

Division Street Gateway

Health Impact Assessment

Spokane, Washington

October 2011-May 2012

Table of Contents

Description of HIA	3
Executive Summary.....	4
Recommendations	5
Introduction	6
Purpose	6
Community Profile	6
Demographics.....	7
Methodologies	9
Summary of Health Impact Topics.....	10
Physical and Mental Health	10
Transportation.....	15
Physical Safety	19
Built Environment	20
Social Capital.....	28
Economic Development	30
Conclusion.....	37
Call to Action	38
Appendix 1 • HIA Steps and Tasks Performed	39
Appendix 2 • Methodology for HIA Recommendation Ranking	40
Appendix 3 • HIA Recommendation Ranking	41
Appendix 4 • Established Bike Routes and Potential Priorities Map	42
Appendix 5 • GIS & Simulation Lab Division Gateway Pedestrian Network Map	43
Appendix 6 • HIA Business Survey	44
Appendix 7 • HIA Resident Survey	47
Appendix 8 • HIA Student Survey	50
References	54

Acknowledgments

The Division Street Gateway HIA team would like to thank the following people for their input and guidance with this HIA:

HIA steering committee members: Paul Dillon, legislative assistant to Rep. Andy Billig; Ron Edgar, engineering and technical supervisor, Spokane Regional Clean Air Agency; Dr. Bob Lutz, Spokane Regional Health District board of health member; Eve Nelson, senior transportation planner, Spokane Regional Transportation Council; Susan Norwood, Spokane Regional Health District board of health member; Mark Papich, principal engineer, City of Spokane; Joel Soden, transit planner, Spokane Transit Authority; Natalie Tauzin, health program specialist, Spokane Regional Health District; Mike Tedesco, president, Downtown Spokane Partnership; and Amber Waldref, Spokane City Council Member.

The team would also like to give special thanks to its NACCHO mentor, Brendon Haggerty, M.U.R.P., program coordinator, Clark County Public Health.

Additionally, the team would like to thank these people for contributing their specialized knowledge: Mallory Atkinson, transportation planner, Spokane Regional Transportation Council; Kerry Brooks, Ph.D., associate professor and landscape architect director, Washington State University; Ron Edgar, engineering and technical supervisor, Spokane Regional Clean Air Agency; Eve Nelson, senior transportation planner, Spokane Regional Transportation Council; Anna Ragaza-Bourassa, senior transportation planner, Spokane Regional Transportation Council; Amy Riffe, epidemiologist, Spokane Regional Health District; Joe Sacco, GIS specialist, City of Spokane; Joel Soden, transit planner, Spokane Transit; and Mark Springer, epidemiologist, Spokane Regional Health District.

This project is funded by in-kind resources from Spokane Regional Health District, the City of Spokane, and partly by National Association of County and City Health Officials (NACCHO).

Contributors

- **Spokane Regional Health District:** Heleen Dewey, Healthy Communities Program; Adrian Dominguez M.S., epidemiologist 2, Community Health Assessment, Planning, and Evaluation; Briann Satterfield, B.S., research assistant; Anthony Summers, B.A., consultant; Elizabeth Wallace, M.S., epidemiologist.
- **The City of Spokane:** Melissa Wittstruck, B.A., U.R.P., AICP, Business and Development Services, City of Spokane.

Description of HIA

In its 2011 report “Improving Health in the United States: the Role of Health Impact Assessment” the National Academies Research Council defines HIA as “a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population.” HIAs provide recommendations on monitoring and managing those effects.

Since the potential health effects identified by HIAs can also contribute to community costs or benefits, they provide another tool to help elected officials, administrators and the public make informed decisions about policy or project implementation.

The HIA process comprises six steps: screening, scoping, identification, assessment, decision making and recommendations, and evaluation and follow up. (Refer to appendix 1 for how we completed each step).

Due to the timeframe, size and scope of the Division Street Gateway project that is the focus of this HIA, the HIA team performed an intermediate assessment, meaning both primary and secondary research was utilized.

Executive Summary

Introduction: The Division Street Gateway Health Impact Assessment (HIA) was developed to help inform decision makers and planning consultants about the potential health impacts that redevelopment and redesign features will have on the current and projected population who will live, work, and recreate within a quarter-mile radius of the Division Street Corridor between I-90 and Sharp.

The City of Spokane is leading a project to redevelop its Division Street Gateway, a stretch of state Highway 2 that measures a little over one mile and runs through the heart of downtown Spokane. It begins at Interstate 90. As it runs north, the highway intersects with the Spokane River and then continues north to a neighborhood near Gonzaga University. The gateway is essentially the city's front door and leads to its living room. It connects residents and visitors with Spokane's central business district, civic buildings, and its University District which houses the Riverpoint campus that is home to five university branches.

The intent of the Division Street Gateway project is to identify needed streetscape and motor transportation improvements that enhance Spokane's visual image, while also fostering a safe and effective corridor for all modes of transportation. The improvements will also act as ingress points for east-west access between downtown and the University District.

This area experiences a relationally high-level of bicycle and pedestrian accidents compared to other major streets in downtown Spokane. Together with the City of Spokane and other local organizations and city officials, Spokane Regional Health District facilitated this health impact assessment (HIA) to measure the potential health impact of the Division Street Gateway project and better inform the public decision-making process. Areas of focus for the HIA are based on potential health impacts to people who reside near or use the Division Street Gateway. In relation to design, authors of the project chose physical and mental health, transportation, physical safety, built environment, social capital, and economic development as topic areas of focus.

The HIA is central to phase four of the Division Street Gateway project timeline, *Conceptual Design Development*, for consideration by a consultant hired by the City of Spokane to design concepts for proposed gateway improvements. The HIA is intended to lend depth to these concepts before they are considered by Spokane City Council members.

Methods: Indicators measure the health impact of streetscape and motor transportation improvements to the previously mentioned areas of HIA focus: physical and mental health, transportation, physical safety, built environment, social capital, and economic development. Authors utilized a combination of primary and secondary data and research. They developed a survey and administered it to residents, business owners, and students within the study area, and utilized peer-reviewed journal articles and local data sources. These culminated in recommendations which were prioritized by the steering committee.

Results: Health impacts and their magnitude on the study population were developed for each topic.

The study area specific to the Division Street Gateway project will experience a projected increase of 1,700 students and over 400 faculty and staff by 2030 (Spokane Riverpoint Academic and Master Plan Overview, 2009). A recent housing study conducted to determine the University District potential market for new market-rate and affordable rental and for-sale multi-family dwelling units indicated an additional 1,740 households (faculty, staff and student) will desire to locate within the Gateway project study area (Zimmerman/Volk, 2009). The authors' student and resident surveys found that students responded as experiencing more stress than residents. It can be assumed that

student stress hits high points during midterms and finals. Riverpoint campus houses multiple universities that operate on different schedules, which results in students experiencing periods of increased stress more times throughout the school year, rather than at specific points in time, which would be found on a campus that housed one university with a uniform schedule. As more students populate the study area, it can be assumed that there will be more stress experienced in the study area as a result of the various university schedules increasing student stress at different times throughout the school year. Future students within the study area may proportionately outnumber non-student residents, which will have a much greater impact on stress experienced within the study area.

In terms of increased pedestrian and cyclist activity in the study area related to an increase in population, two surveys show a general increase in walking and cycling county-wide (University of Minnesota, 2007; Spokane Regional Transportation Council, 2010). These results are likely representative of the study area. Other studies deduce that communities utilizing street-scale urban design land-use policies can expect an increase in people walking and biking for transportation (The Community Guide, 2012).

Increased pedestrian and bicycle activity will not likely decrease air pollution in the study area, as the affected streets (Division/Browne/Ruby) are commuter streets used for trips by people who live outside of the study area, not short trips performed by gateway residents.

Considering automobile use and criminal activity, this increase in active transportation may put non-motorized users' physical safety at risk. Recommendations are provided for mitigating these physical safety risks.

The study area experiences the urban heat island-effect, which is an increase in air temperature resulting from built environment surfaces such as streets, parking lots and roofs.

An expanding population, coupled with public infrastructure investment within the study area is likely to create more business, raising average costs per-square-foot for businesses leasing space, and increasing business revenue by attracting more customers to the study area.

Recommendations: The Division Street Gateway HIA concludes that the project will contribute positively to the health of the study area and that the project be programmed for implementation. Design research shows that the following recommendations will have positive impacts on current and future populations within the study area, and all users of the Division Street Gateway project area. Recommendations were prioritized in consideration of cost, feasibility, level of impact on the number of people, and level of impact on health. Please see Appendix 2 for the methodology on how these recommendations were prioritized. The top 10 recommendations are listed below in descending order of priority.

Top 10 recommendations:

1. Provide enhanced crossing infrastructure to increase pedestrian safety.
2. Provide infrastructure, such as bicycle lanes, to encourage physical activity.
3. Provide wayfinding signage that guides people to common Spokane destinations such as Spokane Convention Center, Riverpoint campus, Gonzaga University campus, Riverfront Park and hospitals.
4. Limit opportunities for criminals to conceal themselves.
5. Assure road diets on Division and Browne streets to slow down motorist traffic and afford for more safety for all users. This also creates more room for bicycle lanes for further safety.
6. Include elements of the natural environment along sidewalks.
7. Provide more benches and gathering areas to encourage more social interaction among residents, business owners and patrons, students, and other users in the project area.
8. Ensure that sidewalks maintain a clear line-of-sight for pedestrians.
9. Incorporate better bike facilities in the study area.
10. Implement high-performance transit.

The HIA report concludes that if the recommendations for each health impact are included within design plans for the Division Street Gateway project, then the health of people using the streets and sidewalks, living, working, attending class, and recreating within the study area will be improved beyond the improved physical connection between downtown Spokane and the University District. The following report offers details supporting the inclusion of these recommendations into Division Street Gateway project design plans.

Introduction

The Division Street Gateway Health Impact Assessment (HIA) is a product of Spokane Regional Health District (SRHD) in partnership with the City of Spokane. Spokane Regional Health District applied for a mentorship grant from National Association of County and City Health Officials (NACCHO) to help guide and structure the assessment of the City of Spokane's Division Street Gateway design project. The intent of the Division Street Gateway project (gateway project) is to identify needed streetscape improvements as well as motor transportation improvements throughout the corridor to provide not only "entrance" statements into Spokane's central business district, but strong linkages that provide east-west access between the Downtown and the adjacent University District. Improvements to this transportation corridor are intended to enhance Spokane's visual image and be a safe and effective transportation corridor for all modes. This project also addresses Washington State requirements for greenhouse gas and vehicle-miles-traveled targets.

Purpose

The Division Street Gateway project HIA uses best available information to assess potential health impacts of design alternatives on the people who live, work, study, and recreate within a quarter mile of the project limits: Division/Browne and Division/Ruby between Interstate 90 (I-90) and Sharp Avenue (see figure 1, Study Area Map, Page 8). The assessment produces several recommendations for enhancing positive health effects, while avoiding or mitigating negative health effects relevant to the project design.

This document is intended to add the consideration of human health to project planning and design, and, eventually, to the decision making process. It is for use by the design team, city staff, residents and City of Spokane elected officials. The authors hope this document will raise awareness of the health implications of projects, programs and policies and encourage discussion about the health impacts of the Division Street Gateway project. Spokane Regional Health District intends this HIA to demonstrate the link between human health and the design of the built environment, in this case transportation infrastructure.

Community Profile

The community profile describes in detail the geographic location of the study area, as well as how the area was developed. The residential population is described in the demographics section, which provides information about race, age, income, household types and figures.

The HIA study area encompasses a quarter-mile radius surrounding the Division Street Gateway project area, which sets its boundaries at Washington Street, Augusta Street, Chandler Street and 7th Avenue (see figure 1, Study Area Map, Page 8). This quarter-mile radius takes into consideration the people who may be directly affected by the design decisions of the project; this includes students, residents and business owners and patrons.

Bordered on the east by Spokane's University District, on the west by the city's central business district, and to the south by its medical district, the Division Street Gateway project area provides unique connectivity between the employment, shopping, dining and entertainment amenities found in downtown Spokane.

The HIA study area spans the eastern edge of downtown Spokane and includes segments of four neighborhoods: Logan, Emerson/Garfield, Cliff/Cannon and East Central. Land in the study area is predominantly zoned for downtown and commercial use. This zoning primarily encompasses the center of the study area. There is also land zoned for office and residential use. Residential zoning can be found in the northeast corner of the study area, while office zoning can be found along the western edge, northeast corner and largely on the south end of the study area across I-90.

Downtown and general commercial zoning provide for a wide-range of uses. City of Spokane land use standards for the Downtown University zone specifically encourage a pedestrian-friendly and safe urban environment for the Riverpoint campus, as well as a wide-range of residential, office, retail and other supporting commercial uses (Spokane Municipal Code Section 17C.124.030). Due to impending Riverpoint campus expansion, it is likely that Spokane's University District and adjacent areas, such as downtown, will experience increased population and development growth in the near future.

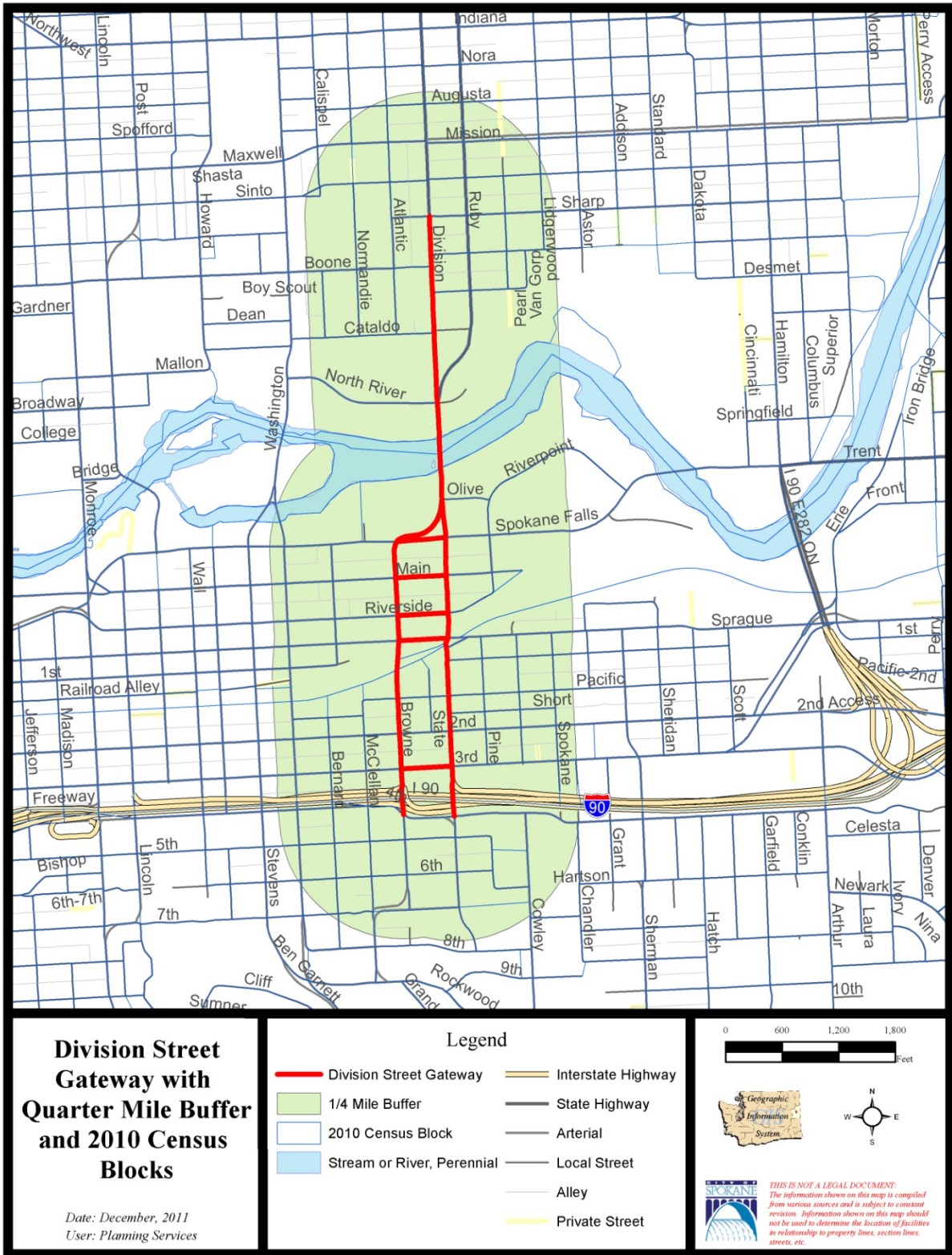
Demographics

Demographic information was extrapolated from the 2010 U.S. Census. The demographic data presented in this report denotes the limited data available for individual years at the block level for the 2010 U.S. Census. The total population within the study area is 4,221 with approximately 97 percent (4,077) of the population aged 18 years and older and approximately 3 percent (144) under 18 years of age. The population within the study area is predominately white non-Hispanic (approximately 80 percent) with 20 percent being ethnic minorities. Among ethnic minorities, Hispanics constitute 26.1 percent of the population and 5.2 percent of the overall study population. Although the majority of the population in the study area is white non-Hispanic, compared to Spokane County, the proportion of ethnic minorities in the study area is significantly higher than the overall proportion of ethnic minorities in the county (approximately 10 percent). In addition, poverty level was examined for households in the study area (U.S. Census, 2005-2009). Poverty is defined as total household income below 100 percent federal poverty level (FPL). A total of 2,742 households were identified in the study area with 43.4 percent of households living below the poverty level.

The study area includes the following neighborhoods partially: Riverside, Logan, East Central, and Cliff/Cannon. All of the above mentioned neighborhoods, with the exception of Logan, had age-adjusted mortality rates higher than Spokane County (Spokane Regional Health District, 2012). The significance of elevated mortality rates may suggest adverse environmental conditions that may be contributing to death earlier than expected. Among all 40 neighborhoods in Spokane County, Riverside had the highest mortality rate (1,364.1/100,000), East Central ranked second (1,102.3/100,000), Cliff/Canon was ranked eleventh (868.1/100,000) and Logan ranked thirteenth (840.2/100,000). Spokane County's mortality rate was 790.1/100,000.

Life expectancy is defined as, statistically the number of years a person can expect to live at a certain age. Life expectancy was determined for all infants born from 2000 to 2009 for each neighborhood in Spokane County and for the county overall. Among all neighborhoods in Spokane County, the Riverside neighborhood had the lowest life expectancy (66.2 years), more than any other neighborhood in Spokane County. In other words, infants born between 2000 and 2009 from Riverside could expect to live 66 years. East Central ranked 39th (72.9) among all neighborhoods, Cliff/Canon ranked 31st (76.5), and Logan ranked 28th (77.1). The difference in life expectancy compared to Spokane County was 12.2 years for Riverside, 5.5 years for East Central, approximately two years for Cliff/Canon, and 1.3 years for Logan. Compared to Southgate (the neighborhood with the highest life expectancy at 84.0 years), the difference in life expectancy for Riverside was 17.9 years, 11.1 years for East Central, 7.5 years for Cliff/Canon, and 6.9 years for Logan.

Figure 1 • Study Area Map



City of Spokane

This map displays the study area, which is the green area that extends a quarter mile out from the Division Street Gateway project area seen in red.

Methodologies

The methodologies section provides an explanation for literature review; why we chose specified health impacts; inclusion criteria for indicators to measure impacts on health; the use of surveys, data collection and analysis methods; and observation methods.

Identification of Health Impact Topic and Indicators

The project steering committee discussed the Division Street Gateway project, and consolidated potential aspects of the project that would affect health, either directly or indirectly. These project aspects will hereto be referred to as *health impact topics*. The health impact topics were then researched using the National Institute of Health's Entrez PubMed Web site to look for specific indicators for collecting primary and secondary data from which to measure the health impacts. This search yielded the indicators that are mentioned in the corresponding section for each topic.

Collection of Primary Data

Surveys: Three surveys were developed with questions derived from literature research. Surveys were distributed to residents, businesses, and Eastern Washington University and Washington State University students who attend classes on the Riverpoint campus.

Residential and business surveys were administered verbally, in-person using volunteers who went to each house and business. An attempt was made to collect a response from every business and residence in the study area. Businesses that were not able to fill out the survey in-person were given a survey and a self-addressed stamped envelope and instructed to mail back the survey. With authorization from each university, an email with a link to the survey was sent from SRHD to Eastern Washington University and Washington State University students who attend Riverpoint campus. There were 24 residential respondents, 56 business respondents, and 251 student respondents.

Commute Trip Reduction Data: Commute Trip Reduction (CTR) is a statewide program, administered by local government, which offers incentives to increase alternative modes of transportation and reduce single-occupancy vehicle-miles-traveled. This program surveys all participants when they enroll, then yearly, to measure ongoing change in travel patterns. Authors gained access to the CTR database for Spokane's local universities. This information was analyzed to sort out the target population and estimate the average percentage of respondents using alternative modes of transportation.

Statistical Analyses: Data was input into Microsoft[®] Excel by hand and transferred to IBM[®] SPSS software for statistical analysis. Descriptive statistics and frequencies, including cross-tabulation by age, were performed in SPSS.

Collection of Secondary Data by Health Impact Topic

Physical and Mental Health: Physical and mental health data was gathered using EBSCOhost to search for articles in peer-reviewed journals. The phrases "built environment and physical health," "built environment and physical activity," "built environment and mental health," "urban design and mental health" were used to find applicable articles. Obesity rates and projections were gathered from the U.S. Centers for Disease Control and Prevention (CDC) and Johns Hopkins Bloomberg School of Public Health (JHSPH). Diabetes rates were gathered from American Diabetes Association and CDC. Residential and student survey data was gathered and included within the indicators section of this chapter.

Transportation: For transportation safety, 2010 data provided by Spokane Regional Transportation Council (SRTC) for pedestrian, cyclist and motorist collision was analyzed. For connectivity, the Washington State University Interdisciplinary Design Institute's GIS and Simulation Lab provided data on sidewalk connectivity in

the study area. For transit ridership, Spokane Transit Authority (STA) provided data on public transportation ridership within the study area.

Physical Safety: Information about physical safety was gathered from the book “Crime Prevention through Environmental Design.” The City of Spokane Crime Map was used to identify the incidence of crime and locations within the study area. Crime incidence was broken down into assaults, burglaries, drug incidents, vehicle thefts and robberies. Information about reducing crime by increasing levels of light brightness was gathered from studies conducted by Robert Samuels, Ph.D., professor of urban design, University of New South Wales, Sydney, Australia.

Built Environment: Information about air quality was gathered from the World Health Organization (WHO), U.S. Environmental Protection Agency (EPA), Spokane Regional Clean Air Agency (Spokane Clean Air), SRTC and Washington State Department of Ecology (Ecology). Information about the urban heat island effect was gathered from the National Oceanic and Atmospheric Association’s National Weather Service, CDC, EPA, and Landsat 7 satellite’s thermal sensor. Information for the healthy food access section was gathered from SRTC, U.S. Department of Transportation (USDOT) and Samuels. Information was gathered for the access to alcohol section by searching both EBSCOhost and Google Web Search™ with “inebriated pedestrians” to find peer-reviewed articles. Additional information for the access to alcohol section was gathered from the Spokane Riverpoint Academic Campus & Master Plan Overview.

Social Capital: Social capital data was gathered by using EBSCOhost to search for articles in peer-reviewed journals. The phrases “social capital and health,” and “social connectedness and health” were used to find applicable articles. The Social Capital Research Web site was also used to locate peer-reviewed articles. Residential, business and student survey data was gathered and included within the indicators section of this chapter.

Economic Development: Local economic development data was gathered through City of Spokane GIS-based information systems, Spokane County Assessor data, and Washington State Department of Revenue taxable retail sales data 2008-2010. Research for economic impacts and transportation projects was drawn from the 2010 working paper “The Walkability Premium in Commercial Real Estate Investments” by Gary Pivo and Jeffery D. Fisher, 2010, “The Economic Benefits of Open Space, Recreation Facilities and Walkable Community Design” from Active Living Research, and the 2011 “Science Daily” article, “Rehabilitating Vacant Lots Improves Urban Health and Safety.” The 2011 Federal Highway Administration “frequently asked questions” (FAQ) document: Transportation and Economic Development was also accessed. Residential, business and student survey data was gathered and included within the indicators section of this chapter.

Summary of Health Impact Topics

Each health impact topic is broken into four sections.

1. Topic introduction – The first section introduces the health impact topic, defines the topic and informs the reader of the best available science supporting the topic’s impact on health.
2. Indicators – The second section provides baseline indicator data.
3. Impact/magnitude – The third section describes the health impact’s implications on study area.
4. Recommendations – The fourth section provides recommendations intended to make the study area a healthier place for people who live, work and recreate in the area.

Physical and Mental Health

Introduction

The way the built environment is designed can influence physical and mental health. For instance, a variety of physical ailments can be prevented and mitigated with physical activity and nutrition. Among these ailments are chronic diseases and conditions affecting many Americans today such as heart disease, diabetes, chronic obstructive pulmonary disease (COPD), asthma, obesity, and mental health issues such as depression and anxiety.

The United States faces two public health crises that can be largely prevented by physical activity—obesity and diabetes. Rates for both have increased tremendously over the last four decades. According to the Centers for Disease Control and Prevention (CDC), about one-third (34 percent) of adults and approximately one-fifth (17 percent) of children and adolescents aged 2-19 in the United States are obese (CDC Obesity Trends, 2011). According to Johns Hopkins School of Public Health (JHSPH) the number of adults with obesity has increased by 20 percent since the 1960s, and they project by 2015 that 41 percent of U.S. adults will be obese (JHSPH Public Health News Center, 2007). The American Diabetes Association (ADA) states that 25.8 million people or 8.3 percent of the U.S. population have diabetes, which is a 232 percent increase since 1980 (Diabetes Statistics, 2011; CDC Data and Trends, 2009). Spokane County obesity and diabetes rates mirror the national average. In 2009, 29 percent of Spokane County adults reported being obese and 7 percent reported having diabetes (Spokane Regional Health District, 2009).

One key element for preventing obesity and diabetes is physical activity. The U.S. Department of Health and Human Services (HHS) recommends adults get at least 2.5 hours of moderate physical activity per week to maintain health (HHS, 2008). The weekly recommended physical activity should be performed in episodes of at least 10 minutes, which a built environment designed for pedestrian and bicycle activity can facilitate; however, most built environments are designed in ways that discourage physical activity (e.g. lack of sidewalks and bicycle lanes). For instance, historically, zoning practices that designate land for different uses contribute to increasing the distances between where people live and their daily activities. Research shows that design practices in the United States impede the physical activity that our nation needs to prevent chronic disease and obesity (Frumkin, 2002).

Moreover, urban design, the shaping of the built environment, can also positively affect mental health. According to HHS, mental illness ranks among the highest of all diseases in the United States (Mental Health, 2010), with depression and anxiety being the most common mental health issues. HHS states that “mental health disorders impact physical health and are associated with prevalence, progression, and outcome of some of today’s most pressing chronic diseases, including diabetes, heart disease, and cancer” (Mental Health, 2010). Built environment design can aid mental health treatment. For instance, since physical activity decreases anxiety and depression, designing built environments to encourage physical activity can have positive mental health impacts (U.S. Preventive Services Task Force, 1996).

Additionally, designing the built environment to encourage human interaction and interaction with nature can improve the mental health of people living, working and recreating within a community. Wayfinding signage, graphic methods used to provide directions, can aid in providing sensory cues for these interactions.

Providing opportunities in the built environment for human interaction may lead to the formation of relationships between people within a community. Relationships lead to the development of social capital (further discussed in the Social Capital Health impact topic), which may have positive effects on mental health. A recent study suggested that high perceptions of social capital may lead to lower risks of major depression (Fujiwara & Kawachi, 2008). Urban design strategies for encouraging increased human interaction may include providing walkable infrastructure that makes people feel safe during the day and at night, providing shaded areas for people to gather such as benches under trees, and providing gathering spaces such as pocket parks, which are small parks that can be located in an area like a vacant lot.

Exposure to the natural environment helps people manage stress and recover from injuries and illness (Parsons, 1991; Ulrich, 1984; Ulrich et al. 1991). People do not need to use nature to benefit from it, nor do they need a lot of it to experience the mental health benefits that nature provides (Kaplan & Kaplan, 1989; Kuo et al. 1998). This means that people do not need to be within a park to benefit from the positive mental health effects offered by nature, but may experience those effects by having visual access to elements of the natural environment such as looking out of a window at a tree-lined street. Urban design can incorporate nature by providing rain gardens, planters for flowers, landscaped strips between sidewalks and streets and trees along sidewalks.

Providing orientation through design can be done with wayfinding signs. It is important for people to orient themselves within the built environment because it can reduce stress (Evans and McCoy, 1998). This can be especially important for people who are new to, or are just passing through, an area.

In summary, through the use of built environment infrastructure and elements of the natural environment, the Division Street Gateway project can improve the physical and mental health of people who live, work, study and pass through the area.

Indicators

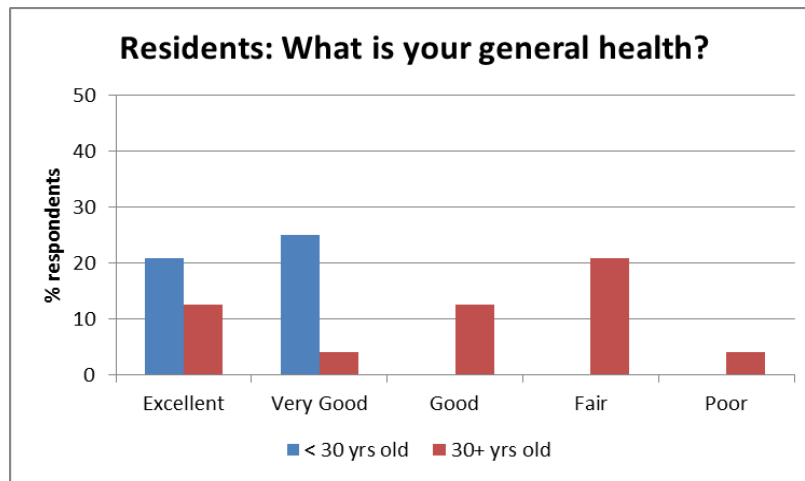
Residents and students were asked questions from a survey with statements pertaining to physical and mental health. Business surveys did not include questions or statements pertaining to physical health or mental health.

Physical Health

For physical health, residents and students were asked if their general health was good, how many days within the last 30 days their physical health was not good, and if a doctor had ever diagnosed them with diabetes, COPD, asthma, or heart disease. Height and weight measurements were also collected and used to determine the body mass index (BMI) of the participant. The BMI was then analyzed to determine if participant was overweight or obese.

Overall, residents and students responded that their physical health was good and the majority of the data supports that individuals in both groups are physically healthy.

On a scale ranging from excellent (1) to poor (5), the residents rated their general health at 2.33, which indicates they find their health to be between good and very good. When graphed by age group, those individuals 30 years of age or younger rated their health to be excellent or very good. Those older than 30 years of age indicated their health to range from excellent to poor, with a majority (21 percent) rating their health as fair. They also indicated that their health was not good on average for about two days in the last 30 days.

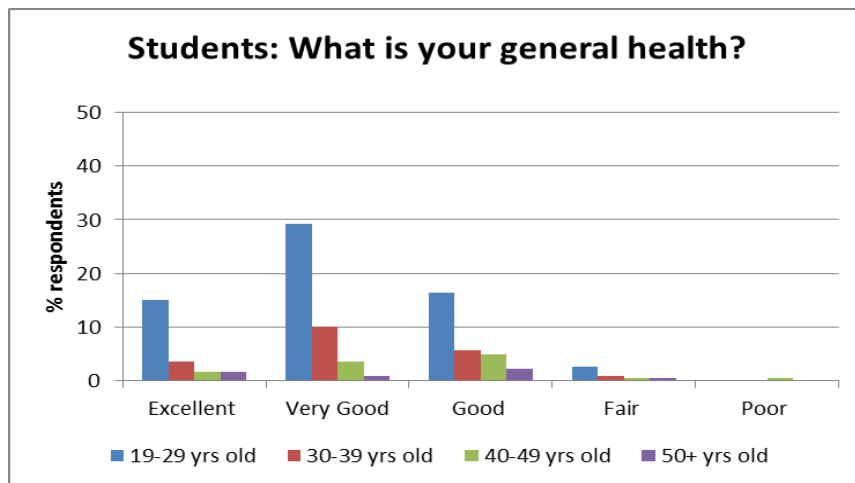


Spokane Regional Health District, 2012

BMI was calculated using the height and weight information collected from the resident surveys. Based on these calculations, the residents surveyed have an average BMI of 28. According to the CDC, this means on average, residents are overweight. Overall, 60 percent of the residents can be classified in the overweight (BMI 25.0 – 29.9) or obese (BMI 30.0 or above) weight status. Only 40 percent of residents were identified as having a normal body weight, with a BMI ranging from 19 – 25.

About 17 percent of residents responded that they have been told by a doctor that they suffer from diabetes, 17 percent from heart disease and 17 percent from asthma. About 4 percent responded that a doctor has told them that they suffer from COPD.

The majority (44 percent) of students rated their general health as being very good, with 20 percent saying that it is good. Students indicated that their health was not good on an average of two days in the last 30 days.



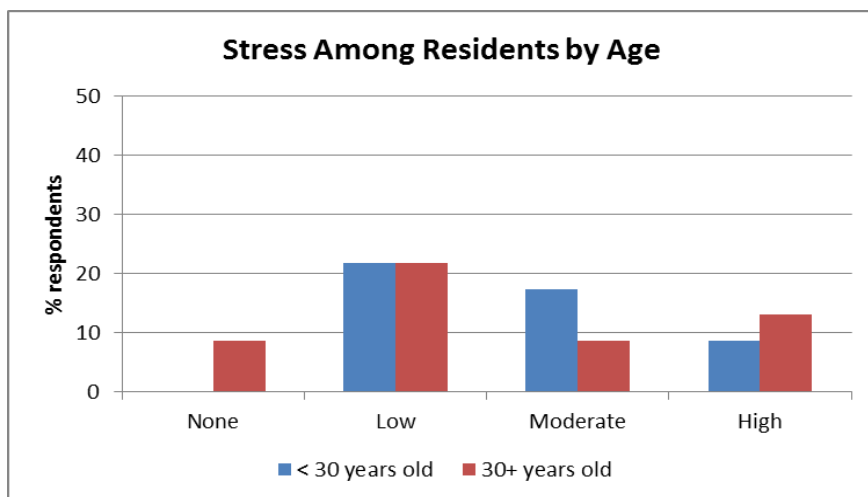
Spokane Regional Health District, 2012

About 5 percent of students responded that a doctor told them that they suffer from heart disease, 13 percent were told they suffer from asthma, 10 percent were told they suffer from diabetes, and about 3 percent were told they suffer from COPD.

Mental Health

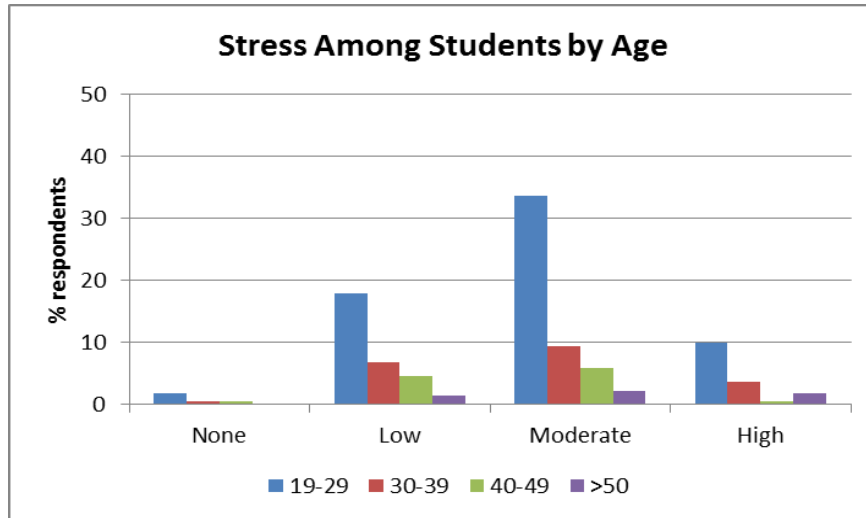
Residents and students were asked how many days in the last 30 days their mental health (including stress, depression and problems with emotions) was not good, and how much stress affects them on a daily basis.

When asked how many days in the last 30 days their mental health was not good, residents responded with an average of one day in the last 30 days. A majority of residents indicated they experience low levels of stress on a daily basis. When broken down by age, younger individuals (30 years of age or younger) experience stress more so at a moderate level, while those older than 30 years of age, experience more stress at a higher level.



Spokane Regional Health District, 2012

Students' responses indicated they experience more stress and mental health issues than residents. It is possible that this is due to academic workloads and tests. Students responded that their mental health was not good an average of four days in the last 30 days. The majority of students (51 percent) reported feeling a moderate level of stress on a daily basis. Those that were youngest (ages 19-39) indicated having more stress on a daily basis than individuals age 50 and up.



Spokane Regional Health District, 2012

Implications

The Division Street Gateway project study area will see a projected increase of 1,700 students by 2030 at the Riverpoint campus as it expands (Spokane Riverpoint Academic and Master Plan Overview, 2009). Student and resident surveys found that students indicated experiencing more stress than residents. It can be assumed that student stress hits high points during midterms and finals. Riverpoint campus houses multiple universities that operate on different schedules, which results in students experiencing periods of increased stress more times throughout the school year, rather than at specific points in time, which would be found on a campus that housed one university with a uniform schedule. Future students within the study area may proportionately outnumber non-student residents, which will have a much greater impact on stress experienced within the study area.

Providing elements of the natural environment along sidewalks and benches that allow students (and all people within the project area) to gather and socialize may have a positive impact on reducing stress. Providing bicycle lanes and clearly marked crosswalks may improve mental and physical health by reducing anxiety about injury and providing opportunities for physical activity.

Recommendations

- **Provide infrastructure that encourages physical activity.** Bicycle lanes encourage physical activity, which can contribute to maintaining a healthy weight. This is especially important for residents in the study area, who were identified as overweight (40 percent) or obese (20 percent).

Bicycle lanes should be considered within the gateway project area for Division, Ruby and Browne streets. These streets are already being traveled by bicyclists, and bicycle travel is legal on Division and Ruby from I-90 to North Foothills Drive.

- **Provide wayfinding signage that guides people using all modes of transportation** to Spokane attractions and recreational opportunities, such as the Spokane Convention Center, Riverpoint and Gonzaga campuses, hospitals, Centennial Trail and Riverfront Park. Wayfinding signage contributes to the legibility

of a city and reduces stress because of the predictability that is provided (Evans and McCoy, 1998).

Potential locations for wayfinding signage are 3rd Avenue at Division Street (exiting I-90/entering downtown); 1st Avenue at Division Street (before going under the trestle); Cataldo Avenue and Division Street (heading south before crossing bridge); Riverside Avenue at Browne Street (leaving downtown).

- **Include elements of the natural environment along sidewalks.** Trees can provide a connection to nature, which relieves stress and fatigue, and improves air quality.

Potential tree locations north and south include: both sides of Division Street from Sprague Avenue to Spokane Falls Boulevard; the west side of Browne Street from Spokane Falls Boulevard to Sprague Avenue (there are no trees on this side); and Browne Street from Pacific Avenue to 3rd Avenue (currently no trees). Potential tree locations east and west include: 2nd and 3rd avenues at Pacific Avenue. Focus should be on the downtown section of the study area where there is more density (business and some residential); this is where people will be more active when considering the future student population living and accessing retail and entertainment downtown.

Transportation

Introduction

Research shows that land-use planning, including transportation decisions, directly and indirectly affects human health by influencing a wide-range of environmental, physical and social factors. Some of those health impacts include physical activity, obesity, air quality, water quality/quantity, urban heat abatement, traffic safety and social capital/mental health (Dannenberg, Frumkin, and Jackson, 2011). The assessment looked at pedestrian, bicyclist and motorist safety; pedestrian, cyclist and motorist connectivity; and transit ridership, and how those specific areas impact the health of the people who work, live and play in the study area.

Injuries can be prevented with an effective combination of environmental design, best-practice policies and behavioral change. With this HIA, we've focused on environmental design opportunities to reduce collisions among pedestrians, cyclists and motorists. According to the World Health Organization (WHO) (2004), unsafe mixing of motor vehicles, pedestrians, and cyclists leads to increased risk of injury and death. In the demographics section of this report, it is noted that the study area consists of low-income neighborhoods; research shows that more pedestrian collisions occur in low-income areas due to greater residential density, higher traffic volume and lower car ownership among the residents in low-income areas. (LaScala, Gerber, and Gruenwald, 2000).

Increasing pedestrian and cyclist connectivity is important to ensure that both modes have a safe, continual path to complete their trip. This can help increase safety for the pedestrian and cyclist, promote physical activity and help reduce vehicle-miles-travelled.

Additionally, a strong transit network can contribute to the creation of a sustainable and healthy community by encouraging walking, reducing greenhouse gases and enhancing a sense of community. Many factors influence a person's decision to use transit as their transportation option. It must be reliable, accessible and functional for transit to be an option.

Indicators

Pedestrian, Cyclist and Motorist Safety

For safety, we assessed the number of pedestrian, cyclist and motorist collisions that occurred in the gateway study area in 2010. There were 11 pedestrian collisions, with one of those being midblock. Most of the pedestrian collisions were on 3rd Avenue and Browne Avenue, between 2nd Avenue and 3rd Avenue (figure 2, Collision Map, Page 17). Also in 2010, there were eight cyclist collisions with motor vehicles. In one of those collisions, the cyclist was intoxicated. There were 346 motor vehicle collisions in 2010. In 26 of those collisions, the motorist was

impaired. The majority of the collision types in the study area were motorists entering at an angle (also referred to as a 't-bone' collision).

Pedestrian and Cyclist Connectivity

To assess connectivity, authors gathered data on sidewalks for pedestrians and on designated marked bike lanes for cyclists. For pedestrian data, authors utilized information from Washington State University Interdisciplinary Design Institute's GIS and Simulation Lab (see Appendix 5). This data showed that the total cumulative length of all sidewalks in the study area equals 28.2 miles. Sidewalks with no barriers constitute 27.9 miles of that (barriers are defined as cracks, broken concrete, poles in middle of sidewalk, or tree overgrowth, but do not include road, alley and driveway crossings). Total lack of sidewalk equals a cumulative length of 3.2 miles. Within the study area, there are 146 intersections and 472 pedestrian crossings. Of the 472 pedestrian crossings, only 28 percent (133) are painted crosswalks. Of the current sidewalk infrastructure, 19 percent of the road crossings for pedestrians are non-compliant in meeting Americans with Disabilities Act (ADA) accessibility.

The data for cyclist connectivity was limited. Authors utilized information from the City of Spokane's Master Bike Plan to determine cyclist connectivity. Currently there are no established bike routes in the HIA study area; however, the City of Spokane has a list of funded bike lanes (2011-2013) that are within the study area. They are east-west connections on Spokane Falls Boulevard, as well as on Riverside, Sprague, 2nd and 4th avenues. There is still a gap in north-south connectivity for cyclists wanting to cross the river. To date, the only cyclist river crossings are the bike/pedestrian bridge on the Centennial Trail, and an established bike lane on Howard Street and Post Street (2010 Collision data).

Transit Ridership

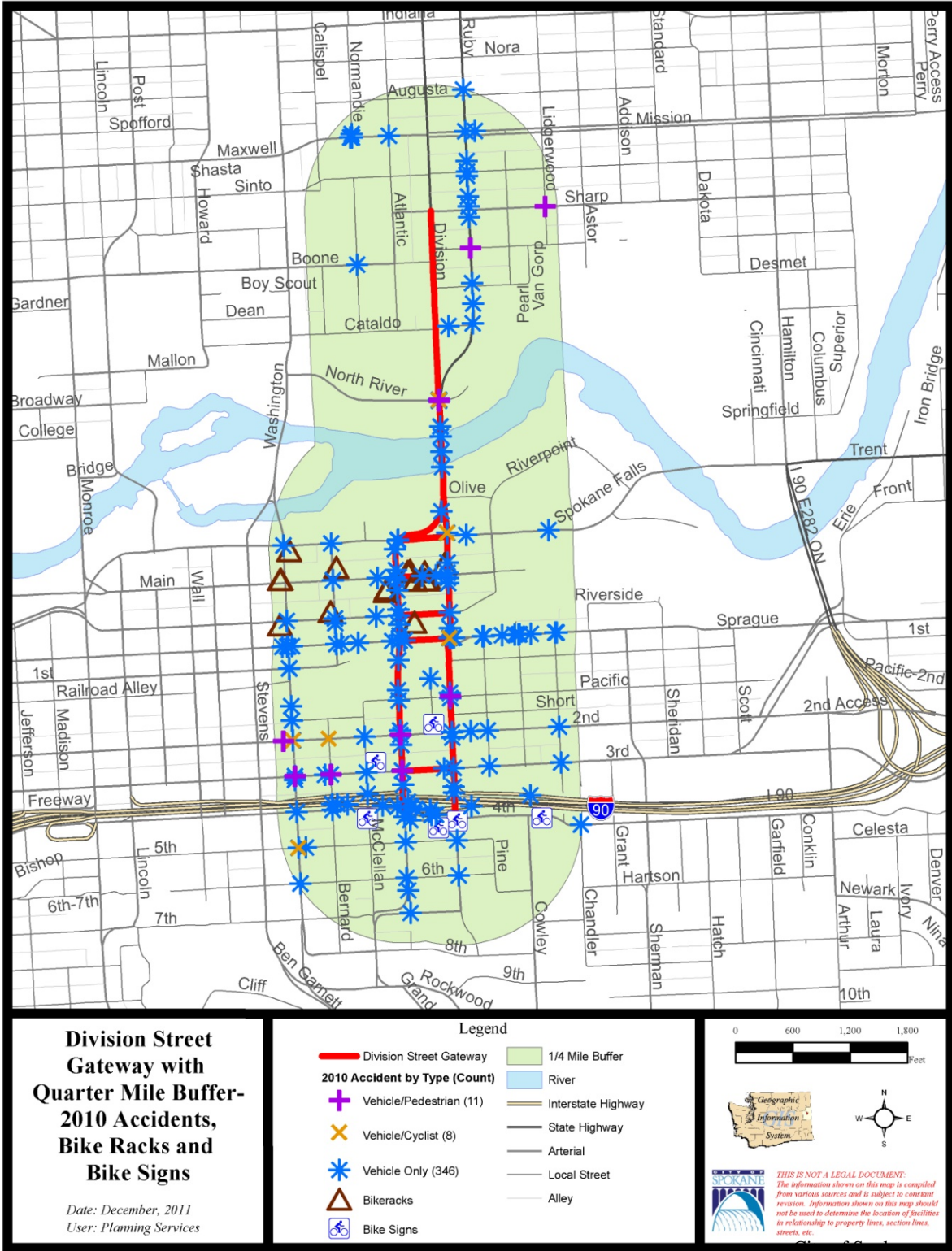
Adjacent to the core of downtown, the study area features seven transit routes that travel through or on Division Street to other parts of the region. One of those routes, Route 25, carries more than 1,000,000 riders annually as it travels from Spokane Transit Authority's (STA) downtown plaza north along Division and Ruby streets through the extent of the study area and up to Hastings Road and Division Street. This route carries more than 3,200 riders on an average weekday with more than 2,000 of those riders crossing the Division Street Bridge. Within the HIA study area, there are several areas with high-transit activity. Stops around the Riverside and Sprague avenue couplet and Division Street/Browne Street couplet combine to feature nearly 200 boardings and more than 200 drop-offs each day. More than 5,100 transit riders travel through the Sprague/Riverside avenue intersections and the Division/Browne street intersections on their way to other places within the study area and beyond.

Implications

In 2006 and in 2010, Spokane Regional Transit Council (SRTC) participated in a non-motorized transportation study to determine transportation behaviors in our community. The study showed an increased rate of residents walking and biking for transportation in Spokane County within the four-year period (University of Minnesota, 2007). Research also shows that when communities utilize street-scale urban design land-use policies, they can expect to see an increase in people walking and biking for transportation (The Community Guide, 2012). According to the City of Spokane Master Bike Plan established Routes and Potential Priorities map, by 2013 there will be five bike lanes established in the study area. Those lanes will be east-west connectors in the study area.

With the goal of making improvements to enhance Spokane's visual image and be a safe and effective transportation corridor for all modes, the Division Street Gateway project will likely contribute to an increase in pedestrian and bicyclist traffic.

Figure 2 • Pedestrian, Bicycle, and Automobile Collision Map



This map displays bicycle accidents, bicycle racks, and bicycle signs within the HIA study area.

Recommendations

- **Provide crossing infrastructure that increases safety for pedestrians.** Special consideration should be given to high collision areas: Ruby/Division streets (north of river), Spokane Falls Boulevard/Division and Browne streets, Browne Street from I-90 to Spokane Falls Boulevard, 2nd Avenue from Division Street to Browne Street, Division Street from Pacific Street to I-90.

This can be further supported by: reducing vehicle speed at intersections using traffic calming measures, improving sight distance and/or visibility between vehicles and pedestrians, implementing lighting or crosswalk illumination measures, and providing crosswalk enhancements (Spokane Regional Pedestrian Plan 2009).

- **Provide better bike facilities in the study area.** A review of 23 studies examining the impacts of transportation infrastructure on bicycling injuries or crashes determined that clearly-marked bike-specific facilities (i.e. cycle tracks at roundabouts, bike routes, bike lanes, and bike paths) were consistently shown to provide improved safety for cyclists compared to on-road cycling with traffic or off-road with pedestrians and other users. Marked bike lanes and bike routes were found to reduce injury or collision rates by about half compared to unmodified roadways (Reynolds, Teschke, Cropton, and Winters, 2009, p. 47).

Bike facilities should be specifically provided at the high cyclist collision areas, including: the intersection of 2nd Avenue/Division Street, at Ruby Street/Division Street (north of river), and at Sprague Avenue in the HIA study area (SRTC collision data). Bike lanes for Division and Browne streets are also needed, as it is a natural crossing for the river (see Appendix 4). It is also recommended to complete the City of Spokane funded bike projects for 2013.

- **Consider road diets for motorist safety on Division and Browne streets.** A reduction in the number of lanes for an identified street is associated with a reduction in collisions. Studies on conversions of undivided four-lane roads to three-lane roads showed a reduction of total collisions by 17 and 62 percent respectively. The same research shows that motorist speeds decrease as individual lanes and streets sections are narrowed (Ewing, Frank, and Kreutzer, 2006).
- **Complete sidewalks to meet ADA standards identified on Job Access and Reverse Commute program map.** This would bring the study area to compliance with ADA law and ensure the safety of those with limited mobility.
- **Provide wayfinding signage.** This will help guide users of all modes of transportation users to Spokane destinations such as the convention center, Riverpoint campus, Gonzaga campus, Riverfront Park, Centennial Trail, I-90 and hospitals.
- **Ensure lane continuity on Division Street.** This is to reduce motorist collisions.
- **Implement High Performance Transit.** This is defined in STA's Comprehensive Plan to encourage transit ridership: developing a central city line (proposed as a green line—a modern electric trolley traveling between Browne's Addition and University District neighborhoods), and a Division Street line (proposed as a red line—to improve frequency, reliability and span while enhancing stations and stops along Division/Ruby streets).

Physical Safety

Introduction

Urban design can influence safety in a variety of ways. As discussed within the transportation chapter, design can make travel safer for pedestrians and bicyclists. Urban design can also make areas safer from criminal activity.

Crime prevention through environmental design (CPTED) is an approach that uses built environment design strategies to deter criminal behavior. “The conceptual thrust of the CPTED program is that the physical environment can be manipulated to produce behavioral effects that will reduce the incidence and fear of crime, thereby improving the quality of life” (Crowe, p. 35). CPTED approaches are unique to each built environment being considered for crime prevention design. This approach identifies the intended use of an area, its users, potential for and kind of criminal behavior, and incorporates crime reduction strategies for an area.

Although a CPTED analysis is beyond the scope of this HIA, CPTED concepts about how the environment shapes human behavior will be used within the recommendations section of this chapter.

Indicators

According to the City of Spokane GIS Crime Map there were a variety of crimes committed within the study area during March 2012. The most common crime committed within the study area was malicious mischief, which occurred 35 times. The second most common crime committed was theft, which occurred 26 times. There were 14 assaults, seven burglaries, four drug incidents, three vehicle thefts and one robbery. The majority of these crimes were reported south of the river where the study area overlaps with the heart of downtown. There were three malicious mischief crimes reported on the corner of Main and Division streets, and two reported on the corner of Division and Short streets. Three reports of theft were recorded at Division Street and 2nd Avenue, and one was recorded at each of the following intersections: Division and Riverside streets, Division Street and 3rd Avenue, South State Street and East Pacific Avenue, and South Pine Street and East Short Avenue.

Our surveys indicate that physical safety related to crime is the most important topic when considering the health of residents. When survey respondents were given a statement directing them to order the importance of seven topics on health of residents—including transportation, natural environment, physical safety, physical health, mental health, unemployment, and business growth—students, business owners and employees, and residents all responded that physical safety (crime-related) was the most important topic. This may indicate that users of the study area perceive the area as unsafe when it comes to criminal activity.

Perceptions about safety were expressed in the responses given from survey participants (SRHD Residential, Business, and Student Survey, 2012). When asked, “When entering the City of Spokane from Division Street what thoughts or assumptions do you and/or your visitors have about the city based on what you/they see?” Respondents generally responded negatively about entering the city on Division Street. Several concerns about safety expressed by respondents are provided below.

- “The underpass is dark, smelly, has too many hiding places for attackers and panhandlers.”
- “It is dirty. Lots of homeless, sketchy people. It’s very dark at night.”
- “Dirty, nasty, poor, and unkempt. I am often asked if it is safe to walk around this neighborhood.”

Implications

With the addition of active transportation infrastructure, student housing, and the possibility of additional residents being attracted to the study area—with special consideration given to Division and Browne streets north of the river—it is assumed that the population will increase, which may lead to an increase in crime (Chamlin & Cochran, 2004).

Conversely, a decrease in crime may be seen (at least when people are active in the area) since increased population and increased use of streets can also increase ‘eyes on the street,’ a form of natural surveillance. This, in turn, can improve perceived safety of person and personal property in the area (Jacobs, 1961). Increased use can also foster the feeling of ‘safety in numbers.’ A recent study supports the ‘eyes on the street’ theory when it comes to assault

and homicide in areas of commercial and residential mixed use areas (Browning, 2010). The study's authors found the association between commercial and residential density to be positive and linear.

Recommendations

- **Light the trestle at Division and Browne streets with a minimum of 20 lux.** This amount of luminance provides an individual the ability to distinguish facial features and colors up to 90 feet away, giving someone the ability to gauge and adjust to a situation that might be dangerous (Crowe, 2000).
- **Paint the trestle at Division Street a lighter color (perhaps a grey).** This will provide more light under the trestle due to reflection.
- **Design sidewalks that maintain a clear line-of-sight for pedestrians.** Humans use their visual sense to scan the middle and far environment to collect information for immediate survival and protection (Crowe, 2000). Providing a clear line-of-sight provides users space and time to counter any harm they perceive to be ahead of them. A clear line-of-sight may also make sidewalk users feel safe if they know they can be seen by other sidewalk users who are separated from them by distance but are still within visual and auditory range of them.
- **Limit opportunities for criminals to conceal themselves.** Akin to the previous recommendation, provide a clear line-of-sight on sidewalks and at the edges of sidewalks. The design should ensure that elements of the natural environment, such as trees and built environment infrastructure including benches or artwork, do not provide opportunities for individuals to conceal themselves.
- **Provide opportunities for social interaction among residents, businesses students, and other users of the project area.** Providing opportunities for interaction will promote connectedness among the users of the project area and also provide a sense of safety by placing more people on the street (suggestions for where to provide opportunities are provided in the Social Capital section).
- **Light sidewalks and roads with a light source that emits a minimum of 20 lux every 90 feet, with fixtures directing light to the sidewalk and street.** A well-lit environment can discourage criminal behavior. Samuels carried out a variety of studies about lighting and crime prevention (Samuels; 1995, 1995b, 1996). These studies reveal that crime is more likely to happen in low-light settings, especially under 5 lux (40 percent of crimes investigated in the study), while settings above 20 lux (3 percent of crimes investigated) saw remarkably less crime.

Placement of 20 lux lighting every 90 feet will provide continual ability to distinguish facial features and colors as a person walks along a sidewalk in the project area. Providing light fixtures that direct light to the ground will provide light where it is most needed for people who are using sidewalks within the project area. Allowing less light to escape provides for brighter and better-focused light on the sidewalks, which will deter criminal activity.

Built Environment

Introduction

The term “built environment” refers to a geographic location created, altered, and maintained by humans. The built environment includes buildings and infrastructure such as streets, sidewalks, bridges, power lines and sewage systems. Neighborhoods, towns and cities are examples of the built environment.

Over the last decade, a growing body of research points to the built environment's effect on human health. Design of the built environment can influence human health in many ways. Design can encourage physical activity, create safe areas for pedestrians and bicyclists, provide connectivity to life's necessities, and keep people comfortable as they commute. Good design can have a positive effect on human health by promoting physical activity and safety, while poor design can have negative effects on human health by discouraging physical activity.

This health impact topic explores four aspects of the built environment that affect human health. These are: air quality, heat island effect, access to food and access to alcohol.

Air Quality

The built environment affects air quality as buildings and automobiles produce emissions. Traditional land-use patterns, which separate residential from commercial uses, tend to determine air quality, but they also separate residents from their daily activities and require the use of automobiles, which can lead to increased air pollution.

According to WHO, exposure to air pollution has been associated with a variety of adverse health effects, such as decreased respiratory and cardiovascular capacity, as well as negatively affecting pregnancy outcomes. It is also noted that people with pre-existing respiratory and cardiovascular conditions are more susceptible to negative health effects caused by air pollution (WHO, 2005).

The Environmental Protection Agency (EPA) has established health standards for six pollutants found throughout the United States, which keep pollution at levels safe for humans. This report focuses on two specific to the HIA study area, ozone and particulate matter. (Six Common Air Pollutants, 2010).

Ozone is a colorless gas found in the air we breathe, it can be good or bad depending on where it occurs. At ground-level, it is found in emissions from vehicles, heavy machinery and large and small industries and utilities—all are usually associated with the built environment. Ozone can cause chest pain, coughing, throat irritation, and congestion. It can exacerbate asthma, bronchitis and emphysema. Ozone can reduce lung function and inflame the linings of the lungs, resulting in permanently scarred lung tissue (Ground-Level Ozone, 2011).

Another pollutant of concern is particulate matter. Particulate matter are solid objects and liquid droplets found in the air. "Particle pollution includes "inhalable coarse particles," with diameters larger than 2.5 micrometers and smaller than 10 micrometers and "fine particles," with diameters that are 2.5 micrometers and smaller" (EPA, 2012). Particles breathed in through the nose and throat can enter the lungs, causing negative health effects for the lungs and heart. Fine particles can embed themselves deeper into lung tissue than coarse particles, and are especially concerning for the EPA. According to WHO, particulate matter affects more people than any other pollutant (WHO, 2005). The large number of deaths and other health problems associated with particulate pollution was first demonstrated in the early 1970s and has been reproduced many times since. One of the ways fine particles can form is when gases emitted from industries and automobiles—again, present in the built environment—react in the air (Particulate Matter, 2012).

Locally, The Washington State Department of Ecology (Ecology) released a report quantifying the health and monetary impacts of fine particle pollution in Washington State (Ecology, 2009, p. 2). It found that the state's particulate matter levels of 2.5 micrometers lead to 1,100 deaths, 1,500 nonfatal heart attacks, 450 incidents of different heart diseases (not resulting in heart attacks), 1,900 incidents of acute bronchitis, 100 cases of chronic lung disease, 250 incidents of pneumonia, 400 emergency room visits for asthma, and thousands of incidents of worsened asthma. Ecology estimates that the direct and indirect costs of these diseases for citizens, businesses and state health care institutions approach \$190 million each year (Ecology, 2009, p. 3).

Indicators

Spokane Clean Air further corroborates that ozone and particulate matter are of particular concern in Spokane (Air Pollutants in Spokane, n.d.). According to the agency, nearly two-thirds of ground-level ozone comes from motor vehicle emissions. Other sources of ground-level ozone include industrial solvents, gasoline refueling, gasoline-powered yard equipment, auto body paint shops, industrial and electric utilities, and consumer products such as charcoal lighter fluid and paints.

Particulate matter, the other air pollutant of concern for the Spokane area, is composed of solid or liquid particles from smoke, dust and condensing vapors (Air Pollutants in Spokane, n.d.). The area's particulate matter pollution comes from a variety of sources, including dust stirred up from traveling on unpaved and paved roadways,

construction activities, gas and diesel-powered engines, wood burning, outdoor burning and industrial/commercial operations (Air Pollutants in Spokane, n.d.).

Negative health effects of bad air quality do not seem to affect the majority of residents and students surveyed for the HIA. When asked if either group suffered from asthma, each group indicated that less than 20 percent suffer from asthma.

Spokane is currently meeting air quality standards (Spokane Clean Air, n.d.). It is unlikely that there are many wood stoves being used within the study area and there are no unpaved streets. These two sources generate most of the complaints about air quality triggering health problems.

Implications

Because power is not generated locally by fossil fuels and the study area does not contain a large quantity of point-source emitters, automobiles are considered the greatest source of air pollution.

Modeling for pollution resulting from current and projected automobile volumes within the study area is beyond the scope of this assessment. According to SRTC's projected traffic volumes for 2030, there will be a dramatic increase between I-90 and 2nd Avenue, but volumes tend to vary less dramatically on Division, Browne, and Ruby streets throughout the rest of the study area. Based on these numbers, there should not be a tremendous pollution increase or decrease within the study area.

Infrastructure encouraging active transportation, such as improved crosswalks and bicycle lanes may increase the use of non-motorized transportation, which will only moderately reduce pollution due to Division, Ruby, and Browne streets being primarily travelled by commuters passing through on longer trips.

Recommendations

- **Install street trees that have a low pollen count along sidewalks.** Through surface contact with particles, trees remove gaseous pollutants. In 1994, it is estimated that street trees in New York City removed 1,821 metric tons of pollution, saving society \$9.5 million (Nowak, D, 2002). A recent study also found an inverse relationship between asthma prevalence in children and street tree density at the neighborhood level in New York City—areas with more street trees have lower asthma prevalence (Built Environment and Health Research Program at Columbia University, n.d.). The authors suggest that street trees may also exacerbate asthma because pollen in is an allergen, therefore it is important to consider planting trees that will not increase asthma in users of the project area.

Heat Island

The urban heat island effect results when natural landscape that is vegetated, moist and permeable is replaced by impermeable built environment infrastructure such as streets, sidewalks, parking lots and buildings (What is an Urban Heat Island, 2011). This infrastructure absorbs heat and does not allow for rainfall to absorb into the ground. Changes to a natural landscape like this result in higher temperatures in areas that have been altered by the built environment when compared to surrounding landscapes that have more permeable surfaces and vegetation.

Urban heat island air temperatures are warmer both day and night when compared with neighboring areas that are less developed with built environment infrastructure. On hot days surface temperatures of pavement and rooftops can be 50-90°F hotter than the air, and after sunset, air temperatures from the built environment can be up to 22°F warmer than air in less developed areas nearby (Berdal, 1997; Akbari, H, 2005).

The negative health effects caused by elevated temperatures within heat island areas can range from general discomfort, respiratory difficulties, heat cramps and exhaustion, non-fatal heat stroke, to heat-related mortality (Heat Island Impacts, 2011).

Urban heat islands are especially concerning for human health because air temperatures do not cool down as much as they do in less developed areas, especially at night, depriving heat island residents of a cool down period (Clarke, 1972). As a result of temperatures being elevated both day and night within heat island areas, mortality rates are

higher than in surrounding less-developed areas (Clarke, 1972; Jones et al., 1982; Smoyer, 1998). When comparing summer temperature records and mortality rates within and surrounding Shanghai, it was confirmed that heat-related mortality rates are higher in urban heat island areas (Jiangou, 2009).

In addition to direct health effects of heat, there are also indirect health effects resulting from heat in urban heat island areas. Increased levels of ground level ozone may result in heat island areas when nitrogen oxides (an emission from automobiles) and volatile organic compounds react in the presence of sun and increased temperatures.

Indicators

Measuring temperatures within the study area to determine the extent of the urban heat island effect is outside of the scope of this assessment, however we do have maps derived from the Landsat 7 satellite's thermal sensor (August 03, 2010). Surface area temperatures within the study area can be up to 26°F warmer than temperatures of adjacent surface areas. These maps help to confirm that the study area experiences the heat island effect.

Implications

Given the amount of impervious infrastructure and lack of vegetation, the HIA study area meets criteria for experiencing the heat island effect. Once east-west connectivity is improved and bicycle and pedestrian infrastructure is installed there may be an increase in active transportation, especially when considering the expansion of Riverpoint campus and future student housing. Pedestrian and bicycle infrastructure exposes people to weather, which can lead to heat-related illnesses on hot days. Since this area likely experiences the heat island effect, there might be an increase in heat-related illnesses among an expanded population engaging walking or bicycling on hot days when temperatures are especially high in the study area.

Recommendations

- **Provide trees, bushes, and other foliage to reduce heat island effect and provide shade for pedestrians.** Potential street tree locations north and south are both sides of Division Street from Sprague Avenue to Spokane Falls Boulevard, the west side of Browne Street from Spokane Falls Boulevard to Sprague Avenue (there are no trees on this side), and on Browne Street from Pacific to 3rd avenues (currently no trees). Potential street tree locations east and west are 2nd, 3rd, and Pacific avenues. Focus should be placed downtown where there is more density (business and some residential). Consideration should be given to Riverpoint Campus expansion and the expected growth in the student population that will likely increase pedestrian activity in the downtown area.
- **Provide benches under trees to give pedestrians a shaded area to rest and cool down.** Benches can be placed on wide sidewalks throughout the project area. Placement near businesses and residential buildings should be considered. Main and State streets and 2nd Avenue may be good locations for benches when considering businesses that are located nearby. Browne Street from Spokane Falls Boulevard to Main Street may also make a good area for bench placement given the wide sidewalks and businesses nearby (especially if trees were provided for shade and traffic was calmed).
- **Utilize rain gardens on streets to capture and retain water, providing moisture and cooling.** A rain garden is a shallow, constructed depression that is planted with deep-rooted native plants and grasses (Rain Garden Network). They are designed to retain and filter water. Since this recommendation is intended to provide a cooling effect for the study area, there are no specific areas for installing rain gardens that would be especially beneficial for the study area; instead all streets should be considered for this kind of infrastructure.
- **Utilize cool pavement such as traditional concrete and white topping to avoid absorbing heat and reflect the sun.** This should be utilized wherever new concrete is being installed.
- **Provide trees, bushes and other foliage to reduce heat island effect and provide shade for pedestrians.** (Refer to potential locations in Physical and Mental Health section).

Access to Healthy Food

Having access to healthy food is an important element to living a healthy life. Eating healthy food in combination with physical activity reduces an individual's chances of acquiring diabetes or becoming obese (McGinnis, 2002). One study found that people who live close to healthy food retail locations were more likely to eat the recommended amounts of fresh fruits and vegetables, reducing their chances of acquiring chronic disease and becoming overweight (Morland, Wing, Diez, 2002).

Although access to healthy food is predominantly a policy issue, design plays an important role in connecting people to healthy food. Infrastructure that makes connectivity to healthy food retail for pedestrians, bicyclists and people with disabilities may encourage trips to grocery stores where healthy food is available. This is especially important within the HIA study area where there are students and low income residents—two populations that may benefit most from pedestrian and bicycle connectivity to healthy food because they are more likely to be without automobiles.

Indicators

Currently there are three year-round healthy food retail locations and one seasonal healthy food retail location within the HIA study area. Two of these healthy food retail locations are small grocery stores and one is a public market. There is one convenience store within the study area, three convenience stores within a quarter mile of the HIA study area, and one small grocery store that offers healthy food within a quarter mile of the HIA study area. Convenience stores will not be given individual attention within the Access to Healthy Food topic because it focuses solely on access to healthy food.

Attention is being given to food retails located within a quarter mile of the HIA study area because residents may shop at those locations as well, and the design may have an impact on people's ability to travel from within the HIA study area to these locations (figure 3, Food Retail Map, Page 26).

Main Market Co-op and Spokane Public Market are year-round healthy food retail locations and Spokane Farmers' Market is seasonal (running from May through October). All of the healthy food retail locations are located within the south end of the HIA study area. Pedestrians within the HIA study area may find themselves crossing a number of streets that may be perceived as dangerous including Division and Browne streets, 2nd, 3rd and Sprague avenues and Spokane Falls Boulevard. Survey respondents also noted that traveling by foot underneath the train trestle and I-90 made them feel unsafe (SRHD Residential Survey, 2012).

Main Market Co-op is a retail food co-op which offers fresh fruits, vegetables and other nutrient rich food items. It sits on the northeast corner of Browne Street and Main Avenue. Browne Street is a three-lane one-way southbound street providing an entrance to I-90 and access to the south hill. It is a wide street that experiences over 1,500 vehicles traveling at its peak hour (SRTC, 2008). These vehicles may travel in excess of the 30 mph speed limit. In some areas crosswalks are no longer visible due to wear.

Spokane Public Market is a year-round public market that offers a variety of food produced within the region. This market is a source for fresh fruits and vegetables as well as grains. Located near the northeast corner of Browne Street and 2nd Avenue, it experiences the same conditions that may make pedestrians feel unsafe when attempting to access Main Market Co-op. A block north of Spokane Public Market is a faded crosswalk at Browne Street and Pacific Avenue, an uncontrolled intersection that can be perceived as dangerous for pedestrians due to proximity of the railroad trestle and poor visibility of emerging automobiles.

Oriental Food Store is located on Division Street at the north end of the HIA study area. They offer produce, grains, and specialty Asian food. People traveling to this store may have to cross Division and Ruby streets, which as mentioned above may not be safe in certain areas for pedestrians. Traveling on Division and Ruby streets may be unsafe for bicyclists due to a lack of bicycle infrastructure such as bike lanes.

Between the months of May and October, Spokane Farmers' Market offers access to fresh produce and other healthy food items. It is located south of I-90 on 5th Avenue between Division and Browne streets, three blocks away from the southern border of the study area. The same perceptions mentioned previously regarding safety are present. This healthy food retail location experiences pedestrians crossing below I-90, which was noted by some survey

respondents as being unsafe.

Due to the wide lanes, faded crosswalks, high traffic volume and fast moving automobiles, Browne and Division streets, 2nd 3rd and Sprague avenues and Spokane Falls Boulevard may be perceived as unsafe to cross for pedestrians. It was noted by survey respondents who travel north and south along Division and Browne streets that walking under the train trestle was perceived to be unsafe due to the transient population that inhabits the area surrounding the trestle. It was noted by some respondents that they did not like being approached by panhandlers and that there were places for people to conceal themselves under the trestle. These perceptions may discourage pedestrians from crossing Browne and Division streets in order to access healthy food. People accessing food retail outside of the study area may encounter the same threats as discussed above if they have to cross Division, Browne, and Ruby streets, or pass under the trestle (SRHD Residential Survey, 2012).

Implications

With a projected expansion in student population and improved connectivity for pedestrians, bicyclists and people with physical disabilities throughout the HIA study area, it is anticipated that more active transportation trips will be made. This includes trips to food retail within the HIA study area.

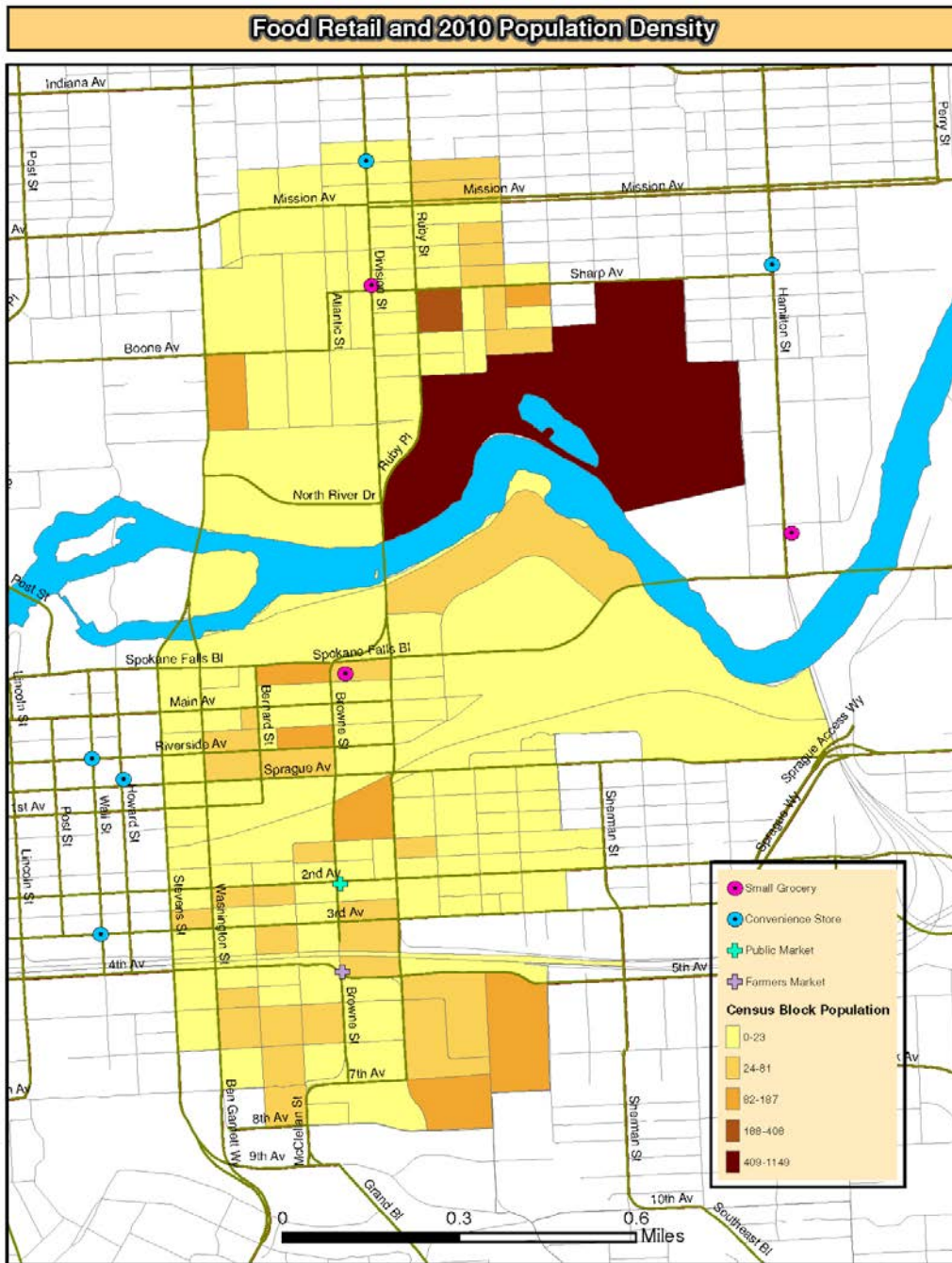
Recommendations

- **Provide connectivity that increases pedestrian safety.** Re-paint faded crosswalks on all streets within the downtown section of the gateway project area.
- **Make crosswalk connectivity safer at the uncontrolled intersection at Pacific and Browne streets.** Provide signage and rectangular-shaped rapid-flash LED beacons to draw attention and increase yielding at the crosswalk. Rectangular-shaped rapid-flash LED beacons are more effective at increasing motorist yielding than standard overhead and side-mounted standard flashing yellow beacons. Automobile drivers that were studied yielded between 80 percent and 90 percent at most sites and this level of yielding persisted for two years and did not show any decline (U.S. Department of Transportation, 2009).
- **Reduce automobile speed to 25 mph on Division and Browne streets,** starting at 3rd Avenue and continuing until Spokane Falls Boulevard. This provides a safer environment for pedestrians to cross (pedestrian and automobile collision risk is further explained in Access to Alcohol).

Traffic calming measures such as lane reductions can be implemented to further encourage automobile speed reduction. Lane reductions should take place on Division and Browne streets between 3rd Avenue and Spokane Falls Boulevard (where safe and appropriate, Division and Browne streets should be reduced to two lanes). Reduction to two lanes should be considered for east and west lanes from 3rd Avenue to Main Street.

- **Improve the trestle at Division and Browne streets.** (Refer to recommendations in the Physical Safety topic).

Figure 3 • Food Retail Map



Spokane Regional Health District

This map features population density and food access within the study area and a quarter mile beyond the study area.

Access to Alcohol

With the future growth of the University District it is anticipated that more students will use and live within the HIA study area. Student housing development is planned for the site currently occupied by the Jensen Byrd building. Future development plans allow for 125 additional units with about 454 beds available for students within the HIA study area. It can be assumed that east-west pedestrian and bicycle traffic will increase as students travel between the University District and the central business district of downtown Spokane for services and entertainment. Pedestrian connectivity is especially a concern when considering that college students may be impaired by alcohol when traveling between University District and downtown.

Intersections of interest when considering late-night and early-morning crossings of alcohol-impaired students are Division Street at Spokane Falls Boulevard, Division Street at Main Streets, Division Street at Martin Luther King Jr. Way, Browne Street at Spokane Falls Boulevard, Browne Street at Main Street, and Browne Street at Riverside Avenue.

Indicators

Pedestrian collisions with automobiles represent between 10 percent and 20 percent of all serious injuries and deaths on roads within many western countries. A substantial amount of the pedestrians injured or killed by collisions with automobiles are intoxicated (Lenne, Corban, Stephen, 2006). The majority of these collisions occur in the late-evening and early-morning hours (Lenne, Corban, Stephen, 2006).

Authors' data does not account for pedestrian and automobile collisions caused by intoxicated pedestrians at the intersections of interest. It is suggested that there will be increased chance of this occurring when more students become residents of the University District, especially in the south end.

Implications

Riverpoint campus will experience an expansion as WSU builds out to include additional medical programs and research facilities. Construction on east Spokane Falls Boulevard will begin in the summer of 2012, specifically on the previously-mentioned student housing structure with 454 beds. The location for this housing development will place student residents across the street from Riverpoint campus' south end. This student housing location will make the intersection of east Spokane Falls Boulevard and Division Street a gateway into Riverpoint campus. This will increase east-west pedestrian activity in this area, especially on weekend evenings when students seek entertainment in downtown Spokane.

Because of student housing being built on east Spokane Falls Boulevard, it is expected that over 400 students will travel between downtown and Riverpoint campus for entertainment in the near future. An estimated 1,700 students (Spokane Riverpoint Academic Campus & Master Plan Overview) will attend WSU medical programs by 2030. This will increase the demand for student housing on the south end of the project area, thus increasing the likelihood of students traveling east and west across Division and Browne streets for entertainment downtown.

Recommendations

- **Reduce speed to 25 mph** on Division and Browne streets from Sprague Avenue to Spokane Falls Boulevard, which is the stretch of street that includes the intersections of interest for this section. A number of studies have stated that the most effective measure in preventing collisions that cause severe pedestrian injury and death is reducing speed limits (TP, Hutchinson, 2011; Lenne, Corban, Stephen, 2006). A recent study found that the fatality risk at 30 mph is more than twice as high as the risk at 25 mph and more than five times higher than the risk at 20 mph (Rosen & Sander, 2009). Another pedestrian fatality study found that (European Transport Safety Council, 1995) the probability of pedestrian death is 5 percent if the vehicle is travelling at 20 mph, but increases to 45 percent at 30 mph, and reaches 85 percent at 40 mph.
- **Light crosswalks with a minimum of 20 lux.** (Refer to recommendations in Physical Safety topic).
- **Reduce the amount of lanes on Division and Browne streets** from Sprague Avenue through Spokane Falls Boulevard. (Refer to recommendations in Transportation topic).

Social Capital

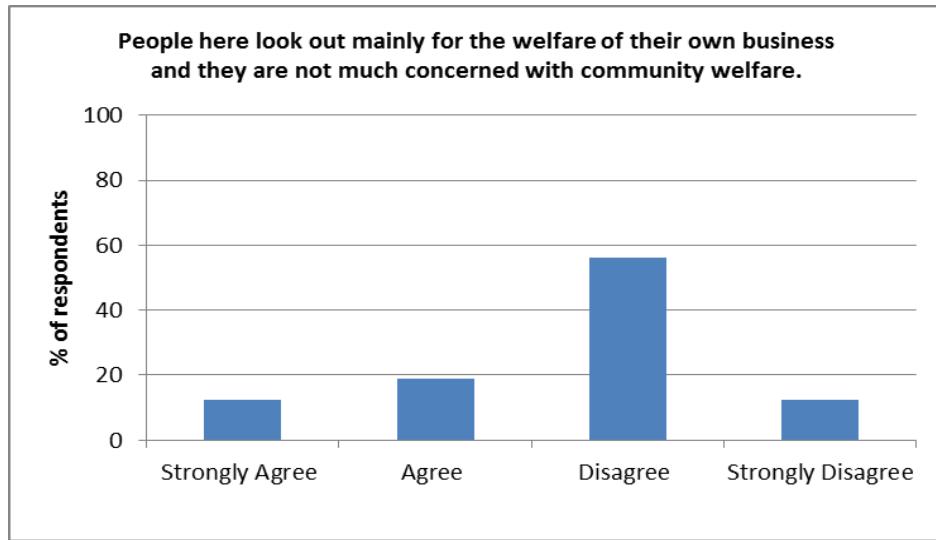
Introduction

Social capital can be thought of as the social connectedness of a community and how those social connections affect a community. Although there is no commonly agreed upon definition for social capital, Social Capital Research states “the commonalities of most definitions of social capital are that they focus on social relations that have productive benefits” (socialcapitalresearch.com).

A benefit of social connectedness is social support. Social support influences health through three different pathways: health behavior, psychological and physiological pathways (Berkman & Glass, 2000). It is suggested that a lack of social support can lead to negative health behavior such as excess smoking, an unhealthy diet, less physical activity, and less likelihood of seeking medical attention when sick. Social support was found to have positive psychological effects, such as promoting self-esteem and self-efficacy. Social support also strengthens a person’s ability to cope with difficulties in life. This reduces stress and creates positive physiological effects on the immune and cardiovascular systems.

Indicators

Although our residential and student surveys did not directly address connectedness, our business survey included the statement: “people here look out mainly for the welfare of their own business and they are not much concerned with community welfare.” Businesses overwhelmingly responded that they disagree with this statement, which provides a positive result for social capital. It can be concluded that there is a sense of connectedness between some of the businesses within the study area.

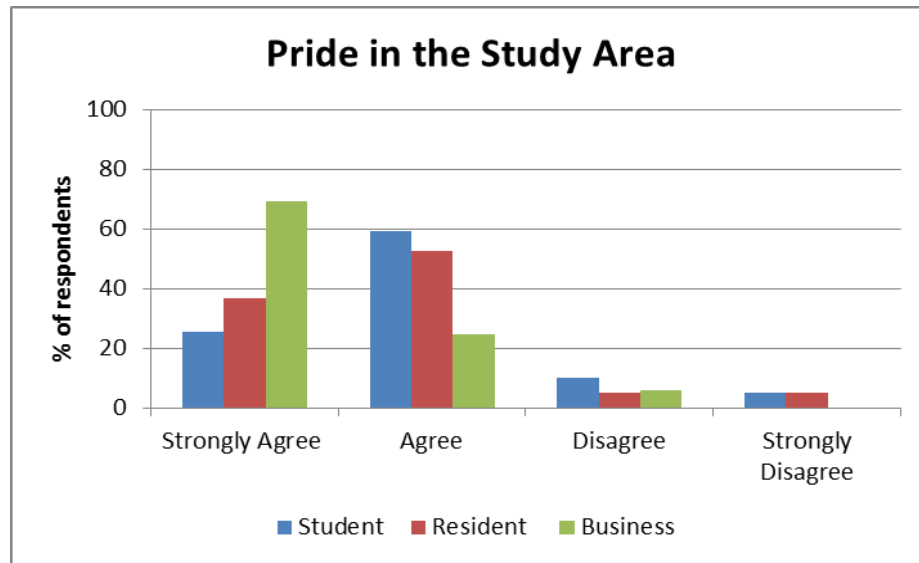


Spokane Regional Health District, 2012

One indicator for social capital is how prideful residents are. (Narayan & Cassidy, 2001; Williams & DeSteno, 2009). Pride was addressed within all of the HIA surveys by including one question and one statement about pride.

Picking up litter is an indicator of neighborhood pride (EPA, 2007). When asked “When you see litter in the area, do you pick it up?” the majority of resident, business and student respondents replied that they pick up litter sometimes when offered the response choices of: almost always, sometimes, hardly, never. About 93 percent of business respondents indicate they pick up litter sometimes when they see it. None of the business respondents indicate they never pick up litter. About 74 percent of the student population surveyed said they pick up litter when they see it in the area sometimes or almost always, and 71 percent of the residents reported they pick up litter either sometimes or always when they see it.

Residents, business respondents, and students were also given the statement “I take pride in this area of Spokane.” Response choices provided were: strongly agree, agree, disagree, and strongly disagree. The majority of these results indicated that respondents are prideful of the study area. Seventy nine percent of residents either agree or strongly agree they take pride in the study area. Ninety four percent of business respondents reported they either agree or strongly agree that they are prideful of the study area, with almost 70 percent of them responding they strongly agree. The survey found that almost 85 percent of students either agree or strongly agree they take pride in the study area, with almost 60 percent of them responding they agree with the statement.



Spokane Regional Health District, 2012

Currently, in the HIA study area, there are businesses such as restaurants, coffee shops and markets that provide gathering places for developing social capital but public spaces are minimal, especially within downtown. Public spaces are important because they offer a space to collect and socialize without requiring a membership or purchasing products that a restaurant, coffee shop or market would require. Public spaces provide free gathering places for everyone.

The study area includes part of Riverfront Park and the Riverpoint campus, which may function as public spaces for people who reside and use this area to gather. These gathering spaces are located at the center of the study area, which may not get a lot of use from people at its north and south edges. Opportunities for public gathering space throughout the HIA study area could encourage more socializing among residents and users, which could result in developing more social capital.

There are not many opportunities for public gathering space currently owned by the City of Spokane within the study area, but two areas exist that could provide space for encouraging the development of social capital. One of these areas is at Division Street and Martin Luther King Jr. Way which is currently under construction. Land has been set aside on the south east corner of Division Street and Martin Luther King Jr. Way, which will function as public gathering space with trees, grass, intertwining sidewalks, and benches. An area that could function as a public gathering space is a traffic island at Spokane Falls Boulevard and Division, Street especially if traffic is slowed down in that area. Since there is not much available public space in the study area for new gathering areas, benches placed along sidewalks would provide social gathering space where it is otherwise limited.

Implications

Providing public space encourages social interactions which can increase social connectedness. If design of the Division Street project area encourages social connectedness, the impact of social capital is predicted to be positive for the area. The magnitude of the impact is unknown due to lack of previous study evidence.

Recommendations

- **Provide opportunities for social interaction among residents, business, students, and other users of the project area by providing benches and gathering spaces.** Gathering areas provide opportunities for people to get to know one another, which develops connectedness among users of the project area.

Public gathering space could be developed at the median at Spokane Falls Boulevard and Division Street, especially if traffic is calmed through here (speed reduced). Benches can be placed on wide sidewalks throughout the project area. Placement near businesses and residential buildings should be considered.

Main, 2nd, and State streets may be good locations for benches when considering businesses that are located nearby. Browne Street from Spokane Falls Boulevard to Main Street may make a good area for bench placement given the wide sidewalks and businesses nearby (especially if trees were provided for shade and traffic was calmed). Public space is being developed at Division Street and Riverside/East Martin Luther King Jr. Way.

Economic Development

Introduction

Economic Development activity, including infrastructure investment, impacts the health of a community in many ways. According to WHO, wealth creation engenders positive health outcomes and better health results in more productive and wealthier people (WHO, 2012). Our research for this topic took into account both angles – at the impact of potential economic growth as a result of infrastructure design on health, and how improving health as a result of infrastructure design may affect economic growth.

Another facet economic development considered is the factors that influence job creation, and the intersection with health; good health flows from the activities (jobs) that result in wealth creation. The decline of American inner cities in the last half of the 20th century resulted in community disinvestment and job loss. In 2008 and 2009, it's estimated that the U.S. labor market lost 8.4 million jobs, or 6 percent of all payroll employment” (The State of Working America, The Great Recession n.d.). Disinvestment and job loss is particularly evident for neighborhoods located around central business districts (CBDs), like derelict industrial zones and blighted residential areas, where the value of underutilized and deteriorated public infrastructure and private building stock measures in the trillions nationally. Ensuring public safety in these environments is often challenging and costly, and accompanied by additional strain to health and well-being from the threat of crime.

Obsolete infrastructure and land use patterns combined with unemployment and crime drives away economic investment, leading to further job loss. As a major thoroughfare through the downtown of a mid-size city, the Division Street Gateway project exhibits some of these conditions. Although not severe, the study area does include some vacant or underutilized buildings, loss of population, crime, and streets and sidewalks in poor condition. Improving the roadway function and aesthetics of the public realm may attract new private investment to the area. Recent surveys of businesses and residents in the area elicited concern over crime, the homeless population, poor lighting and unsafe street crossings (SRHD Survey, 2012). The redesign of Division Street can be used to mitigate these conditions to support economic growth that can provide people living here, or moving into the area, with incomes that give them access to better nutrition, housing, better health care services, and less stressful lives.

Indicators

For economic development, the authors chose indicators likely to be impacted by redesign of Division, Browne, and Ruby streets that would increase safety for all modes of travel and a more aesthetically pleasing experience for residents, customers, investors, and visitors to Spokane. These indicators included the potential for new residential and student housing, safety, crime, new or expanding businesses and jobs, increases in taxable property values, decreases in vacant or underutilized property, and taxable retail sales. Information was drawn from 2012 surveys of residents, students, and businesses in the area, government data sources, and literature review.

Implications

Housing

A 2009 housing study conducted to determine the University District market indicated an additional 1,740 households (faculty, staff, and student) desiring to locate in the area (Zimmerman/Volk). At the time, the housing study offered this absorption forecast: “barring a long-term continuation of the downturn in national, regional, and local economies, it is likely that between five and six percent of the potential market for new dwelling units within the District could be absorbed per year over the near term. As the economic environment improves over the next five years, it is likely new developments could begin to capture higher percentages of the annual market potential; with a strong economy, it should be possible to capture up to 10 percent of the market for each housing type, which would double the annual forecast absorption” (p. 40).

The current residential population of the study area is 4,221 according to the 2010 US Census with a variety of housing units, including student housing in the north related to Gonzaga University, single and multi-family, and retirement housing. In 2011, Campus Advantage, a Texas-based student housing developer, proposed a 454 bed project in the study area. If the property transactions and construction are realized, this project would also return land and buildings to the property tax rolls (property currently owned by Washington State University) and may be an early indicator of market segment strength.

Safety and Crime

The current roadway design is discouraging to existing residents in terms of vehicle speed, lack of perceived personal safety for walking and biking, and fear of crime (SRHD Residential Survey, 2012). In order to better attract and support new residential development these concerns could be addressed through safety enhancements and CPTED principles. Crime statistics in the study area from 2011 bear out the perceived safety issues revealed in the survey: 120 assaults, 89 burglaries, 28 robberies, 299 instances of theft, and 210 vehicle prowling, among other crimes (Spokane Police Department, Police Planning February 2012). Looking at the map, CPTED design features including better and more lighting, clear sightlines, and careful landscaping could be especially focused in the area from the I-90 off ramp to the “living room” of the study area around Main Avenue (figure 4, Crime Map, Page 33). These features will require operations and maintenance, an ongoing expense that will need to be programmed as the design is developed.

The cost of pedestrian and bike collisions should be a factor in design decisions and appropriate interventions applied. Most of these collisions occurred in the southern end of the study area, between Sprague and 3rd avenues. The average economic cost of a nonfatal injury per person in a motor vehicle collision is calculated at \$52,900 (2005 dollars) (National Safety Council, n.d.). Using the National Safety Council (NSC) figure, in the Division Street Gateway project study area the 8 pedestrian and 11 bicyclist collisions in 2010 amounted to \$1,005,100. The estimated economic cost of all 143 injuries in the study area is \$7,564,700 (including the 19 bicycle and pedestrian injuries). The economic cost of a casualty, according to NSC, includes “wage and productivity losses, medical expenses, administrative expense, motor vehicle damage, and employers’ uninsured costs” (Estimating the Costs of Unintentional Injuries, 2012). The comprehensive cost of a single fatality in the study area is estimated by NSC to be \$3,840,000. This figure includes the economic cost, plus “a measure of the value of lost quality of life, which was obtained through empirical studies of what people actually pay to reduce their safety and health risks” (ibid).

Property

Because there are few establishments that provide daily goods and services (groceries, for instance) within the study area, residents must travel to other neighborhoods to obtain them. Where they do exist, they are difficult to access due to the barriers of traffic volume and lack of safe travel features. Proximity and access are two critical features defining walkability. A recent report about neighborhood walkability notes that to be walkable, an area needs to have close-by, desirable locations (daily goods and services) and accessibility (safety, ease of travel, connectivity) (Pivo & Fisher, 2010). This report defines walkability as “the degree to which an area within walking distance of a property encourages walking trips from one property to other destinations” (p. 2). The authors attempted to attach a value to walkability and used 10 years of data on over 10,000 diverse property types across the United States. This data was combined with information from the website Walk Score in their report. The hypotheses were that the

incomes and values of walkable properties were as much or more, and produce returns as good as, or better than, less walkable sites. The data showed that office, retail, and industrial properties with a Walk Score of 80 were worth 6-54 percent more than a Walk Score of 20, allowing for property type (p. 19).

Excluding right-of-way, roughly 41 percent or 180 acres of the study area's total 434 acres (868 parcels), is exempt from property tax (figure 5, Taxable Property Value, Page 34). An additional 30 acres (33 parcels) are partially exempt (Spokane County Assessor). Revenue from property tax is a significant source for city services, which makes a strong case for those properties that are on the tax roll to be supported to full build out and engaged in highest and best land uses for both owners and the city General Fund. Property tax revenue is essential to providing municipal services budgeted out of the General Fund, such as police and fire. That said, exempt parcels produce other revenue streams and benefits; for example, revenue associated with the Public Facilities District (PFD) Convention Center or the jobs, skills, and technology associated with higher education facilities.

Vacant and underutilized properties provide another set of reasons to support economic growth through design features that will attract private investment (figure 6, Vacant and Underutilized Property, Page 35). Comparing the maps of crime activity (figure 4, Crime Map, Page 33) and the locations of vacant and underutilized properties in the study area, shows increased criminal activity in some of these areas, particularly in the southern end. Just this quick scan points to the value of incorporating CPTED design principles, such as improved lighting in high crime areas with empty space, or providing temporary interventions until development takes hold. One example of a temporary intervention is found in a recent article in the online journal Science Daily, detailing a decade-long study comparing vacant and improved vacant lots in Philadelphia (Science Daily, 2011). The study demonstrated that fairly simple efforts to clean up, plant, and provide low level fencing to the sites was linked to reductions in gun assaults and in some areas, reductions in vandalism. "Improving the places where people live, work, and recreate, holds great promise for changing health and safety. Greening vacant lots is a low-cost, high value approach, which may prevent certain crimes and encourage healthy activity for more people and for longer periods of time than many other approaches" (ibid).

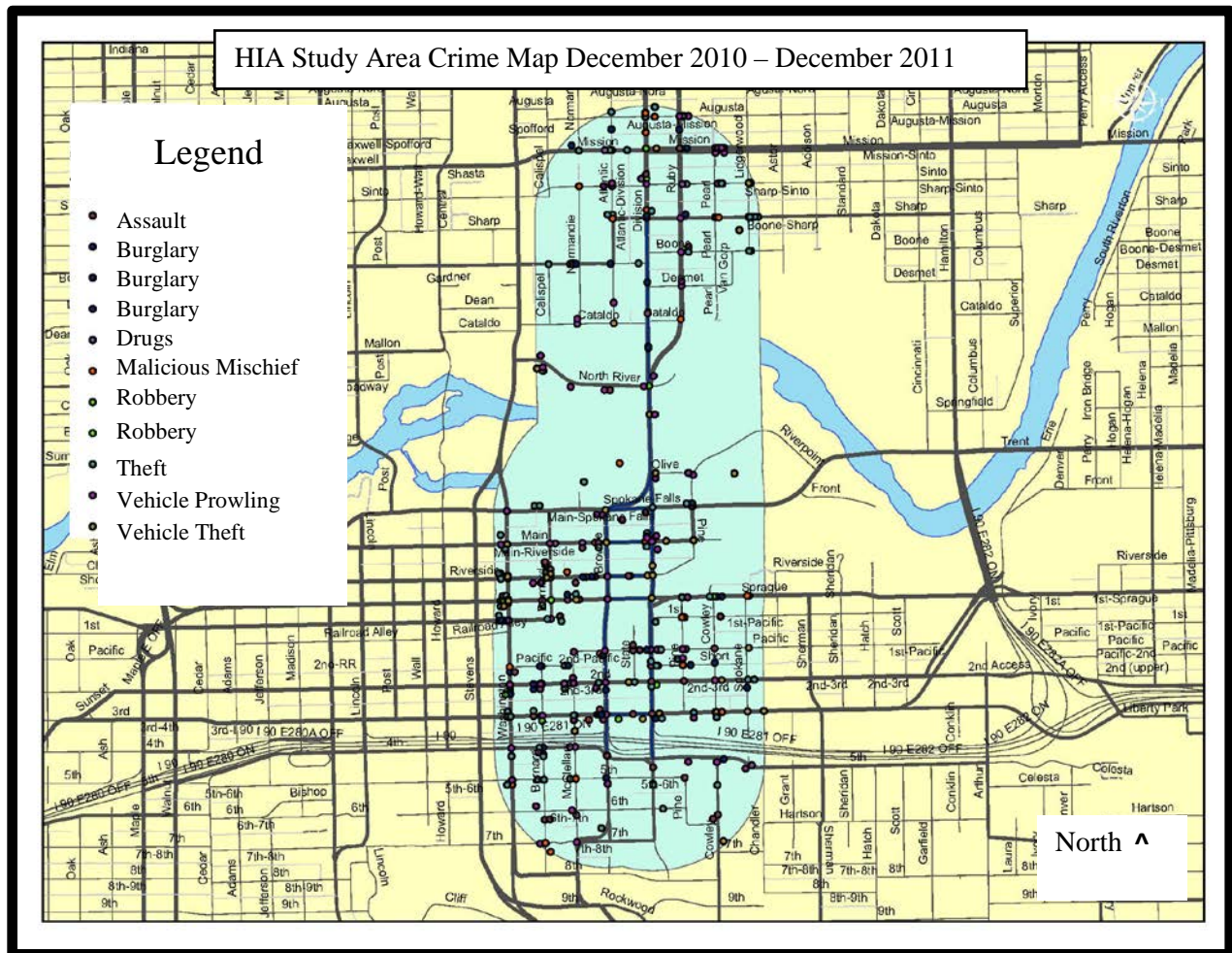
There are 25 acres of vacant parcels in the study area (excluding exempt and partially exempt), which is about 6 percent of the total acreage (excluding right-of-way). An additional 85 acres, or approximately 20 percent of the total acreage, are categorized as "underutilized" where the value of improvements is less than 1.5 times the land value. This number likely includes some income producing surface parking lots, as well as lots associated with existing uses. Cleaning and greening vacant sites may help deter crime, as well as producing a more attractive environment for investors, residents, and visitors.

In theory, a robust real estate market should drive these parcels to higher/best use as demand for land to more fully develop rises, leading to wealth creation for the property/building owners and tax revenue as taxable values rise. Together, the vacant and underutilized parcels represent 110 acres with some measure of untapped potential for new development or redevelopment with public infrastructure and capacity for growth already in place.

The Spokane County Assessor's data shows total assessed property values in the study area are \$1,055,108,580, while total taxable value is \$471,794,156. For the purposes of discussion only, dividing the total taxable value by the square footage of the acreage (exempt and partially exempt excluded) yields a very rough average taxable value of \$25 per square foot. The study by Gary Pivo and Jeffery D. Fisher (2010) found that, "all else being equal, the benefits of walkability are capitalized into office, retail, and industrial property values with more walkable sites commanding higher property values (p. 1). "On a 100 point scale, a 10 point increase in walkability increases property values by 1 to 9 percent, depending on property type" (p. 1). The study also found that "lower cap rates and higher incomes are connected to walkability, suggesting "expectations of less risk, greater income growth, or slower depreciation" (p.1).

Rising land values are key to development interest, as is risk mitigation. A recent study on the economic impacts of public infrastructure investments found evidence that private sector productivity stands to gain from public infrastructure investments (Department of the Treasury with the Council of Economic Advisors, 2010). Well-designed infrastructure investments can increase economic growth, productivity, and land values while also providing significant growth to economic development, energy efficiency, public health and manufacturing.

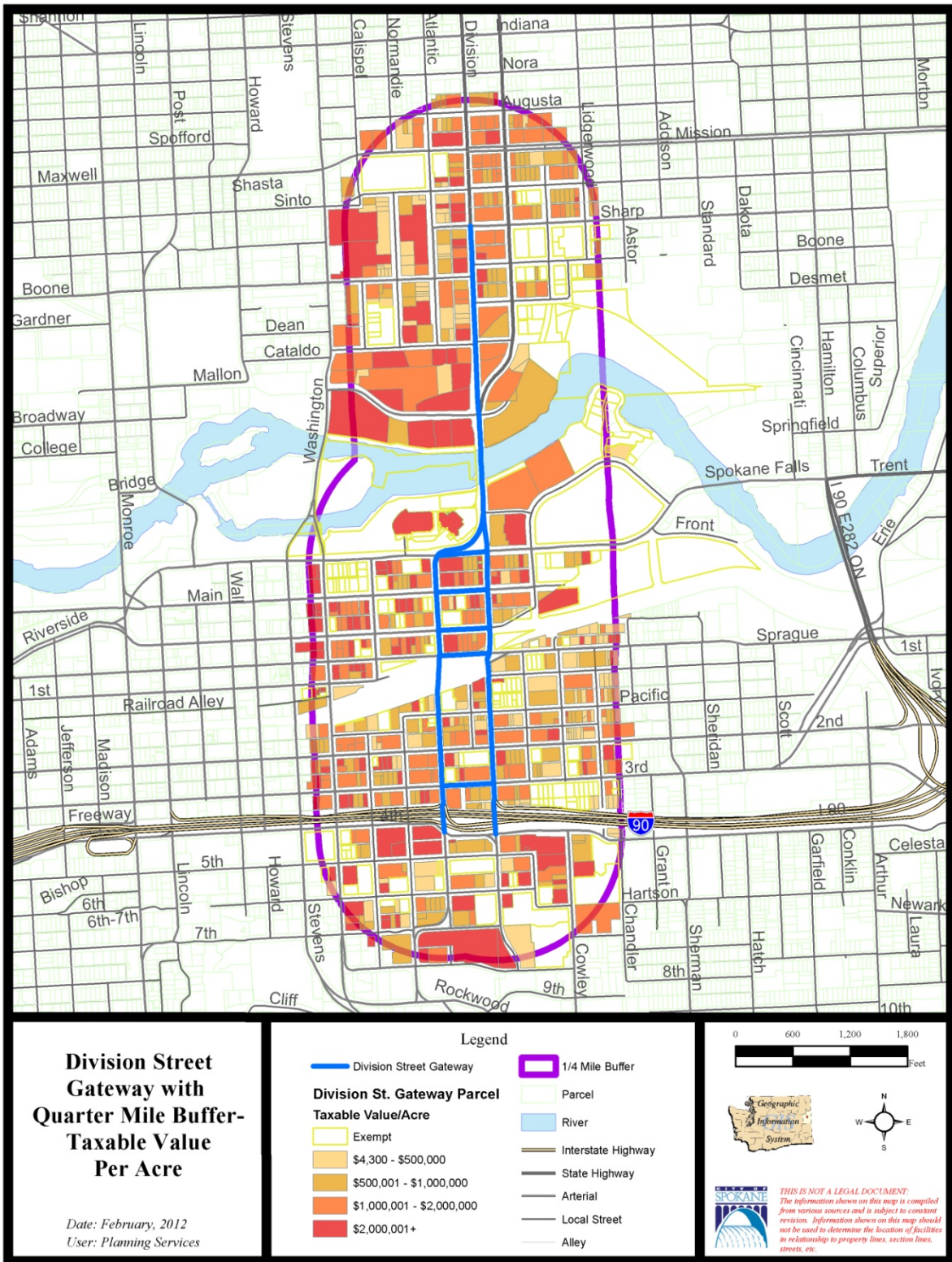
Figure 4 • Crime Map



Spokane Police Department

This map displays crime within the study area. There are three categories of burglary: commercial, garage (unattached), and residential. There are two categories for robbery: robbery (of a person, E.g. mugging) and commercial robbery.

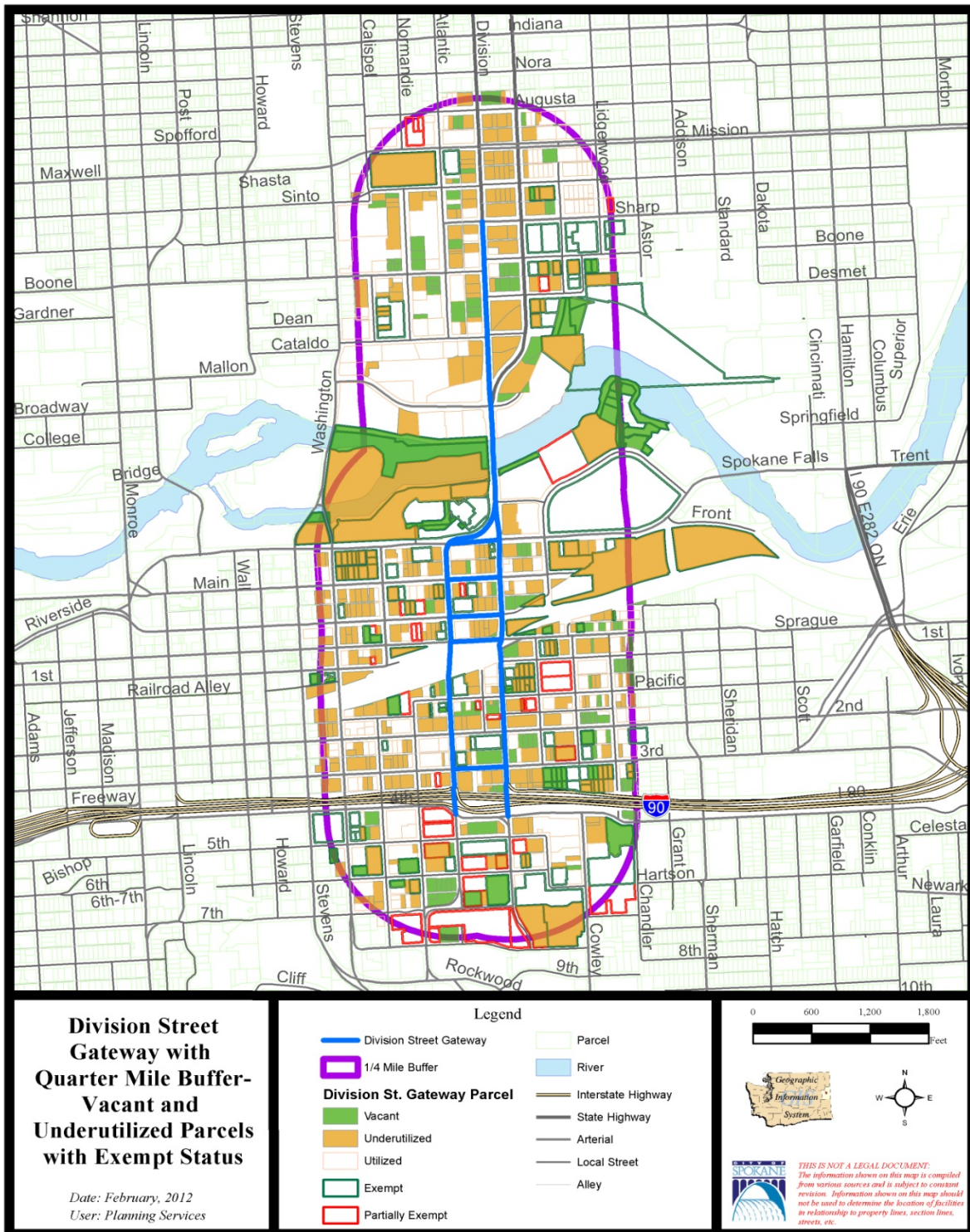
Figure 5 • Taxable Property Value



City of Spokane

This map displays property tax values per parcel within the study area.

Figure 6 • Vacant and Underutilized Property



City of Spokane

This map displays vacant, underutilized, utilized, exempt, and partially exempt parcels within the HIA study area.

Necessary attributes of walkability such as urban density and a mix of land uses are available in the study area, others such as sidewalk width and continuity, perceived safety, and aesthetics are not, as highlighted by several survey comments such as “a lot of Division looks rundown,” and “Yuck.” “Others mentioned “the big hole where the church was,” and “[need] more planters, banners, trees, and lighting” (SRHD Survey, 2012).

Incorporating better lighting, improved sidewalks, landscaping features and safer crossings into the redesign, especially in the highly commercial ends of the study area where destinations attractive to pedestrians currently exist (shopping or dining), as well as potential infill sites, may be a worthwhile investment to improve private sector wealth generation, attract new land uses, and raise public sector revenues to improve service delivery for citizens.

Taxable Retail Sales

Not surprisingly, taxable retail sales in the study area have declined in each of the last three years (figure 7, Taxable Retail Sales, Page 36), according to the Washington State Department of Revenue. It is vital that the transportation infrastructure effectively move traffic and enhance the safety of all users, and Washington State Department of Transportation standards for design and safety are required. However, Division is a “Main Street” for Spokane and investment in the public realm must also have a strong focus on supporting business growth and attracting new residents and visitors as customers to the area. While the effects of the Great Recession are clearly visible, developing a destination complementary to the revitalized downtown will bring in new business infill and the study area can become more competitive in the effort to attract a skilled workforce. Focus areas for public realm improvements that will help revitalize surrounding commercial areas were particularly noted in the resident, student, and business surveys. These include 3rd Avenue and Division Street, the railroad overpass at the intersection of Sprague and Division streets, and the intersection of Main and Division streets (SRHD Survey, 2012).

Figure 7 • Taxable Retail Sales

Division Street Gateway Study Area		
Taxable Retail Sales		
2008	2009	2010
\$437,111,300	\$390,738,018	\$323,535,110

Source: Washington State Department of Revenue February 2012

Rising land values are key to development interest, as is risk mitigation. A recent study on the economic impacts of public infrastructure investments found evidence that private sector productivity stands to gain from public infrastructure investments (Department of the Treasury with the Council of Economic Advisors, 2010). Well-designed infrastructure investments can increase economic growth, productivity, and land values while also providing significant growth to economic development, energy efficiency, public health and manufacturing.

Based on the research, it should be anticipated that the redesign of Division Street should:

- Attract desired residential development
- Decrease costs associated with collisions and crime
- Increase land and building values per square foot on average in the corridor
- Reduce vacant space due to increasing levels of customers, which should attract new businesses and new housing
- Increase business revenue by bringing more customers into the Division Street Gateway study area

Recommendations

- **Enhance the public realm with green spaces, street trees, better lighting, sidewalk repair, and safe crosswalks.** The public realm should be enhanced with these elements throughout the study area. Priority should be given to the “entryway” (I-90 off ramp at 3rd Avenue) and “destination” (Sprague Avenue to

Spokane Falls Blvd.) locations at the southern end of the study area. These are the areas where future residents of the South University District and students, staff, and faculty of Riverpoint and Gonzaga should be encouraged to move back and forth to the entertainment, shopping, and employment in Downtown. Safer, more attractive crossings should be provided across the Division/Browne couplet and to the Centennial Trail. In addition, the Gonzaga campus area of the North Bank should be better connected to the commercial outlets to the west across the Division/Ruby couplet, and the existing landscaping in this area should be maintained and expanded along the couplet.

- **Include Crime Prevention through Environmental Design (CPTED) principles in design.** Perceived safety is an important issue for current users of the study area. CPTED should be incorporated throughout the project area, but enhanced interventions should be added in those areas identified by Spokane Police Department as having higher incidents of crime and more destinations for residents, visitors, and employees. These strategies include transparent and attractive low fencing, pedestrian scale lighting, and design that increases bicycle and pedestrian traffic (eyes on the street). These measures encourage visitors to come into the area, lower public safety costs through crime deterrence, and reduce property and business losses.
- **Include bicycle infrastructure such as lanes, parking areas and racks.** A recent study has shown that encouraging bicycling is good for local business; people who biked or walked to an area reported that they spent more money in that area than people who drove there (League of American Bicyclists, 2009).
- **Invest in pedestrian amenities such as benches, public art, and social gathering locations.** Pedestrian amenities entice people to an area and invite them to linger. Public artwork contributes character to an area, also drawing visitors. Elements that encourage foot traffic also contribute to “eyes on the street,” helping to lower crime incidents.
- **Ensure safe and attractive connections to infill locations (vacant and underutilized sites) in the study area.** The Division Street Gateway redesign will have a long lifespan; consideration for future development and redevelopment with new land uses should be considered in the present.
- **Work with property owners to identify and support funding mechanisms for operations and maintenance.** Lighting, landscaping, and other design interventions require funding and an oversight organization to keep them maintained. These discussions should start early to build support for their inclusion in design. Alternatives may include expansion of the existing business improvement district and new local improvement districts.

Conclusion

The purpose of this HIA is to evaluate the health impacts that the Division Street Gateway project will have on the current and anticipated population within a quarter-mile radius of Division, Browne, and Ruby streets. The goal of this HIA is to present information to the project design team, public, and policy makers which will facilitate informed decisions. The intent is for the HIA to have positive impacts on the health of people who will use the streets and sidewalks affected by the design of the project. Recommendations are included to improve six health topics: physical and mental health, transportation, economic development, social capital, built environment, and physical safety.

Positive health impacts, safe and effective transportation for all modes, and aesthetic improvements that will beautify the Division Street Gateway project area are likely to occur with the implementation of the recommendations included within this HIA. The following recommendations had the top three highest scores on the prioritization matrix for providing positive health impacts.

- Provide enhanced crossing infrastructure that increases safety for pedestrians

- Provide infrastructure, such as bicycle lanes, to encourage physical activity.
- Provide wayfinding signage that guides people to Spokane destinations such as the convention center, Riverpoint campus, Gonzaga campus, Riverfront Park, and hospitals.
- Limit opportunities for criminals to conceal themselves.
- Assure road diets on Division and Browne streets to slow down motorist traffic and afford for more safety for all users. This also creates more room for bicycle lanes for further safety.

Some of the conclusions may be limited when there is no quantifiable evidence regarding the impact and magnitude for some of the health impacts. For example, quantifiable evidence is lacking about impact and magnitude of project design including elements of the natural environment for mental health improvement within the study area. There have not been studies that quantify the effect of how much stress relief elements of the natural environment provides and how much of it is needed for providing stress relief (although one study suggests that not a lot of it is needed in order to positively affect mental health). As a result, we relied on qualitative evidence gathered from the surveys about the positive mental health effects that elements of the natural environment have on people who live and work within the area.

The authors conclude that Division Street Gateway project design will likely have a positive impact on human health. Recommendations and their prioritization are found in the table in Appendix

Call to Action

This HIA can be used by the design team, policy makers, and elected officials when making Division Street Gateway project design decisions that will affect human health. The priority recommendations have been deemed most important for having positive impacts on human health, promoting safe and effective transportation for all modes, and improving the aesthetic qualities of the Division Street Gateway project area. The top ten recommendations should be considered first for implementation. The balance of the HIA recommendations should also be considered important in their ability to positively affect human health and should be implemented as time and funding allows.

Appendix 1 • HIA Steps and Tasks Performed

Step	Purpose	Tasks
Screening	Determine Whether HIA is Appropriate and Required	<ul style="list-style-type: none"> -Core HIA team met to decide if HIA was required -NACCHO grant proposal was written and submitted
Scoping	Set Out Parameters of HIA	<ul style="list-style-type: none"> -Steering committee was formed -Held a steering committee meeting to share resources and developed subjective rankings for impact, magnitude, and equity for topics. -Decision made to make this an intermediate HIA -Identified which impacts to assess -Scoped evidence to be gathered -Developed project plan
Identification	Develop a Community Profile and Collect Information to Identify Potential Health Impacts	<ul style="list-style-type: none"> -Developed a neighborhood profile -Shared HIA with the public at a City of Spokane planning open house -Conducted a literature review for health impacts and indicators -Developed methodologies for measuring effects of impacts -Developed and implemented a residential, business and student survey
Assessment	Synthesize and Critically Assess the Information in Order to Prioritize Health Impacts	<ul style="list-style-type: none"> -Assessed positive and negative impacts and sources of information -Sent initial design considerations to design consultant -Developed a draft report
Decision Making and Recommendations	Make Decisions to Reach a Set of Final Recommendations for Acting on HIA Findings	<ul style="list-style-type: none"> -Developed a draft set of recommendations -Held a steering committee meeting to review all information collected on impacts and prioritize recommendations -Developed a report
Evaluation and Follow Up	Evaluate the Process Involved in the HIA and its Impact, and Follow up the HIA Through Monitoring and a Health Impact Management Plan	<ul style="list-style-type: none"> -Process evaluation held by steering committee -Impact evaluation to identify what changes resulted from the HIA

Appendix 2 • Methodology for HIA Recommendation Rankings

A prioritization exercise was performed by the steering committee to determine the top 10 recommendations. The exercise was a systematic approach for comparing recommendations by selecting, weighing, and applying criteria. Recommendations for the HIA were provided after data was collected and analyzed for each health topic. A weighted value (xi) was determined for each recommendation. The weighted value was calculated by using the following formula: $x_i = y/T$

- X_i =Weighted value for each recommendation
- y =Total sum of health topics affected by each recommendation
- T =Total sum of each y for each recommendation

Each weighted value was then squared to create a larger margin of difference between each of the weighted values and to illustrate that certain recommendations encompassed an expanded amount of health topics.

Next, each recommendation was evaluated by the steering committee on four criteria: cost (c), feasibility (f), level of impact on the number of people (p), and the level of impact on health (h). Each recommendation was given a value of one, three, or five for each criterion after consensus by the steering committee.

- For cost, each recommendation was assessed for the cost to implement the project
 - o 1-high cost
 - o 3-medium cost
 - o 5-low cost
- For feasibility, each recommendation was assessed for the ease and feasibility to implement the project
 - o 1-low feasibility
 - o 3-medium medium feasibility
 - o 5-high feasibility
- For the level of impact on the number of people, each recommendation was assessed for the proportion of people the project would impact
 - o 1-low number of people
 - o 3-medium number of people
 - o 5-high number of people
- For the level of impact on health, each recommendation was assessed for its overall impact on health
 - o 1-low
 - o 3-medium
 - o 5-high

Next, an overall criterion value (Z) was calculated for each recommendation. The overall value was defined as the summation of each value determined for each criterion for each recommendation. The following formula was used to calculate the overall criterion value for each recommendation:

$$Z=(c + f + p + h)$$

- Z =Overall criterion value for recommendation
- c =Value for cost
- f =Value for feasibility
- p =Value for level of impact on the number of people
- h =Value for level of impact on health

Next the overall criterion value (Z) for each recommendation was multiplied by its weighted score value (xi) and the overall relative value (R) was determined for each recommendation.

$$R=(Z)(x_i)$$

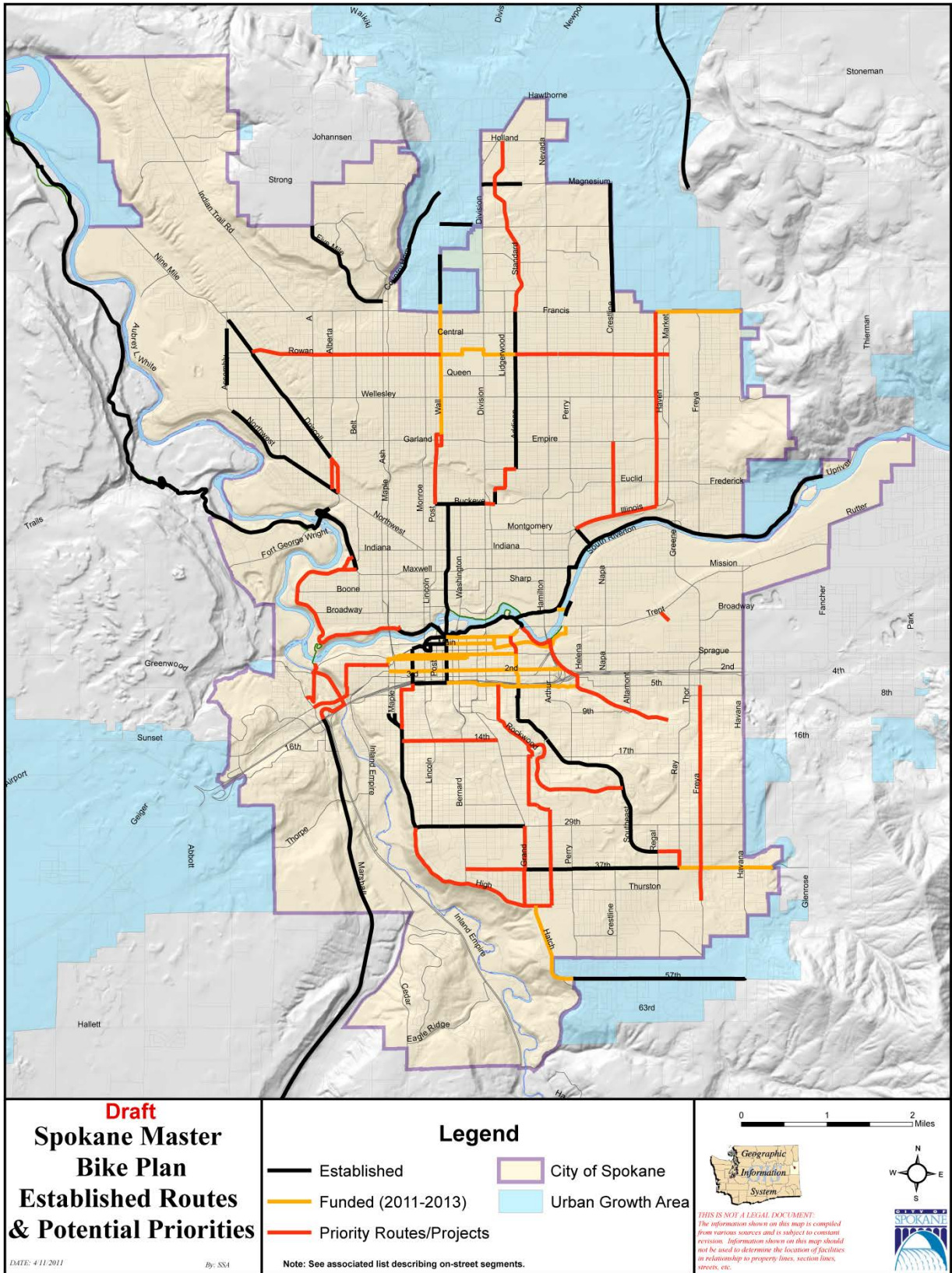
The overall relative values (R) for each recommendation were then compared and ranked from highest to lowest score. The steering committee engaged in a discussion regarding the ranking of recommendations and finalized the top 10 list found in this report.

Appendix 3 • HIA Recommendation Rankings

Recommendation rankings taken from priority matrices

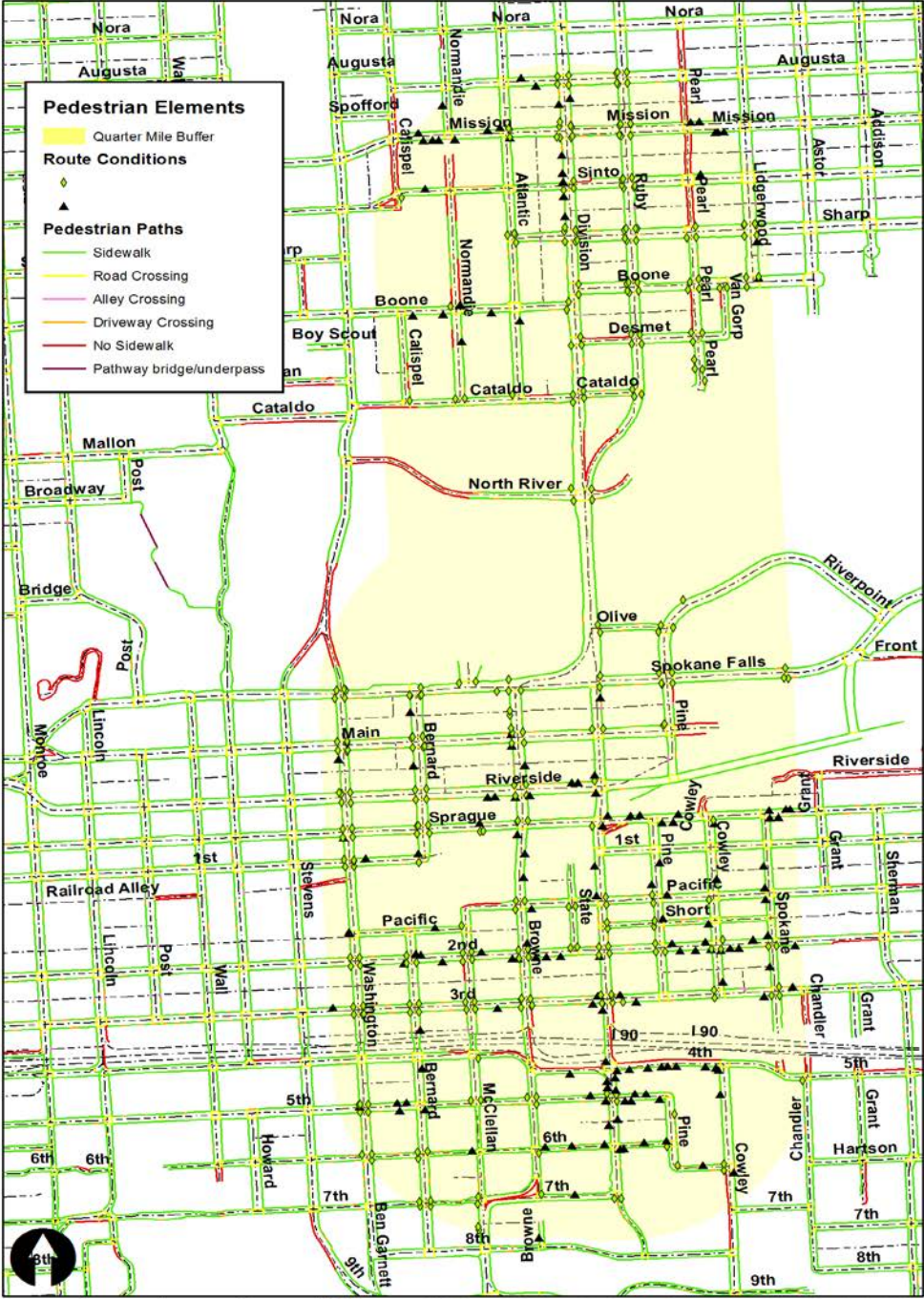
Provide enhanced crossing infrastructure that increases safety for pedestrians.	1
Provide infrastructure, such as bicycle lanes, to encourage physical activity.	2
Provide wayfinding signage that guides people to Spokane destinations such as the convention center, Riverpoint campus, Gonzaga campus, Riverfront Park, and hospitals.	3
Limit opportunities for criminals to conceal themselves.	3
Assure road diets on Division and Browne streets to slow down motorist traffic and afford for more safety for all users. This also creates more room for bicycle lanes for further safety.	3
Include elements of the natural environment along sidewalks.	4
Provide opportunities for social interaction among residents, businesses, students, and other users of the project area by providing benches and gathering areas.	4
Ensure that sidewalks maintain a clear line of sight for pedestrians.	5
Incorporate better bike facilities in the study area.	6
Implement High Performance Transit.	6
Light sidewalks and roads with a light source that emits a minimum of 20 lux every 90 feet.	7
Provide improved lane continuity on Division Street.	8
Utilize rain gardens along streets.	9
Complete sidewalks to meet ADA standards that are identified on JARC map.	9
Work with property owners to identify and support funding mechanisms for operations and maintenance of lighting and landscaping features, including expansion of existing business improvement district and new local improvement districts.	9
Light the trestle at Division with a minimum of 20 lux.	10
Paint the trestle at Division lighter color (perhaps a grey).	10
Ensure safe and attractive connections to infill locations (vacant and underutilized sites) in the study area.	11

Appendix 4 • Established Bike Routes & Potential Priorities



City of Spokane

Division Gateway Pedestrian Network



Division Street Gateway Health Impact Assessment Business Survey

As a business owner within a quarter mile of the Division Street Gateway Project your input is being solicited. The goals of the project are to make the Division Street Gateway into Spokane safer and friendlier to all forms of transportation. This project will also focus on beautifying the area making it cleaner and safer for those who live, work, and pass through here. As a business owner, you are a stakeholder and should have input on this.

The project study area extends a quarter mile west of Browne Street, south of I-90, east of Division Street, and north of Sharp Street. This anonymous survey will take approximately five minutes to complete. Your responses will help us (both positive and negative) if the project is funded and implemented. Your responses will be kept confidential. Your name and address will not be collected for this survey. Feel free to skip any questions that you do not want to answer.

About your business.

1. What are the cross-streets nearest to your business? (for example: 2nd and Browne)
1st street
2nd street
2. Do you lease or own your business space?
 Own Lease
3. What is your zip code?

About your business area.

4. I take pride in this area of Spokane.
 Strongly agree Agree Neutral Disagree Strongly disagree
5. When you see litter in the area, do you pick it up?
 Almost Always Sometimes Hardly Never
6. People here lookout mainly for the welfare of their own business and they are not much concerned with community welfare.
 Strongly agree Agree Neutral Disagree Strongly disagree

7. What type of improvements would make the area more attractive and safer for your customers and employees? (Landscaping, lighting, crosswalks, etc)

8. When entering the City of Spokane from Division Street what thoughts or assumptions do you and/or your customers have about the city based on what you/they see?

Appendix 6 • Business Survey

More about your business area.

9. Describe a location along Division or Browne Street between I-90 and Sharp Street that stands out to you. Do you like or dislike this location? Do think this location makes a positive or negative impact upon people who may live, work, or pass through the study area?

10. The next few questions are about the area that your business is in. Please tell me whether you strongly agree, agree, disagree or strongly disagree with the following statements or if you are unsure.

	<i>Strongly agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly disagree</i>
The roads are in good shape	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are enough sidewalks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The sidewalks are in good shape	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are enough bike lanes or marked shared roads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The bike lanes and marked roads are in good shape	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When walking across intersections I feel safe from traffic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is convenient to access transit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

About your transportation.

11. Please describe your concerns for each mode of transportation when using/crossing Division and/or Browne Street.

Car

Bicycle

Walking

Other

Appendix 6 • Business Survey

12. In a typical week, what percent of trips do you use the following modes of transportation?

Drive alone

Carpool

Ride bike

Ride bus

Walk

100%

13. What is the total number of miles that you drive your car per week. (Use zero if you do not drive.)

About health.

14. The Division Street Gateway Health Impact Assessment is looking at topics that affect the health of individuals in the study area. Please rate the importance of these topics on health.

	<i>Not important</i>	<i>Low importance</i>	<i>Medium importance</i>	<i>High importance</i>
Transportation (e.g. safety, connectivity)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Natural Environment (e.g. air pollution, water pollution)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical Safety (crime related)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical Health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mental Health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unemployment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business Growth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for taking time to let us know your thoughts about the Division Street Gateway Project HIA study area.

Appendix 7 • HIA Resident Survey

Division Street Gateway Health Impact Assessment Residents Survey

As a resident living within a quarter mile of the Division Street Gateway Project your input is being solicited. The goals of the project are to make the Division Street Gateway into Spokane safer and friendlier to all forms of transportation. This project will also focus on beautifying the area making it cleaner and safer for those who live, work, and pass through here. As a resident, you are a stakeholder and should have input on this.

The project study area extends a quarter mile west of Browne Street, east of Division Street, south of I-90, and a north of Sharp Street. This anonymous survey will take approximately five minutes to complete. Your responses will help us to determine the impact on human health (both positive and negative) if the project is funded and implemented. Your responses will be kept confidential. Your name and address will not be collected for this survey. Feel free to skip any questions that you do not want to answer.

About your home.

- | | |
|---|---|
| <p>1. What are the cross-streets nearest to your home? (for example: 2nd and Browne)</p> <p>1st street <input type="text"/></p> <p>2nd street <input type="text"/></p> | <p>3. Approximately what percentage of your gross income (before taxes) goes towards the cost of housing?</p> <p><input type="text"/></p> |
| <p>2. Thinking about where you are currently living, do you rent or own your home?</p> <p><input type="radio"/> Own <input type="radio"/> Rent <input type="radio"/> Visiting</p> | <p>4. What is your zip code?</p> <p><input type="text"/></p> |

About your neighborhood.

- | | |
|--|--|
| <p>5. I take pride in this area of Spokane.</p> <p><input type="radio"/> Strongly agree</p> <p><input type="radio"/> Agree</p> <p><input type="radio"/> Neutral</p> <p><input type="radio"/> Disagree</p> <p><input type="radio"/> Strongly Disagree</p> | <p>6. When you see litter in the area, do you pick it up?</p> <p><input type="radio"/> Almost Always</p> <p><input type="radio"/> Sometimes</p> <p><input type="radio"/> Hardly</p> <p><input type="radio"/> Never</p> |
|--|--|

7. When entering the City of Spokane from Division Street what thoughts or assumptions do you and/or your visitors have about the city based on what you/they see?

8. Describe a location along Division or Browne street between I-90 and Sharp street that stands out to you. Do you like or dislike this location? Do think this location makes a positive or negative impact upon people who may live, work, or pass through the study area?

Appendix 7 • Resident Survey

About your transportation.

9. Please rate the ease of getting to destinations downtown using the following modes of transportation:

	<i>Very easy</i>	<i>Somewhat easy</i>	<i>Somewhat difficult</i>	<i>Very difficult</i>
by driving?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
by bicycle?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
by walking?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
by public transportation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. How often do you use Division and Browne streets? 5-7 times weekly 1-4 times monthly <6 times annually
 1-4 times weekly 6-11 times annually Never

11. Please describe your concerns for each mode of transportation that you participate in when using/crossing Division and/or Browne street.

Car	
Bicycle	
Walking	
Other	

12. In a typical week, what percent of trips do you use the following modes of transportation?

Drive Alone	
Carpool	
Ride bike	
Ride bus	
Walk	

100%

13. What is the total number of miles that you drive your car per week. (Use zero if you do not drive.)

14. Approximately what percentage of your gross income (before taxes) goes towards transportation? (combine all expenses for each mode of transportation used: car, bike, etc.)

Appendix 7 • Resident Survey

About your health.

15. The Division Street Gateway Health Impact Assessment is looking at topics that affect the health of individuals living in the study area. Please rate the importance of these topics on the health of residents.
- | | <i>Not important</i> | <i>Low importance</i> | <i>Medium importance</i> | <i>High importance</i> |
|---|-----------------------|-----------------------|--------------------------|------------------------|
| Transportation (e.g. safety, connectivity) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Natural Environment (e.g. air pollution, water pollution) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Physical Safety (crime related) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Physical Health | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Mental Health | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Unemployment | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Business Growth | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
16. Would you say that in general your health is: *Excellent* *Very Good* *Good* *Fair* *Poor*
17. Now thinking about your physical health, which includes physical illness and injury, how many days during the past 30 days was your physical health not good? (# of days)
18. Now thinking about your mental health, which includes stress, depression and problems with emotions, for how many days during the past 30 days was your mental health not good? (# of days)
19. How much does stress affect you on a daily basis? *None* *Low* *Moderate* *High*
20. Has a doctor ever told you that you suffer from any of the following ailments: (check all that apply)
- | | |
|---|--|
| <input type="checkbox"/> <i>Heart Disease</i> | <input type="checkbox"/> <i>Asthma</i> |
| <input type="checkbox"/> <i>Chronic Obstructive Pulmonary Disease</i> | <input type="checkbox"/> <i>Diabetes</i> |
21. In the last 12 months, have you fallen and seriously injured yourself while walking or biking to and from your home? *Yes* *No*

A little more about you.

22. What is your age today?
23. Are you male or female?
 Male *Female*
24. How tall are you? (In inches, 5ft=60 in)
25. How much do you weigh? (lbs)
26. Do you currently receive any of the following forms of assistance? (check all that apply)
- | |
|---|
| <input type="checkbox"/> <i>TANF (Temporary Aid for Needy Families)</i> |
| <input type="checkbox"/> <i>SSI (Supplemental Security Income)</i> |
| <input type="checkbox"/> <i>Unemployment</i> |

Division Street Gateway Health Impact Assessment Student Survey

The goals of the Division Street Gateway project are to make Spokane safer and friendlier to all forms of transportation. This project will also focus on beautifying the area, making it cleaner and safer for those who live, work, and pass through here. As a student attending class within a quarter mile of the Division Street Gateway Project your input is being solicited. You are a stakeholder and should have input on this.

Please only complete this survey if you attend classes at either Riverpoint Campus or Gonzaga University. Students only attending classes in Cheney or Pullman do not need to complete the survey.

The project study area extends a quarter mile west of Browne Street, a quarter mile east of Division Street, a quarter mile south of I-90, and a quarter mile north of Sharp Street. This anonymous survey will take approximately five minutes to complete. Your responses will help us to determine the impact on human health (both positive and negative) if the project is funded and implemented. Your responses will be kept confidential. Your email address will not be collected for this survey. Feel free to skip any questions that you do not want to answer.

1. On which campus do you attend class?

- Riverpoint Campus
- Gonzaga Campus

About your home.

2. What are the cross-streets nearest to your home? (for example: 2nd and Browne)

1st street

2nd street

4. Approximately what percentage of your gross income (before taxes) goes towards the cost of housing?

3. Thinking about where you are currently living, do you rent or own your home?

- Own Rent Visiting

5. What is your zip code?

About the Division Gateway area

6. I take pride in this area of Spokane.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. When you see litter in the area, do you pick it up?

- Almost Always
- Sometimes
- Hardly
- Never

8. When entering the City of Spokane from Division Street, what thoughts or assumptions do you and/or your visitors have about the city based on what you/they see?

Appendix 8 • Student Survey

9. Describe a location along Division, Ruby, or Browne street between I-90 and Sharp street that stands out to you. Do you like or dislike this location? Do think this location makes a positive or negative impact upon people who may live, work, or pass through the study area?

About your transportation.

10. Please rate the ease of getting to campus and to destinations downtown using the following modes of transportation:

	<i>Very easy</i>	<i>Somewhat easy</i>	<i>Somewhat difficult</i>	<i>Very difficult</i>
by driving?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
by bicycle?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
by walking?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
by public transportation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. How often do you use Division, Ruby, and/or Browne street?
- | | | |
|--|---|---|
| <input type="radio"/> 5-7 times weekly | <input type="radio"/> 1-4 times monthly | <input type="radio"/> <6 times annually |
| <input type="radio"/> 1-4 times weekly | <input type="radio"/> 6-11 times annually | <input type="radio"/> Never |

12. Please describe your concerns for each mode of transportation that you use when using/crossing Division, Ruby, and/or Browne street.

Car	
Bicycle	
Walking	
Other	

13. In a typical week, what percent of trips do you use the following modes of transportation?

Drive Alone	
Carpool	
Ride bike	
Ride bus	
Walk	

100%

14. What is the total number of miles that you drive your car per week. (Use zero if you do not drive.)

15. Approximately what percentage of your gross income (before taxes) goes towards transportation? (combine all expenses for each mode of transportation used: car, bike, etc.)

About your health.

Appendix 8 • Student Survey

16. The Division Street Gateway Health Impact Assessment is looking at topics that affect the health of individuals living in the study area. Please rate the importance of these topics on the health of residents.

	<i>Not important</i>	<i>Low importance</i>	<i>Medium importance</i>	<i>High importance</i>
Transportation (e.g. safety, connectivity)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Natural Environment (e.g. air pollution, water pollution)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical Safety (crime related)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical Health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mental Health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unemployment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business Growth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. Would you say that in general your health is: *Excellent* *Very Good* *Good* *Fair* *Poor*

18. Now thinking about your physical health, which includes physical illness and injury, how many days during the past 30 days was your physical health not good? (# of days)

19. Now thinking about your mental health, which includes stress, depression and problems with emotions, for how many days during the past 30 days was your mental health not good? (# of days)

20. How much does stress affect you on a daily basis? *None* *Low* *Moderate* *High*

21. Has a doctor ever told you that you suffer from any of the following ailments: (check all that apply)

<input type="checkbox"/> <i>Heart Disease</i>	<input type="checkbox"/> <i>Asthma</i>
<input type="checkbox"/> <i>Chronic Obstructive Pulmonary Disease</i>	<input type="checkbox"/> <i>Diabetes</i>

22. In the last 12 months, have you fallen and seriously injured yourself while walking or biking to and from your home? *Yes* *No*

A little more about you.

23. What is your age today?

24. Are you male or female? *Male* *Female*

25. How tall are you? (In inches, 5ft=60 in)

26. How much do you weigh? (lbs)

27. Do you currently receive any of the following forms of assistance? (check all that apply)

<input type="checkbox"/> <i>TANF (Temporary Aid for Needy Families)</i>
<input type="checkbox"/> <i>SSI (Supplemental Security Income)</i>
<input type="checkbox"/> <i>Unemployment</i>

Thank you for taking your time to complete this survey.

Appendix 8 • Student Survey

12. In a typical week, what percent of trips do you use the following modes of transportation?

Drive alone

Carpool

Ride bike

Ride bus

Walk

100%

13. What is the total number of miles that you drive your car per week. (Use zero if you do not drive.)

About health.

14. The Division Street Gateway Health Impact Assessment is looking at topics that affect the health of individuals in the study area. Please rate the importance of these topics on health.

	<i>Not important</i>	<i>Low importance</i>	<i>Medium importance</i>	<i>High importance</i>
Transportation (e.g. safety, connectivity)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Natural Environment (e.g. air pollution, water pollution)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical Safety (crime related)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical Health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mental Health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unemployment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business Growth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for taking time to let us know your thoughts about the Division Street Gateway Project HIA study area.

References

Executive Summary

The Community Guide. (2012). Retrieved on March 6, 2012 From:

<http://www.thecommunityguide.org/pa/index.html>

Spokane Riverpoint Academic Campus & Master Plan Overview. (2009). Retrieved on April 22, 2012

From: <http://spokane.wsu.edu/aboutWSUSpokane/development/plan.html>

University of Minnesota. (2007). Nonmotorized Transportation Pilot Program Evaluation Study.

Retrieved March 6, 2012 from <http://www.srtc.org/Documents/Programs-Projects/Bike>

[Pedestrian_Documents/draft_non-motorized_study.pdf](http://www.srtc.org/Documents/Programs-Projects/BikePedestrian_Documents/draft_non-motorized_study.pdf)

Zimmerman Volk. (2009). University District Housing Study. Retrieved on April 30, 2012 From:

<http://www.spokaneuniversitydistrict.com/documents/FinalUniversityDistrict.pdf>.

Demographics

U.S. Census Bureau. (2005-2009). Spokane city, Washington. Selected from social characteristics in the

United States[Data]. 2010 American Community Survey 5-Year Estimates. Retrieved on April 4,

2012 From: <http://factfinder2.census.gov>

Spokane Regional Health District. (2012). Health Equity Report.

Physical and Mental Health

American Diabetes Association. (2011). Diabetes statistics. Retrieved on January 27, 2012 From:

<http://www.diabetes.org/diabetes-basics/diabetesstatistics/>

Blair, S.N., & Dunn, A.L., (2010). Translating evidenced-based physical activity interventions into

practice: the 2010 challenge. *American Journal of Preventive Medicine*, 22, 8-9.

Centers For Disease Control and Prevention. (2011). U.S. obesity trends. Retrieved on January 27, 2012

From: <http://www.cdc.gov/obesity/data/trends.html>

Centers for Disease Control and Prevention. (2009). Crude and age-adjusted percentage of civilian, non-

institutionalized population with diagnosed diabetes, United States, 1980–2009. Retrieved on

January 27, 2012 From: <http://www.cdc.gov/diabetes/statistics/prev/national/figage.htm>

Ewing, R., Schmid, T., Killingsworth, R., Zlot, A., & Raudenbush, S., (2003). Relationship

between urban sprawl and physical activity, obesity, and morbidity. *American Journal of Health Promotion*, 18, 47-57.

- Frank, L. D., Stone, B., & Bachman, W., (2000). Linking land use with household vehicle emissions in the central Puget Sound: Methodological framework and findings. *Transportation Research D*, 5,173-196.
- Frank, L. D., Andresen, M., & Schmid, T., (2004). Obesity relationships with community design, physical activity, and time spent in cars. *American Journal of Preventive Medicine*, 2, 87-96.
- Frank, L. D., Schmidt, T. L., Sallis, J. F., Chapman, J., & Saelens, B. E., (2005). Linking objectively measured physical activity with objectively measured urban form findings from smartraq. *American Journal of Preventive Medicine*, 28, 117-125. doi:10.1016/j.amepre.2004.11.001
- Frank, L. D., Sallis, T. F., Conway, T. L., Chapman, J. E., Saelens, B. E., & Bachman, W., (2006). Many pathways from land use to health associations between neighborhood walkability and active transportation, body mass index, and air quality. *Journal of the American Planning Association*, 72, 75-87.
- Frumkin, H., (2002). Urban sprawl and public health. *Public Health Reports*, 117, 201-217.
- Frumkin, H., (2003). Healthy places: exploring the evidence. *American Journal of Public Health*, 93, 1451-1455.
- Grabow, M. L., Spak, S.C., Holloway, T., Stone, B., Mednick, A.C., Patz, J.A. (2012) Air Quality and Exercise-Related Health Benefits from Reduced Car Travel in the Midwestern United States. *Environmental Health Perspectives*. 120(1)
- Handy, S. L., Boarnet, M. G., Ewing, R., Killingsworth, R. E., (2002). How the built environment affects physical activity views from urban planning. *American Journal of Preventive Medicine*, 23, 64-74.
- Jackson, R. J., (2003). The impact of the built environment on health; an emerging field. *American Journal of Public Health*, 93, 1382-1384.
- Johns Hopkins School of Public Health. (2007). Obesity rates continue to climb in the United States. Retrieved on January 27, 2012 from http://www.jhsph.edu/publichealthnews/press_releases/2007/wang_adult_obesit.html
- Kaplan, R., and S. Kaplan. (1989). *The experience of nature: A psychological perspective*. Cambridge, UK: Cambridge Univ. Press.
- Lee, C., & Moudon, A. V., (2006). Correlates of walking for transportation or recreation purposes. *Journal of Physical Activity and Health*, 3, 77-98.
- Nowak : USDA (2002) *The Effects of Urban Trees on Air Quality*: Retrieved on April 2, 2012 From : http://nrs.fs.fed.us/units/urban/local-resources/downloads/Tree_Air_Qual.pdf
- Parsons, R. 1991. The potential influences of environmental perception on human health. *Journal of Environmental Psychology*. 11: 1-23.

Spokane Counts. Diabetes (Adult). 2009. Retrieved on April 27, 2012. From:

<http://www.srhd.org/spokane-counts/indicator/28/diabetes-adult>

Ulrich, R. S. 1984. View through a window may influence recovery from surgery. *Science*. 224(4647), 420-421.

Ulrich, R. S., R. F. Simons, B. D. Losito, E. Fiorito, M. A. Miles, and M. Zelson. 1991. Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*. 11: 231-248.

US Department of Health and Social Services. 2008 Physical Activity Guidelines for America. Retrieved on March 3, 2012 From: <http://www.health.gov/paguidelines/>

US Department of Health and Social Services. Healthy People 2020. Mental Health. Retrieved on April 3, 2012 From: <http://www.healthypeople.gov/2020/LHI/mentalHealth.aspx>

US Preventive Services Task Force. Guide to Clinical Preventive Services, 2nd ed. Baltimore: Williams and Wilkins, pages 611-624. 1996.

Transportation

The Community Guide. (2012). Retrieved on March 6, 2012 From:

<http://www.thecommunityguide.org/pa/index.html>

Ewing R, Frank L, Kreutzer R. (2006). Understanding the Relationship between Public Health and the Built Environment: A Report to the LEED-ND Core Committee.

LaScala EA, Gerber D, Gruenewald PJ. (2000). Demographic and environmental correlates of pedestrian injury collisions: a spatial analysis. *Accid Anal Prev*. 32:651-658.

World Health Organization Penden M, Scurfield R, Sleet D, et al. (2004). World report on road traffic injury prevention. Accessed at: <http://whqlibdoc.who.int/publications/2004/9241562609.pdf>.

Reynolds CCO, Harris MA, Teschke K, Cropton PA, Winters M. (2009). The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature. *Environmental Health*, 8:47

University of Minnesota. (2007). Nonmotorized Transportation Pilot Program Evaluation Study. Retrieved March 6, 2012 from [http://www.srtc.org/Documents/Programs-Projects/Bike Pedestrian_Documents/draft_non-motorized_study.pdf](http://www.srtc.org/Documents/Programs-Projects/BikePedestrian_Documents/draft_non-motorized_study.pdf)

Physical Safety

Browning C, et al. (2010). *Journal of Research in Crime & Delinquency*. 47 (3). Pp. 329-357.

Chamlin, M.B, Cochran, J. K. (2004). An Excursus on the Population Size-Crime Relationship. *Western Criminology Review*. 5(2), 119-130.

City of Spokane - GIS. Information Retrieved in March, 2012 From:
<http://www.spokanegis.org/crimemap2/>

Crowe, T.D. (2000). *Crime Prevention Through Environmental Design*. Butterworth-Heinemann. Stoneham, MA.

Jacobs, Jane. (1992). *The Death and Life of Great American Cities*. P. 35. Vintage:New York.

Samuels, R. (1995). *Design and Planning for Urban Safety and Security*. Rep. New South Whales: Department of Housing.

Samuels, R. (1995). "Defensible Design and Security- University Campuses Final Report." Department of Employment, Education and Training, Commonwealth of Australia.

Samuels, R. (1996). "Environmental Design and Management: People and Safe-Places"

Built Environment

Air Quality

U.S. Environmental Protection Agency. Information Retrieved on April 6, 2012 From:
<http://www.epa.gov/mats/>

U.S.Environmental Protection Agency. (2012). Particulate Matter. Information Retrieved on April 22, 2012 From: <http://www.epa.gov/air/particlepollution/basic.html>

Built Environment and Health Research Program at Columbia University. Children Living in Areas with More Trees Have Lower Asthma Prevalence. Retrieved on March 28, 2012 From:
http://beh.columbia.edu/articles/children_living_in_areas_with_more_trees_have_lower_asthma_prevalence/

Nowak, D.J. (2002). *The Effects of Urban Trees on Air Quality*. USDA Forest Service, Syracuse, NY
Washington State Department of Ecology. (2009) *Health Effects and Economic Impacts of Fine Particle Pollution in Washington*

Spokane Regional Clean Air Agency. Information Retrieved on April 6, 2012 From:
<http://www.spokanecleanair.org/>

Washington State Department of Ecology. (2009) *Health Effects and Economic Impacts of Fine Particle Pollution in Washington*. Olympia, WA.

World Health Organization. (2005) *Air Quality Guidelines - Global Update 2005*. Retrieved on April 12, 2012 From: http://www.who.int/phe/health_topics/outdoorair_aqg/en/

Urban Heat Island

- Akbari, H. (2005). Energy Saving Potentials and Air Quality Benefits of Urban Heat Island Mitigation. LBNL-58285. Berkeley, CA: Lawrence Berkeley National Laboratory.
- Berdahl, P. and S. Bretz. 1997. "Preliminary Survey of the Solar Reflectance of Cool Roofing Materials," Energy and Buildings - Special Issue on Urban Heat Islands and Cool Communities, 25(2):149-158.
- Clarke JF (1972) Some Effects of the Urban Structure on Heat Mortality. Environ Res 5:93–104
- U.S. Environmental Protection Agency. Heat Island Impacts. Retrieved on April 2, 2012 From: <http://www.epa.gov/heatisld/impacts/index.htm>
- U.S. Environmental Protection Agency. What is an Urban Heat Island? Retrieved on April 2, 2012 From: <http://www.epa.gov/hiri/about/index.htm>
- Jones TS, Liang AP, Kilbourne EM et al (1982) Morbidity and mortality associated with the July 1980 heat wave in St. Louis and Kansas City, Mo. J Am Med Assoc 247:3327–3331
- Rain Garden Network. Definition of a Rain Garden. Retrieved on May 4, 2012 From: <http://www.raingardennetwork.com/raingardenis.htm>
- Smoyer KE, Rainham DGC, Hewko JN (2000) Heat-stress-related Mortality in Five Cities in Southern Ontario:1980–1996. International Journal of Biometeorology 44:190–197
- Tan, J.,Zheng, Y., Tang, X., Guo, C., Li, L., Song., G., Zhen, Z., Yuan, D., Kalkstein A. J., Li, F., Chen, H. (2010). The urban heat island and its impact on heat waves and human health in Shanghai. International Journal of Biometeorology. 54 :75-84

Access to Healthy Food

- McGinnis JM. (2002). Diabetes and physical activity: Translating evidence into action. Am J Prevent Med: 22(4S)
- Morland K, Wing S, Diez Roux A. (2002). The contextual effect of the local food environment on residents' diets: The atherosclerosis risk in communities study. Am J Public Health: 92(11)
- Spokane Regional Health District. (2012). Residential Survey.
- U.S. Department of Transportation (2009). Efficacy of Rectangular-shaped Rapid Flash LED Beacons. Retrieved on March 23, 2012 From: http://mutcd.fhwa.dot.gov/resources/interim_approval/ia111/stpetersburgreport/index.htm

Access to Alcohol

- Lenne, M., Corban, B., Stephan, K., (2007) Traffic Signal Phasing at Intersections to Improve Safety for Alcohol-Affected Pedestrians. *Accident Analysis and Prevention*. 39: 751-756
- Grundy, C., Steinbach, R., Edwards, P., Green, J., Armstrong, B., Wilkinson, P., (2009). Effect of 20 mph traffic speed zones on road injuries in London, 1986-2006: controlled interrupted time series analysis. *British Medical Journal*: 339:b4469
- Hutchinson, T. P., (2011). Intoxicated pedestrians: Accident data from South Australia. Centre for Automotive Safety Research, University of Adelaide, South Australia .
- New Jersey Department of Transportation. (2009). Design and Evaluation of Effective Crosswalk Illumination. Retrieved on April 2, 2012 From:
<http://www.utrc2.org/research/assets/152/FHWANJ-2009-0031.pdf>
- Rosen, E., Sander, U. (2009). Pedestrian Fatality Risk as a Function of Car Impact Speed. Autoliv Research, Wallentinsvägen 22, 447 83, Vårgårda, Sweden.
- Spokane Riverpoint Academic Campus & Master Plan Overview. (2009). Retrieved on April 22, 2012 From: <http://spokane.wsu.edu/aboutWSUSpokane/development/plan.html>
- UNC Highway Safety Research Center. (2010) Pedestrian Safety Program Strategic Plan; Final Background Report. Retrieved on April 2, 2012 From:
http://safety.fhwa.dot.gov/ped_bike/pssp/background/background092010.pdf

Social Capital

- Berkman LF, Glass T. (2000). Social integration, social networks, social support, and health. In Berkman & Kawachi (eds.) *Social Epidemiology*. Oxford: Oxford University Press. pp. 137-173.
- Environmental Protection Agency. (2007). Working Together for a Healthy Environment; A Guide for Multi-Cultural Community Groups. Retrieved on April 12, 2012 From:
<http://www.epa.gov/osw/wycd/downloads/cbo-guide.pdf>
- Yiengprugsawan, V. (2011). Social capital and health in a national cohort of 82,482 Open University adults in Thailand. *Journal of Health Psychology*. 16(4) pp. 632-642.
- Williams, L., DeSteno, D., (2009). Pride; Adaptive Social Emotion or Seventh Sin? *Journal of the Association for Psychological Science*: 20(3).
- Narayan, D., Cassidy, M., (2001). A Dimensional Approach to Measuring Social Capital: Development and Validation of a Social Capital Inventory. *Current Sociology*: 49(2).

Economic Development

- The Department of the Treasury with the Council of Economic Advisers. (2010). An Economic Analysis of Infrastructure Investment. Washington, DC. Retrieved on April 20, 2011

From:http://www.treasury.gov/resource-center/economic-policy/Documents/infrastructure_investment_report.pdf

Estimating the Costs of Unintentional Injuries. (2012). National Safety Council. Retrieved on April 6 From:
http://www.nsc.org/news_resources/injury_and_death_statistics/Pages/EstimatingtheCostsofUnintentionalInjuries.aspx

League of American Bicyclists. (2009). Retrieved on April 11, 2012 From:
http://www.bikeleague.org/resources/reports/pdfs/economic_benefits_bicycle_infrastructure_report.pdf

National Safety Council. (n.d.). What is the Economic Costs of Crashes Involving Pedestrians and Bicyclists? Accessed on April 30, 2012 From:
<http://www.bicyclinginfo.org/faqs/answer.cfm?id=42>

Pivo, G., Fisher, J. (2010). The Walkability Premium in Commercial Real Estate Investments (Responsible Property Investing Center, University of Arizona and Benecki Center for Real Estate Studies, Indiana University working paper). Retrieved on April 14, 2012 From:
http://www.u.arizona.edu/~gpivo/Walkability%20Paper%208_4%20draft.pdf

Science Daily. (2011). Rehabilitating Lots Improves Urban Health and Safety. Retrieved on April 27, 2012 From: <http://www.sciencedaily.com/releases/2011/11/111117140420.htm>

Spokane County Assessor; City of Spokane GIS. Retrieved on April 20, 2011 From:
<http://www.spokanecounty.org/Assessor/content.aspx?c=1379>

Spokane Regional Health District. (2012). Residential Survey.

Spokane Police Department. (2012). Police Planning Crime Data December 2010 – December 2011

The State of Working America. (n.d.). The Great Recession. Retrieved on April 30, 2012 From:

World Health Organization. (2012). Health Systems, Health, Wealth and Societal Well-being. Retrieved on April 12, 2012 From:http://www.euro.who.int/__data/assets/pdf_file/0007/164383/e96159.pdf

Zimmerman/Volk. (2009). University District Housing Study. Retrieved on April 30, 2012 From:
<http://www.spokaneuniversitydistrict.com/documents/FinalUniversityDistrict.pdf>.