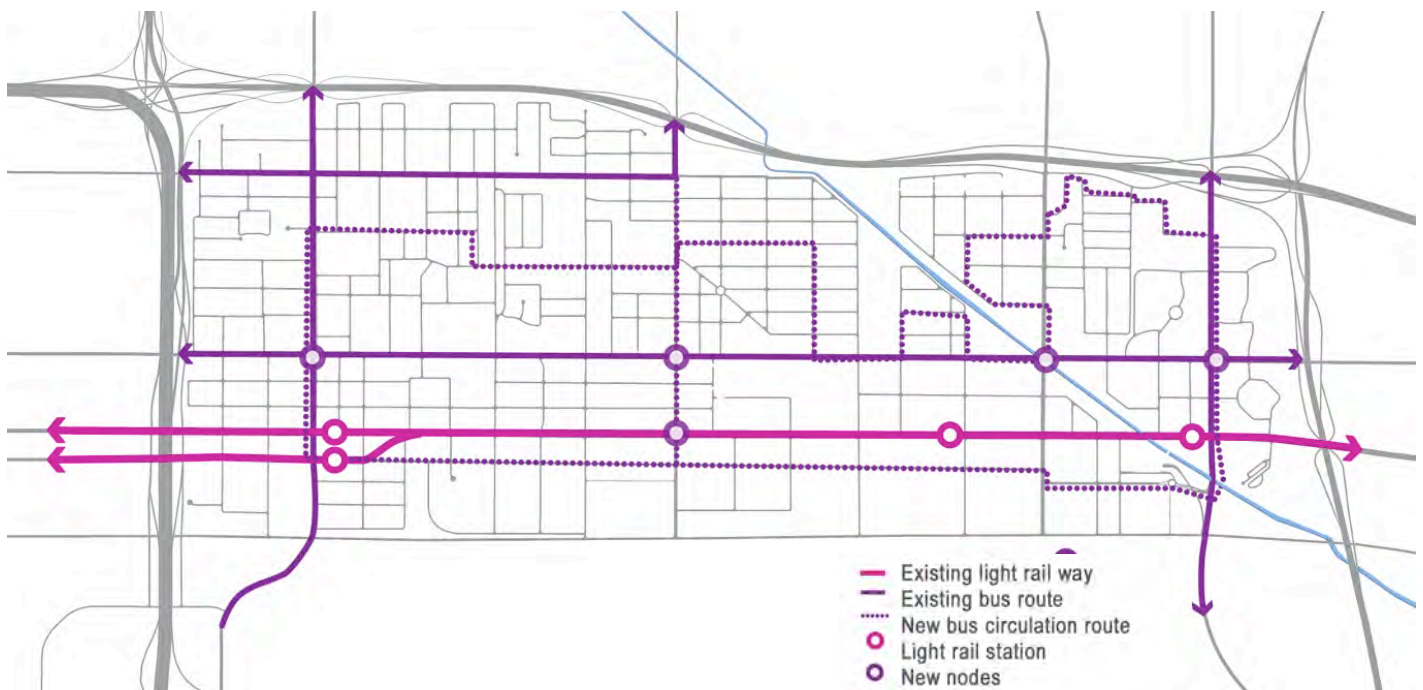


Fig. 44

列 1	%OF RESIDENTS WALK, BICYCLE TO WORK	AVERAGE HOURS WAITING FOR TRANSIT SERVICES (BUS + LIGHT RAIL)	AVERAGE TRANSIT FREQUENCIES Transit (BUS + LIGHT RAIL)	ANNUAL LIGHT RAIL USE (BOARDINGS/DEB OARDINGS)	PUBLIC TRANSIT ROUTE
Before	18	30min	25min	1,433,764	5
Future	54	15min	15min	2,240,000	7

Fig. 45

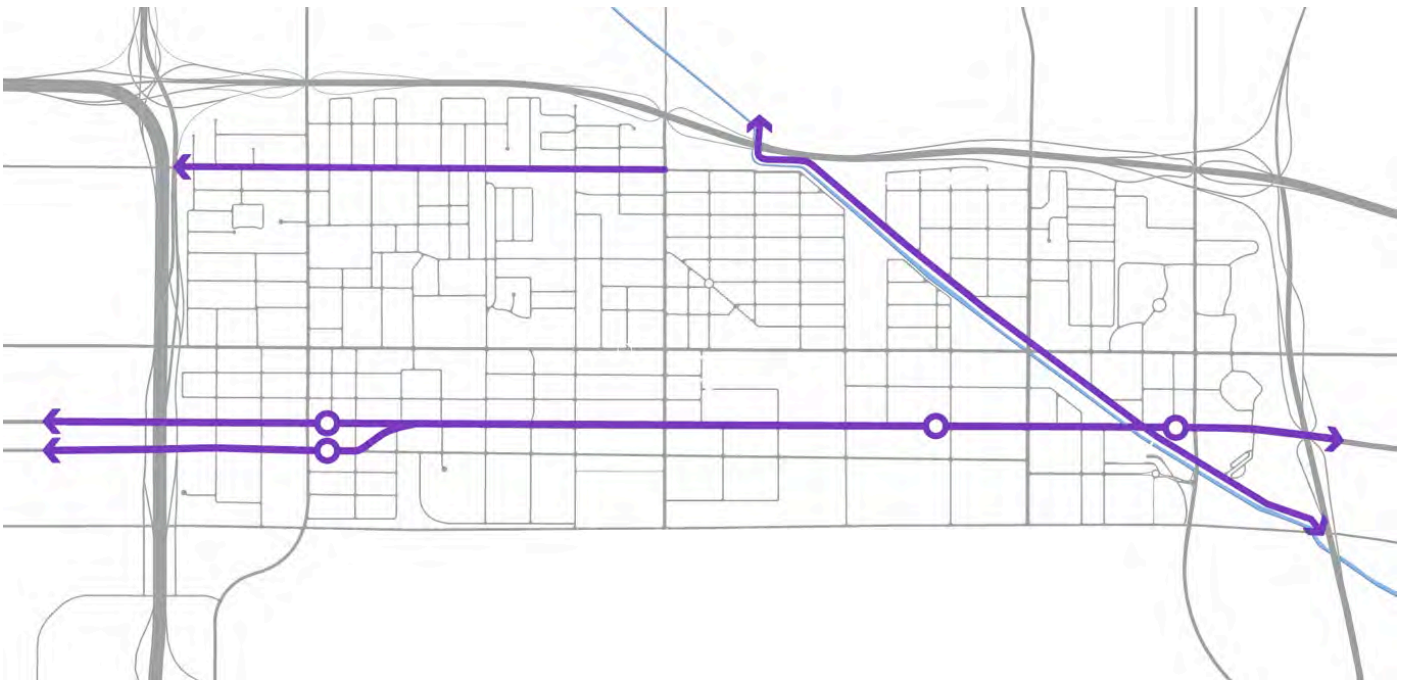
Public Transportation Comparison Before& After

5.4 Walkability Evaluation

By adding Green Street, Green Path and River Walk, this proposal increased walkable street from 3 into 21. And by the good connectivity from each destinations including commercial, retail, residential and public transportation, this proposal designed the whole neighborhood into a walkable community.

Walkability	Walkable Route	% Households within 1/4 mile walk to Public Recreation Facilities	% Households within 1/4 miles walk to Health Food	%Walk with Shading
BEFORE	3	10	3	0.5
FUTURE	21	55	60	89

Fig. 46



Walk & Bike Route Before

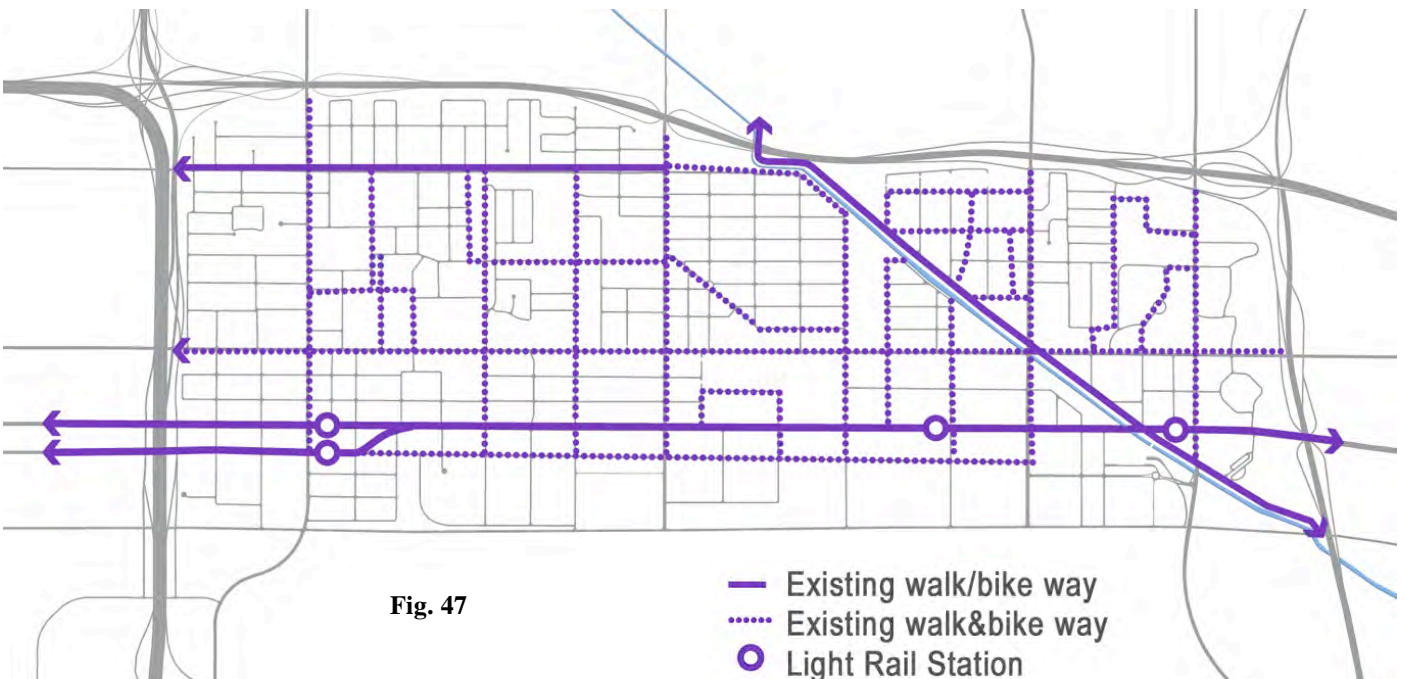


Fig. 47

Walk & Bike Route After

5.5 Quadruple Bottom Line Benefits

5.5.1 Economical

Firstly, by infill 300-acre vacant land with new development, which could attract potential residents to Gateway Community, as well as attract developer and new investment, which will increase the tax income. Secondly, by building a mixed-use commercial and business near sky train station, more company will be drawn to this district, which means more jobs will be created, and also create potential customer for local commercial and business, in this way, this design will benefit Gateway District with more jobs. Thirdly, designing this district into Green & Walkable community plus with new development, could increase the land value, and lead to better economic benefits for developer and for real estate.

5.5.2 Social

Being a declined community as Gateway District, there are many social problems including social isolation, lacking of sense of community and safety issue. By infill the vacant land into public civic parks and commercial and retails, adding more vitality into this district, convert the declining neighborhood into a lively and vibrant community, with strong sense of community and safety.

5.5.3 Environmental

Both infill and renewal of Gateway District have increased the coverage of green space to this area, which efficiently decrease the surface temperature, and could provide a more sustainable environment to residents. Moreover, by adding TOD development mode into this area, could reduces the usage of automobiles, thus reduce urban heat island for the whole city.

5.5.4 Aesthetical

This design has provided many newly amenities for the community, change Gateway District from a declining community into a well-maintained, beautiful new district.



Literature Cited

Dunphy, Robert. (2005). "Smart Transportation and Land Use: the New American Dream". Smart Growth and Transportation: Issues and Lessons Learned. Conference proceedings, Transportation Research Board, volume 32). Washington, D.C.: Transportation Research Board of the National Academies. p. 126

“The Infill and Redevelopment Code Handbook” September, 1999

City of Phoenix, “Reinvent PHX GATEWAY TOD policy plan”, 2015

Saelens, B. E., Sallis, J. F., & Frank, L. D. (2003). Environmental correlates of walking and cycling: findings from the transportation, urban design, and planning literatures. *Annals of behavioral medicine*, 25(2), 80-91

Sierra Club. (2003). Stop sprawl: Sierra Club Challenge to Sprawl Campaign. <http://www.sierraclub.org/sprawl/> (accessed September 23, 2003).

Hamin, E. M., & Gurran, N. (2009). Urban form and climate change: Balancing adaptation and mitigation in the US and Australia. *Habitat international*, 33(3), 238-245

Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Random House.

Torjman, S. (2001). *Reclaiming Our Humanity*.