Planning for the opioid crisis:

how four cities approach zoning of healthcare related facilities

by

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B.A., Drury University, 2017

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF REGIONAL AND COMMUNITY PLANNING

Department of Landscape Architecture, Regional & Community Planning
College of Architecture, Planning, and Design

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2019

Approved by:

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Abstract

As the opioid epidemic continues to ravage the United States, there are a variety of structural and societal causes of the epidemic that must be explored in order to produce a sustainable solution to the problem. According to the Centers for Disease Control (CDC), "a multifaceted, collaborative public health and law enforcement approach is urgently needed" (Rudd, 2016). The intersection of community social dynamics, public health, and planning is a critical area to study and can uncover the role that planners have to play in ending the crisis.

This study seeks to answer the question "How do zoning and land use regulations affect the accessibility of substance abuse treatment facilities?" The purpose of this study is to determine an effective land use regulation and policy regime for the city of Springfield, Missouri, USA to employ in order to improve access to substance abuse treatment facilities (SATF). This topic is important to understand because knowing where there are gaps in accessibility to treatment will inform where to develop new treatment centers to treat a larger swath of the population. Improving access to treatment facilities improves the health and wellbeing of communities and reduces the time and financial cost of seeking treatment (Pearce, Witten, & Bartie, 2006).

This study relies on zoning analysis and qualitative methods, plus a site suitability analysis to assess how Springfield, Missouri can update their zoning codes to provide increased accessibility to SATF facilities. The framework for this study is based on the methods used by Nemeth and Ross (2014). The analytic strategy for this project can be divided into three basic components: a zoning analysis, a socioeconomic disadvantage (SED) index, and site suitability analysis. ArcMap was used to map city zoning and socioeconomically disadvantaged census tracts, and also for land area calculations that contribute to a site suitability analysis. The maps produced demonstrate the accessibility of treatment centers via the permissiveness of zoning for potential locations of treatment centers using land area calculations. This study also demonstrates the availability of treatment according to an overlay of the zoning permissions and location of various population demographics via a socioeconomic disadvantage index. The study utilized Springfield, Missouri as the main study site. Regulation suites included in the analyses were Seattle, Washington, USA; Denver, Colorado, USA; and San Francisco, California, USA. Research findings suggest that Denver, CO provides the most equitable model for siting SATFs in Springfield despite the fact that the model is the least permissive. There are four key takeaways from this study:

1. Syntax matters. SATF are human health services and can be retail service uses.
2. Normalizing seeking treatment can start with co-locating facilities in established retail developments.
3. Quality of permitted zones should be considered over quantity of permitted use zones.
4. Utilize additional zoning tools such as districts and conditional use zones.

This limited sample indicates that cities must carefully consider zoning regulations in order to promote both high equity and high permissiveness in siting SATFs. This could be an area for further study in providing high quality treatment to all segments of the population.

Table of Contents

List of Figures

List of Tables

Chapter 1 - Introduction

The Problem

According to the National Survey on Drug Use and Health (NSDUH), in 2016, 11.8 million people misused an opioid drug such as prescription pain relievers (e.g. morphine or oxycodone), heroin, and synthetics like fentanyl (p. 20). The problem is not simply the misuse of prescription opioids though. The crisis has escalated to entail high rates of opioid overdose related deaths. According to the Center for Disease Control (CDC), "in 2007, approximately 27,000 unintentional drug overdose deaths occurred in the United States, one death every 19 minutes" (Morbidity and Mortality Weekly Report, p. 10). In 2015, over 63% of the 52,404 drug overdose related deaths involved an opioid (Rudd, 2016). One hundred fifteen Americans die every day from an opioid overdose (CDC, 2017).

As the opioid epidemic continues to ravage the United States, there are a variety of structural and societal factors that must be explored in order to produce a viable and lasting solution to the problem. According to the CDC, "a multifaceted, collaborative public health and law enforcement approach is urgently needed" (Rudd, 2016). In a 2012 Morbidity and Mortality Weekly Report, the CDC suggested several medical approaches to curbing the crisis. Suggestions from the CDC perspective including preventing "doctor shopping," improving legislation and law enforcement, improving prescribing best practices, and improving emergency and long-term treatment from a public health perspective (CDC, 2012). The CDC also encourages the implementation of more harm reduction programs that "emphasize broader distribution [of the] opioid antidote, naloxone" (CDC, 2012).

The intersection of community social dynamics, public health, and planning is a critical area of study that can determine the role that planners have to play in ending the crisis. The

opioid epidemic is no longer just a "war on drugs" or problem affecting one segment of the population. It is a national problem that has grown to affect people of all races, genders, and socioeconomic statuses. There is a void in information regarding the current iteration of the epidemic. Most literature is from the "war on drugs" era of the late 80s and early 90s, and the dynamics of our country and its cities have changed greatly since then, as has the nature of substance abuse. There is a great need for current research. "The demographic composition of heroin users entering treatment has shifted over the last 50 years such that heroin use has changed from an inner-city, minority-centered problem to one that has a more widespread geographical distribution, involving primarily white men and women in their late 20s living outside of large urban areas" (Cicero, Ellis, Surratt, & Kurtz, 2014). The demographics are shifting and so too must the conversation.

Health professionals have identified a need for increased substance abuse treatment facilities (SATF) (Jones, Campopiano, Baldwin, & McCance-Katz, 2015). Current wisdom does not look at the local legislative hurdles in the way of accessible treatment (Marshall & Park, 2018). In many communities, leaders recognize the importance of improving treatment options and increasing accessibility, but citizens protest against the development of new treatment centers citing concerns of decreased property values, safety, and other classic "Not in My Backyard" (NIMBY) arguments (Marshall & Park, 2018). City officials must utilize all of the tools available to them to increase the accessibility and efficacy of substance abuse treatment. The opioid crisis has highlighted the need to identify new, progressive planning strategies in the decisions regarding siting of treatment facilities. This study is a beginning of that process, by researching how three cities in the United States have attempted to implement novel, progressive

planning policies in the form of land use regulations to address issues analogous to the siting of SATF, and applying those strategies to the midwestern city of Springfield, Missouri, USA.

SATFs are often not efficiently or desirably sited because of the biases against the people who seek treatment at such facilities. SATFs are considered locally unwanted land uses (LULUs), as can also be the case with other types of medical services, because people do not want to have a SATF located in their neighborhood. The opposition to LULUs is known as NIMBY. As a result, SATF's, like other LULUs often end up being concentrated in low SES, or socioeconomically disadvantaged (SED) neighborhoods. This may not be the most efficient or desirable siting for these services for a number of reasons, such as perpetuating negative stereotypes, discouraging participation in treatment, and contributing to a downward spiral in already depressed neighborhoods. The regulation suites included in this study illustrate attempts by progressive cities to spread out medical services across SED and non-SED neighborhoods alike, resulting in more equitable, efficient and desirable siting. There are good arguments for applying these same approaches to future zoning and siting of SATFs. The main assertion of this study is that substance abuse treatment facilities should be equitably located and spread out across a city, in both SED and non-SED areas. Doing so should have a number of positive effects, such as decreasing the stigma attached to substance abuse and treatment, and encouraging participation in treatment across SES classes, with the at long-term benefits to the neighborhood and city that are associated with a reduction in substance abuse.

Research Question

This study seeks to answer the question "How do zoning and land use regulations affect the accessibility of substance use treatment facilities?" This topic is important to understand

because knowing where there are gaps in accessibility to treatment will inform where to develop new treatment centers to reach a larger swath of the population. Improving access to treatment facilities improves the health and wellbeing of communities and reduces the time and financial cost of seeking treatment (Pearce, et al., 2006). Substance use disorder is not just a low-income community problem anymore, so common sense suggests treatment centers should not be concentrated in low income areas. Concentrating services in low income communities also discourages the use of SATFs by upper socioeconomic status populations. Locating SATFs only in low socioeconomic status neighborhoods also further perpetuates the stigma of seeking treatment and the stereotype of drug addicts (Faulkner-Gurstein, 2017; Saloner et al., 2018).

Secondary questions to consider include roles outside of land use regulations that planners can play in ending the crisis, and how planners are currently addressing substance use treatment centers in their communities. The underlying question that inspired this study is "How do community attitudes towards regulations regarding substance use disorder treatment facilities affect the location and accessibility of treatment?"

Project Goal

The goal of this study is to determine how zoning and land use regulations can facilitate opioid prevention and treatment efforts in American communities. The epidemic has had a massive direct impact on not only the populations of cities, but also the economies and infrastructures of cities (Blumenthal & Seervai, 2017).

Ending the opioid epidemic has become not only a matter of saving lives, but also preserving cities. The opioid epidemic is a public health battle for improvements in the sustainability and resiliency of our communities. Planners play a critical role in acting as

advocates for change in their communities in a variety of areas. From community development campaigns to end the stigma of seeking substance use treatment to seeking changes in land use regulation policies, planners can and must play a part in ending the opioid crisis the United States is facing. This study explores the third recommendation for local government identified in "A Prescription For Action" authored by the National Association of Counties and National League of Cities:

> *"Local leaders should institute policies that expand treatment for individuals struggling with opioid addiction [by] increase[ing] availability of medication-assisted treatments" (p. 27, 2017).*

By exploring the various attitudes cities have adopted as reflected in zoning and land use ordinances, this study will provide a framework for planners to change the conversation about substance use treatment in their communities, and hopefully move communities to enact changes in such regulations that make treatment options available to all members of their community who need it.

This study seeks to:

- identify land use regulations that allow the lack of accessible treatment to be addressed
- examine the zoning ordinances that pertain to the siting of treatment facilities in order to accomplish that
- briefly address the issue of decreasing political and public stigma surrounding seeking treatment via a case study of a successful implementation of an opioid use disorder treatment program

The tangible outcome of this study is to generate five recommended SATF site locations in the city of Springfield, Missouri, USA with a rationale for the recommended siting. These sites are determined based on a suitability analysis using qualitative analysis and quantitative data based on a study done in 2014 by Nemeth and Ross. A brief case study of Vancouver, British Columbia, Canada incorporated into the review of literature will also inform suggestions for successful policy implementation.

Chapter 2 - Literature Review

A topical search of major news outlets such as The Economist (London), National Public Radio, or the New York Times shows that the United States' opioid problem has been charting its brutal course since around 2010. Only now, nearly a decade later has it picked up so much steam that it is mentioned nearly daily in a news outlet across the country. Due to the dynamic nature of the epidemic, this research relied on popular sources that were able to capture the crisis accurately in the moment. Scholarly work on the topic only started to emerge around 2015 in the fields of pain management, public health, and other non-planning related disciplines. This is not the first time the United States has suffered a massive drug problem. The 1980s and 1990s brought the crack cocaine epidemic that led to the Reagan-era War on Drugs. A cooling period in the early 2000s made it seem like we could move onto new problems, but the focus of social scientists, news media, and policymakers, and other professions quickly shifted back to drugs as the opioid epidemic began in 2010.

One of the main indicators of the opioid epidemic is our knowledge of access to drug treatment programs (Saloner et al., 2018). Only one-fifth of people with opioid use disorder receive any treatment (Saloner & Karthikeyan, 2015; Saloner et al., 2018). One of the only ways to improve the rates of people who receive treatment is to expand access to treatment facilities (Saloner et al., 2018; Sarkar, Webster, & Gallacher, 2014).

Key Concepts

There are several critical assumptions that serve as the foundation for this study. First, accessible SATFs are necessary to ending the opioid crisis. Second, SATFs are an important component of the health and human services a community can provide, and a crucial part of

community infrastructure. Third, proper siting of SATFs is key to accessibility and optimal utilization of SATFs. Presently, the determination of the location of SATFs is not necessarily based on factors, especially planning related factors, that lead to the most efficient placement of facilities. This is where planners can play a key role.

There are a variety of explanations for why treatment is inaccessible to various population demographics within communities. Substance abuse treatment facilities are viewed as locally unwanted land uses (LULUs) and are heavily regulated and restricted by zoning and other city ordinances (Schively, 2007). Because of this less than desirable status, that many SATFs are concentrated in areas with low-SES and large minority populations, a common consequence of Not In My Back Yard (NIMBY) syndrome (Schively, 2007).

Planning for Public Health and Welfare

The American Institute of Certified Planners (AICP) Code of Ethics holds planners to a standard to serve the public interest, consider the long-range consequences of any planning action, and to "provide timely, adequate, clear, and accurate information on planning issues to all affected persons" (AICP, 2016, A.1(d)). In March 2018, the American Planning Association (APA) finally recognized the importance of the opioid epidemic issue by initiating a three-part webinar series through the Planning and Community Health Center. The APA also featured an article titled "The Geography of Loss" highlighting the lives of those lost to the opioid epidemic in the March 2018 issue of *Planning Magazine* (Barth, 2018.) The epidemic had been raging for nearly 8 years at this point. One of the purposes of this research is to initiate crucial and desperately needed research into planning and the opioid epidemic. While there have been other resources published by PolicyMap (Langer, 2018) and Esri (2018) showing the geography of the

crisis, little has been done by the profession of planning to answer the questions "why is this happening in our cities?" or "how can we stop this from happening in our cities?" It is time for the profession of planning to research and act upon the timely, relevant, and factual information regarding the opioid crisis that the profession is called to in sections A.1(d) of the AICP Code of Ethics (AICP, 2016).

It is the general obligation and objective of planning professionals to promote the happiness and wellbeing of the people in the communities in which they work. Promoting the public welfare also means planning for wellness. The link between planning for the health of the public is quite obvious in both planning theory literature and public health literature. "Urban planning without the aspect of health is nonsense" (Barton & Tsourou, 2000, p.70). Many scholars argue that cities have lost sight of the connection between planning and public health, with planning professionals focusing primarily on land use control and public health professionals dealing with therapeutic health services (Sarkar et al., 2014). However, planning professionals argue that recently, planners and public health professionals have begun to revitalize their work in developing the connections between planning the built environment and the health of the public (Maantay, 2001; Whitton, 2015).

Planning for the health of cities and the people who inhabit them must "relate to the widest range of issues regarding health" including the built and social environments (Barton & Tsourou, 2000). A reintegration of planning and public health does not just mean creating healthy, walkable cities, but also includes improving the social environments and community resources that people need in order to be healthy (Sarkar et al., 2014). Planners can still focus on land use but should view it through the lens of what will promote the greatest overall wellbeing of the community.

The opioid crisis threatens the health of all aspects of cities. The interdisciplinary nature of the profession of planning prepares planners to be leaders in ending the epidemic that requires a multifaceted approach to a solution. A few areas in which the opioid epidemic threatens the health of our cities are: physical environment, economic stability, safety, and housing quality.

Many "healthy city" initiatives in the United State are policies put in place by federal or state level government (Sarkar et al., 2014). The opioid epidemic is a nation-wide crisis, but because each community is unique, it affects each community in a unique way. Planners who work at the local level are best suited to take on the issues presented by the opioid crisis because they have the most intimate knowledge of the communities for which they are working (Sarkar et al., 2014).

Planning for public health in part means "ensuring that the supply of services meets the population's needs" (Delamater, Shortridge, & Messina, 2013). Cities could potentially be inhibiting that supply via land use regulations that do not account for the actual needs of a community. Provisioning adequate land for healthcare facilities is a critical role that planners can play in planning for public health.

Zoning and Land Use Politics

Zoning is the original planning tool used to promote public health. The separation of land uses was conceived as a way to promote public health and welfare by separating noxious land uses, such as factories and meat packing warehouses, from residential areas in cities (Hirt, 2013; Levy, 1988; Maantay, 2001). Zoning is one of the first steps in the development process and something that every city planning office has almost complete autonomy over. Jurisdictions implement laws enabling certain types of facilities, treatment options, etc., but if the municipality

does not allow it in its land use codes, if there is no permissible place to site the facility, then the ability to introduce that intervention is null. According to (Maantay, 2001), "zoning [is] an important element in any comprehensive strategy to improve the public's health" (p. 1013).

Zoning is a land-use control tool that "limits uses to which land can be put" (Levy, 1988; Maantay, 2001). Levy identifies four elements of land use defined by zoning ordinances: 1.) site layout requirements, 2.) requirements for structure characteristics, 3.) uses to which structures may be put, and 4.) procedural matters (Levy, 1988). Each of these elements has a distinct impact on the built environment of a city, the health of a community, and the accessibility of various resources throughout a city (Whitton, 2015). Zoning can be seen as prohibitive but can also be used to enable.

There is an implicit hierarchical order to zoning and land use categories (Hirt, 2013). It is assumed that housing is the highest and best use of land, and manufacturing and industrial uses should be separated as much as possible from residential zones. Mixed uses in a zone are seen as "intrusions" (Hirt, 2013). Zoning became a way to promote the health and safety of certain social groups, without regard for other groups like minority and low-income people (Hirt, 2013). An underlying thesis of this paper is that zoning should be used for enriching the lives of all community members.

Zoning can help prevent a clustering or concentration of services. A concentration of services and facilities that address "problem behaviors" can "overwhelm the carrying capacity of a neighborhood" (Wuerstle, 2010, p.5). "When that carrying capacity is reached, the economic demographics begin to deteriorate and, ultimately, a struggling community emerges" (Wuerstle, 2010, p.5). According to Delamater et al. (2013), there are several problematic assumptions in

the previous statement, but nonetheless, preventing a clustering of services is critical to maintaining the character of an area and proving high quality, accessible social services.

LULUs: Locally Unwanted Land Uses

LULUs are types of property that raise concerns in communities in which they are proposed to be located. Common concerns include health risks, decline in property values, increase in number of undesirable land uses in the area via a snowball effect, increased noise, traffic, odor, and other environmental concerns, decreased quality of life, overburdening of community services and budget, and increase in undesirable aesthetics (Schively, 2007, p. 256). Various types of facilities fit the LULU bill (Schively, 2007). Often "human or public service facilities associated with quality of life or property value impacts," and "facilities with potential environmental impacts" are considered LULUs (Schively, 2007, p. 256). Land uses such as drug treatment facilities, affordable housing, detention centers, and homeless shelters are commonly assumed to have a negative impact on property values (Shively, 2007). The community reaction to LULU properties being located in close proximity to their own property often far outweighs the actual impact they have on a property value or quality of life measure (Schively, 2007). People who perceive the costs of LULUs as very high fuel opposition to such land uses. Whereas, those who do not see the costs as very high to themselves are not likely to display opposition (Schively, 2007).

The LULU siting process according to Schively (2007) involves community perceptions of impacts, other participants, and the siting process in general. Actual impacts of a LULU being sited near another property "pale in comparison" to the impacts perceived by the public (Schively, 2007, p. 258). The public exhibits a distrust in the siting authorities (i.e. planners), a

general distrust in most levels of government, and even distrust in experts on siting and the proposed land use (Schively, 2017). How experts communicate information has a huge impact on how the public views a proposal (Schively, 2017). Community input and scientific evidence input into the siting process is more likely to elicit more positive responses from community members (Schivley, 2017). Knowledge of this information is critical to inform planners where to site substance use treatment facilities. Schively (2007) also points to a variety of responses to concerns that can help planners deal with siting LULUs, including compensation, communication and clarification about impacts, empowerment, consensus building, and institutional change. "More fully understanding perceptions of LULUs and their impacts can assist planners in creating decision-making and participatory processes that account for perceptions" (Schively, 2007, p. 263).

Land use regulations and the placement of LULUs affect income segregation (Lens & Monkkonen, 2016). There are two explanations for this according to Lens & Monkkonen (2016): a self-sorting process, and policies and efforts put in place to make exclusive areas for those with the power to do so. However, land use regulation affects income segregation primarily through the planning process influences and development pressures (Lens & Monkkonen, 2016, p. 7). Density restrictions segregate higher income communities because high density housing developments move more affluent communities to segregated areas (Lens & Monkkonen, 2016. Other factors that contribute to income segregation: inequality, population size, density, growth rates, and political fragmentation (Lens & Monkkonen, 2016, p. 7). "Spatial concentrations of poverty and wealth lead to unequal access to [human services] ...and exacerbate negative life outcomes for low-income households" (Lens & Monkkonen, 2016, p. 9).

SATFs fall under the "human services" category of LULUs according to the categorization provided by (Németh & Ross, 2014, p. 11). Concerns most commonly associated with human services LULUs are crime, safety, property values, and neighborhood image (Németh & Ross, 2014). If treatment facilities were viewed as an essential part of cities, perhaps they would not be viewed as an unwanted land use. Understanding community perceptions and working to change them in a productive manner is an important step in improving desirability of siting.

NIMBY: Not in My Backyard

The "Not In My Backyard" or "NIMBY" syndrome/phenomena is defined as public opposition to a change, usually by an organized group, but it can be an individual's set of values (Dear, 1992; Schively, 2007). NIMBY is frequently "community opposition to services for stigmatized populations" (Tempalski, 2007). Factors that determine whether or not there will be a NIMBY response to a situation include client characteristics, facility characteristics, host community characteristics, and programmatic considerations (Dear, 1992). Client characteristics are facilities dealing with crime, alcoholism, and drugs, which are in the least desirable tier of installation in a community (Dear, 1992). Facility characteristics include several categories including type, size, number, operating procedures, reputation of sponsoring agency, and appearance (Dear, 1992). Some of the facility characteristics that pertain most to substance use treatment facilities are the type, number, and reputation. Type refers to whether the facility is residential or nonresidential, serves local or outside clients, and the type of clients the center serves (Dear, 1992). Number simply refers to the number of similar facilities located in an area. A community might have qualms about adding a first facility of a certain type, such as a

substance use treatment center, because of the impact it might have on the community (Dear, 1992). A community may also oppose the additional of a new facility out of concern for saturating the community with human services (Dear, 1992). Those who are active in NIMBY and LULU opposition may not represent the community's sentiments, but are just the passionate, vocal segment. (Schively, 2007)

Weisberg (1993) provides ideas about responding to community siting concerns through the framework of the New York City Fair Share criteria. Such criteria encourage planning, early and consistent communication from developers with the governing body, and consultations with all impacted communities (Weisberg, 1993). Weisberg (1993) also points out that the criteria should outline how it will benefit a local community or benefit a more regional community. The fair share criteria attempt to equally geographically distribute undesirable facilities across New York City so that not one demographic, such as low socioeconomic status neighborhoods, are bearing the burden (Weisberg, 1993). This approach, in theory, could improve accessibility of resources like homeless shelters, health care facilities, and other human services uses.

However, the fair share criteria may not actually reduce the amount of NIMBY responses or do anything to reduce stigma around certain types of facilities. In fact, some scholars have argued that the criteria enable NIMBYism in communities, directly counteracting the goals community leaders might have set to improve public perceptions of facilities like human service uses. The "fair share" approach to siting does not necessarily provide equitable siting and might lead to a further clustering of facilities within neighborhoods (Rose, 1993). Fair share does not always mean equitable share.

According to Takahashi and Dear (1997), factors leading to community opposition to human service facilities include geographic location of the community within the United States

and the type of community. Communities in the Northeast and West were found to be more accepting of human services facilities, and nonmetropolitan communities were found to be more accepting than rural communities (Takahashi & Dear, 1997). These geographic qualities were taken into consideration during this study as further explained in the methods section. Takahashi and Dear (1997) further suggest that communities must adopt a diverse set of strategies to promote community acceptance of treatment facilities by capitalizing on certain locations and the data from those locations. This study aims to provide more insight to the geospatial tendencies of the location of substance use treatment facilities through examining zoning and land use requirements of other cities siting similar facilities.

An early study of public perceptions of various urban services uses found that mental health facilities, of which drug treatment centers are a subsector, were found to be "among the most highly noxious of all urban facilities" (Smith & Hanham, 1981). Smith and Hanham recommend collocating drug treatment facilities in areas with other human service uses, commercial uses, and even within general hospitals (1981, p. 333). They argue that this can reduce the visibility of the facilities and perhaps reduce the stigma against them (Smith & Hanham, 1981). While reducing visibility of facilities may serve as a short-term solution to NIMBY opposition, such techniques do not do anything to actively improve the accessibility of facilities. Nor does comingling to reduce visibility show a commitment on the part of community leaders to improve the public perception and reduce the stigma barrier to seeking treatment.

Substance Use Disorder Treatment

Many cities and bureaucracies, in general, take a risk management approach to dealing with public health issues. Planning is in essence, a harm reduction approach to solving the problems that cities face and may encounter in the future. By anticipating issues in a community,

planning is able to help cities not experience those issues, or reduce the impacts of those issues. Taking a harm reduction approach to the future of the opioid crisis includes providing policy provisions that encourage accessible and equitable treatment options, SATF treatment facilities, and reducing the stigma associated with seeking treatment at those facilities. City planners have a direct role to play in this harm reduction approach by creating land use codes that enable the equitable and accessible siting of SATF facilities.

There are a number of different kinds of SATF facilities and can include residential and outpatient treatment centers. Outpatient treatment facilities are easier to identify and more visible to the public, thus more likely to be outwardly stigmatized. In places like Boston, Massachusetts, USA, there is a clustering of treatment services known as "Methadone Mile." The area has become highly stigmatized due to the heavy traffic of people struggling with substance use.

Residential treatment centers are the historically stigmatized mental health treatment centers, known commonly as "group homes." Group homes are the topic of many locally unwanted land use and NIMBY studies. They are a critical piece of community infrastructure, but no one wants to live near them.

Another treatment approach recently covered in the media is safe injection facilities (SIF). Several cities in the United States have explored implementing these as a treatment option, however their status as federally prohibited has made it impossible to move forward in that process. Eventually, SIF and needle exchange facilities should be available to people in the United States, but until our social politics and health policies arrive at that conclusion, improving access to legal, risk-management treatment options is paramount.

For the purposes of this paper, substance abuse treatment facilities include all of the above. The reason for this is that regardless of the specific type of treatment facility, what it is

called, or the treatment model being used, all SATF are likely to be subject to the same zoning regulations and have similar stigmas attached at different degree. Because this study is about zoning and not about a particular type of treatment or treatment model, the general category of SATF is most useful. There are too many subtypes of SATF to make a meaningful distinction among them in a preliminary study such as this one.

Precedent Study: Vancouver, British Columbia, Canada

This precedent study addresses a key goal of this project: to provide cities with the tools they need to gain public support for drug treatment services in order to site new facilities after the relatively easy process of rezoning. Taking a position on the implementation of safe injection sites is outside the scope of this project. Rather, this overview of the implementation of safe injection facilities is meant to show the political processes necessary and power of enabling legislation to shift the public perception of seeking help for substance use disorders. The introduction of safe injection facilities was not an overnight occurrence, but rather the result of decades of research, controversial conversations, and careful planning that ultimately hinged on change in two areas: 1.) cultural shift, and 2.) political change. Changes in these two realms led to the eventual implementation of safe injection sites in Vancouver, BC which has implications in the far more basic solutions to the opioid crisis that are perhaps just as controversial in conservative parts of North America.

Vancouver, BC provides a look at successful policy implementation to address a drug treatment problem. Vancouver was able to open its first pilot safe injection facility, INSITE, based on the argument that more research on the harm reduction approach was necessary (Boyd, 2013). These facilities are illegal in the United States under federal law and any city that

attempts to implement them faces potential retribution from the federal government. However it is valuable to understand how such a controversial new treatment approach was introduced and sited.

"The establishment of North America's first safe injection facility required a major cultural shift in the way drug addiction was viewed" (Small, Palepu, & Tyndall, 2006, p. 75). Understanding the elements of this cultural shift that allowed the implementation of SIF provides context to how cities in the United States, particularly conservative cities, might respond to citizen concerns regarding implementation of new drug treatment facilities and programs.

Investigating harm reduction facilities serves as an effective proxy for substance abuse treatment facilities. Harm reduction facilities are faced with similar, even greater stigma than SATFs are in the United States (Small, et al. 2006). In the early 2000s, under the leadership of Vancouver's Mayor Phillip Owen, the city took a four pillared approach to reducing drug overdose related deaths: 1.) prevention, 2.) treatment, 3.) harm reduction, 4.) enforcement (Boyd, 2013). Supervised injection facilities follow the logic of the harm reduction approach (Boyd, 2013).

After the election of Prime Minister Stephen Harper in 2006, Canada's national drug policy approach shifted to that of three priorities: 1.) enforcement, 2.) treatment, 3.) prevention (Boyd, 2013). Making enforcement the number one priority and omitting a harm reduction approach altogether creates an environment that looks drastically different than the 4 pillared approach of previous administrations. This three-pronged approach is similar to the drug policies of the United States and has had massive consequences for the country as a whole and some argue it negatively affects our cities.

Removing the harm reduction approach to decreasing drug overdose related deaths encourages the emergence of "back alley sites." Implementing a harm reduction approach requires that we shift our approach to focus on treatment and prevention, because as the continual 1980s-era War on Drugs has taught us, enforcement alone does not work (Faulkner-Gurstein, 2017).

The key takeaway from the Vancouver example is that there must be political influence on the public perception of drug treatment facilities in order for there to be a cultural shift in the thoughts around drug treatment facilities. The United State must abandon its abstinence and criminalization approaches for a more harm reductionist policy approach. Progressive planning based on a sound rationale that is properly presented to the public can assist in the implementation of harm reduction approaches to community problem solving.

Chapter 3 - Analytic Strategy

This study relies on zoning analysis and qualitative methods, plus a site suitability analysis to assess how Springfield, Missouri, USA can update their zoning codes to provide increased accessibility to SATF facilities. The framework for this study is based on the methods used by Nemeth and Ross (2014). The analytic strategy for this project can be divided into three basic components: 1.) a zoning analysis, 2.) a socioeconomic disadvantage (SED) index, and 3.) a site suitability analysis using permissiveness and equitability rankings (Figure 3.1). ArcMap was used to map city zoning and socioeconomically disadvantaged census tracts, and also for land area calculations that contribute to a site suitability analysis. The maps produced demonstrate the accessibility of treatment centers via the permissiveness of zoning for potential locations of treatment centers using land area calculations. This study also demonstrates the availability of treatment according to an overlay of the zoning permissions and location of various population demographics via a socioeconomic disadvantage index.

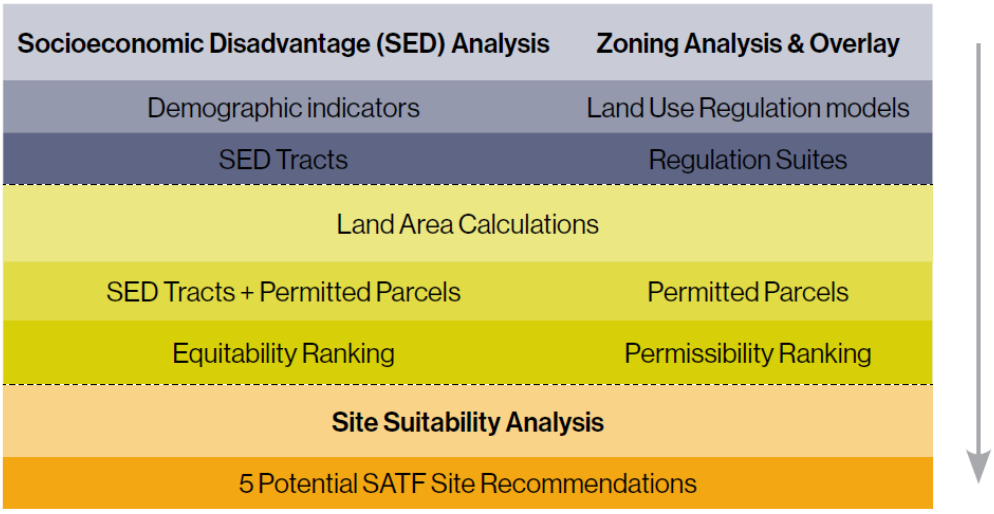

Figure 3.1 Outline of Methods

The study utilized Springfield, MO as the main study site. Regulation suites included in the analyses were Seattle, Washington, USA; Denver, Colorado, USA; and San Francisco, California. USA.

Demographic data used for the SED index was collected from the US Census Bureau American Community Survey via American FactFinder. Municipal codes and zoning ordinances for evaluation and GIS data were collected from several municipalities across the country. See Table 1 for a detailed list of data sources. This study did not require Institutional Review Board (IRB) approval, as there was no contact with human subjects. An IRB exemption was granted for this project.

Table 1. List of Data Sources

Location	Data Type	Data Source
Springfield, Missouri	land use code	Municode
	zoning shapefile	City of Springfield GIS Open Data
Seattle, Washington	land use code	Municode
	zoning shapefile	City of Seattle
San Francisco, California	land use code	American Legal Publishing Corp.
	zoning shapefile	City of San Francisco
Denver, Colorado	land use code	Municode
	zoning shapefile	Denver Open Data Library

Cities of Study

This study focuses on Springfield, MO and utilize regulation suites from the following cities: Seattle, WA; Denver, CO; and San Francisco, CA. Each city analyzed in this study and used as a model regulation suite was chosen based on their political and planning responses to the opioid epidemic (or lack thereof) as it has affected their community. While their population

sizes and geographic locations vary greatly from the study site of Springfield, Missouri, they are all dealing with the opioid crisis (and confounding issues) on a similar scale and provide a progressive lens through which to view the problem and its potential solutions. Each of these regulation suite cities is substantially larger than Springfield, MO, but the issues they face with respect to the opioid crisis are similar.

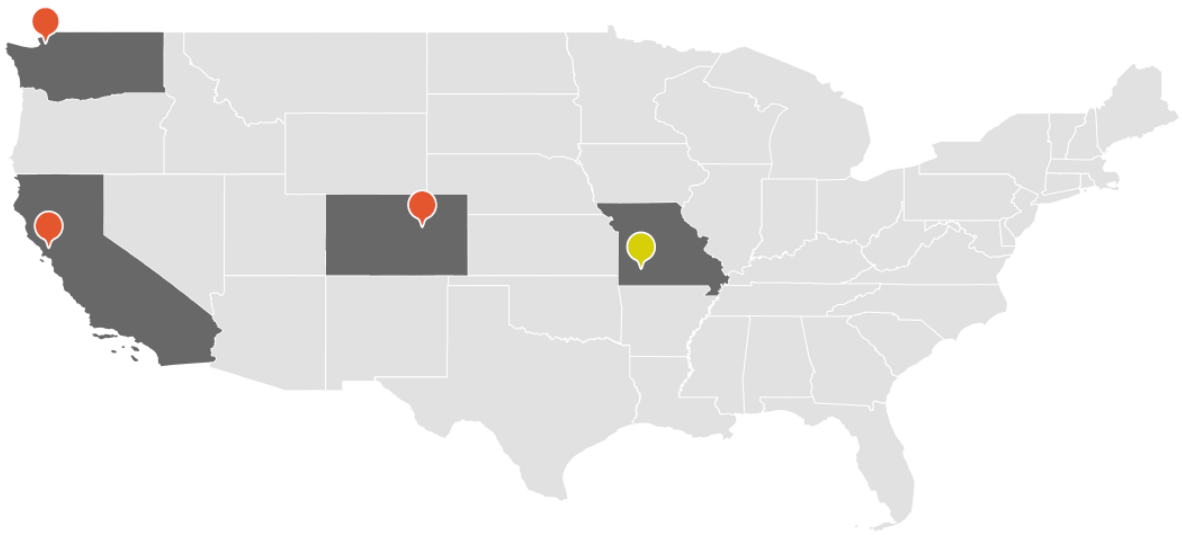

Figure 3.2 Map of Cities of Study

Study Site

The study site serves as the application site of policy and zoning recommendations. Nemeth and Ross (2014) studied Denver, CO, because of the proximity and convenience, as well as its topicality to their study of zoning for medical marijuana dispensaries. In reality, any city in the country that has experienced effects of the opioid crisis could be used as a study site for this project. Because of my personal familiarity of the community, I chose to use Springfield, MO as my study site.

Springfield, Missouri

Springfield is the third largest city in the state of Missouri with a population of approximately 167,000. It is the largest city and county seat in Greene County. In 2016, the median home value in Springfield was $109,500 and the median household income was $33,769 (US Census Bureau, 2016). During the 2018 point in time count, 235 people were experiencing homelessness (Kramer & Knapp, 2018). The poverty rate in Springfield is twice the Missouri statewide rate at 25.9% (US Census Bureau, 2016).

Springfield serves as an urban node for many surrounding communities whose residents travel to Springfield to seek medical care. The city is surrounded by many rural counties that are struggling with elevated rates of opioid overdose related deaths. Examining the potential accessibility of treatment services in Springfield not only has implications for residents of Springfield, but also so residents of communities who often travel to Springfield to seek medical care.

Understanding where in the city of Springfield SATFs can be located will provide leaders in other jurisdictions with critical information about how to continue to develop their arsenal in fighting the opioid crisis. Springfield is the large hub of a fast growing but still heavily rural, highly impoverished area, so policies and services in the city have a broad reaching effect. The results of this study in Springfield will contribute to understanding how a community like Springfield can work to end the opioid crisis. This study is generalizable to cities across the country in a similar geographic, social, and economic position.

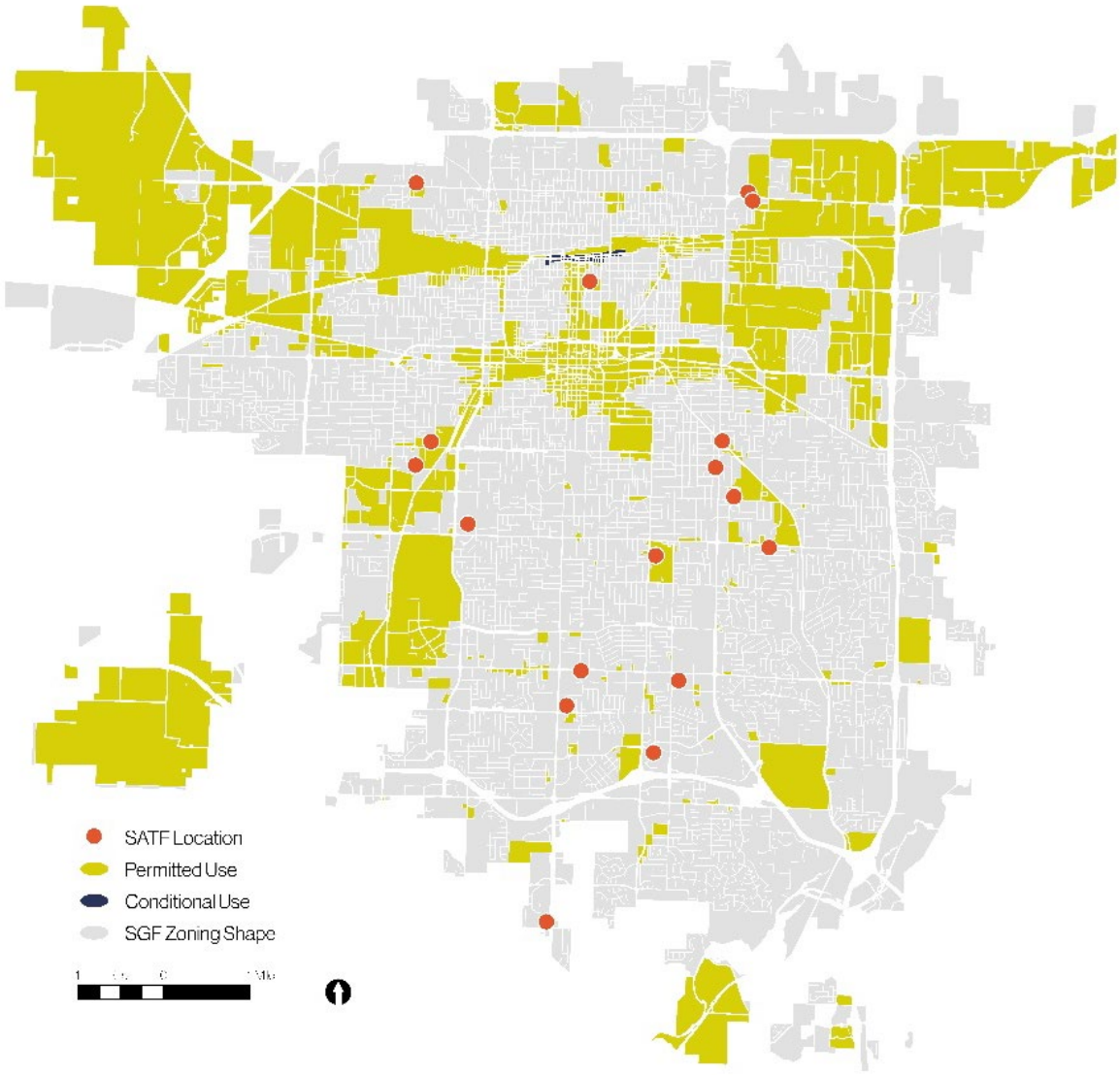

Figure 3.3 Current Substance Abuse Treatment Facilities located in Springfield, MO

Within the city of Springfield, there are vast socioeconomic divisions. Divisions are most noticeable with a north/south divide. Historically, the northwest quadrant of the city is the most impoverished and the southeast quadrant of the city has the highest standard of living. The southwest portion of the city is also fairly well-off, while the northeast portion of the city is

primarily manufacturing and industrial uses with a few very low-income residential areas. These dynamics are clearly represented in the socioeconomic disadvantage portion of this study.

According to SAMHSA, there are several drug treatment facilities in Springfield, but not many in the surrounding areas. Missouri is ranked as one of the worst states in the country for treatment accessibility, and Springfield, located in Greene County is at the epicenter (Crandell, 2016; University of Wisconsin Population Health Institute, 2018). Springfield is a crucial site for addressing substance abuse in Missouri.

Regulation Suites

"Regulation suites" are "models for comparison" (Nemeth & Ross, 2014, p. 11). Regulation suites are comprised of the zoning and land use regulations from model cities. I chose model cities based on their progressive attitudes and policies regarding health-related issues, the availability of data, and scholarly studies on the zoning and legislative tactics of the cities. Many cities are trying revolutionary strategies to help solve the opioid crisis or similar public health crises, so it is instructive to explore their municipal codes in order to see what changes would need to be made in other cities in order for them to follow suit.

Takahashi and Dear (1997) found that 20 years ago, the Northeast and West regions of the United States were most accepting of developing human service centers in their communities, so it was vital to choose at least one community from one of those regions to explore if their findings still hold. Variance in zoning approaches was also taken into consideration. Nemeth and Ross (2014) included intensity of zoning, proximity restrictions, and density restrictions in their analysis as key variables to identify in the regulation suites.

Denver, Colorado

Denver, Colorado is home to more than 663,000 residents. Within the city, the average home value is $292,700 and the median household income is $56,258 (US Census Bureau, 2016). The homeless population in Denver according to their 2017 Point-In-Time count was 3,336 persons. The 2016 American Community Survey reports at 16.4% of Denver residents live below the poverty line. In 2017, the rate of opioid overdose related deaths was 16.7 deaths per 100,000 residents.

Denver was chosen as a study site and regulation suite because of the experiences the city went through in zoning for the siting of medical marijuana dispensaries, and then later, retail marijuana dispensaries. Nemeth and Ross (2014) used Denver as the site for their study because of the availability of data and the extent to which the area was struggling with the problem of siting marijuana dispensaries. Marijuana dispensaries are widely considered LULUs and present issues of NIMBYism, and for that reason can be used as a proxy for SATF facilities in this study.

In analyzing the zoning ordinances of Denver look at the siting regulations for marijuana dispensaries. The stigma surrounding marijuana has largely decreased across Denver and Colorado as a whole, which may have an effect on the zoning regulations pertaining to dispensaries. It may be inferred that as the stigma of providing and seeking treatment for opioid use disorder decreases, the regulations pertaining to the siting of SATF facilities will lead to the facilities being more accessible.

Seattle, Washington

Seattle, Washington is a Pacific Northwestern city with a population of 668,849 according to the American Community Survey (US Census Bureau, 2016). The average home

value is $484,600 and the average household income is $74,458 (US Census Bureau, 2016). Thirteen percent of the population of Seattle lives below the poverty line, and during the 2017 point in time count, 8,522 people identified as experiencing homelessness (US Census Bureau, 2016). Seattle has the highest rate of opioid related overdoses of all the cities involved in this study with a rate of approximately 32.9 deaths per 100,000 people (King County Medical Examiner's Office, 2016). The attempts to enact safe injection sites in Seattle serve as a proxy for siting SATF facilities in other cities primarily by means of policy implications. Since safe injection facilities have not yet been approved for development in Seattle, current zoning regarding substance use disorder treatment facilities were analyzed in this study.

In Seattle city ordinances, health or medical services encompass drug treatment facilities. Hospitals may also serve as drug treatment facilities according to Seattle city ordinance definitions.

San Francisco, California

San Francisco, California is the largest study site with a population of over 850,200 (US Census Bureau, 2016). The median home value in San Francisco was $858,800 in 2016, and the median household income was $87,701, the highest of cities used in this study (US Census Bureau, 2017). The 2017 San Francisco Homeless Count and Survey reported a homeless population of 7,499 and 12.5 percent of the population is living below the poverty line according to 2016 American Community Survey data.

Recently, press has been building around the city's opioid epidemic as they explore the implementation of the nation's first safe injection sites. According to a 2017 briefing on harm reduction services in San Francisco from the San Francisco Department of Public Health, there

were 110-120 opioid related overdoses in the years 2006-2014 and 98 opioid related deaths in 2015 (San Francisco Department of Public Health, 2017). Those numbers average out to roughly 14 opioid related deaths per 100,000 people each year. Though the opioid crisis is not numerically at the same level as some of the other study sites, the legislative and public health interventions San Francisco is working to enact constitutes a valuable, forward thinking framework for responding to the opioid crisis. While such progressive tactics may not yet work in Springfield, Missouri, it is important to have lofty goals for the city to work towards.

The attempt to implement safe injection sites in San Francisco is one of the main reasons I chose the city for this study. While the community impact and gravity of safe injection sites is much deeper than that of SATF. The public response Springfield would have to SATF facilities would be of a similar nature to that received in San Francisco for safe injection sites due to the conservative nature of the southwest Missouri community. Since safe injection sites are not yet federally legal, there have not been any policy or zoning changes in San Francisco to make way for them, but the liberal attitudes of San Francisco will inform their healthcare facility siting policies.

Part A: Zoning Analysis

Step 1: Search Term Identification

The first component of this study is analyzing the zoning and land use codes of each city included in the study. In order to analyze the land use codes of the city, a keyword or search term, was identified for each city. In some cases, the search terms were straight forward, in other cases, a suitable proxy had to be identified. In order to provide a variety of regulation suites to overlay onto Springfield's zoning, the same search term or proxy was not used for each city. Table 2 identifies search terms used for each city.

Table 2. Search Terms for Cities of Analysis

City	Search Term
Springfield, MO	Substance Abuse Treatment Facility
Denver, CO	Medical Marijuana Dispensary
Seattle, WA	Human Services/Medical Services
San Francisco, CA	Retail Services/Health Services

Springfield, Missouri

To gain a baseline understanding of the conditions present, Springfield, MO was the first city analyzed. Zoning ordinances in Springfield specifically include "substance abuse treatment facilities" as a permitted, prohibited, or conditional land use, so no proxy was used for the study site. This is particularly advantageous for gaining a clear understanding of where facilities are currently located, where they could potentially be located, and how redefining community perceptions of the land use might improve the accessibility of treatment for residents throughout the community. Although hospitals can include drug treatment facilities, substance abuse

treatment services are not explicitly included in the hospital definition, so they are not included in this study.

According to the City of Springfield land use code, Article III, Division 2, Sec. 36-321, the definition of a hospital is:

> "An institution providing primary health services and medical or surgical care to persons, primarily in-patients suffering from illness, disease, injury, deformity and other abnormal physical or mental conditions, and including, as an integral part of the institution, related facilities such as laboratories, outpatient facilities or training facilities."

A substance abuse treatment facility is defined as:

> "A facility, not accessory to a hospital, for treatment of alcohol or other substance abuse, with or without the use of drugs or other medical intervention, for one or more patients who are provided with care, meals and lodging and that is accredited by the State of Missouri, the Joint Chief Hospitals Operations Administration (JCHOA) or CARF. Additional services and programs may also be performed such as: (a) Outpatient substance abuse treatment; (b) Outreach to target populations to inform and facilitate access to services; (c) Prevention programs; (d) Support services including, but not limited to, vocational training, education, psychological or psychiatric services, child development and placement services." (City of Springfield Land Development Code, Zoning Regulations: §36-321, Definitions)

Hospitals and substance abuse treatment facilities are allowed in many of the same zones in Springfield, however the difference in definitions is key. Substance abuse treatment facilities are not just outpatient hospital clinics, they are not just "accessories" to hospitals. They are standalone facilities that offer a variety of services including residential care.

Seattle, Washington

Seattle municipal code identifies drug treatment facilities under human services uses. A "human services use" is:

> "a use in which structure(s) and related grounds or portions thereof are used to provide one or more of the following: emergency food, medical or shelter services; community health care clinics, including those that provide mental health care; alcohol or drug abuse services; information and referral services for dependent care, housing, emergency services, transportation assistance, employment or education; consumer and credit counseling; or day care services for adults. Human service uses provide at least one (1) of the listed services directly to a client group on the premises, rather than serve only administrative functions. §23.84A.016 "Human service use"

Human services were both mapped and analyzed in this study due to the specific inclusion of drug treatment services in the definition.

Denver, Colorado

When analyzing the zoning procedures of Denver, CO, regulations the city has imposed pertaining to marijuana uses was used as a proxy for substance use treatment facilities. Marijuana businesses are a suitable proxy for SATFs because they are a locally unwanted land

use and are frequently met with NIMBY challenges similar to SATFs. Technically, medical marijuana dispensaries (MMD) are a human services use, like SATF, however MMDs and retail marijuana dispensaries are most often regulated like nuisance/vice uses (Nemeth & Ross, p. 9, 2014).

Additionally, medical marijuana dispensaries were chosen as a proxy for SATF facilities because of a lack of mention of substance treatment facilities in Denver land use codes and the ambiguity of the verbiage of the codes. Using a specific proxy like MMDs provides a stronger data set and valuable knowledge despite the lack of an exact match in land use. Medical marijuana has highly sought after in Denver, however there are still groups of people who do not want these facilities located in their neighborhoods. This is quite similar to medical land uses for SATFs. Medical facilities and access to high quality health care services are universally desired, however they are often still a NIMBY issue.

San Francisco, California

The San Francisco Planning Code defines several terms under which a substance abuse treatment facility could fall:

A. Institutional Use. A Use Category that includes Child Care Facility, Community Facility, Private Community Facility, Hospital, Job Training, Medical Cannabis Dispensary, Philanthropic Administrative Services, Religious Institution, Residential Care Facility, Social Service or Philanthropic Facility, Post-Secondary Educational Institution, Public Facility, School, and Trade School.

a. *Institutional Community Use.* A subcategory of Institutional Uses that includes Child Care Facility, Community Facility, Private Community

Facility, Job Training, Philanthropic Administrative Services, Religious Institution, Social Service or Philanthropic Facility, and Public Facility.

i. *Social Service or Philanthropic Facility.* An Institutional Community Use providing assistance of a charitable or public service nature, and not of a profit-making or commercial nature.

b. *Institutional Healthcare Use.* A subcategory of Institutional Uses that includes Hospital, Medical Cannabis Dispensary, and Residential Care Facility.

i. *Hospital.* An Institutional Healthcare Use that includes a hospital, medical center, or other medical institution that provides facilities for inpatient or outpatient medical care and may also include medical offices, clinics, laboratories, and employee or student dormitories and other housing, operated by and affiliated with the institution, which institution has met the applicable provisions of Section 304.5 of this Code concerning Institutional Master Plans.

B. Service, Health. A *Retail Sales and Service Use* that provides medical and allied health services to the individual by physicians, surgeons, dentists, podiatrists, psychologists, psychiatrists, acupuncturists, chiropractors, or any other health-care professionals when licensed by a State-sanctioned Board overseeing the provision of medically oriented services. It includes a clinic, primarily providing outpatient care in medical, psychiatric, or other health services, and not part of a Hospital or medical center, as defined by this Section of the Code.

The Retail Sales and Service Use, Health Service, was the search term used in this study because it encompasses a wide range of substance abuse treatment facility types, whereas the other terms

are exclusionary. Ultimately, substance abuse treatment facilities are health services and should be zoned as such.

Step 2: Zoning Analysis + Mapping

After identifying a proxy or search term for each of the cities of analysis, the search terms were identified within the land use codes of each city. For each specified search term, each land use zone in the city was identified as permitted use, conditional use, or prohibited use. In this study, "permitted use" refers to a zone that allows the proxy use out right, without any density, bulking, proximity, or other restrictions. A "conditional use" zone is one where the zoning code allows the use, but imposes density, bulking, proximity, or other restrictions on the development. A spreadsheet was made to show each land use and its level of permissiveness. An excerpt from the Springfield, MO zoning analysis chart is below in Table 3:

Table 3. Springfield, MO Zoning Analysis Example

Abbreviation	Zone	Permission
C	Center City	P
COM	Commercial Street District	C
CS	Commercial Service	P
GR	General Retail	X
HC	Highway Commercial	X

Search Term:
"substance abuse treatment facility"

Key
P = Permitted Use
C = Conditional Use
X = Prohibited Use

Zoning shapefiles were obtained from city open data sites and imported into ArcMap. The land uses were then coded in accordance with their permissiveness of the search terms. An example workflow of this process in ArcMap for Springfield using Table 3 as a data source: All Center City (CC) zones were selected and filled with a green color; all GR and HC zones were

filled with grey; all COM zones were filled with orange and coded “conditional”. This process of searching and reading zoning codes for their permissions of search terms, then charting and mapping those permissions was repeated for each regulation suite city as well, producing four charts and maps.

Step 3: Zoning Overlays

Zoning of each regulation suite was overlaid with the zoning of Springfield in order to create a new set of permissions for the city. These overlays were determined via qualitative comparison between Springfield land use codes and each regulation suite code. No regulation suite land use categories exactly matched those of Springfield, so the overlays represent an approximate match via careful qualitative analysis. Should the recommendations produced from this study be carried forward, more in-depth legal analysis would necessary to ensure adherence with state enabling legislation and other legal considerations, as those were outside the scope of this research.

Comparison of land use codes was carried out via careful reading of code sections defining the intended purpose and overall character of the land use districts. Details such as road type, lot size, bulking, and building style were particularly useful in comparisons, as well as other land uses permitted. For example, in Denver, the “Urban Edge-Town House” (E-TH) category was overlaid with the “Residential Townhouse District” (R-TH) of Springfield because the wording in Denver’s code (“mix of elements from suburban and urban neighborhood context”) reflected similar characteristics as stated in Springfield’s municipal code.

This analysis produced three maps geographically based in Springfield, MO, using the same zoning categories as Springfield, but with qualifications of the regulation suites

incorporated into those categories. A spreadsheet chart showing each city's regulations and their equivalent to the study site was also created (see Table 4 for example).

Table 4. Zoning Overlay Example

Springfield			Denver		Seattle	
Zone	**Description**	**Regulation**	**Regulation**	**Equivalent**	**Regulation**	**Equivalent**
CC	Center City	P	P	D-C	P	DMC
COM	Commercial St. District	C	P	C-MS	X	PMM

Step 4: Land Area Calculations

After all zoning mapping and overlay mapping was complete, land area calculations were completed to determine the percentage of total land that allows, conditionally permits, or prohibits the siting of SATF in Springfield. These calculations were done using the calculation feature in ArcMap. These calculations contribute to the permissiveness rankings of each regulation suite.

Part B: Socioeconomic Disadvantage Index (SED) Analysis

Step 1: SED Score Calculation

A socioeconomic analysis serves as an indicator of the accessibility of possible treatment center location sites to a variety of populations. Data were collected on socioeconomic status indicators in each census tract of Springfield and mapped according to socioeconomic disadvantage (SED). SED was determined using the SED index from Roux et al., 2001, and Rehkopf et al., 2006. Using a SED index rather than a few singular indicators of socioeconomic status such as income, home value, or education provides a "more robust" view of disadvantage (Nemeth & Ross, 2014). Nemeth & Ross (2014) also mapped African American, Hispanic,

Asian, Native American (AHANA) populations. However, for the purposes of this study SED was the primary measure of accessibility because in Springfield, AHANA populations are almost always included in SED populations.

Table 5. SED Index Indicators shows the list of variables and data sources used to calculate the SED index. Data for each of the variables listed was downloaded from American Fact Finder at a census tract level. Several studies have determined that a census tract level of analysis is the most effective way to gauge the socioeconomic status of a neighborhood (Krieger, 2003). These studies have also pointed to the linkages between socioeconomic disadvantage and healthcare quality, treatment availability, and other health outcomes and influences. The local measure is used to determine SED, national measures are given in this table to contextualize the norm in Springfield against the national norm. SED scores are only relative to the norms in Springfield and do not indicate the level of socioeconomic disadvantage of Springfield compared to a national scale.

Table 5. SED Index Indicators

Measure	Variables	Local Measure (national measure)	ACS Table Yr. – Table #
Income	- Median household income	Below SGF median of **$34,775** ($57,652)	2017 – DP03
	- Percentage of persons below poverty	Greater than SGF average of **25.7%** (14.6%)	2017 – DP03
	- Median value of owner-occupied housing units	Below SGF median of **$111,600** ($193,500)	2017 – DP04
	- Percentage of housing units that are owner occupied	Below SGF average of **44.9%** (87.8%)	2017 – DP04
Education	- Percentage of adults 25 yrs. and older who have completed high school	Below SGF average of **28.7%** (27.3%)	2017 – S1501
	- Percentage of adults 25 yrs. and older who have completed college	Below SGF average of **16.9%** (19.1%)	2017 – S1501
Employment	- Percent employed	Below SGF average of **61.5%** (63.4%)	2017 – DP03

Source: Németh & Ross, 2014, Table 5, p. 13.

To determine whether or not a tract was "socioeconomically disadvantaged," tract level data for each measure was compared to the local level data of the same measure. The tracts' SED score was determined by counting the number of measures that were determined to be a socioeconomic disadvantage. The maximum SED measure score for a tract was 7/7, meaning they were socioeconomically disadvantaged in all 7 of the measures. Then, the mean SED score was calculated for all census tracts in Springfield. Tracts with an above mean number of SED measures were determined to be "SED tracts." So, the tract was socioeconomically disadvantaged relative to the other tracts in Springfield. Looking at the national measures, it is clear that Springfield, MO is overall more socioeconomically disadvantaged than the national average based on this set of indicators.

Understanding the overall patterns of socioecnomic conditions in Springfield informs better decisions about siting SATF in an equitable manner, avoiding a clustering of services in high socioeconomic status areas as well as in low socioeconomic status areas. These diagrams show the overall patterns of socioeconomic indicators throughout Springfield, but they do not show the conglomerate of those measures as the SED score measure does. Figures 3.3 through 3.6 show the income indicators used to determine socioeconomic disadvantage by census tract in Springfield.

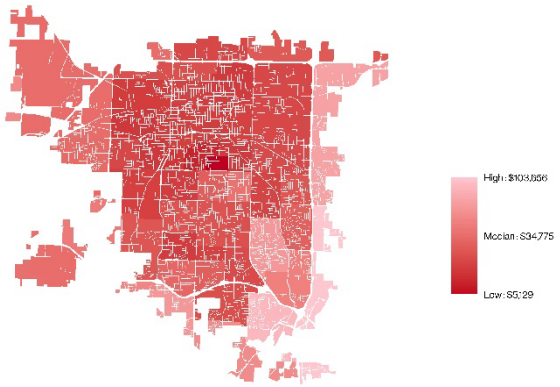

Figure 3.4 Median household income

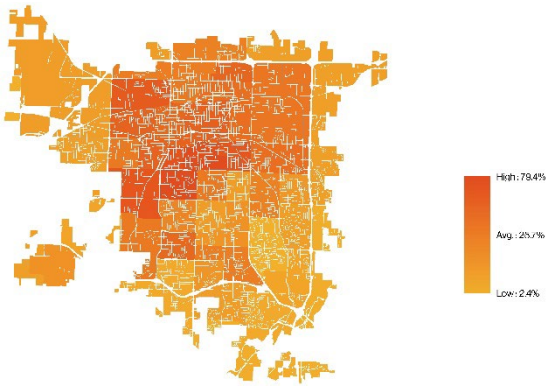

Figure 3.6 Percentage of persons below poverty

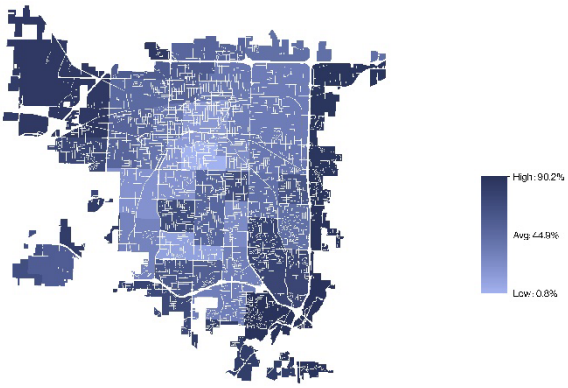

Figure 3.5 Percentage of owner occupied housing units

Figure 3.7 Median value of owner occupied housing units

Figures 3.7 through 3.9 show the employment and economic SED indicators by census tract in Springfield.

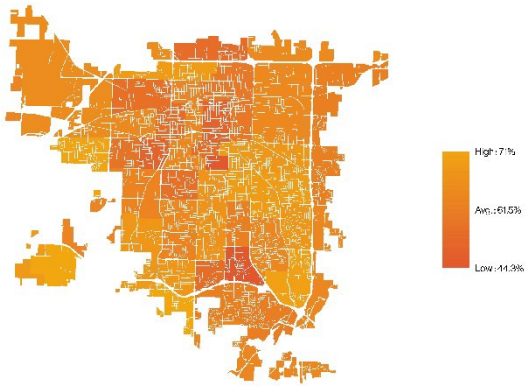

Figure 3.8 Percent employed

Figure 3.9 Percentage of adults 25 and older who have completed college

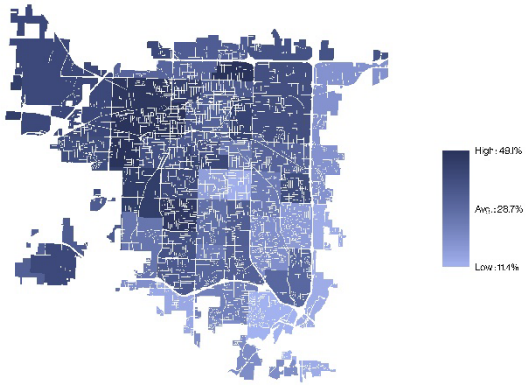

Figure 3.10 Percentage of adults 25 and older who have completed high school

Step 2: SED Mapping + Overlay

After SED tracts were identified, they were mapped in ArcMap and overlaid with the entire set of zoning maps of Springfield (including those with regulation suite zoning overlays). This second layer of overlay identifies where SATF facilities could potentially be sited in

relationship to SED or non-SED populations. It is important to understand this connection in order to provide potential SATF facility site recommendations that allow all sectors of the population of Springfield to have access to treatment. A map of Springfield's SED values was overlaid with each of the land suitability model maps from each regulation suite to give a general idea of the equitability of each suite.

Step 3: Land Area Calculations

Finally, land area calculations of SED tracts; SED tracts that overlap with permitted land use code, conditional use, and prohibited land use code was calculated for each regulation suite overlay map. This step of the process quantifies how each regulation suite improves or hinders the siting of treatment facilities to all segments of the population of Springfield. Due to the demographic composition of the city, the broad socioeconomic status demographic affected by the opioid crisis, and the locations of current treatment facilities, a somewhat nontraditional approach may be necessary to siting new treatment facilities. These calculations contributed to equitability rankings.

Part C: Site Suitability Analysis + Recommendations

Combining the data collected from Parts A and B of this analysis, the final step of this study is to identify potential new SATF sites and to provide evidence supporting current zoning policies or necessity for zoning code changes in Springfield. The site suitability analysis was based on three criteria:

1. Priority of Most Permissive **or** Most Equitable model
2. Human comfort within the Permitted Land Use zones

3. Equitable distribution of potential site among SED and non-SED tracts

Permissiveness rankings are based on the total area of land zoned "permitted" which allow for SATF or healthcare related proxies. The regulation suite that zones the highest area of land permitted is ranked 1, the regulation suite with the least area of permitted land is ranked 4. Permissiveness rankings do not take into consideration the land area of conditional use zones, nor do they take into consideration the current use of the land.

Nemeth and Ross (2014) assigned an "equitability rank" to each regulatory suite model according to each SED parameter. The percent difference in land area between SED and non-SED tracts that allows for SATF siting was calculated for each regulation suite (Nemeth & Ross, 2014). The percent differences are then rank ordered. A higher numerical ranking for a regulation suite identifies higher accessibility, and a lower numerical ranking identifies less equitable accessibility to treatment facilities (1 is most equitable, 4 is least.) The less of a difference there is between the area of land in SED versus non-SED tracts that allows for SATF facility siting, the higher a model city's rank was. Equitability rankings do not identify the best balance in land area zoned permitted in SED and non-SED tracts as this study advocates for, however they do identify where facilities should not be clustered.

Using those equitability rankings and the maps produced by the SED + zoning overlay, five potential sites for SATF facilities were identified. The differences in search terms and proxies between regulation suites is important to note in this step and has important implications for changes of zoning and public political perception of treatment facilities. This study suggests the importance of syntax and specific word choice in land use codes and the message they portray to citizens of cities.

Chapter 4 - Findings

Socioeconomic Disadvantage Index Analysis

Springfield, Missouri as an entire city falls below the national midline of many of the indicators of socioeconomic disadvantage. Table 6 shows local, national, and tract averages and means for each SED indicator taken into consideration by this study. The median income citywide is $34,775 (US Census Bureau, 2017). The percent of population living below the poverty line in Springfield was 25.7% in 2017, while the national average was just 14.6% (US Census Bureau, 2017). The median income at the census tract level was $39,775 and the percentage of the population below the poverty line was 17.6% in 2017 (US Census Bureau). Median home value in 2017 was $111,600 across Springfield, while the tract median was $121,800 (US Census Bureau). Owner occupancy rates were higher at the census tract level (53.9%) than at the citywide level (44.9%) (US Census Bureau, 2017). Measures of education attainment were more similar across the city and tract level than other SED indicators. Percentage of the population with a high school degree in Springfield was 28.7%, and 30.1% at the census tract level (US Census Bureau, 2017). Percentage of the population with a college degree in Springfield was 16.9%, and 17.4% at the census tract level (US Census Bureau, 2017). The percentage of the population with a high school degree was above the national average of 27.3% across both local geographies, but below the national average of 19.1% for college degree attainment (US Census Bureau, 2017). There are slight variations between citywide data and census tract level data due to the specificity that tract level data detects. Census tract level data shows the "gradient" of data across the city rather than a broad generalization (Krieger, 2002).

Table 6. SED Indicator Norms, Springfield, MO

	Median Income	% Below Poverty	Med. Home Value	Owner Occupied	HS Degree	College Degree	Employed	SED Score
Local (National)	$34,775 ($57,652)	25.7% (14.6%)	$111,600 ($193,500)	44.9% (87.8%)	28.7% (27.3%)	16.9% (19.1%)	61.5% (63.4%)	--
Tract Average	$44,265	21.6%	$128,643	54.8%	29.1%	17.7%	62.1%	3.29
Tract Median	$39,775	17.6%	$121,800	53.9%	30.1%	17.4%	62.4%	2.5

Source: US Census Bureau, American Community Survey, 2017

Table 7 shows the frequency of SED scores across census tracts in Springfield. The mean SED score for census tracts within Springfield city limits is 3. Therefore, every tract that had a score of greater than three was determined to be a socioeconomically disadvantaged census tract. According to this methodology, 25 out of 62 census tracts in Springfield city limits are socioeconomically disadvantaged. This set of indicators reveals that 40.98% of census tracts in Springfield are socioeconomically disadvantaged. Nearly every tract within Springfield, 96%, was below the local SED indicator in at least one measure.

Table 7. SED Scores for Springfield, MO Census Tracts

SED Score	Count
0	4
1	16
2	11
3	6
4	2
5	6
6	9
7	8

Figure 4.1 shows the location of SED tracts in Springfield. Almost all tracts on the northern side of the city are socioeconomically disadvantaged. The socioeconomic disadvantage

index map shows that approximately 38% of the entire land area of Springfield included in this study is considered socioeconomically disadvantaged. Basically, the northernmost third of the city is socioeconomically disadvantaged, plus areas along the southwestern side of the community. City officials are currently particularly focused on the “northwest quadrant” of the city, a very underserved area lacking access to many resources that are available to the rest of the city. The grey area on the East side of the city is not socioeconomically disadvantaged and is primarily high-end residential neighborhoods, plus commercial districts that serve the needs of those residents.

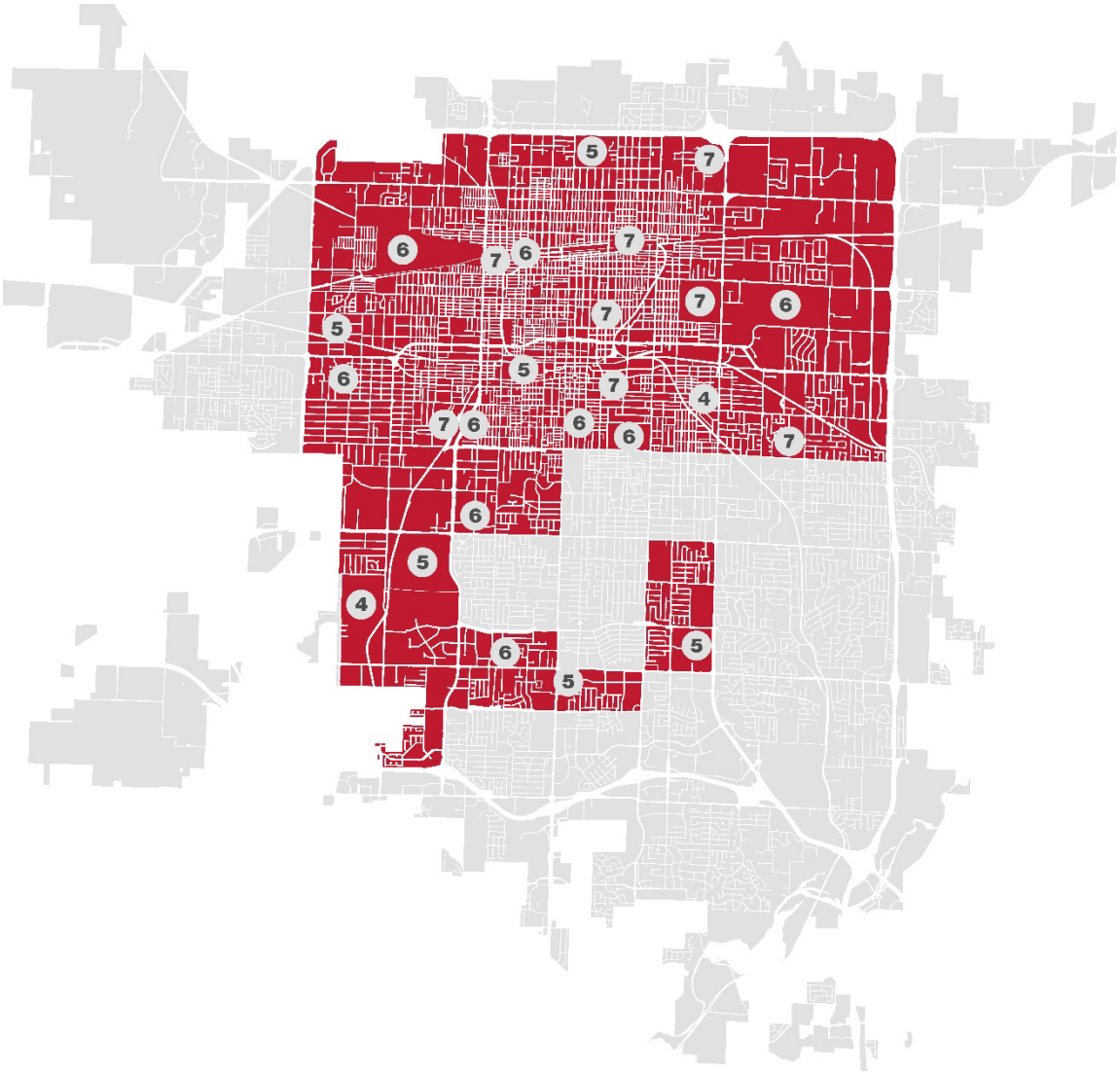

Figure 4.1 SED Census Tracts with Scores in Springfield, MO

Zoning Analysis

As identified by (Németh & Ross, 2014), planners have a very versatile set of tools they can use to regulate land use, including proximity and density restrictions. Another type of restriction frequently used by model cities was building bulk regulations. Each of the model cities had a different approach to zoning regulations which led to a wide variety of overlay outcomes. Zoning codes were analyzed for permissiveness and notes were made about the other zoning tools and tactics the model city used.

After each regulation suite was analyzed for permissiveness and other tools, basic maps were made showing the zoning of model cities overlaid onto the city of Springfield according to the zoning equivalency in each model city to a land use category in Springfield. Maps show where the proxy (human services, MMD, SATF, etc.) are permitted, prohibited, or conditional uses. On each map, green shows permitted use zones, blue shows conditional use zones, and grey shows zones where SATF are not permitted, either explicitly or passively, according to the zoning code.

Table 8. Zoning Regimes in Regulation Suites

City	Density	Bulking	Proximity	Districts
Springfield, MO				•
Seattle, WA	•	•	•	•
Denver, CO		•	•	•
San Francisco, CA		•	•	•

Table 8 provides an overview of the zoning tools model cities used in addition to land use zones. These tools were not taken into consideration when analyzing land area available for siting SATF, but they provide ideas for a new framework that Springfield could implement in future

zoning code amendments. Springfield uses limited districts in the city zoning code. Districts include: Center City (which is primarily in the downtown area), Commercial Street, and West College. The Commercial Street district is the most defined, true district in Springfield. West College is a portion of a street to the west of downtown that is going through revitalization currently.

Seattle uses density, bulking, and proximity restrictions, plus districts as additional tools in their land use code. Density, bulking, and proximity restricts are generally tied to districts in the Seattle zoning code. This allows the city to create and maintain specific aesthetics and use values within different parts of the Seattle. Bulking and proximity restrictions are also often related. For example, a medical service use (clinic) that is located next to an institutional medical use (hospital campus), is constrained to a specified square footage. Another instance of use of these bulking tools is where a medical service use located on the second floor of a mixed-use building is allowed to have more square footage than a medical service use located on the ground floor of a mixed-use building.

Denver uses bulking, proximity, and districts in the city land use codes. The Denver zoning code is particularly focused on the physical building requirements with bulking and façade requirements. Bulking and other physical building requirements are tied to district or "neighborhood context" regulations and goals, not land use. Proximity is directly tied to land use; there cannot be medical marijuana dispensaries located within a specified distance from one another. Denver also requires zoning permit review for all proposed medical marijuana dispensary development regardless of whether or not the proposed site is zoned permitted or conditional. Campus neighborhood contexts require additional zoning permit review for the proxy land use, and as such were coded as a conditional use zone.

The San Francisco land use code utilizes bulking and proximity restrictions, and also heavily relies on districts. Bulking regulations were the most detailed in San Francisco, specifying use allowances per floor of a building based on the size of each building. Detailed bulking regulations were based on the district in which the building is located. Districts are based on and used to preserve the cultural, aesthetic, economic, and geographic conditions of neighborhoods**.**

Springfield, Missouri

Table 9 shows the current zones in which SATF may be sited in Springfield. "Substance Abuse Treatment Facility" is a specific land use category written in the City of Springfield land use code. Nearly 35% of the land area of Springfield allows SATF as a permitted or conditional use. The majority of parcels that allow substance abuse treatment facilities are zoned general manufacturing, heavy manufacturing, and government and institutional use. While nearly 35% of the land area of Springfield allows SATF as a permitted or conditional use in the current zoning code, it is important to consider the land use category under which those allowances fall. The majority of parcels that allow substance abuse treatment facilities are zoned general manufacturing, heavy manufacturing, and government and institutional use. Human service uses do not belong in manufacturing and industrial uses. That creates an uncomfortable environment and does not encourage people to seek treatment at facilities located next to factories and train yards. Part of the role of cities and particularly planners in destigmatizing seeking treatment is to allow facilities to be places in areas that are generally inviting, clean, and safe. Following current

regulations, office zones would be the most suitable location for SATF facilities. Several existing SATF on the south side of Springfield are located in O-1 zones.

Table 9. Springfield, MO Zoning Regulations

Zone	Zone Description	Regulation
CC	Center City	P
COM	Commercial Street District	C
CS	Commercial Service	P
GR	General Retail	X
HC	Highway Commercial	X
LB	Limited Business	X
GM	General Manufacturing	P
HM	Heavy Manufacturing	P
IC	Industrial Commercial	X
LI	Light Industrial	P
RI	Restricted Industrial	X
GI	Government & Institutional Use	P
L	Landmarks	X
O	Office	P
PD	Planned Development	X
WC	West College Street	X
R-HD	High Density Multifamily Residential	X
R-LD	Low Density Multifamily Residential	X
R-MD	Med. Multifamily Density Residential	X
R-MHC	Manufactured Home Community	X
R-SF	Single Family Residential	X
R-TH	Residential Townhouse district	X

Analysis of Springfield began with locating all "Substance Abuse Treatment Facilities" currently located in the city in order to establish a context for the zoning regulations (see Figure 4.2). The Substance Abuse and Mental Health Services Administration (SAMHSA) maintains a database of these facilities on their website (Substance Abuse and Mental Health Services Administration, 2019). Currently, all SATF are located in "permitted" zones. There are no SATF located in conditional zones.

Zoning analysis revealed that the majority of land use categories that allow SATF are spatially located on the north, central, and outer regions of the city. Table 10 shows the land area

percentages that make up each permission category, plus SED considerations. According to land area calculations, 34% of the land area of Springfield allows SATF, and less than 1% includes SATF as a conditional use. This means that over a third of the land in Springfield could potentially serve as a site for a SATF facility, with 11% of that land located in SED census tracts.

Table 10. Springfield, MO Land Area Calculations

	Area in Sq. Feet	% of Total
Total Area	1,938,927,886.17	100%
SED	733,486,927.00	38%
SGF Permitted	651,511,891.10	34%
SGF Conditional	1,469,306.59	0.08%
SED + Permitted	70,739,233.00	11% (of permitted)
SED + Conditional	1,469,306.59	100% (of conditional)

The only conditional use category is located along the historic Commercial Street corridor. This area formerly held a cluster of human and social services, including homeless shelters and mental health facilities. In the past few years, those uses have declined and the area is mainly commercial uses, including restaurants, gift shops, a yoga studio, and a bean-to-bar artisan chocolate factory. This area, titled “center city” for the purposes of this analysis, is shown in Figure 4.3, along with one SATF just south of the Commercial Street district. This particular SATF is a subsector of a large health complex and is located immediately adjacent to a small liberal arts college, and within a 2-5 block radius of a Title-I elementary school, a low-income middle school, and a thriving International Baccalaureate high school.

Figure 4.2 Center City Callout

Currently, only 6 out of the 17 substance abuse treatment facilities in Springfield are located outside of socioeconomically disadvantaged census tracts. Shown in Figure 4.4, this represents a clustering of an unwanted land use in areas of disadvantage. This also means that the demographic that may be the most affected by the opioid crisis may feel a barrier to seeking treatment because the facilities are not located in their neighborhood. 11% of parcels in Springfield zoned to permit SATF are located in SED tracts. Conditional use parcels are located 100% within SED census tracts.

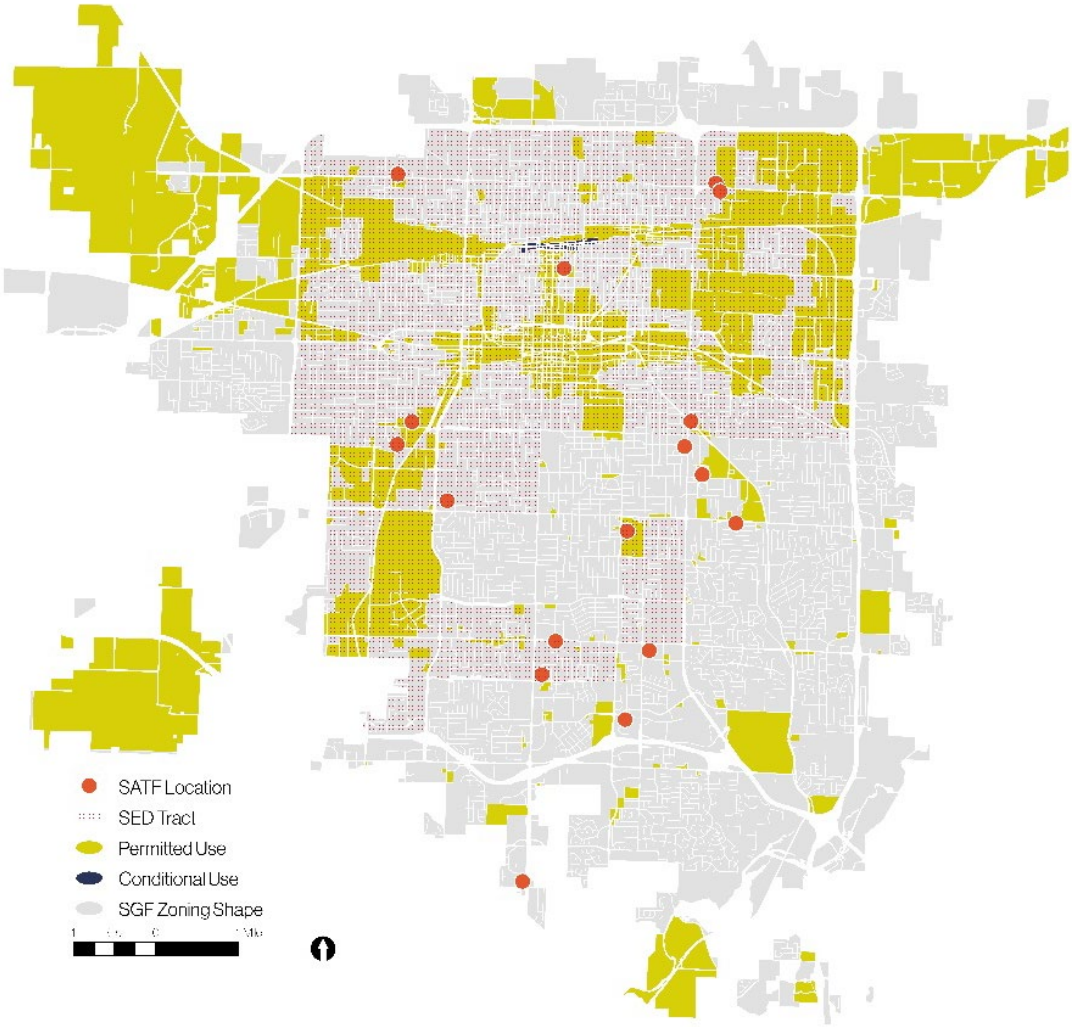

Figure 4.3 Springfield, MO SATF Zoning Regulations

Seattle/Springfield Overlay

The Seattle regulation suite uses a combination of proximity, bulking, density, and district regulations to determine land use zoning. Seattle zoning prohibits medical and human services in single family residential zones and the Pikes Place Market mixed use zone. Multifamily residential zones of various densities allow conditional use of medical services as a ground floor commercial use. “Medical service uses other than permitted ground floor commercial uses are prohibited,” and clinics are considered an approved commercial use (Seattle Zoning Code).

Neighborhood Commercial zones also provision conditional use with various bulk and density restrictions. In all Neighborhood Commercial zones, medical services over 10,000 sq. ft., within 2,500 ft. of a major medical institutions (i.e. hospital) require a conditional use permit. In Neighborhood Commercial 1 (NC1) designations, medical service uses are limited to 10,000 sq. ft. unless they were established before August 1, 2015 and provide services to extremely low-income communities (200% or more below the poverty line). Such establishments can be up to 20,000 sq. ft. In NC2 zones, medical service uses have a 25,000 sq. ft. bulking restriction. NC3 zones are created to serve the surrounding neighborhood and outright permit medical service uses that follow the aesthetic character of the surrounding neighborhood. Medical services are permitted in all previously unmentioned zones in Seattle, including Residential-Commercial and Downtown Core zones.

The Seattle zoning overlay relies on human service and hospital proxy land uses and provisions land use area for SATF as shown in Table 11.

Table 11. Seattle Model Overlay Land Area Analysis

	Area in Sq. Feet	% of Total
Total Area	1,938,927,886.17	100%
SGF/SEA Permitted	813,677,972.08	42%
SGF/SEA Conditional	265,935,953.95	14%
SED + Permitted	441,098,662.27	54% (of permitted)
SED + Conditional	69,545,263.01	26% (of conditional)

The Seattle regulation suite allows for 42% of the total land area of the city to be a permitted zone for SATF. Of the permitted land, 54% of that is located within SED tracts. The Seattle overlay provisions a conditional use zone for 14% of the total land area of Springfield; 26% of the conditional land use areas are in SED tracts. Figure 4.5 shows the spatial configuration of the Seattle model overlay.

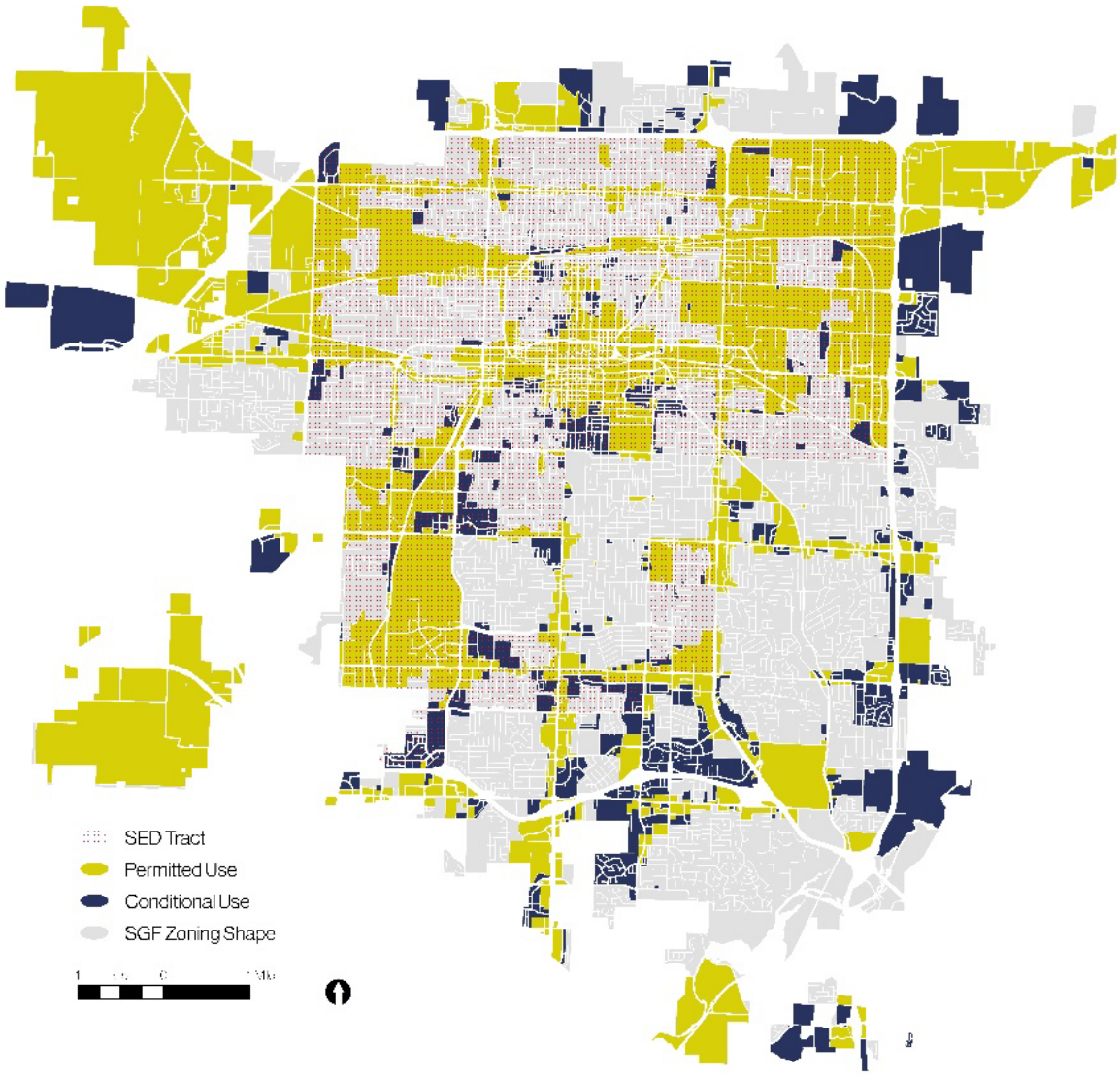

Figure 4.4 Seattle Regulation Suite Overlay on Springfield

Table 12 shows the differences in land use regulations between existing Springfield zoning and potential changes if Seattle's model was implemented. One of the most notable differences in the two models is that Seattle's model allows conditional use in multifamily residential area. Seattle also does not allow medical services in their cultural business district of Pikes Market, which is analogous to the Commercial Street District in Springfield. The Seattle

model also permits SATF in general retail and commercial areas, all industrial areas, and conditional use in limited business areas.

Table 12. Seattle Zoning Equivalents

Springfield			Seattle	
Zone	**Zone Description**	**Regulation**	**Regulation**	**Zone Equivalent**
CC	Center City	P	P	DMC
COM	Commercial Street District	C	X	PMM
CS	Commercial Service	P	P	C
GR	General Retail	X	P	C
HC	Highway Commercial	X	P	C2
LB	Limited Business	X	C	NC
GM	General Manufacturing	P	P	IG
HM	Heavy Manufacturing	P	P	IG
IC	Industrial Commercial	X	P	IC
LI	Light Industrial	P	P	IG
RI	Restricted Industrial	X	P	IG
GI	Government & Institutional Use	P	P	DOC
L	Landmarks	X	X	PMM (Pike Market)
O	Office	P	P	DOC
PD	Planned Development	X	C	MPC
UC	Urban Conservation	X	C	NC
R-HD	High Density Multifamily Residential	X	C	HR
R-LD	Low Density Multifamily Residential	X	C	LR
R-MD	Med. Multifamily Density Residential	X	C	MR
R-MHC	Manufactured Home Community	X	X	RSL (Residential Small Lot)
R-SF	Single Family Residential	X	X	SF (Single Family Residential)
R-TH	Residential Townhouse district	X	X	RSL (Residential Small Lot)

Substance abuse treatment facilities are permitted uses in the following land use categories: center city, commercial service, general retail, highway commercial, manufacturing, industrial, government and institutional use, and office. Figure 4.6 shows where SATF are a permitted land use according to the Seattle regulation suite overlay. Most permitted parcels are

clustered in the downtown center of the city, along the outer northern and western boundaries in industrial areas, and along major thoroughfares through the southern portion of the city.

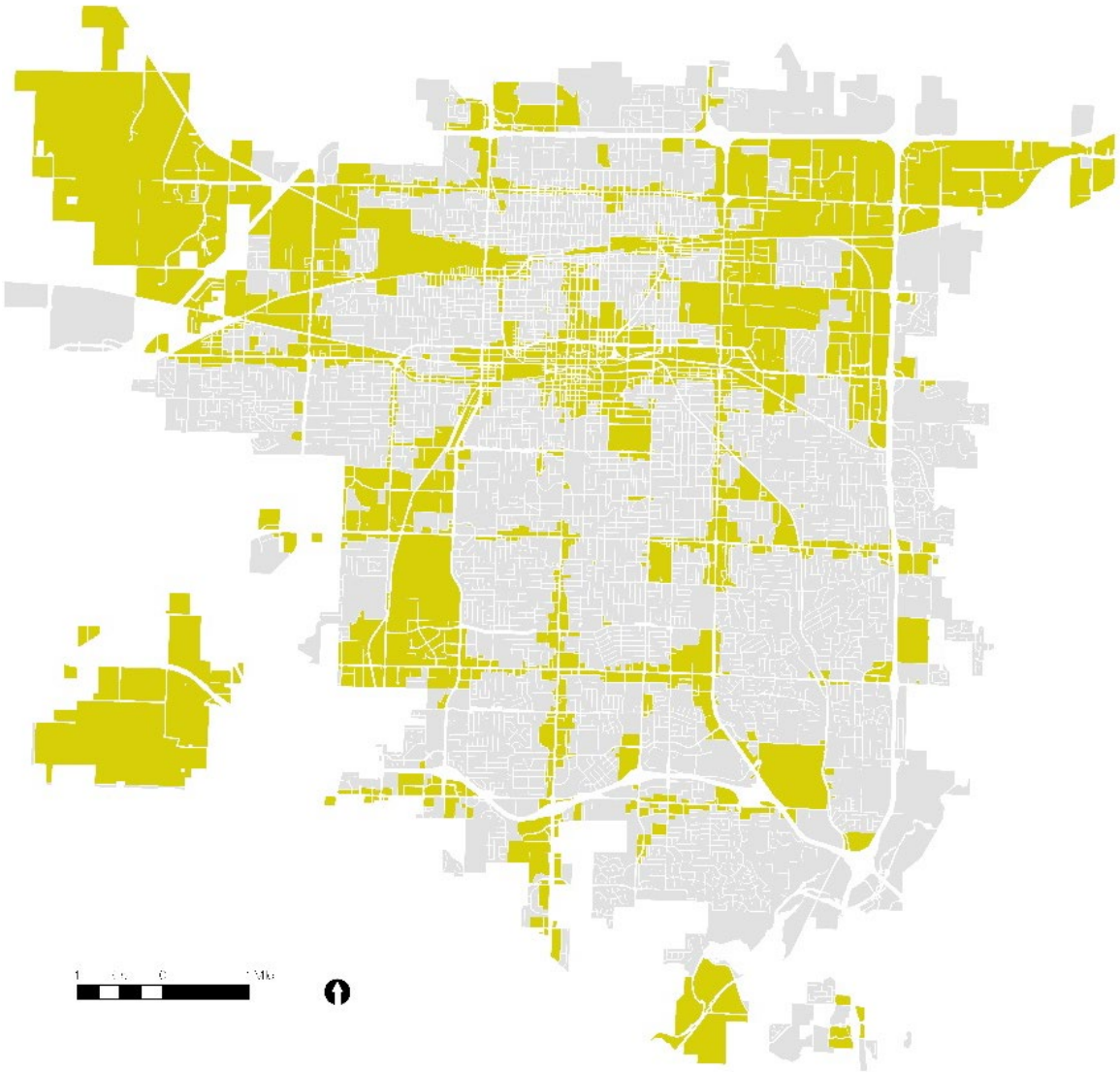

Figure 4.5 Seattle Overlay Permitted Land Use Zones on Springfield

Conditional use permits are considered in the following land use categories: limited business, planned development, west college street, and multifamily residential of all densities. Shown in Figure 4.7, conditional use parcels are scattered across the city with the Seattle model.

There are opportunities for conditional use along the southern and eastern edges of Springfield, and the Commercial Street district is no longer the sole conditional use zone.

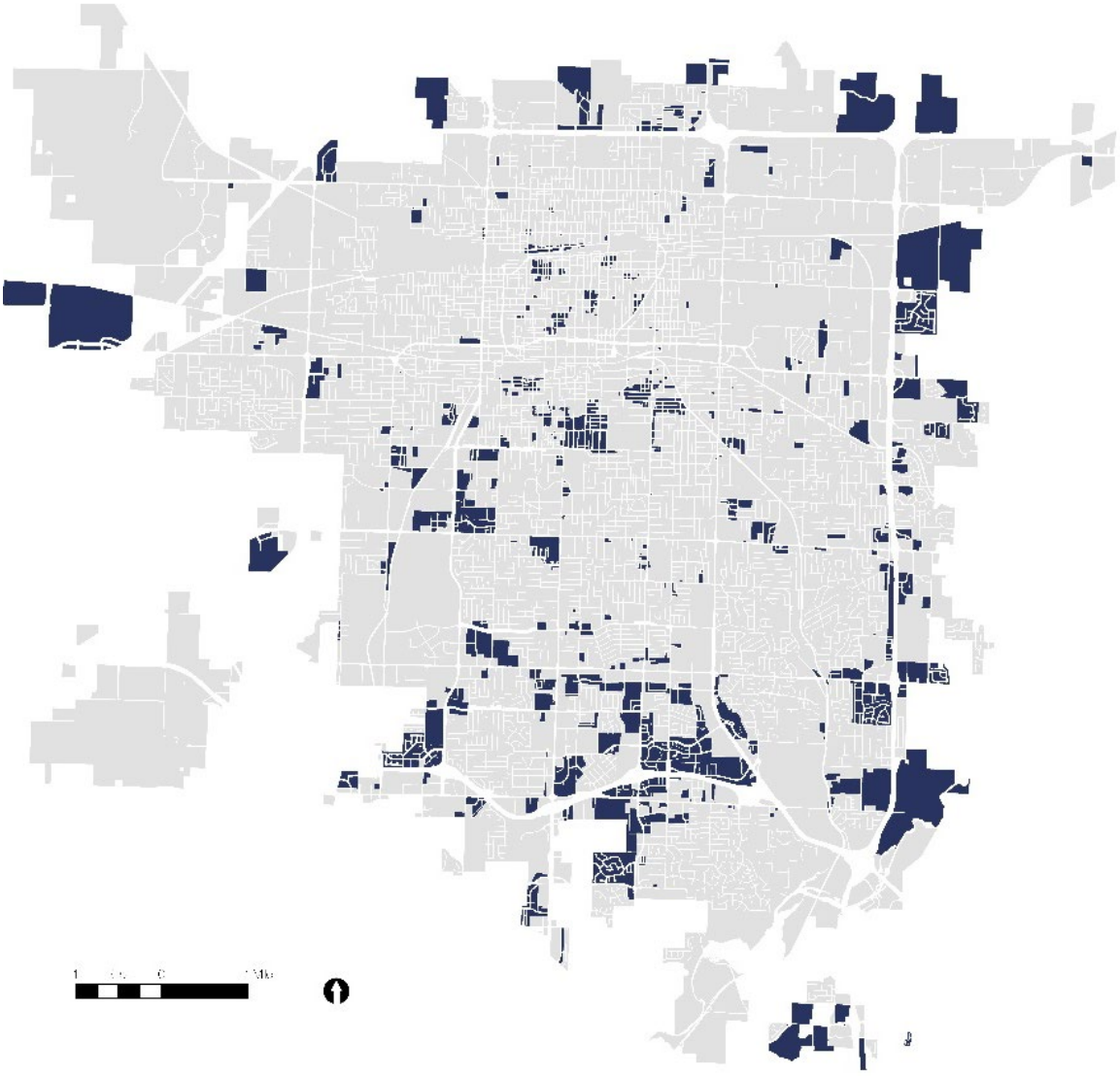

Figure 4.6 Seattle Overlay Conditional Land Use Zones on Springfield

The Seattle model prohibits SATF facilities in the Commercial Street district, landmarks, single family residential, manufactured home communities, and residential townhouse zones.

One of the notable differences between this regulation suite and the others is that the Commercial Street District does not allow SATF.

Denver/Springfield Overlay

The Denver zoning overlay is based on a medical marijuana dispensary proxy, which is a hybrid commercial and human services use. Figure 4.8 shows a map of Denver's zoning regulations overlaid with the city of Springfield land use zones. The Denver model utilizes proximity and bulking regulations, along with a less transferable use of district regulations. Denver land use codes are primarily form-based and rely heavily physical characteristics of buildings to distinguish between zones rather than particular land uses. Still though, medical marijuana dispensaries are given special provisions. Within each "neighborhood context" a variety of land uses are provisioned for in order to provide a mixed-use atmosphere at a neighborhood scale. This technique, ideally, prevents clustering or segregation of services. Because of the "districting" approach to the entire city through the neighborhood context zoning, special districts are not heavily used. In the Denver zoning code, all medical marijuana dispensaries must undergo zoning permit review before they are built in both permitted zones and conditional zones.

The Denver model utilizes proximity buffers to site facilities which may be a useful tool for planners in Springfield to employ. The cluster of permitted uses on the southern end of the city is located near a large hospital campus. Introducing conditional use zoning along with proximity buffer regulations in this area would prevent a clustering of services in an already human service dense area.

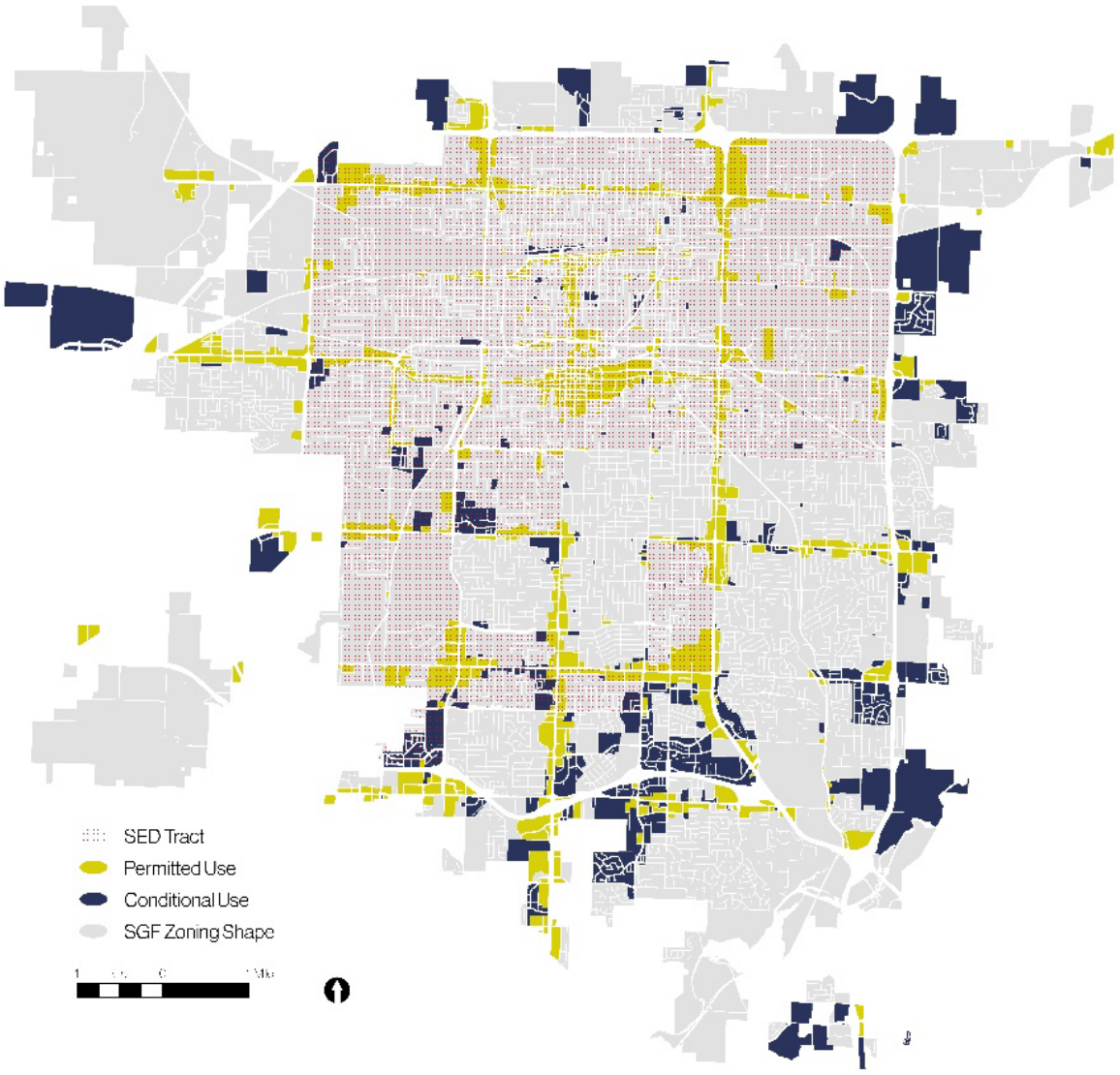

Figure 4.7 Denver Regulation Suite Overlay on Springfield

Zoning equivalencies determined through qualitative analysis of Denver land use codes, shown in Table 13. Denver Zoning Equivalencies, permit more retail locations of SATF facilities and prohibit them in manufacturing areas. The Denver model also changes the Commercial Street district to a permitted zone and makes planned unit developments (PUDs) and office parcels conditional zones.

Table 13. Denver Zoning Equivalencies

Springfield			Denver	
Zone	**Zone Description**	**Regulation**	**Regulation**	**Zone Equivalent**
CC	Center City	P	P	D-C (Downtown Core)
COM	Commercial Street District	C	P	C-MS (Urban Center, main street)
CS	Commercial Service	P	P	X-CC (Any neighborhood context, commercial corridor dominant form)
GR	General Retail	X	P	S-CC, MX (Suburban, Commercial Corridor, or Mixed Use)
HC	Highway Commercial	X	P	E-CC (Urban Edge, Commercial Corridor)
LB	Limited Business	X	P	G-MS, MX (General Urban, mixed use or main street)
GM	General Manufacturing	P	X	I-B (General Industrial)
HM	Heavy Manufacturing	P	X	I-B (General Industrial)
IC	Industrial Commercial	X	P	I-MX (Industrial Mixed Use)
LI	Light Industrial	P	P	I-A (Light Industrial)
RI	Restricted Industrial	X	X	I-B (General Industrial)
GI	Government & Institutional Use	P	X	D-CV (Downtown, Civic)
L	Landmarks	X	X	OS-C (Open Space, Conservation)
O	Office	P	C	G-MS, MX (General Urban, mixed use or main street)
PD	Planned Development	X	C	M-CC, MX, IMX, GMX (Master Planned)
UC	Urban Conservation	X	X	OS-C (Open Space, Conservation)
R-HD	High Density Multifamily Residential	X	X	G-MU (General Urban, multi. unit)
R-LD	Low Density Multifamily Residential	X	X	S-MU (Suburban, Multi. unit)
R-MD	Med. Multifamily Density Residential	X	X	E-MU (Urban Edge, multi. unit)
R-MHC	Manufactured Home Community	X	X	S-SU (Suburban, Single Family)
R-SF	Single Family Residential	X	X	S-SU (Suburban, Single Family)
R-TH	Residential Townhouse district	X	X	E-TH (Urban Edge, Town House)

Land area analysis revealed that the Denver regulation suite overlay allows SATF as a permitted use on 10% of the total land area of Springfield, and conditional use on 11% of the land. This overlay places 54% of the permitted parcels in SED tracts, and 16% of the conditional parcels in SED tracts. The majority of permitted parcels are along main thoroughfares throughout the city, with a high concentration of conditional use parcels on the south side of the city. Detailed land area analysis figures are shown in Table 14.

Table 14. Denver Model Overlay Land Area Analysis

Zoning	Area in Sq. Feet	% of Total
Total Area	1,938,927,886.17	100%
SGF/DEN Permitted	198,693,644.14	10%
SGF/DEN Conditional	222,156,063.78	11%
SED + Permitted	108,023,022.90	54% (of permitted)
SED + Conditional	35,207,502.64	16% (of conditional)

Substance abuse treatment facilities are permitted in the following land use categories: center city (downtown), Commercial Street district, commercial service, general retail, highway commercial, limited business, industrial commercial, light industrial, and West College Street. Figure 4.9 shows that permitted use zones are located primarily along major thoroughfares and dispersed throughout the city. There is a large cluster of permitted use parcels between the downtown area and the Commercial Street district.

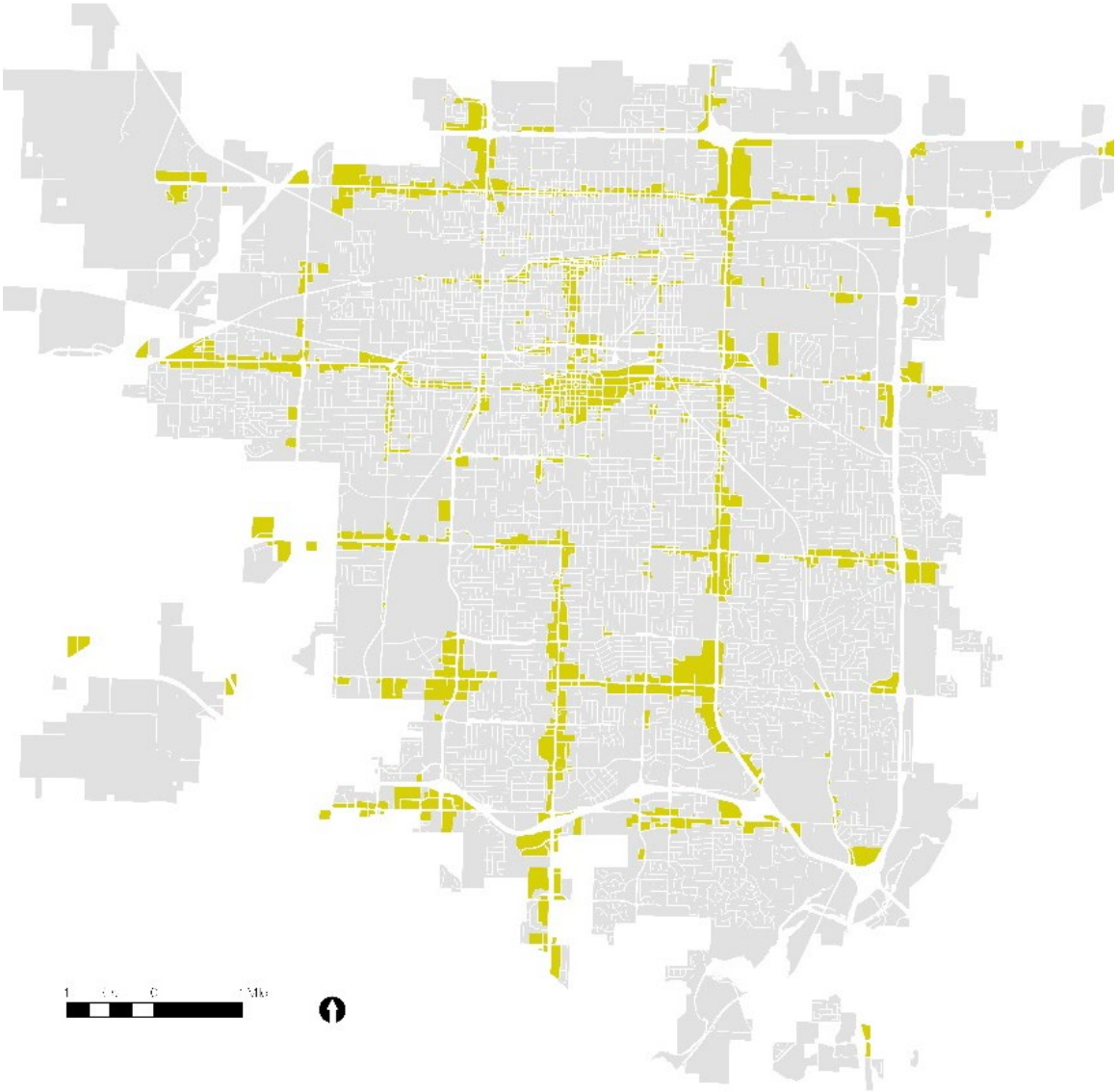

Figure 4.8 Denver Overlay Permitted Land Use Zones on Springfield

Conditional use permits are a possibility for SATF facilities in office and planned development use zones. Under the Denver model, SATF facilities would be prohibited in manufacturing, residential, government and institutional use, and restricted industrial zones. Figure 4.10 shows that conditional use parcels are randomly dispersed throughout the city, with

the majority located on the south side of Springfield and east of the major highway (US Hwy. 65) to the east.

The Denver model establishes conditional use zones on the perimeter and on the south side of the city. Particularly in the southern and eastern parts of the city, treatment facilities are needed. This model serves that need well. The conditional use parcels on the northern boundaries are primarily industrial, manufacturing uses currently. The Denver model maintains Commercial Street as a conditional use zone but does not expand the amount of conditional use land throughout the rest of the central city. By maintaining a conditional use zone on Commercial Street and not expanding conditional use in the central city, this model does nothing to help prevent a clustering of services in the district.

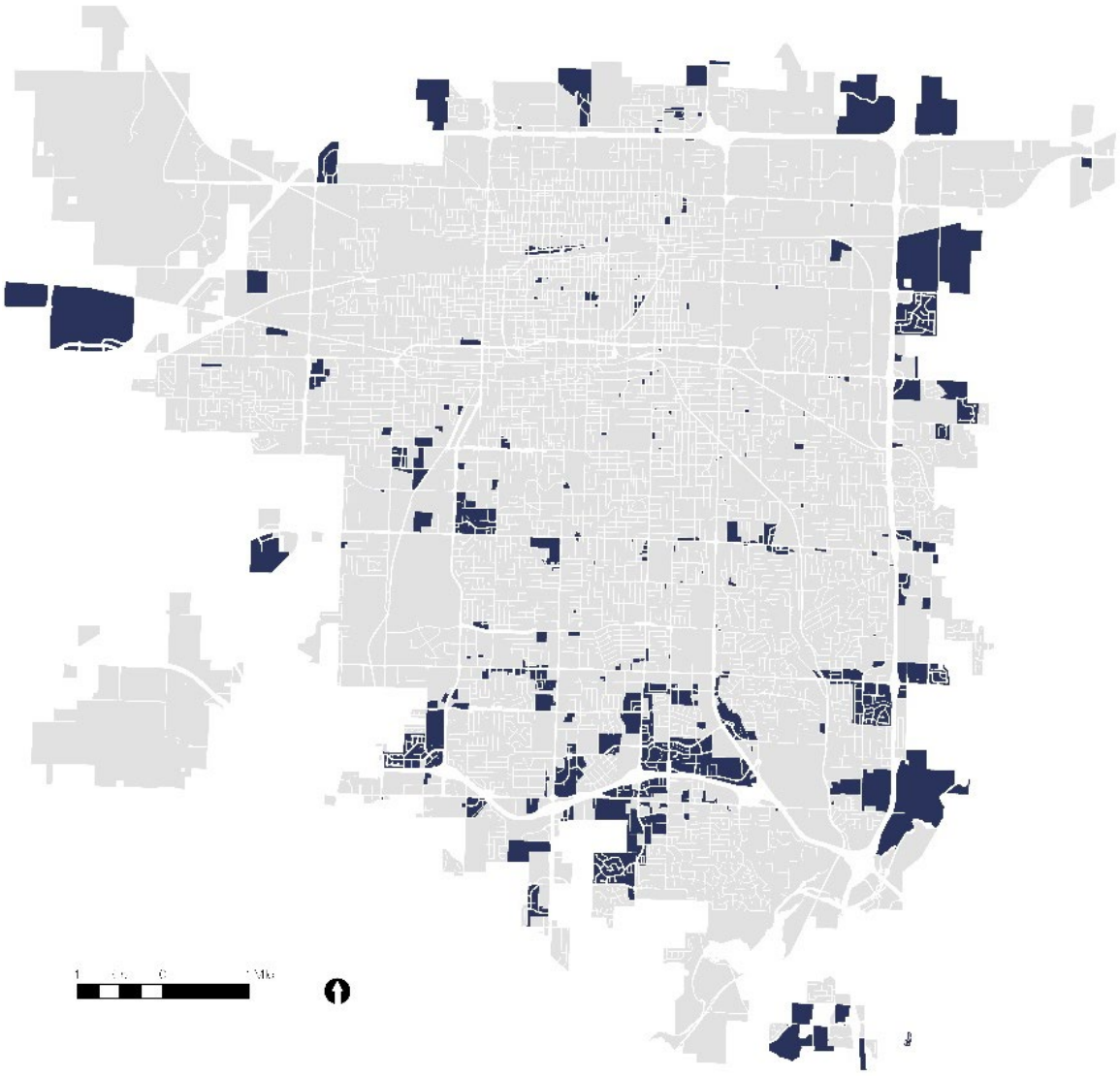

Figure 4.9 Denver Overlay Conditional Land Use Zones on Springfield

San Francisco/Springfield Overlay

The San Francisco Planning Code utilizes special use districts and named neighborhoods/districts to provide specific zoning regulations based on the character, culture, and physical environment in each area of the city. Density, proximity, and other restrictions are also used heavily in the San Francisco Planning Code. San Francisco allows medical service uses in nearly every land use category except for residential and "public use" districts (See Table 15).

Table 15. San Francisco Zoning Equivalencies

Springfield			San Francisco	
Zone	**Zone Description**	**Regulation**	**Regulation**	**Zone Equivalent**
CC	Center City	P	C	Neighborhood Commercial Districts
COM	Commercial Street District	C	C	Neighborhood Commercial Districts
CS	Commercial Service	P	P	C-3-G (Downtown General Commercial District)
GR	General Retail	X	P	C-3-R (Downtown Retail District)
HC	Highway Commercial	X	P	C-3-G (Downtown General Commercial District)
LB	Limited Business	X	P	C-2 (Community Business Districts
GM	General Manufacturing	P	P	PDR (Production Distribution Repair)
HM	Heavy Manufacturing	P	P	PDR (Production Distribution Repair)
IC	Industrial Commercial	X	P	M- (Industrial)
LI	Light Industrial	P	P	M- (Industrial)
RI	Restricted Industrial	X	P	M- (Industrial)
GI	Government & Institutional Use	P	X	P (Public Use)
L	Landmarks	X	X	P (Public Use)
O	Office	P	P	C-3-O (Downtown Office District)
PD	Planned Development	X	C	PUDs are conditionally allowed in most zoning districts in San Francisco
UC	Urban Conservation	X	C	Neighborhood Commercial Districts
R-HD	High Density Multifamily Residential	X	X	Residential
R-LD	Low Density Multifamily Residential	X	X	Residential
R-MD	Med. Multifamily Density Residential	X	X	Residential
R-MHC	Manufactured Home Community	X	X	Residential
R-SF	Single Family Residential	X	X	Residential
R-TH	Residential Townhouse district	X	X	Residential

The San Francisco regulation suite overlaid onto Springfield zones provisions 36% of the total land area in Springfield as permitted use zones for SATF facilities. As shown in Table 16, 51% of the area of permitted land is located in a SED tract (or about 18% of the total city's land area.) Conditional zones comprise 12% of the total land area, 22% of which are in SED tracts.

Table 16. San Francisco Model Overlay Land Area Analysis

	Area in Sq. Feet	% of Total
Total Area	1,938,927,886.17	100%
SGF/SANF Permitted	696,093,972.00	36%
SGF/SANF Conditional	223,502,532.69	12%
SED + Permitted	355,605,831.77	51% (of permitted)
SED + Conditional	48,209,230.24	22% (of conditional)

Figure 4.11 San Francisco Regulation Suite Overlay shows parcels of permitted and conditional land use zones. Socioeconomically disadvantaged tracts are also layered to visually represent how much of the city is such.

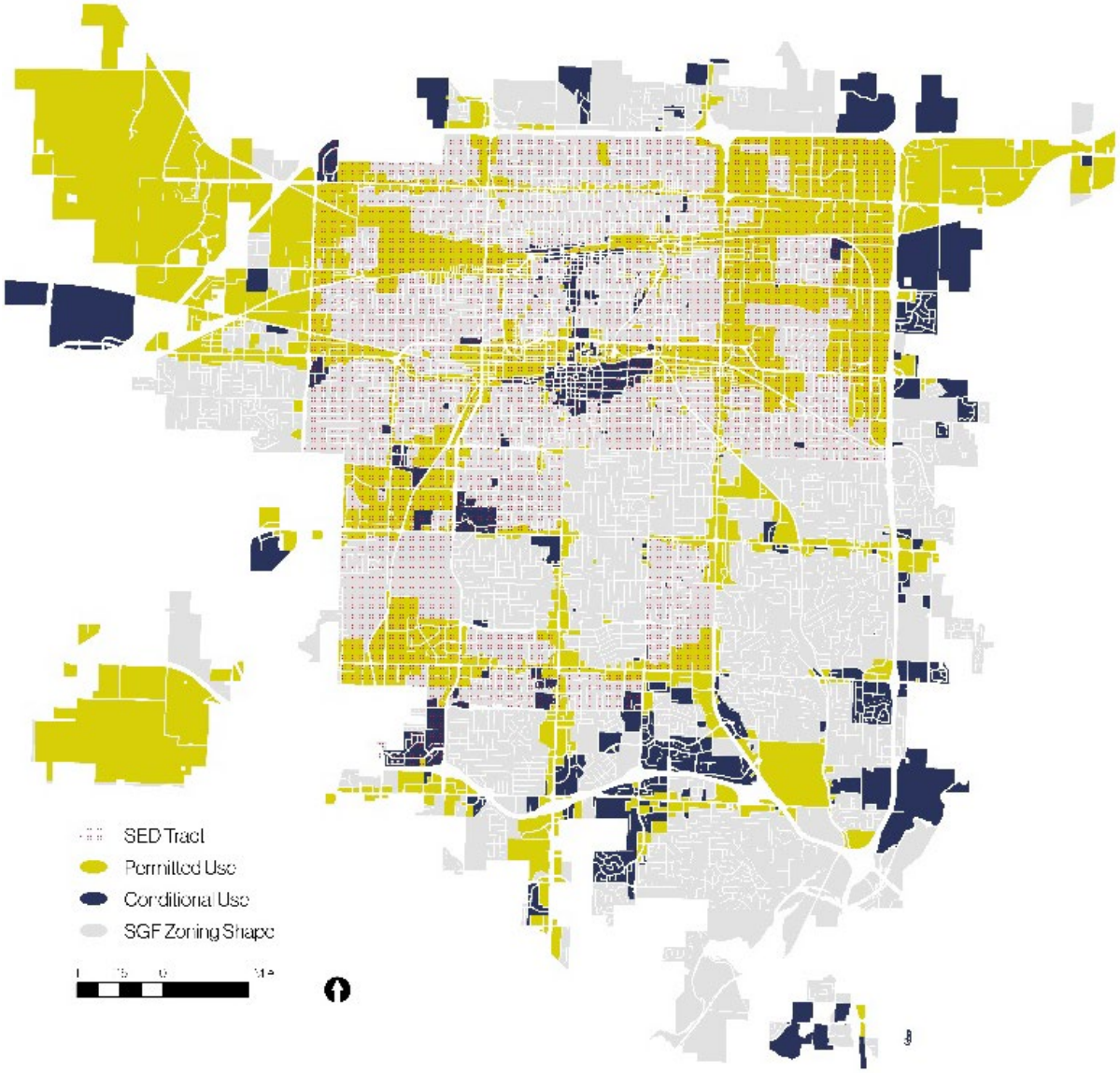

Figure 4.10 San Francisco Regulation Suite Overlay on Springfield

Permitted use zones are dispersed throughout the city, with the majority of parcels located on the northern half of the city (see Figure 4.12). Permitted zones are located primarily along major streets in the southern part of the city. The San Francisco model leaves large portions of the city, primarily residential areas, prohibited use zones.

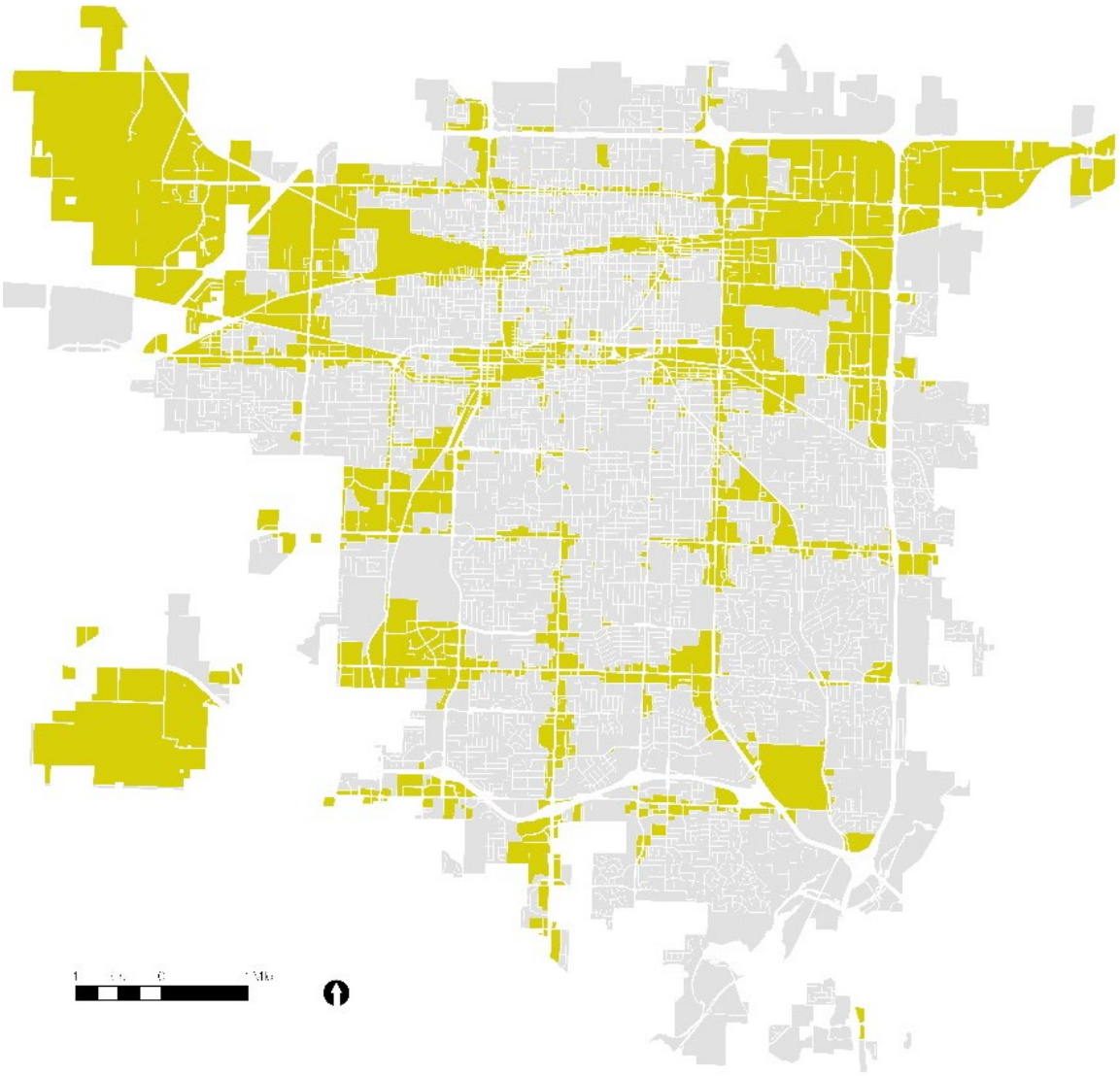

Figure 4.11 San Francisco Overlay Permitted Land Use Zones on Springfield

The San Francisco regulation suite maintains conditional use in the Commercial Street district and expands conditional use to the downtown business district. Figure 4.13 shows that most of the conditional use land area is located on the perimeter of the city, particularly to the south and east regions of the city.

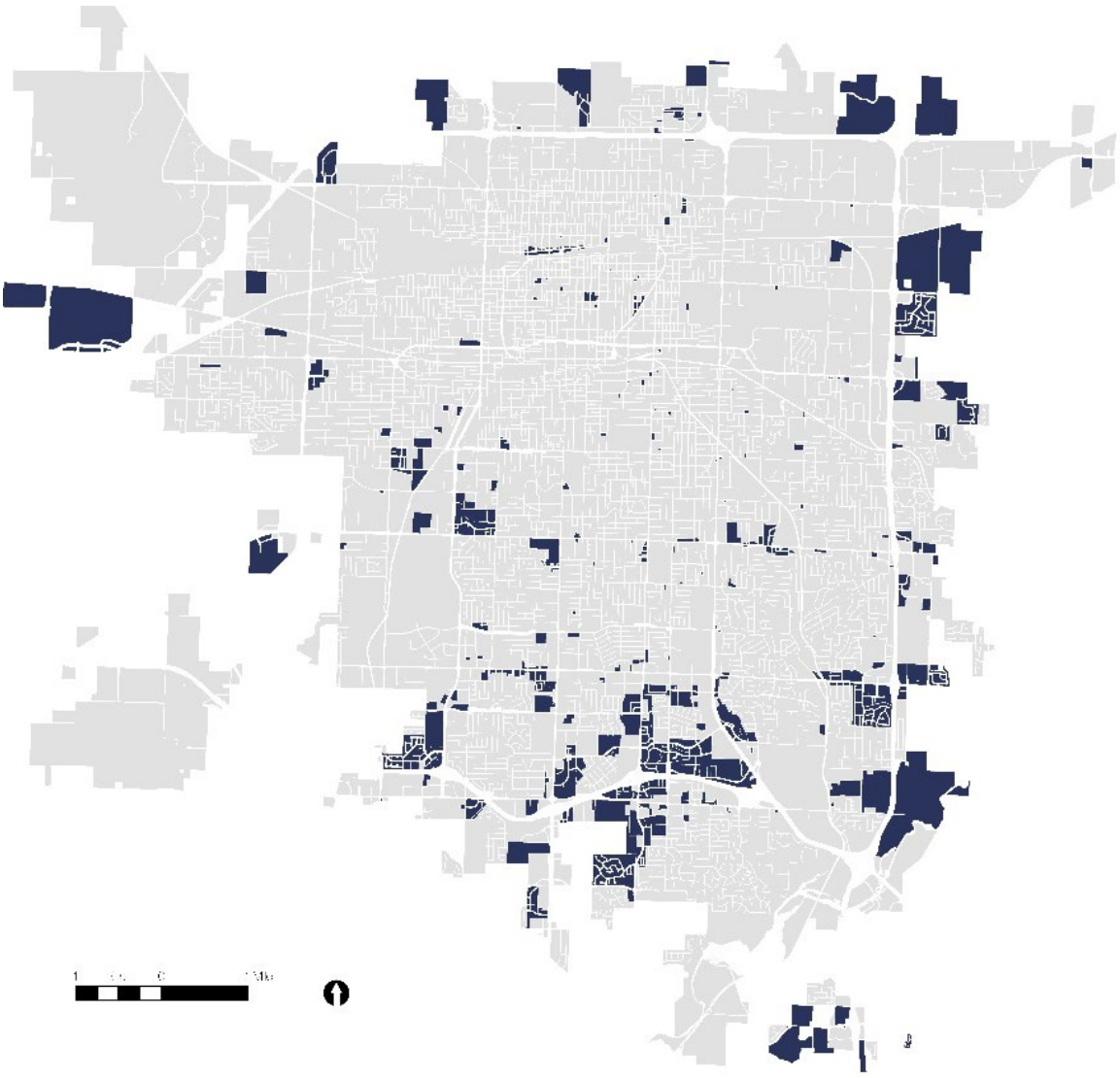

Figure 4.12 San Francisco Overlay Conditional Land Use Zones on Springfield

The majority of conditional use zones in the San Francisco model are along the perimeter of the city. There are clusters in the downtown business district and on the south side of Springfield. This model also maintains the Commercial Street district as a conditional use zone. The cluster of conditional use zoned parcels on the south side of the city is in near a large hospital (Cox Hospital) and strip mall style retail centers. Conditional use of land around

hospitals for treatment facilities prevents a clustering of services. However, the large hospital campuses in Springfield are already a clustering of services, so it may make more sense for SATF facilities to be a permitted use around hospitals.

San Francisco uses several land use zone designations like Neighborhood Commercial Districts (NCD) as well as Neighborhood Commercial Transit Districts (NCT) to specify land use regulations per each floor of a building in each district. This allows the city planning department to work to maintain the character and feel of each neighborhood. While it complicates the zoning process, Springfield would benefit from implementing more specific land use requirements in special use and neighborhood districts. This would enable the city to have more oversite in the siting process of SATF and ensure that the facilities are sited in areas of greatest need, and not sited in inappropriate areas. While the city may receive pushback from property owners worried about losing autonomy over their land, creating more specific land controls will prevent broad and sweeping regulations from leaving the most vulnerable parts of the city without the services they need.

San Francisco allows medical service uses in most land use designations with the exception of residential and public use zones. Allowing widespread siting of such facilities signals to the public that medical facilities, specifically SATF, are a land use that is desirable to locate all around the city. It should not be restricted to one area or one type of land use, like an industrial area or just next to hospital institutions.

Land Area Calculations

Permissiveness & Equitability Rankings

Table 17. Permissiveness Rankings

	Area in Sq. Feet	% of Total	Permissiveness Rank
SGF Permitted	651,511,891.10	34%	3
SGF/DEN Permitted	198,693,644.14	10%	4
SGF/SEA Permitted	813,677,972.08	42%	1
SGF/SANF Permitted	696,093,972.00	36%	2

Overall, the Seattle model is the most permissive land use regulation model for siting SATF, with 42% of the total land area of Springfield zoned permitted (Table 17). The Denver model is the most restrictive, with only 10% of the land area zoned permitted. Permissiveness rankings do not take into consideration the land area of conditional use zones.

Table 18. Equitability Ranking

SED + Permitted	Area in Sq. Ft. of Permitted in SED Tracts	% of Total SGF land area Permitted and in SED Tracts	Area in Sq. ft. Permitted in Non-SED tracts	% of Total Land Area Permitted and in Non-SED Tracts	% More in SED Tracts than in Non-SED Tracts	Equitability Rank
SGF	70,739,233.00	4%	580,772,658.10	30%	-26%	4
DEN	108,023,022.90	6%	90,670,621.24	5%	1%	1
SEA	441,098,662.27	23%	372,579,309.81	19%	4%	3
SANF	355,605,831.77	18%	340,488,140.23	18%	1%	2

The current zoning regulations in Springfield provide the least equitable regulations (Table 18), with only 4% of the total land area in a permitted zone and SED tract compared to 30% of land area in a permitted zone and non-SED tracts. This means that while services are unlikely to be clustered in SED areas, people living in SED tracts may also not have access to services they need. Springfield is ranked third in permissiveness (Table 17). Seattle is the least equitable model city, with only a four percent difference in the number of parcels zoned

permitted in SED and non-SED tracts. Denver and San Francisco have the same percent difference between percentage of permitted land area in SED tracts and non-SED tracts. San Francisco ranks second in equitability because of a higher percentage of land area in SED tracts, than Denver (ranked first in equitability).

Chapter 5 - Discussion & Conclusions

Discussion

This study has three main considerations: land use regulations, equity considerations, and public policy and engagement. Each decision a city planner makes sends a message to the public about those three areas of practice. From those considerations and the data that follows, suitable zones in Springfield were identified for siting new SATF facilities. Current zoning practices do not provide the most permissive and equitable distribution of SATF facilities; however regulations can be changed to improve facility accessibility.

Permissibility rankings suggest that Seattle is the best regulation suite to model suitable sites after in Springfield. Equitability rankings suggest that Denver is the best model to use for siting treatment facilities. This limited sample indicates that cities must carefully consider zoning regulations in order to promote both high equity and high permissiveness in siting SATFs. This could be an area for further study in providing high quality treatment to all segments of the population.

Using land area as a measure of permissibility could also lead to these discrepancies and a skew in the data. The land area of various land use categories varies just based on the type of activities that happen in that zone. Manufacturing and industrial zones have larger parcels and therefore more land area that would be considered permitted. However, it may be beneficial to have some SATFs in industrial and manufacturing zones, close to places of employment for people who may seek treatment.

Another explanation is that cities which have equitable zoning tend not to have an excess of permitted parcels. This could point to more carefully considered zoning regulations which site

SATFs in a very intentional manner. I think this is likely the case in Denver where the process of siting MMDs was carefully considered.

While the Denver model restricts the land area in which treatment facilities may be sited, I think that the quality of the parcels available is much more valuable than the quantity of land area that Seattle provides. The Denver model restricts treatment facilities to business, commercial, retail, center city, and Commercial Street zoned parcels, while Seattle allows them to be located industrial, manufacturing, and conditionally in multifamily residential areas. The Denver model removes permitted zones from industrial and manufacturing areas where human health services do not fit in.

The Denver zoning overlay relies on a medical marijuana dispensary proxy, which is a hybrid commercial and human services use. While it was originally hypothesized that this would allow more liberal siting of SATF facilities, it severely restricts the amount of land area where SATF facilities could potentially be sited. The same special provisions given to medical marijuana dispensaries are not necessary to every medical service use. Medical marijuana dispensaries are strictly retail uses but have a health services connotation to them. Medical marijuana dispensaries were a widely unwanted land use when medical cannabis was first legalized in Denver, but they have morphed into more of an upper-middle class luxury land use/amenity that people have accepted being located close to.

However, in instances where the public may be particularly vocal about a perceived threat to their current standard of living, it may be useful to provide extra provisions to at least show that the city planners have thoroughly considered all of the long-range consequences of their decisions. On the other hand, special zoning provisions for SATF facilities may further the stigma against and increase the barriers to seeking treatment for substance abuse.

One of the major differences between Springfield and Denver's land use regulations in this overlay is that the Denver regulation suite allows for facilities to be sited in commercial areas, along major thoroughfares and in retail districts. While the Denver overlay severely restricts the quantity of suitable land for SATF facility siting, it represents an improvement in the quality of the zoning regulations. Per the Denver regulation suite, SATF facilities are not allowed in manufacturing areas which is a major improvement from current Springfield land use codes. The Denver regulation suite also provides more opportunities for facilities to be sited outside of SED areas and closer to the more residential zones of the city. As Smith and Hanham (1981) suggest, co-locating substance use treatment facilities with other human service uses or within larger complexes like a mixed-use development can reduce the stigma surrounding treatment facilities (p. 333).

The Denver regulation suite does not cluster the available land for siting treatment facilities as does the Springfield land use code. Since permitted sites are primarily commercial and retail commercial, potential treatment facility sites are spread throughout the city, along major roads and in areas where many health clinics and mixed service and retail strip malls are already located.

Another difference between the Denver regulation suite and Springfield's land use code is the number of conditional use zones compared to permitted use zones. About 97% of potential sites (conditional and permitted uses) under Springfield's current regulations are outright permitted use sites. The Denver regulation suite is split more evenly between permitted and conditional uses, 47.6% permitted and 52.4% conditional use. The majority of potential sites being regulated as conditional could present a challenge to the process of developing new treatment facilities by requiring public hearings and copious amounts of paperwork. However,

this could also benefit the siting of facilities by requiring careful consideration of where new treatment facilities are developed. The city would have more influence on preventing clustering of facilities and encouraging development of facilities in areas of the city that are most in need via proximity regulations and just general application review.

One change to the Denver model that I would suggest in the context of Springfield, is to maintain the conditional status of Commercial Street. In other suites, it is conditional or permitted (Denver). This is good for preserving the original intent of the district (historic, mixed use) but does not necessarily relay the message that SATF are destigmatized. This also removes the historical use of the whole district. This area has historically been a target area for clustering of services and is easily accessible by many low-income populations. However, they are trying to rebrand the area as a shopping, dining, and entertainment district (it's a BID, almost a main street district), so perhaps this land use reg suite would fit the planning goals for the area? Certainly, does not meet the goal of destigmatizing treatment facilities, but would give the area a fresh image perhaps.

Removing medical/human services from Commercial Street would encourage the development of the business district. Commercial street used to be a social service hub but was recently dismantled due to the relocation of a major homeless shelter (The Kitchen, Inc.). I think that this zoning change would promote the future development goals of the Commercial Street District without harming the accessibility of human health services.

Conversely, maintaining Commercial Street as a conditional use zone and changing zoning throughout the rest of the city to provide more viable parcels for SATF might also improve the problem of clustering services on Commercial Street. Completely changing the zoning and taking away any opportunity to provide human medical services in the district might

give the impression that people who live near those neighborhoods do not deserve easy access to those services. Providing more potential locations for SATF and human medical services could improve the perception/reputation of Commercial Street though; the city would be sending a message that equitable treatment access is important.

The difference in syntax between each regulation suite is another important outcome of this study. Springfield's planning code specifies Substance Abuse Treatment Facilities as a land use category. In Seattle and San Francisco, medial or health use categories were used as proxies, but there are two important distinctions to be made between the two cities. In Seattle, "medical services" is considered a "human service use". In San Francisco, "health services" are a "retail service use". Additionally, Seattle code distinguishes drug and alcohol treatment services from mental healthcare services. The San Francisco Planning Code includes substance use disorder treatment in its human services definition as a form of mental healthcare. This slight semantic difference has the potential to change public perception of the vital importance of substance use disorder treatment. The two types of treatment are increasingly being provided in the same facilities, and much research points to the necessity of colocation of those facilities. It is important for city planners to understand the interconnectedness of substance use and behavioral health treatment and provision for accessible, high quality treatment facilities throughout their communities.

In their role of serving the best interests of the public, planners can act as advocates for a cause or neutral mediators between the many parties involved in a given planning issue. Planners, particularly those working in a government capacity, are public servants and therefore should do everything in their power to advance the public interest. Planners do not have political will or concern for accountability to a specific constituency, nor do they have power of the purse

or budgetary control. Without political or monetary power, planners must turn to their most powerful tool of advocacy in order to promote the public's best interests. In the case of the opioid crisis, two of the most powerful planning tools, advocacy and land use regulation, must be used to contribute to ending the crisis.

This study suggests that planners can lay the groundwork for new development of treatment facilities via land use regulations that are permissive of substance abuse treatment facilities (and other mental healthcare facilities). Planners should help reduce the stigma associated with seeking "drug treatment" by continuing public outreach efforts and rebranding it as mental healthcare. Planners can take it a step further though by being on the front lines of advocating for safe injection sites across the United States. This too can be done by creating enabling land use regulations, and through continuing public outreach and engagement efforts.

Working towards social justice and equity, and the public's best interests via public health is the profession obligation of planners, per the AICP Code of Ethics. Addressing social justice issues regarding the opioid crisis can also be uncomfortable because the demographic we need to fight on behalf of is the reverse of who we are usually advocating for. In urban settings, the opioid crisis is affecting primarily middle- to upper-class, white populations, while planners are usually concerned about minority, underserved, and underrepresented populations. Talking about equity and access regarding an issue facing this population is contrary to almost all conversations about social justice we normally have. The opioid crisis is not a comfortable subject for anyone to talk about, but it is the responsibility of public servants like planning professionals to start the conversation and encourage it to continue until the problem is resolved. The opioid crisis is an urban problem, a rural problem, and ultimately a human problem that will not be resolved without the work of many sectors, including planning professionals.

Site Recommendations

Determining the model to use in recommending suitable sites for Springfield requires a judgement on whether to prioritize the equitability or permissiveness of a regulation suite. Based on the assumption that equitable SATF siting will lead to more accessible treatment and reduced stigma against seeking treatment, the Denver model was chosen to inform site recommendations because it has the highest equitability ranking among cities in this study. The higher number of conditional use parcels that the Denver model employs is improves the chances of having equitably sited facilities, spread across a variety of levels of socioeconomic status.

Suitable sites were selected with consideration for permitted use zones and SED tracts. A goal of this study is to promote an even spread of treatment facilities accessible to both SED and non-SED populations, which requires treatment facilities to be located in both SED and non-SED tracts, and in some cases, along the border of two tracts to promote accessibility by the largest group of the population. Figure 5.1 shows suitable site recommendation locations, site descriptions and rationale follow.

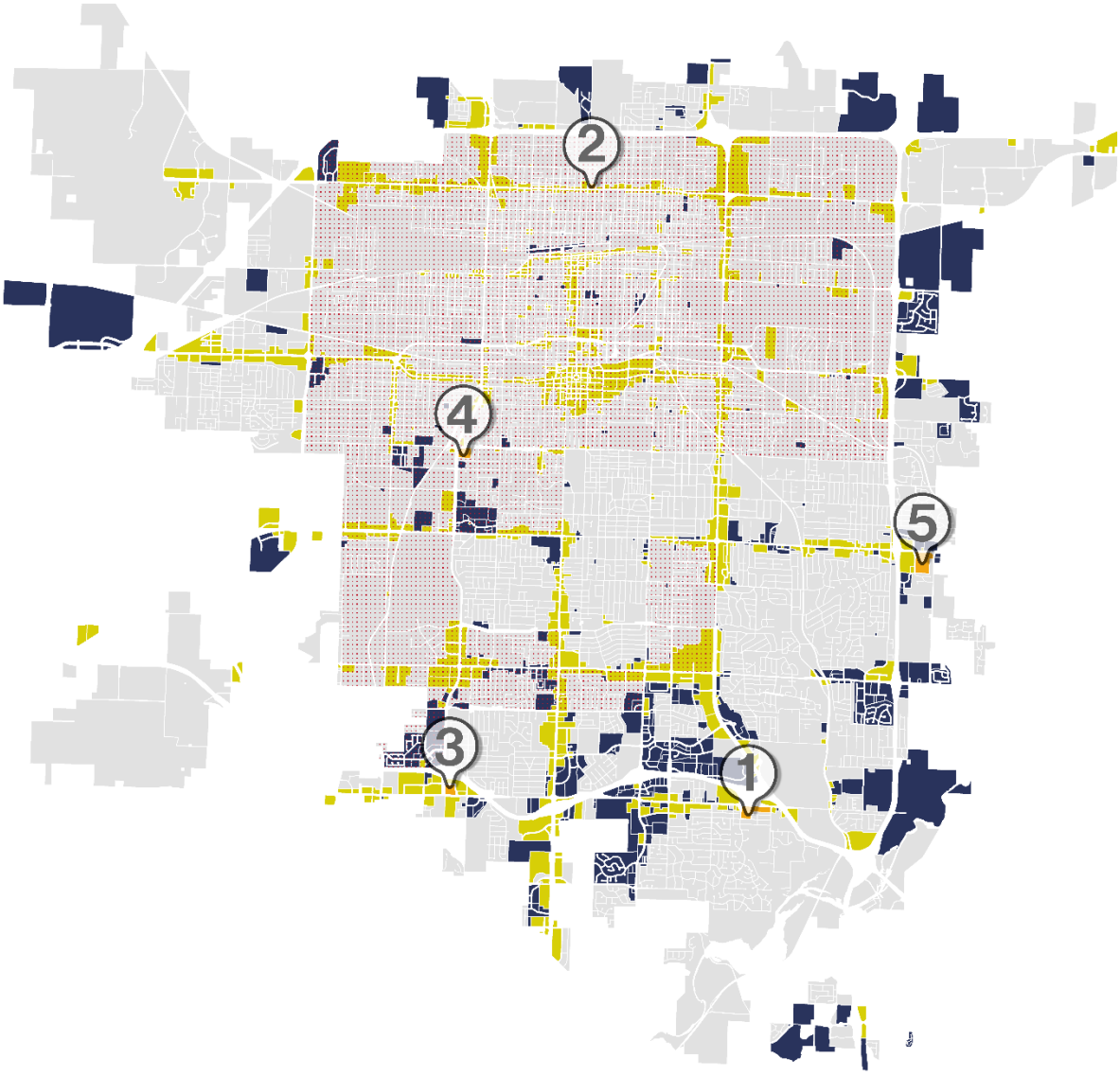

Figure 5.1 SATF Site Recommendations

1. **Farmer's Park:** This site is zoned general retail which is a permitted use zone under the Denver model of zoning. Farmer's Park is a high-end mixed-use development with retail, office, and residential uses. A SATF could easily be integrated into the development. One of the key takeaways from this research is to integrate human

health services into mixed use developments throughout cities. Healthy city planning calls for more mixed-use developments and providing better accessibility to health services (Barton & Tsourou, 2000; Sarkar et al., 2014). This site is close to many residential units and offices and is easily accessible from two major highways. It is not in a SED tract and is physically accessible to people from a variety of socioeconomic statuses. It would be a particularly comfortable setting for people from middle and upper socioeconomic strata.

2. **Kearney:** This site is zoned general retail and is a permitted use zone according to Denver's zoning model. This site is in a SED tract and is along a major throughcare, easily accessible by car or public transportation. The site is close to many industrial and manufacturing areas, making it a good option for people who may want to seek treatment close to their work site. This site is the farthest north site recommendation and would be accessible to people from communities outside of Springfield to the north.
3. **West Republic:** This site is zoned general retail, a permitted use zone under the Denver model of zoning. This site is in a non-SED tract but is located in close proximity to a SED tract as well as smaller communities to the southwest of Springfield that could benefit from a SATF located in this location.
4. **Grand:** This site is zoned general retail which is a permitted use zone for SATFs according to the Denver zoning model. This location would serve the central city and the northwest quadrant of the city which is severely lacking in many resources.
5. **East Sunshine:** This site is zoned general retail which is a permitted use under the Denver regulation model. Each of the selected sites is intended to serve a diverse

population in the segment of the city in which they are located. However, I selected this site specifically to serve a high-income population that is more inclined to be uncomfortable seeking treatment in any other part of Springfield. This population served by this site is the demographic that is being most effected by the opioid crisis and sees the most stigma against seeking treatment (Cicero et al., 2014).

Limitations

While zoning and changing the allowable land uses in areas of cities where treatment facilities are needed most is an effective step in improving the accessibility of treatment, zoning should not be the first or only line of defense in all cities. Zoning changes should never be the only line of defense. This study does not address the need of more public education to end the stigma against seeking treatment for substance abuse. Additionally, zoning and land use solutions do not necessarily apply to rural areas where there are different barriers to treatment, in addition to zoning regulations and facility siting issues.

It is important to recognize that the opioid crisis is no longer a "poor man's" crisis. This epidemic is affecting people of all racial, social, and economic backgrounds so calculating suitable sites for SATF facilities based only on socioeconomic disadvantage does not do much to ensure access to treatment for higher income populations. Springfield is racially non-diverse, with a population that is 88.4% white, so this study does not consider many of the racial inequalities that may exist in larger cities (US Census Bureau, 2017). Some might argue that such a low minority population would lead to even greater inequity in access to treatment, however that data is unavailable to consider in this study and is outside the scope of the study.

Another limitation of this study is the level of detail of zoning analysis. Detailed zoning information such as overlays, PUDs, and special districts were not available to analyze. Additionally, such zones and land uses are unique to each city and nontransferable to other cities. In order to have a completely accurate zoning overlay, zoning regulatory frameworks in cities across the country would need to be standardized and homogenous.

Suggestions for Future Research

This study is a preliminary study of the practices of three progressive communities in siting potentially undesirable facilities (LULUs), and the implications for siting substance abuse treatment facilities. Further research into the topic requires a broader, interdisciplinary approach. Further inquiry should explore the effects of siting treatment facilities in SED versus non-SED areas on treatment enrollment and participation. Further inquiry could explore the effects of siting SATFs in SED versus non-SED areas on participation by SES status. Another area of inquiry would be to explore whether actual treatment outcomes vary by non-SED sited facilities versus SED sited facilities.

As the United States continues to recognize the importance of a variety of substance abuse treatment approaches, and as the nation as a whole begins to destigmatize the act of seeking treatment for substance use, it would be advantageous to broaden the scope of this study. Further study of new approaches to improving treatment accessibility or introducing new treatment approaches as suggested by this study would provide important further evidence regarding the findings and inferences proposed in this study.

Other questions this study raised are:

- What land use category do SATFs belong to? What type of service are SATFs? Human service? Medical service? Retail service?
- How does zoning substance use disorder treatment services as a retail service use change the location and accessibility of the facilities?
- Does the zoning really make a difference, or is it just a matter of what type of use category they fall into?

Conclusion

This study was one of the early academic analyses conducted on the intersection between planning and addressing the opioid crisis. By exploring the policies, prejudices, and politics surrounding the accessibility of treatment for opioid use disorder, this project hopes to provide an important start to establishing the role planning can and should play in fighting the opioid crisis. Through site suitability analysis, five site recommendations were identified in Springfield, Missouri and a framework for improved siting was created. Studying Denver, San Francisco, Seattle, and Vancouver, BC gives this project a diverse set of data points. Each of these cities has commonalities with cities around the nation in regard to the opioid crisis. Basing the study in Springfield, Missouri allows the resulting framework to be scaled up or down due to the midsized and nodal nature of Springfield.

There are four key takeaways from this study:

1. Syntax matters. SATF are human health services and can be retail service uses.
2. Normalizing seeking treatment can start with co-locating facilities in established retail developments.
3. Quality of permitted zones should be considered over quantity of permitted use zones.

4. Utilize additional zoning tools such as districts and conditional use zones.

This study analyzed the zoning of four cities across the United States to see how they regulate the siting of analogous medical services facilities using zoning restrictions. Zoning changes alone will not solve the problems of the opioid epidemic. Zoning is also not the only planning problem that Springfield and other cities need to consider in improving substance abuse treatment accessibility and outcomes. Improving public transportation systems and creating campaigns to decrease the stigma around seeking substance abuse treatment are other ways a city can intervene. But, strengthening ties between public health and planning in any city will improve the chances of curbing the opioid epidemic.

The World Health Organization suggests that human service uses such as substance abuse treatment facilities should be planned for at the neighborhood level (Barton & Tsourou, 2000). Utilizing research-based zoning and siting regulations, planners can help cities develop SATFs that are more accessible and successful. Such researched-based planning could also go a long way toward reducing the social stigma surrounding seeking treatment, in turn reduce the number of people opposed to living close to a treatment facility, reducing NIMBYism towards not only SATFs, but perhaps other so-called LULUs that are similarly crucial to our society.

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Appendix A: Exclusion of Boston, Massachusetts

Boston, Massachusetts is a historic east coast city with a population of over 658,000. According to the 2016 American Community Survey estimates, the median household income is $58,000 and the median home value is $423,200. The City of Boston's 37th Annual Homeless Census in the winter of 2016-2017 revealed that there are 2,397 people living in homelessness in Boston. 21.1% of Bostonians live below the federal poverty line. A study by the Massachusetts Department of Health reported 193 opioid related overdoses in 2016, which is about 29.3 deaths per 100,000 people.

In recent years, Springfield, Missouri has experienced a clustering of services for people living in homelessness, as well as those struggling with mental health and substance abuse problems. Learning from the similar issue that Boston is facing could help Springfield expand their services and avoid future concentrations of services. At the center of the opioid epidemic facing Boston is "Methadone Mile." The Methadone Mile is an epicenter of treatment, but also of abuse, setting suboxone clinics, homeless shelters, and an "open air drug market" all along the same small stretch of city blocks (Zalkind, 2017). Methadone Mile in Boston provides a critical example of how clustering services can lead to cyclical behaviors among people struggling with substance abuse disorder. Understanding the city politics, particularly those related to zoning and the siting of treatment facilities, will provide insight into the importance of providing access to treatment throughout cities and avoiding clustering. For this reason, Boston was considered as a regulation suite for this study, however upon further analysis was ultimately excluded.

The city of Boston is very compact and historic, which has led to the formation of a number of unique zoning districts that do not follow the customary Euclidian land uses that many cities, including the study site, include in their zoning code. It was determined that a zoning analysis of Boston would not be able to be overlaid with the zoning of Springfield because of the number of special districts. While the land use codes of the remaining regulation suite cities, and even the study site itself include zoning for special districts, their numbers are not nearly as great as the city of Boston's. The land use codes of Boston were deemed not only inapplicable to Springfield, but also not generalizable to cities across the country as a whole. However, the policy interventions and other non-physical planning interventions that the city might be employing could serve as valuable tools for planners. This information is outside the scope of this study.

Appendix B: Zoning Regulations Table

Table 19. Land Use Regulations - Visual Representation

Zone	Zone Description	SGF	SEA	DEN	SANF
CC	Center City	·	·	·	-
COM	Commercial Street District	-	x	·	-
CS	Commercial Service	·	·	·	·
GR	General Retail	x	·	·	·
HC	Highway Commercial	x	·	·	·
LB	Limited Business	x	-	·	·
GM	General Manufacturing	·	·	x	·
HM	Heavy Manufacturing	·	·	x	·
IC	Industrial Commercial	x	·	·	·
LI	Light Industrial	·	·	·	·
RI	Restricted Industrial	x	·	x	·
GI	Government & Institutional Use	·	·	x	x
L	Landmarks	x	x	x	x
O	Office	·	·	-	·
PD	Planned Development	x	-	-	-
WC	West College Street	x	-	x	-
R-HD	High Density Multifamily Residential	x	-	x	x
R-LD	Low Density Multifamily Residential	x	-	x	x
R-MD	Med. Multifamily Density Residential	x	-	x	x
R-MHC	Manufactured Home Community	x	x	x	x
R-SF	Single Family Residential	x	x	x	x
R-TH	Residential Townhouse district	x	x	x	x

KEY

- \- Conditional Use
- · Permitted Use
- x Prohibited Use

Appendix C: Land Area Calculations & Rankings

Table 20. All Land Area Calculations

	Area in Sq. Feet	% of Total	SED + Permitted	Area in Sq. Ft.	% of Total Permitted
Total Area	1,938,927,886.17	100%	SGF	70,739,233.00	11%
SED	733,486,927.00	38%	DEN	108,023,022.90	54%
SGF Permitted	651,511,891.10	34%	SEA	441,098,662.27	54%
SGF Conditional	1,469,306.59	0.08%	SANF	355,605,831.77	51%
SGF/DEN Permitted	198,693,644.14	10%			
SGF/DEN Conditional	222,156,063.78	11%	**SED + Conditional**	**Area in Sq. Ft.**	**% of Total Conditional**
SGF/SEA Permitted	813,677,972.08	42%	SGF	1,469,306.59	100%
SGF/SEA Conditional	265,935,953.95	14%	DEN	35,207,502.64	16%
SGF/SANF Permitted	696,093,972.00	36%	SEA	69,545,263.01	26%
SGF/SANF Conditional	223,502,532.69	12%	SANF	48,209,230.24	22%

Table 21. Permissiveness Rankings

	Area in Sq. Feet	% of Total	Permissiveness Rank
SGF Permitted	651,511,891.10	34%	3
SGF/DEN Permitted	198,693,644.14	10%	4
SGF/SEA Permitted	813,677,972.08	42%	1
SGF/SANF Permitted	696,093,972.00	36%	2

Table 22. Permitted Zones Equitability Rankings

SED + Permitted	Area in Sq. Ft. of Permitted in SED Tracts	% of Total SGF land area Permitted and in SED Tracts	Area in Sq. ft. Permitted in Non-SED tracts	% of Total Land Area Permitted and in Non-SED Tracts	% More in SED Tracts than in Non-SED Tracts	Equitability Rank
SGF	70,739,233.00	4%	580,772,658.10	30%	-26%	1
DEN	108,023,022.90	6%	90,670,621.24	5%	1%	2
SEA	441,098,662.27	23%	372,579,309.81	19%	4%	4
SANF	355,605,831.77	18%	340,488,140.23	18%	1%	3

Table 23. Permitted & Conditional Zones Equitability Ranking

Permitted & Conditional in SED	Area in Sq. Ft. in SED tracts	% in SED tracts	Area in Sq. ft. in other tracts	% in other Tracts	Additional % in SED tracts	Equitability Rank
SGF	72,208,539.59	4%	580,772,658.10	30%	-26%	1
DEN	143,230,525.55	7%	277,619,182.37	14%	-7%	2
SEA	510,643,925.28	26%	568,970,000.76	29%	-3%	4
SANF	403,815,062.00	21%	515,781,442.68	27%	-6%	3