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ACKNOWLEDGMENTS

Prepared by the Iowa State University Planning Team: Ahmad Al-Saygh, Meghna Chakraborty, and Mohammed Hossain in cooperation with the City of Des Moines and River Bend Neighborhood Association.

River Bend’s revised neighborhood plan was produced in partnership with the City of Des Moines, the River Bend Neighborhood Association, and Iowa State University’s Community and Regional Planning department. Under the guidance of Assistant Professor Jane Rongerude, a group of 15 graduate students designed and managed all activities related to the planning process including: outreach, holding focus groups, conducting stakeholder meetings, identifying resources, and plan writing. The students who made up the Iowa State planning team were Gertrude Addei, Ahmad Al-Saygh, Elisa Cardenas, Meghna Chakraborty, Kristen Greteman, Mohammad Hossain, Devanshi Mehta, Jackie Nester, Arindam Roy, Jingjing Ruan, Yuxuan Tian, Andrea Vaage, Kun Wu, Xiaomeng Xu, and Changsong Zhao.
River Bend Neighborhood Association reached out to the City of Des Moines to update the Neighborhood Action Plan that was published in 1992. With the partnership of the Community and Regional Planning Department, the graduate students of the Community Planning Studio were split into four teams including the Quantitative Research Team. The Quantitative Research Team was created to address and analyze the current conditions of River Bend neighborhood. The team has collected spatial and quantitative data that helps other teams to connect the numbers to the whole picture.

The following report is the collective work of the Quantitative Research Team, which created a substantial impact on the creation of the revitalization plan of River Bend Neighborhood. The report focus is to stay true to the current conditions of the neighborhood and project future changes in order to reflect a better future of River Bend community.

OBJECTIVES

The research team objectives are to create, analyze, and share data that represent the current conditions of River Bend Neighborhood. These data are delivered as visual representation and spatial analyses information of the neighborhood. The goal of the team is to demonstrate the current conditions and project changes within the neighborhood.
DATA COLLECTION

Most of the data collected by the team was passed down to the other teams in order for them to share the data with the community and finalize the teams’ plans. The data collected by the quantitative research team are from the following sources:

- Iowa Natural Resources: Geographic Information Systems Library
- United States Census Bureau
- City of Des Moines
- Des Moines Police Department
- Polk County Assessor
- Office of the Polk County Auditor
- Google Earth
- Field observation
Based on the responses collected from the door-to-door surveys and the stakeholders meetings. The team has decided to look into the following concern of the community, which also became the main research topics for the quantitative research team:

- Demographics
- Housing
- Economic Development
- Infrastructure
- Traffic
- Crime
AUTHORS’ NOTE

METHODOLOGY TO ESTIMATE THE CENSUS DATA FOR 2010

The River Bend neighborhood is located in five census tracts of the Polk County and they are Census Tracts 6, 7.01, 15, 49 and 50. But out of these five, Census Tracts 7.01 and 15 do not have any housing units in the portions of the neighborhood. We confirmed this by looking at the GIS map of River Bend neighborhood (Figure 1). Thus, we curtailed our calculations only to get the data for the Census Tracts 6, 49 and 50. We calculated the portion of the area of the neighborhood with respect to the total area of the Census Tracts.

But the difficulty in this simplified calculation was, based on the above calculation we estimated the population data and it was fairly less than that of provided by the City of Des Moines. Looking into the discrepancy in depth, we realized, the population density is not uniform across all the Census Tracts and also across the entire region within each Census Tract. Moreover, in Census Tract 49, about half of the area is designated for the commercial use, and we should not take that into account. So to avoid this discrepancy, we calculated an effective area for each of the census tracts where the residential housing units are located, by a rough estimation from the map itself, as Table 1. Based on this effective area (Area Equivalent) we calculated the percentage of the area of each census tract within the River Bend neighborhood. As per the percentage calculated, we estimated the data for River Bend for all the required data from Decennial Census 2010.
Figure 1: The census tracts and block groups of River Bend
Source: City of Des Moines
We applied the similar method (Table 2), mentioned above for the required data from American Community Survey 2010, and we ignored the “Marginal Error” associated to each of the estimated value, as all the errors were less than 15%.

Table 1: Area and population calculations for River Bend from the Census Data 2010

<table>
<thead>
<tr>
<th>Census Tracts, Polk County, IA</th>
<th>Area (Acres)</th>
<th>% Equivalent</th>
<th>Eq. Area (Acres)</th>
<th>RBN Area (Acres)</th>
<th>Census Tract Population</th>
<th>Area Ratio</th>
<th>RBN Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>784.45</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7.01</td>
<td>618.69</td>
<td>65</td>
<td>402.1485</td>
<td>12.65</td>
<td>3,310</td>
<td>12.65/402.1485</td>
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<tr>
<td>15</td>
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<tr>
<td>49</td>
<td>487.89</td>
<td>70</td>
<td>341.523</td>
<td>174.38</td>
<td>2,159</td>
<td>174.38/341.523</td>
<td>1,102</td>
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<tr>
<td>50</td>
<td>377.17</td>
<td>50</td>
<td>188.585</td>
<td>120.55</td>
<td>4,076</td>
<td>120.55/188.585</td>
<td>2,606</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau and City of Des Moines

Table 2: Calculations for the ACS (5-years estimates) data for River Bend for 2010

<table>
<thead>
<tr>
<th>Census Tracts, Polk County, IA</th>
<th>Population ACS</th>
<th>Population DC</th>
<th>Population with Occupancy</th>
<th>Population without Occupancy</th>
<th>Owner Occupied</th>
<th>Renter Occupied</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7.01</td>
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<td>104</td>
<td>99</td>
<td>5</td>
<td>60</td>
<td>39</td>
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<td>49</td>
<td>947</td>
<td>1,102</td>
<td>1,002</td>
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<td>50</td>
<td>2,170</td>
<td>2,606</td>
<td>2,356</td>
<td>249</td>
<td>1,392</td>
<td>933</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau and City of Des Moines
AUTHORS’ NOTE

Though these estimates give a fairly close overall picture of the neighborhood, we are unsure if they could represent the unique features of RBN like vacancy status, homeless population etc.

We also collected the Block Group level data for Polk County from Decennial Census 2010 for some datasets and calculated them for River Bend neighborhood applying the similar method mentioned before (Table 3). We got the individual area of the portions of the block groups of each of the census tracts from the GIS map. We compared them with the Census Tracts area also within the neighborhood. The areas of all the block groups are either partially or entirely matching with that of the Census Tracts. Based on the percentage of the area of the block groups we calculated the total population and other datasets.

<table>
<thead>
<tr>
<th>Census Tracts, Polk County, IA</th>
<th>Block Groups</th>
<th>Census Tract Population</th>
<th>Area (Acres)</th>
<th>% Equivalent</th>
<th>Eq. Areas (Acres)</th>
<th>Block Group Area (Acres)</th>
<th>Area Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.01</td>
<td>3</td>
<td>3,310</td>
<td>618.69</td>
<td>65</td>
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<td>100.18/ 341.523</td>
</tr>
<tr>
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<td>2,159</td>
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<td>341.523</td>
<td>74.2</td>
<td>74.2/ 341.523</td>
</tr>
<tr>
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<td>1</td>
<td>4,076</td>
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<td>50</td>
<td>188.585</td>
<td>41.15</td>
<td>41.15/ 188.585</td>
</tr>
<tr>
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<td>2</td>
<td>4,076</td>
<td>377.17</td>
<td>50</td>
<td>188.585</td>
<td>48.06</td>
<td>48.06/ 188.585</td>
</tr>
<tr>
<td>50</td>
<td>3</td>
<td>4,076</td>
<td>377.17</td>
<td>50</td>
<td>188.585</td>
<td>31.34</td>
<td>31.34/ 188.585</td>
</tr>
</tbody>
</table>

Table 3: Area calculations for Block Groups in River Bend from the Census Data 2010
Source  U.S. Census Bureau and City of Des Moines
ANALYSES

**POPULATION & DIVERSITY**

Neighborhoods matter to the well being of children and families (Ellen and Turner 1997). They are the locus for essential public and private services. Teenagers in particular are profoundly influenced by their immediate peer groups, which are often dominated by neighbors. Where people live influences their exposure to crime and violence, including the risk of being a victim of burglary or assault. Some neighborhoods offer better access to job opportunities than others. In short, population and diversity influence the planning strategies greatly in every aspect (housing, economic development, safety etc.). The goal of healthy, sustainable communities cannot be achieved as long as current levels of neighborhood segregation, exclusion, and inequality persist. As the nation becomes more and more diverse, public policies must ensure that families aren’t excluded from neighborhoods based upon race or ethnicity and that diverse neighborhoods aren’t denied the services and amenities they need to thrive. The Department of Housing and Urban Development has proposed a new plan (“Affirmatively Furthering Fair Housing”) to change U.S. neighborhoods it says are racially imbalanced or are too tilted toward rich or poor. This kind of integration strengthens economic equality.”

To better understand the key issue areas in details, we need to first have a glance at the population and diversity in the River Bend neighborhood.

<table>
<thead>
<tr>
<th>Census Year</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>River Bend Population</td>
<td>3,921</td>
<td>3,809</td>
</tr>
<tr>
<td>Percent Change of River Bend</td>
<td>NA</td>
<td>-2.86</td>
</tr>
<tr>
<td>Des Moines Population</td>
<td>198,682</td>
<td>203,433</td>
</tr>
<tr>
<td>Percent Change of Des Moines</td>
<td>NA</td>
<td>2.39</td>
</tr>
</tbody>
</table>

*Table 4: Population change of River Bend from 2000 to 2010, w.r.t City of Des Moines*

Source: U.S. Census 2010

Table 4 shows the total population change of River Bend Neighborhood and the city of Des Moines. It also shows the River bend Neighborhood’s percentage of total population of the city of Des Moines. We can see here, that the population of River Bend neighborhood decreased over the last decade whereas it has increased almost in the same rate in the city of Des Moines.
Figure 2 shows the percentages of male and female population in the city of Des Moines and River Bend neighborhood for 2010. Unlike the Des Moines city population, the percentage of male population is higher than that of the female population.

Figure 3 shows the median age in River Bend in comparison to Des Moines. Most residents in River Bend are younger than the general median age in Des Moines. This becomes a critical information when we look at the educational attainment and rate of unemployment of young population in the River Bend Neighborhood.
Comparing the median age above, looking at Figure 4 shows that River Bend residents under the age of 20 exceeds the number of population distribution under the age of 20 in Des Moines.

In Figure 5, the graph on the left represent the population pyramid in River Bend while the graph other right represent the population pyramid in Des Moines. While it is clear there is a younger population living in River Bend, it also indicates that more young females proportion is higher than in general in Des Moines.
Figure 6 shows the diversity in River Bend comparing to Des Moines. While races other than white are considered a minority in Des Moines. This is not the case for River Bend as there are generally more diverse races living within the neighborhood.

Figure 7 shows the Hispanic population in the River Bend Neighborhood is much higher than that of the city of Des Moines. This strongly supports the previous finding, that this neighborhood is fairly diverse unlike the city of Des Moines.
Figure 8 shows the total population projection for 2015 in the River Bend neighborhood. We can see from this graph, that with the gradual decrease in population in the last 10 years is expected to decline more in future. We have used a Ratio (Shift Share) Extrapolation method to project the total population for 2015.
ANALYSES

HOUSING
According to many survey responses by the residents of the neighborhood and concerns of stakeholders, the neighborhood is facing some problems in its housing market. These concerns are based on the housing conditions and affordability within the neighborhood.

To verify these information and get a better scope of the problem, the Polk County Assessor information on housing and U.S. Census Bureau data were used to conduct further analysis on the housing market of River Bend.
Figure 9: Current zoning districts of River Bend
Source: City of Des Moines
ANALYSES

Figure 9 shows the current zoning districts in River Bend neighborhood. It shows that the neighborhood is predominantly one-family low-density residential. Commercial corridors are on 2nd Avenue, which is zoned as light industrial, and 6th Avenue, which is zoned neighborhood retail commercial. The legend in Figure 10 indicates the key zoning districts in relation to Figure 9.

![Legend]

There is not much of a difference between the current zoning districts and the Land Use map that was presented in River Bend Neighborhood Action Plan of 1992 as shown in Figure 11. There is not much rezoning happened in the neighborhood in the past two decades. Therefore, the neighborhood was able to maintain its majority of the residential zone district for the past 20 years.
ANALYSES

Figure 11: Land Use Map of River Bend

Source: River Bend Action Plan 1992
Figure 12: Housing Types in River Bend
Source: Polk County Assessor (2014)
Figure 12 shows the locations of housing types in River Bend neighborhood. There are more than 600 residential properties in River Bend with majority of the housing market consisting of single-family houses. There is currently over 400 single-family housing and over 200 multifamily housing in the neighborhood. This is a big shift from the housing market in the neighborhood 20 years ago.

River Bend Action Plan of 1992 indicates that the housing type is split evenly between single-family housing and multifamily housing. However, when examining the number of houses built in the past two decades, it is possible that over 50 single-family houses were built within the neighborhood (Figure 13). This could explain the shift of increasing single-family housing in the past 20 years.

Figure 13 also indicates that many residential houses were built in late 19th century and early 20th century. This indication explains that River Bend is one of the oldest neighborhoods in Des Moines.

New developments still happen in River Bend, including multifamily residential properties. There are 97 multifamily-residential units built since 2000, according to Table 5. The period of 1960-1980 was low in term of single-family housing, but it was relatively high for multifamily housing units (Figure 14).
While the neighborhood holds a great number of old and historical landmark properties, the neighborhood association was able to get approvals to register four local historic districts including, Oakland Historic District, Prospect Park Second Plat, Riverview Park Plat, West Ninth Street Corridor. Bates Park National Historic District was registered since 1996, this bring the number to five historic districts within the neighborhood (Figure 15).
ANALYSES

Figure 15: Historic districts in River Bend
ANALYSES

Figure 16 shows the occupancy status in River Bend Neighborhood and the same in the city of Des Moines for 2010. As we see in this figure, that the share of rental housing are much higher (almost half of the total occupied housing units) with respect to the city of Des Moines (about one third of the total occupied housing units). This implies, the percentage of housing ownership in this neighborhood are comparatively lower than the city and therefore, we considered only the rental housing to calculate the housing affordability.

Figure 17 shows the percentages of vacant housing units with respect to the total occupied housing units. This figure tells us that along apart from the nuisance properties and distressed housing, this neighborhood has a much higher share of vacant housing than the city of Des Moines. This information was extremely important in forming some of our action items, where suggestions were given to utilize these vacant houses for community engagement purposes and development of affordable housing.
Figure 18 shows the percentages of population in occupied housing units and also the population without permanent occupancy in the city of Des Moines and River Bend neighborhood for 2010. This tells us, the population without permanent housing is much higher compared to the city of Des Moines. The population without permanent housing might imply homeless Population, population in temporary shelters or transition. During our door-to-door survey, we realized, the homeless population is one of the major concerns for the residents in the neighborhood and this data gives a credible support to that.

Table 6 shows the average household size of the River Bend neighborhood. On average, there are 2.7 residents per occupied unit in this neighborhood. This household size is comparatively higher than the city of Des Moines (2.4 persons per occupied unit).
Figure 19 shows household size distribution in the city of Des Moines and River Bend neighborhood for 2010. Household sizes are mostly bigger in RBN. This might be an indication of cultural difference or lack of financial independence.

Figure 20 shows a large percentage of owner occupied housing units have comparatively lower value, and very significant number of houses have values higher than $99,900.
We estimate affordable housing supply for renter household in RBN using the 30% of household income method. It assumes that if a household only spends 30% or less on housing, it lives in an affordable unit. This method does not account for the fact that some households have saving in the bank or could receive rent subsidy, which could reduce the actual rent burden for these households. It also does not consider the fact that some households over-consume housing and thus their rent can exceed 30% of their household income.

Using the ACS data, we estimate that the median rent for all occupied rental units in RBN is $725/month (or $8700/year). Following the logic of the 30% of household income method, we estimate that a household has to earn $29,000/year or more to afford these units. To estimate how much percentage of the households in RBN earn $29,000/year (=8700*100/30) or more, we made a continuous distribution of median renter households’ income in RBN based on the ACS data (Figure. #). We see that about 50% of all the renter households earn $29,000 or more per year. At this point, we can conclude that for all the rental units, at least half of them (50%) are affordable for the typical renter household. The remaining 50% may live in an unaffordable housing unit.

The ACS data show how many households pay more than 30% of their household income for housing by census tract. If we simply assume that these households are in need of affordable housing, then we can estimate the maximum demand for affordable housing by census tract.
Based on the ACS data, we found that as many as 50% renter households in RBN spend more than 30% of their household income on rent and we call these renter households “rent-burdened households”. In reality, households in need of affordable housing are part of these rent-burdened households. But not all rent-burdened households would need an affordable home, as we do not know whether (A) the rent-burdened households have extra saving in the bank, which would enable them to afford a home in addition to annual income; (B) the rent-burdened households have extra saving in the bank, which would enable them to afford a home that asks for a rent which is more than 30% of their annual income; (C) whether the rent-burdened households receive rent subsidy.

One way to more accurately estimate households in need of affordable housing is to compare the cumulative distribution of household income and gross rent. With the distribution function, we could estimate how much percentage of households and how many households are in need of an affordable housing unit. Using this information, we can make a graph showing the cumulative distributions of the 30% median household income by month for renter households and median gross rent for renter-occupied units in RBN (Figure 2). If we assume that the cumulative distributions of household income and gross rent of the renter households of all income level is the same as the above distribution, we can then estimate how much percentage of households and how many households are in need of an affordable housing unit by different income brackets.
Based on Figure 22, we can see that there are more households than homes when the gross rent is around or more than $1000, that is, the household income is almost $30,000/month, assuming only 30% of the household income is spent on rent. We can estimate how many affordable housing units are needed below different rent and income levels. For instance, when the rent is $1250/month or the household income is $50,000/year, 63 units are needed. The calculation is as follows:

On the supply side: at the rent of $1250/month or more, there are only 80% of all the rental homes (n=627). On the demand side: there are as much as 90% of all the renter households (n=627) that make $50,000/year. The difference between the above would be the demand for affordable housing, which are 10% of 627 = 63 (rounded).

Figure 23 shows the projection for total number of housing units for 2015 in the River Bend neighborhood. We can see from this graph, that with the gradual decrease in total number of housing units in the last 10 years is expected to decline more in future. We have used a Ratio (Shift Share) Extrapolation method to project for 2015.

Figure 23: Projection of total housing units in River Bend for 2015
Source: U.S. Census 2010
ANALYSES

Figure 24 shows the projection for total number of occupied housing units for 2015 in the River Bend neighborhood. We can see from this graph, that with the gradual decrease in total number of occupied housing units in the last 10 years is expected to decline more in future. We have used a Ratio (Shift Share) Extrapolation method to project for 2015.

Figure 25 shows the projection for total number of vacant housing units for 2015 in the River Bend neighborhood. We can see from this graph, that in contrast with the above two graphs, the total number of occupied housing units in the last 10 years has decreased in a steady manner and also is expected to decline more in future. We have used a Ratio (Shift Share) Extrapolation method to project for 2015.
Figure 26 shows the current housing property condition in River Bend. Currently, 442 housing properties are in above and normal conditions while 175 properties are in poor conditions. There is no concentration of specific housing condition where it is predominant over the other level.

There is also the problem of distressed properties within the neighborhood. There are currently 28 distressed properties of which 14 of them are considered public nuisance. City of Des Moines considers these properties as unfit for habitation or unsafe for the community. In addition, out of the 28 distressed properties there are 20 property owners failed to pay their property taxes. According to Whitaker and Fitzpatrick, property owners evading paying their taxes are either unable to pay their taxes or maximizing their income.
Figure 27: Effects of poor condition properties on the adjacent properties

Source: Polk County Assessor
ANALYSES

Figure 26 shows the current housing property condition in River Bend. Currently, 442 housing properties are in above and normal conditions while 175 properties are in poor conditions. There is no concentration of specific housing condition where it is predominant over the other level.

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ECONOMIC DEVELOPMENT

Strong economy is a vital for any neighborhood. Having businesses within the neighborhood can help to bring property values higher and create local jobs. There are two commercial corridors in the neighborhood. The first being under light industrial zoning district on 2nd Avenue and the other is part of 6th Avenue corridor, right in the heart of the neighborhood.

While conducting the door-to-door surveys, many respondents stated there is lack of retails and variety in River Bend. There are many vacant parcels within the neighborhood and could bring economic boost to the neighborhood.
ANALYSES

Figure 28: Commercial and Vacant Properties (Parcels) within the neighborhood
Source: Polk County Assessor (2012)
Figure 28 locates the businesses in River Bend, majority of businesses are located on 2nd Avenue and 6th Avenue, however, there are many vacant properties within the neighborhood. There is a lack of business categories within the neighborhood, there are six auto shops, three groceries or convenience stores, four restaurants, 21 retails, and 20 offices, that is according to the latest data available which is for the year 2012.

<table>
<thead>
<tr>
<th>Area</th>
<th>Median Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>River Bend</td>
<td>$32,479</td>
</tr>
<tr>
<td>Des Moines</td>
<td>$44,178</td>
</tr>
</tbody>
</table>

Table 7 shows that the median income for the River Bend Neighborhood is much lower as compared to the city of Des Moines. We assume, the actual picture could be even worse, as the calculation for median income also includes the income in the commercial area of the census tract 49.

Figure 29 shows the household income distribution in the city of Des Moines and River Bend neighborhood for 2010. Average household income is comparative much lower than the city of Des Moines. The percentage of the population is much higher in the RBN for the lower range of income (up to $35,000). The percentage of the population is much lower in the RBN for the higher range of income (more than $50,000).
Figure 30 shows the percentages of population in different occupations in the city of Des Moines and River Bend neighborhood for 2010. Much less percentage of population are in Management, business, science and arts occupations.... Somewhat lesser population in Healthcare, education, legal and media occupations. Much higher percentage of population in services occupation. This might be a reflection of educational attainment and other characteristics of the neighborhood.

Figure 31 shows that the rate of unemployment is extremely high in River Bend neighborhood for the population of age 20 - 24 years. This is critical information in our analyses, as we see above that this neighborhood has a major share of young population. This implies the unemployment in young population in this neighborhood is a matter of great concern.
ANALYSES

Figure 32 depicts an overall picture of the unemployment in the neighborhood. As we can see from this graph, the unemployment rate is much higher in the neighborhood as compared to the city of Des Moines, implying a weak economy of the neighborhood.

Figure 33 shows the employment and unemployment rates of the population of age 16 years or more in the city of Des Moines and River Bend neighborhood for 2010. This graph reiterates the previous graph showing a high percentage of unemployment and much lower percentage of employed population.
Figure 34 shows, along with the high rate of unemployment, the neighborhood also suffers from a high poverty rate. Both the rates of unemployment and poverty are more than double than that of the city of Des Moines.

Figure 35 shows the educational attainment of the population in the city of Des Moines and River Bend neighborhood for 2010. Population with educational attainment less than high school is much more in the River Bend Neighborhood. Population with educational attainment of high school or some college is somewhat comparable in the neighborhood. The population with an Associate degree, Bachelors degree, and higher are much lower in the RBN.
Figure 36 depicts a good picture of the neighborhood for the expected educational attainment. The projection shows, the population count with high school graduation has increased over the last ten years and is projected to grow more. This is important in terms of the overall economic development of the neighborhood, which includes higher skilled labor suitable for more job opportunities, healthier environment.

Figure 37 shows the projection for unemployment rate for 2015 in the River Bend neighborhood. In contrast with the above picture (Figure 36) the unemployment rate has increased with time and expected to grow more. A combination of these two set of information tell us, there would be a great scope for creating job opportunities which are to be utilized by the skilled and educated young population.
ANALYSES

INFRASTRUCTURE & TRAFFIC
Analysis of the infrastructure condition of the neighborhood is significantly important from the urban planning perspective. Better infrastructure condition does not only improve the condition if the lifestyle of the residents in a neighborhood, it also plays a key role behind the improvement of other issues related to the community condition. Better infrastructure condition helps to increase the property value in an area, which helps us to improve the housing condition in an area. Investors are also interested to invest in an area, when infrastructure condition is improved, which eventually plays a key role behind the improvement of the whole community.

River Bend Neighborhood is a medium density multi-cultural neighborhood. Better infrastructure condition will play a key role behind the improvement of the lifestyle of the whole community at the same time it is going increase the safety of the residents in the neighborhood. Better availability of the street lighting and controlled vehicular movement will not only make the neighborhood more livable, but will also play key role behind decreasing crime rate and improving housing condition in the area. Infrastructure condition of an area is also related to the water management system in the neighborhood, which includes both municipal water supply and water management during flood or heavy rain. Storm water management is a significant part of the infrastructure condition in an area. Although the condition of the storm water management in such a small area like River Bend Neighborhood is not important from the perspective of supplying better municipal water, it is important for pedestrian movement during heavy rain.

Condition of the traffic system in an area will depend on the presence of the better traffic control system, availability of the better sidewalks and condition of the roads. A detailed study on all these factors has been conducted in this study. Location of all the traffic control signs, like stop sign and traffic signals have been identified and have been plotted on the map to find out some problem for further inquiry and they have been also linked to other issues like, crime and housing condition. Analysis on the condition of the sidewalks are also important to ensure safety in the neighborhood at the same time maintaining better environmental condition in the neighborhood. Several maps have prepared basically to show defects in the present system of the infrastructure at the neighborhood and then to relate them with other factors of the neighborhood, like crime, housing or the economic development in the area.
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Methodology
Most of the data related to the infrastructure condition in the neighborhood, like storm drainage system, location of the obscured street lights have been collected from the City of Des Moines in shape file format. These data have been then plotted in the boundary and the street network shape file of the River Bend Neighborhood at the ArcGIS platform to find out the condition of these facilities in the neighborhood. These maps have been visually compared with other issues of the neighborhood to find out their corresponding correlation. Traffic signage map of the study area to show the location of the stops signs and the traffic signals have been collected by visual observation from the Google Earth. These data have been also crossing checked with the stops signs and the traffic signals data collected from the Des Moines Department of public Works.

Information of the condition of the road infrastructure map has been collected during field survey in the neighborhood. Field survey was conducted after a rainy day in the neighborhood, so we were able to identify the location of several standing water areas in the River Bend Neighborhood. In case of identifying condition of the sidewalks, several factors have been given importance these were width of the sidewalk, condition, presence of big trees etc. These big trees do not only make the streetlights obscured but also create problems, when the pedestrian moves through the area.

Description
Traffic Signage: From the visual observation of the traffic signage map, one thing can be easily identified that most of the roads are controlled by two-way stop signs, except intersections through the college avenue. Necessity of the four way stop signs throughout the neighborhood is a complicated issue, because in streets like 9th street to 6th street, traffic volume is quite low, so use of four way stop signs might some create problem in case of vehicular movement. But the main area of concern was the 2nd street. Despite being an arterial road and close to major crime prone area of the neighborhood, Oakland Historical District, this road has only one traffic signal at the intersection point with the University Avenue.

Four out of five intersection points are controlled by two-way stop signs and no stop sign is located in the intersection point at the College Avenue. People face huge difficulty in case crossing streets from that point at the same time it gives more opportunity to the criminals to flee from the neighborhood after committing crime in the neighborhood. Condition of 6th Avenue is much better compared to the 2nd Avenue, because this arterial road has four traffic signals out of its seven intersections. One of the positive finding of the study was that most of the intersections in the College Avenue are controlled by four way stop signs. This area is very important in the neighborhood, because of the location of the school.
Figure 38: Traffic Signals in the River Bend
Source: City of Des Moines
ANALYSES

Storm Drainage: Information related to the sewerage system in the river bend neighborhood has been collected from the City of Des Moines. Map prepared based on that data indicate that the neighborhood storm water management system is basically concentrated along three streets. It requires further improvement in almost every part of the neighborhood. From the map it can be said that more storm manholes and pipelines are required to be within the college Avenue and University Avenue, because standing water problem is mainly concentrated in that part of the study area.

Presence of the damaged roads at the same time unsatisfactory storm drainage management system in areas close to the Indiana Avenue make this area quite vulnerable in case of heavy rain and flood. Oakland Historic District is another part of the neighborhood, which requires major consideration in case of storm water management. One of the significant problems in the neighborhood is the garbage collection and this problem is distributed throughout the neighborhood. This year more than 357 complains have been received by the Des Moines Department of Public Works. If storm water is not managed in proper way, it might cause water pollution, because of the unplanned disposal of the garbage.
Figure 39 : Storm Drainage System in the River Bend
Source: City of Des Moines
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Speed Limit: Speed limit map of the study area represents some important findings related to the traffic condition in the neighborhood. Most of the streets are controlled by the 25 mph speed limit as it’s supposed to be for any neighborhood. In two arterial roads of the neighborhood, 2nd Avenue and 9th Avenue, speed limit is 30 mph. But the proper analysis of the speed limit of an area is dependent on other issues of the neighborhood, like stop sign and road condition. In case of 2nd Avenue one thing can be easily said that the speed limit is not so high, but traffic signals are not available, this issue needs to be given importance, otherwise in other parts of the neighborhood speed limit was satisfactory.
Figure 40: Speed Limit throughout the River Bend
Source: City of Des Moines
Infrastructural Condition

Infrastructural condition covers several important issues, like the condition of the sidewalk, road condition, streetlight, and storm water management. Condition of the sidewalk was in alarming condition in most of the roads, especially near the southeast corner of the neighborhood. Some of the sidewalks in these areas were quite narrow and broken. This condition sometimes forces the residents to walk through the street. In some cases, sidewalks have not continued in proper ways, they suddenly stopped after a certain point. Significant problems with the sidewalk were in the 2nd Avenue. Sidewalks were narrow, and another important issue was the presence of big trees within the sidewalk. Big trees were sometimes found above the sidewalks in the 2nd Avenue. This issue requires to be given huge importance.

Conditions of the roads were also not satisfactory. Some potholes have been found near the College Avenue, 9th Street, and Indiana Avenue. These areas also increase the amount of standing water in case of heavy rain. Some of the roads close to the Bates Park were quite narrow. Cars face difficulty in case of moving through these areas. 7th Street was in most satisfactory condition in the neighborhood, and streets like 9th Street, 2nd Avenue, and Indiana Avenue require major modifications, especially sidewalks throughout the neighborhood require major modifications and maintenance. Some of the big trees might also require to be cut to keep the neighborhood in proper condition and ensure safety of the neighborhood. Streetlights were present in most every part of the neighborhood, but the presence of big trees has made them obscured in several cases. In those cases, streetlights might be placed in both sides of the road to solve this problem or some of the trees can be cut to solve this problem.
Figure 41: Infrastructure Condition in the River Bend
Source: City of Des Moines
ANALYSES

Summary
Condition of 2nd Avenue is in most deteriorated condition and sidewalk, traffic control system; road condition requires major modification in the 2nd Avenue.

Condition of the 2nd Avenue is directly related to the housing condition in the Oakland Historic District and crime rate along the eastern portion of the neighborhood. This area requires more traffic signals to solve this problem.

Some of the potholes are causing problems in case of storm water management at shorter scale, but in the long term full drainage system requires further modification and changing the complete drainage system. These improvement will increase the property value in the area at the same time improve the living condition.
ANALYSES

CRIME

Consideration of different characteristics of recent trend of crime in a neighborhoods, like rate of crime, concentration of crime, public perception towards crime etc. are significantly important from urban planning perspective. These issues are directly related to other issues like, economic condition of the area, housing pattern, condition of the infrastructure etc. Higher rate of crime or concentration of crime in several areas requires necessary initiatives not only by responsible police departments, but urban planners can also play a positive role by utilizing these data. Some of the maps prepared by using the crime data can be used by the urban planners to take decision, like where neighborhood some problems related to the street lighting, traffic signage of the road condition. During our field survey to the study area importance of conducting an analysis on the recent pattern of the crime came forward. Significant numbers of residents from the study area have expressed their concern regarding level of shooting cases, prostitution, and robbery in the neighborhood. River Bend Neighborhood has huge importance from the historical perspective and historical zones cover 250 residential properties of the neighborhood and the conditions are not satisfactory according to the residents. Another important finding for the housing condition was that the poor condition houses are located in almost every part of the neighborhood, which clearly indicate the need of conducting a crime study throughout the neighborhood. These poor condition houses are definitely playing a key role behind the decrease of property value and median income of the households in the neighborhood. These issues are definitely playing a key role behind crime in the neighborhood. As we have found before median household income in the Des Moines area are $32,479 and in River Bend Neighborhood $44,178 (Source: U.S. Census, 2010). Crime rate in a low-income neighborhood, like River Bend is supposed to be higher compared to other places, except they have better infrastructure condition or the police in the neighborhood are more effective. Crime is related to infrastructural facilities, like street lighting, traffic control system and speed control system in the neighborhood. Although neighborhood has quite satisfactory speed limits, its traffic signals are not in satisfactory condition. In streets like 2nd Avenue and 7th Street significant problems have been found related to the traffic signal and street lighting. Locations of the historical districts are also close to these streets. These findings indicate the importance of doing an inventory on crime rate in these areas. Analysis of the crime pattern in the neighborhood will give us some idea regarding safety of the residents in the neighborhood. Demographic analysis is also important to get some idea of the crime rate. Although River Bend Neighborhood is a multi-cultural neighborhood, level of unemployment is quite high in the neighborhood. 36.5% people are unemployed in this area within the age group 20-24 (Source: U.S. Census, 2010), which is a major finding to
anyone working on the safety issue of the neighborhood. Employment rate of the residents in management, business, healthcare, and education related activities are also quite low compared to Des Moines. This picture represents the necessity of doing a comparison of the crime rate between Des Moines and River Bend Neighborhood.
ANALYSES

Methodology
Analysis of the crime pattern in the neighborhood has been done in two stages.

Stage 1: In this stage, trend analysis of the total number of crimes in River Bend Neighborhood and crime rate comparison with the Des Moines Area have been done. Most the data in this stage has been collected from the Des Moines Police Department and from city-crime-statistics.findthebest.com. Outcome of analysis is going to help to decide, whether police department are actively monitoring the area or whether infrastructure is in satisfactory condition in the neighborhood.

Trend analysis of the crime in River Bend Neighborhood was divided in two parts. In the first part, total number of crimes in River Bend Neighborhood has been plotted using a single line. In the second figure, a linear chart has been prepared using Microsoft Excel to show the changes in the total number of each type of crime from 2009-2014. Total eight types of crimes have been considered in this section.

Crime rate calculation has been used to do a comparison between Des Moines Area and River Bend Neighborhood using the below formula.

\[
\text{Crime Rate} = \left( \frac{\text{Number of Crimes}}{\text{Total Population}} \right) \times 1000
\]

Crime rate comparison has been done for the year 2009-2013. Population data of the River Bend Neighborhood for the year 2013 was not available. Linear population projection method has been utilized based on the population data available from 2009-2012. These data and the year has been plotted using scatter plot tool of the Microsoft excel and the equation found in the scatter plot tool has been used to calculate the population of River Bend Neighborhood for 2013 manually.

Stage 2: Maps have been prepared in this stage to show the location of total number of different type of crimes in different parts of the neighborhood. Crime rate map of the study area based on blocks have been also prepared to make a crime prone area map of the study area.

All the data related to the location of the crime have been collected from the Des Moines Police Department. These were in the PDF format, so we have to manually enter all the data in the Microsoft Excel to join all the data with ArcGIS shape file of the plot address. Different query tools of the Microsoft Excel have been used in this stage to find out the total number of crimes in each address of the River Bend Neighborhood. Then address field of the both crime data and plot address shape file have been used in the ArcGIS join tool to create a complete database of the crime data. Then ArcGIS Symbology tool has been used in this stage to show the number of crimes in each plot from 2009-2014.
Six other maps of the total number of each type of crime in different parts of the neighborhood have been also prepared following the same procedure. Six maps were the location maps of the theft, robbery, burglary, weapons and abuse for the years from 2009-2014. Main excel database has been divided into six extra excel sheets in this stage to join them separately with the plot address shape file.

Description
Crime Trend in River Bend Neighborhood: As discussed before, crime trend in the River Bend Neighborhood has been analyzed from 2009-2014. Total number of crime in the River Bend shows significant increase after 2009. It changes from 211 reported cases in 2009 to 240-270 reported cases within the period 2010-2013. For the year 2014, data was available until October 2014 that’s why value in the trend line for year 2014 is bit lower.

Although we can identify that the number of crimes in the River Bend Neighborhood are increasing in recent days, important factor required to be considered is what type of crimes are actually increasing. From Fig 2, it can be said that larceny/theft is the most prominent type of crime in the neighborhood and number of theft cases show slower rate of increase in recent days. Increased number of theft cases in recent days indicates the importance of doing a correlation analysis between street lighting condition in the neighborhood and location of the theft cases.

That’s why a location map for the theft has been prepared in the later part of the report to find out whether bad lighting condition is increasing the number of theft cases in the neighborhood. According to the responsible police officer in the River Bend Neighborhood, condition of the fences, windows and doors in some of the
houses are responsible behind increased number of crimes in the River Bend Neighborhood.

Most important finding from Figure 2 was the increased number of burglary cases in recent days in River Bend Neighborhood. In case of assault and robbery trend was quite similar in most of the years. Separate location map for robbery, assault and burglary have been prepared in later parts of the report to find out, whether traffic control system at the same time housing condition are playing a key role behind these crimes.

Comparison of the Crime Rate between River Bend Neighborhood and Des Moines Area: River Bend Neighborhood is located in quiet middle of the Des Moines Area, so different characteristics of the crime in River Bend Neighborhood are supposed to the quite close to the Des Moines Area. Any significant difference from the characteristics of the Des Moines Area will indicate the necessity of further inquiry. Total crime rate in the River Bend Neighborhood (63.11) are higher compared to the Des Moines Area (53.56). Significant findings from Figure 43 are that the rates of all seven types of crimes are higher in River Bend compared to Des Moines.
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Crime Prone Area Separation: Concentration of crime analysis in different parts of the neighborhood are significantly important from the urban planning perspective, because it helps us to locate areas, where most of the initiatives required to be taken to stop the further expansion of crime in the River Bend Neighborhood.

Number of crime map of the River Bend Neighborhood map shows that the crimes are distributed throughout the neighborhood. In several areas, of the neighborhood like, the McDonalds and Oakland Historical District number of crimes are high. In other areas, like 9th street, 8th street or 7th street crimes are very much equally distributed. From this map, separations of the crime prone areas were quite difficult. That’s why another map has been prepared based on the crime rate equation for each block. Fig. 4 has showed this map.
Figure 45: No. Of Crimes in River Bend (2009-2014)  
Source: Des Moines Police Department
ANALYSES

Four areas have been selected as the crime prone areas based on the value of crime rate and relative size. These four areas are, Oakland Historical District, 6th Street and Forest Avenue, Block Adjacent to McDonald’s and Bates Park.

From the locational perspective of these four areas, one thing can be identified that they all are quite close to the arterial road 2nd Avenue except McDonalds. As previously mentioned, traffic control system in the 2nd Avenue are not satisfactory.
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Figure 46: Crime Rate in River Bend
Source: Des Moines Police Department
Figure 47: Crime Prone Areas in River Bend
Source: Des Moines Police Department
Crime Trend Near Bates Park: Crime analyses near the Bates Park Area are significantly important from the perspective of the community development. It’s one of the main places of the community gathering. Although crime data for 2014 has been collected up to October, number of crimes near the Bates Park in the year 2014 is highest. This picture represents an alarming condition near the Bates Park Area. Most of the roads are quite narrow in this area and with defects. Street lighting condition is not also satisfactory near the Bates Park. During field survey through the area, street light problem has also found in this area.

Numbers of theft cases near the Bates Park area are quite low compared to the burglary and robbery. This picture represents the presence of the narrow street and low lighting condition, are making the area burglary prone area.

Figure 48: Crime Trend near Bates Park
Source: Des Moines Police Department
ANALYSES

Crime Trend Near Oakland Historic District: Oakland Historic District is the most prominent crime prone area in the River Bend Neighborhood and occurrence of theft in this portion is much higher compared to other parts of the neighborhood. From the analysis of the street light map of the River Bend neighborhood it can be found that three out of the four street lights in the portion of the 4th Street are covered by big trees and significant number of houses in this area are in poor condition. So, presence of relatively calm environment at the same time broken windows, defected door and fences are giving the opportunity for conducting theft in this area.

Figure 49: Crime Trend near Oakland Historic District
Source Des Moines Police Department
ANALYSES

Crime Trend Near McDonalds: Almost all types of crimes are quite high near the smaller areas adjacent to the McDonalds and gas station. Although the number of crimes has started to decrease in recent days in this area, it is still quite high. This area is known as a low-density area and street lighting condition is not in satisfactory condition. One of the important findings is that the number of weapons or shooting-related cases are quite high in this area. This picture represents that presence of arterial roads are giving the opportunity to people conduct shooting and then flee quickly through the arterial roads in the neighborhood.

Figure 50: Crime Trend near McDonalds
Source: Des Moines Police Department
Crime Trend Near 6th Street and Forest Avenue: Major crime related problem near the 6th Street and the Forestry Avenue are theft and burglary. In the left side of the zone several streetlights are in complete obscured condition. Residents of the River Bend Neighborhood also complained about the presence of several relatively calm or hiding places in this area. Basically, lighting condition in this portion need to be improved.

Figure 51: Crime Trend near 6th Street and Forest Avenue
Source: Des Moines Police Department
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Location of the Crime Maps Based on Types

Theft Map: Although theft is the most prominent crime problem in the River Bend Neighborhood, it's basically concentrated in several areas, near the Oakland Historic District, northern portion of the 9th street to 6th Street and near McDonalds. Reasons behind the higher rate of theft near the Oakland Historical District and McDonalds have been already analyzed before. One of the important finding during the field survey was the presence of street light was on only one side of the road in this portion of the neighborhood. Streetlights were only present in one portion and in most cases they were obscured. Housing condition in this portion is relatively better compared to other parts of the neighborhood, Presence of high income residents and better houses might attracting people to commit crime in this portion of the neighborhood.

Burglary Map: Burglary is the second most prominent crime type in the River Bend Neighborhood. Burglary is concentrated near the Oakland historical District and the southern portion of the 9th Street to the 6th Street. In the southern portion of the 9th Street to the 6th Street area presence of obscured streetlights. Poor condition houses near the Oakland Historic District might play a key role behind the increased crime rate in this portion of the area.

Robbery Map: Quite similar to the theft and burglary map, robberies are happening near the McDonalds and Oakland Historic District. It can be said that the responsible police and other authorities need to take major initiatives in this part of the neighborhood like increasing the number of police patrol in this part of the neighborhood. City authorities also need to take some initiatives like cleaning of the big trees at the same time increasing investment for the development of the historical district for the improvement of this portion of the neighborhood.

Assault Map: Assault is happening in almost all part of the neighborhood except the southeast corner. This picture represents the necessity of increasing police patrol in all parts of the neighborhood. Also some of the two-way stop signs might be converted to four way stop signs so that the people do not get the opportunity to flee after committing crimes.

Weapons map: Weapons map show us that most of the shooting cases are happening in the southern part of the neighborhood. This picture represents the necessity of increasing. Police patrol is the main way of decreasing crimes in this portion of the neighborhood.
Figure 52: Location Map of the Theft (2009-2014)
Source: Des Moines Police Department
Figure 53: Location Map of the Burglary (2009-2014)
Source: Des Moines Police Department
Figure 54: Location Map of the Robbery (2009-2014)
Source: Des Moines Police Department
Figure 55: Location Map of the Assault (2009-2014)
Source: Des Moines Police Department
Figure 56: Location Map of the Weapons (2009-2014)
Source: Des Moines Police Department
ANALYSES

Summary
According to the officials of the Des Moines police department, some of the main reasons behind the crime rate are lack of street lighting, broken window doors, lack of public awareness etc. They put importance maintenance and repair of all the broken windows and doors at River Bend Neighborhood.

Presence of trees and bushes in front of the houses sometimes obstruct the view. So, cleaning of these areas are also necessary.

Most important factor to reduce crime prevention according to the officials is the public awareness. They need to inform quickly to the police department in case of any type of crime either by calling 911 or Des Moines Police Department phone number.

From theft map it can be easily identified that theft is basically concentrated near the 9th, 8th and 7th street. Street lighting is one of the major problems in this area. Streetlights are mainly placed in one side of the road and in many cases they are covered by high tree (map: Appendix).

Some of the violent crimes like assault and weapons (shooting) are basically happening near the University Avenue and 2nd Ave. this picture represent the importance of increasing police patrol in these areas.
Appendix 1: Map displaying the proposed park trails within River Bend.
Appendix 2: Map displaying the green spaces in River Bend (2013)
REFERENCES

