

# Urban grain and the vibrancy of older neighborhoods: metrics and measures

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## ABSTRACT:

As American cities focus on urban growth and increased density, they must learn to adapt and transform over time. The character of place and pedestrian vibrancy and neighborhood sustainability depends on the accessibility and proximity of services and functions in order for them to be successful. Older neighborhoods – ones that were developed before the dependence on the automobile – are our best examples of walkable, vibrant neighborhood fabric yet are disappearing at an alarming rate across American cities in the name of the a new urban density and under the premise that non ‘historic’ buildings hold little value. Neighborhoods that encompass a variety of textures, building ages and sizes that relate to pedestrian scale and walkability contribute a collective heritage and value to cities over time.

## INTRODUCTION

Current trends of urbanization across the country are focusing on increased density in our cities. While the idea of living at higher densities can combat sprawl, how does this affect existing, older neighborhoods? Many new buildings built for high density lack a sense of historic character and uniqueness of place, and cover entire blocks that don’t lend themselves to a quality pedestrian experience. Density must be combined with livability if we are to make quality cities that make successful places for people. This paper presents a study that suggests that a variety of age, texture and scale in buildings inherently assert a degree of richness in neighborhoods. Preliminary results of the study suggest that fine grain buildings in a block correlate with increased pedestrian activity and therefore urban vibrancy. The research method conducted for the National Trust for Historic Preservation’s Seattle-based Preservation Green Lab in consultation with Copenhagen-based Gehl Architects, ‘urban-quality’ consultants that have led revitalization efforts in over 500 cities around the world.<sup>1</sup> The Gehl approach is a proven observation and survey-based data gathering methodology that is used to measure the impacts of detailed features of the built environment on pedestrian behavior in the public realm. The study was built upon the premise that older, finer grained neighborhoods also contribute to sustainable environments by reducing the need for new construction, especially in the name of urban density, by preserving and reusing what we already have. Ultimately, this phase-one of the project adapted and built upon this ideology and methodology to determine connections between causes and effects in older, fine-grained urban commercial neighborhoods.

While this study considers neighborhood vibrancy and quality, it also recognizes older neighborhoods as contributing significant environmental benefits. Preservation and reuse of our existing buildings and neighborhoods reduce the need for new material and resource consumption, minimize construction and demolition waste to landfills, and use less energy than demolishing and re-constructing new buildings. Most often in the name of density, new, denser neighborhoods are replacing existing ones at a rapid pace in urban cities across America . A recent study by the Brookings Institution reported if we continue with national trends of teardowns, by 2030 we will have demolished and rebuilt nearly one-third of our entire building stock – a staggering total of 82 billion square feet. The energy required to demolish these buildings would power the entire state of California – 37 million people – for a decade.<sup>2</sup> Rather than tearing down and rebuilding, historic buildings and neighborhoods can be upgraded with new technologies to maximize efficiency while maintaining historic integrity.

In the name of density, many older buildings and neighborhoods are demolished in favor of new, higher density construction. These new buildings are often rebuilt at a larger scale to increase density,

incorporate vehicle parking and larger stores that can attract commercial tenants, often chain stores. The result is often buildings that are out of human scale and distinct with no distinct historic texture or neighborhood character. In her book *The Death and Life of Great American Cities*, Jane Jacobs wrote “we need texture and age in our cities,”<sup>3</sup> and promoted the need for vibrant neighborhoods that can incorporate the past as well as establish successful futures. The successful neighborhood experience is intimately tied to the small details that compose a building as well as the neighborhood block. The built environment must be of such a high quality that it supports the way that people live, whether they are sitting, working, playing, walking, talking, or eating. Older neighborhoods with a mixture of historic building types lend themselves to a sense of what can be referred to as “smallness” – or the relationship of the building to the human scale. Smaller, fine grained streets with a variety of buildings not only is sustainable through preservation of our existing resources, but also creates a more vibrant pedestrian experience.

Our bodies and senses have not changed much through modern times, and the basic needs of people remains consistent across cities, and across cultures. The human is a walking being, moving with an average speed of 3 miles per hour and experiencing life through delicate senses. The everyday world is viewed at an average angle of 72 degrees from eye level.<sup>4</sup> When walking through a neighborhood, therefore, the things at ground floor—or eye level—will be most likely to hold someone’s attention. The quality, arrangement, and function of these things are crucial to the legibility of a neighborhood and to our overall impression of the quality of life. The battle for neighborhood quality is won or lost at the small scale. Successful cities rely on buildings that relate to pedestrian activity, and neighborhoods that have a variety of activates and building types, a variety of age in the building fabric and texture can be easily adaptive into new uses that retell their story for generations.

## **METRICS AND MEASURES FOR UNDERSTANDING OLDER NEIGHBORHOODS**

This study examines the ‘urban grain’—defined as the degree to which the quantitative physical features of façades are finely mixed and various at street level. By examining and mapping the building massing, age, texture, functions, rhythm, and accessibility along with pedestrian behavior, the study attempts to assess the following questions:

- How important are scale, age/historic character and texture of ground floor façades to neighborhood success?
- Does a fine urban grain and building age correspond to a more vibrant urban experience?
- Do different user groups exhibit a discernible pattern of behavior in relation to the buildings’ physical character?
- Can a set of metrics be established to measure these qualities and replicated elsewhere?

This initial study measured the quality of urban grain and existing building stock of two neighborhoods in Seattle (Figure 1). This first phase focused on establishing a working set of metrics that could be established as a way to measure urban grain, building age and neighborhood quality in different urban settings. ‘Urban grain’, in this context, was observed on two scales: individual building and entire block. The two sites were older, historic neighborhoods that had blocks of new construction with larger scale buildings inserted within the older fabric. Since people are the primary users of our built environment, the study designed a methodology that looked at both the *physical characteristics* of the street-block, and the *physical activities* of the people-users.

## **STEP ONE: RATING BUILDING AND BLOCK QUALITY**

The study first set out to measure the quality of the neighborhood at both the block and street level. One set of measurements rated the quality of the buildings within each street. Buildings were rated on a scale of one to five with one being a low rating and five being a high rating.<sup>5</sup> Each metric was recorded then entered into a GIS database system that was set up for the study so a variety of scenarios could be pulled from the study. The first metric was *building age*, which was pulled from a GIS database from the City of Seattle. The second metric, *activity and rhythm*, measured the façade

width of the building by a single numerical measurement. The third metric, *materials, quality and maintenance*, rated the overall primary materials and the care they had been treated with over the years. This quality of maintenance can reveal many things about the building; the respect for the building by the owners, the character of the overall street through upkeep and competition, and the longevity and durability of the building itself. *Visual Quality*, the fourth building metric, looked at over all texture and surfaces. In Gehl research, the visual quality and textural interest at the human level contributes to the level of engagement by the pedestrian, and detail and texture are part of that quality. *Physical Quality* looked at the looked at the amount of openings in a building that could be either walked through (doors) or communicated through (open windows) through simple measurements of openings while transparency and visual interest measured the overall transparency, taking into account all transparency (windows and doors) that engaged the pedestrian regardless of whether they could move through them or not. These six building measurements incorporated both quantitative measurements and qualitative measurements, and focused on the individual quality of the buildings, which was then cross-referenced with the block quality measurements.

The second set of neighborhood measurements rated the overall block. Blocks were rated at one side of the street at a time, and on a scale of one to five with one being a low rating and five being a high rating. (Figures 2&3).. Once collected, the data was entered into charts and a GIS database and mapped. The first metric looked at *urban rhythm* of the street. Lively and vibrant streets have an urban rhythm that has diverse functions along the street wall and many doors, windows and openings that result in dynamic contact between inside and out. The second metric was the *fine grain* of the street, which measured how many buildings were on a given block to understand the amount of buildings in relation to the plot size. The third metric took an *average façade width* of the block, dividing the total block width by the number of buildings of the block, and the final score was the building score average, which took an average based on the overall quality of the buildings and the number of buildings on that block (Figures 2 and 3). Each of these scores were then entered into the GIS database where they could then be mapped and analyzed (Figure 4).



**Figure 1:** Areas of study in two Seattle neighborhoods, Belltown and the Pike Pine Corridor

# urban grain

## study summary

### street metrics:

#### [A1] urban rhythm

Lively and vibrant streets have an urban rhythm: 15-20 units and 20-25 doors every 300 feet. Diverse functions along the street wall provide narrow units and many doors, resulting in dynamic contact between inside and out.

#### [A2] fine grain

Fine grain streets have a high diversity of small and medium building widths. These small frontages provide many points of exchange between inside and outside. Conversely, continuous building facades and open, empty lots lack variety and rich sensory experiences.

#### [A3] average facade width

Buildings with shorter facade widths result in a more dynamic street wall, with many opportunities for new functions and pedestrian engagement. The average facade width is calculated by dividing the total block width by the number of buildings on the block.

#### [A4] building score average

Each building on the street will given a score based on its individual characteristics (see [B6]). The average of all building scores for a block constitutes a Block Score Average based on the overall quality of the buildings and the number of buildings on that block.

#### [B1] age

Buildings which adapt to new functions over time and age gracefully contribute greatly to our urban environment. Through time we invest buildings with meaning and the reuse of these older structures speaks to pedestrians through memory and cultural association, as well as through the craftsmanship and detail frequently present in older buildings.

#### [B2] activity & rhythm

Fine grain streets have a high diversity of small and medium building widths. These small frontages provide many points of exchange between inside and outside. Conversely, continuous building facades and open, empty lots lack variety and rich sensory experiences.

#### [B3] materials, quality & maintenance

Materials that are of a good quality and well-maintained create a pleasant atmosphere that help pedestrians feel safe and experience the longevity of a building. A building that is well-maintained is generally treated with respect.



[1] & [2] Small units, many doors. Streets with small permeable buildings make walking trips interactive and inviting for pedestrians.  
 [3] Historic buildings adapt to accommodate changing programmatic needs. This building is both memorable and malleable, built from quality materials and well maintained.



[1] Long, continuous building facades provide no interest or engagement for the pedestrian.  
 [2] Poor material quality does not enrich the public realm and experience for the passerby.  
 [3] Open and empty lots detract from a vibrant pedestrian environment, providing no public functions, visual interest or activity.



## study summary continued

### building metrics:

#### [B4] visual quality

The building is rich with multiple textures, either through materials or through surfaces. Details and varied visual experiences create an engaging and enjoyable pedestrian environment.

#### [B5] physical quality

When a building extends activity into the street (either through operable openings at the ground level or through utilizing space adjacent to facade), the pedestrian is automatically engaged through multiple sensory experiences. A building that relates to human scale and breaks up the facade vertically and horizontally, creates a rhythm for the pedestrian to follow.

#### [B6] transparency & visual interest

A high degree of transparency allows for a healthy relationship between inside and outside. Pedestrians take part in the activity within a building through this visual contact. Transparency in a building at ground level engages pedestrians.

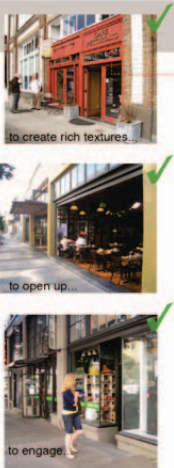


Figure 2 and 3: Street Metrics A1-A4 and Building Metrics B1-B3, Street Metrics A1-A4 and Building Metrics B1-B3, Building Metrics B4-B6



**Figure 4.** GIS maps illustrating [B1] Building Age, [B3] Building Materials and [B7] Building Average, Source: (Author, 2010)

## STEP TWO: MEASURING PEDESTRIAN ACTIVITY

The next set of metrics counted pedestrian use. Understanding how people use the public realm helps understand and define what makes successful streets. Public life is composed of understand how people use space in and around the street and buildings. For this portion of the study, two types of measurements were taken; moving pedestrian counts and static pedestrian counts. Data for both was gathered on pedestrian activity at regular intervals and recorded on maps, and recorded to measure the interaction between pedestrian activity and building quality. Results were entered into a GIS database, which was turned into a set of graphics that could illustrate the results.

The first set of measurements counted moving pedestrians through the street. Researchers stationed themselves at one end of the street for 30 minutes both morning and evening, weekend and weekday, and imagined a laser line running across the sidewalk in one location (Figure 5). For each pedestrian that crossed the line in either direction, a count was recorded using a clicker. Counts were taken by pedestrians only, no wheels (bikes, strollers) were counted. Data was assembled and entered into the GIS database (Figure 6).



**Figure 5:** Moving Pedestrians were counted as if moving through an imaginary line (Source: Gehl Architects 2010).

The second set of people measurements measured how people interacted with the building façade; whether pausing/standing, entering/exiting or sitting. Mapping of stationary pedestrians occurred by standing at the same location as moving counts, for 30 minute intervals, morning and evening, weekend and weekdays. Researchers gathered data at both end of the streets and recorded pedestrian activity entering and exiting buildings, standing, pausing, leaning and sitting. Each of the movements were recorded on maps with notations (Figure 7), and then graphically expressed next to the building and street data through diagrams (Figure 8). Each figure represents exactly one pedestrian in each drawing, the shade corresponding to their activity. This set of diagrams were the most revealing in comparing the specific quality and quantity of pedestrian activity to the quality of building and block data (Figure 9).



Figure 6: Moving pedestrian counts were entered into the GIS database Source: (Author, 2010)

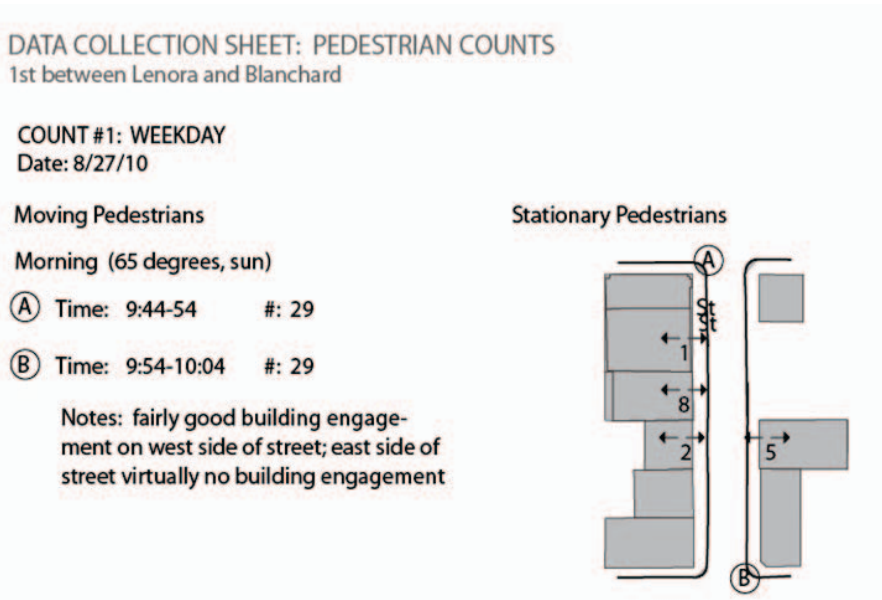
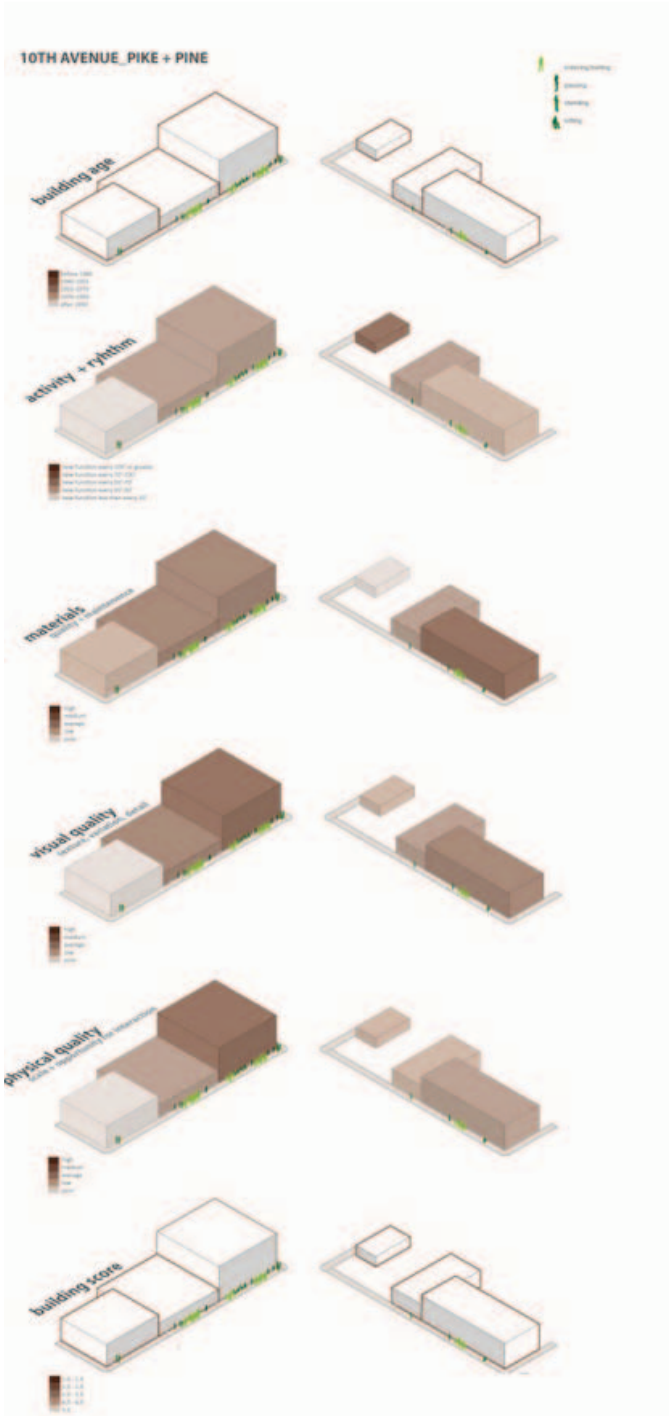
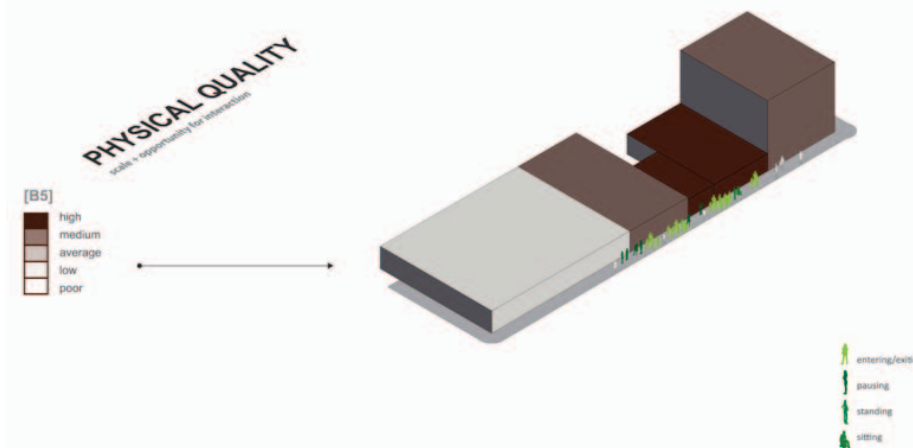


Figure 7: Data illustrating the moving pedestrian counts and how they were recorded Source: (Author, 2010)



**Figure 8:** Diagram of a block with all ratings and stationary pedestrian counts included. Each figure represents one pedestrian, and the shades represent corresponding activity (Source: Author 2010)



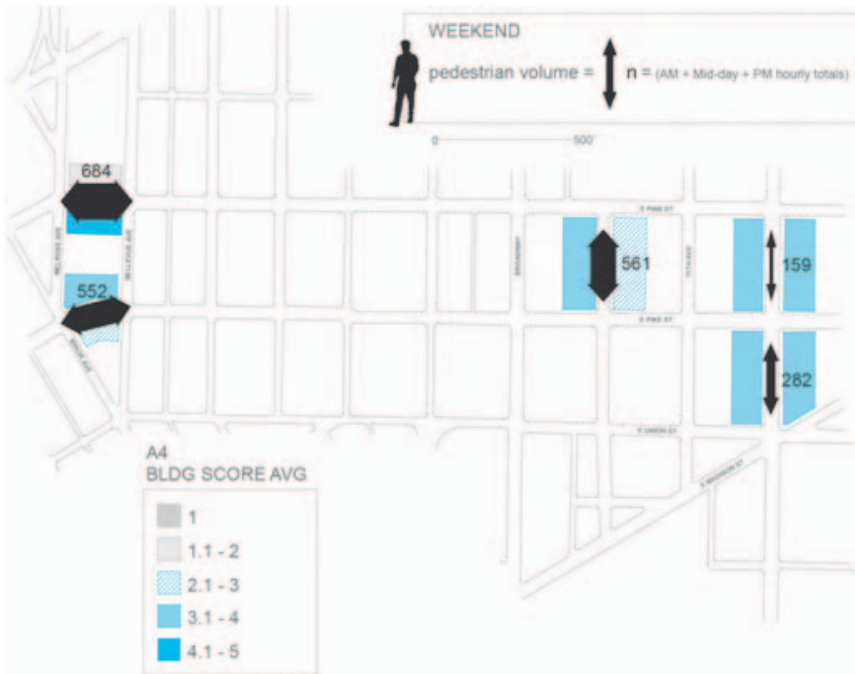
**Figure 9:** Diagram of a block with building rating [B5] and stationary pedestrian counts included. Each figure represents one pedestrian, and the shades represent corresponding activity Source: (Author, 2010)

### CASE STUDY: 12<sup>TH</sup> AT PIKE AND PINE

The Pike Pine Neighborhood is an eclectic low-rise neighborhood just east of downtown Seattle. In 1998, the neighborhood created design guidelines out of concern for the scale of downtown development creeping into the neighborhood. In recent years, despite the current zoning and design guidelines, development pressures have begun to accelerate changes that alter the character of the neighborhood including the demolition of the existing building stock and construction of new buildings out of scale with the urban grain. Like many developing neighborhoods in Seattle and across the US struggling with new urban population growth, the community is balance the desire for density and development with that of physical and cultural continuity in order to accommodate the need for increased residential and commercial capacity. This context made it a good urban studio for the measurement of urban grain and neighborhood vibrancy.

The Pike/Pine corridor has an eclectic mix of older buildings, many of which are vernacular with no formal historic designation. Of a total of 278 buildings within the Pike/Pine study area, 165 (59.4%) are more than 85 years old. Forty-six buildings (16.5%) were built between 1923 and 1945, 51 (18.3%) were built between 1946 and 1995, and 16 (5.8%) were built from 1995 to 2007. The Pike/Pine neighborhood developed as a commercial corridor just east of downtown Seattle and south of the Capitol Hill neighborhood. Through there were residences early on, the neighborhood quickly became a commercial hub of automotive uses known as “auto row” in the early part of the 20th century. The automotive uses established a collection of distinct building types consistent to the neighborhood. The open span 1-4 story concrete and brick buildings held auto-related showrooms, offices, repair, and parking. The open structural bays framed large industrial windows along the street letting in light (along with skylights) and establishing high visibility into the businesses. Over the years some of the automotive uses left and were readily converted to office, retail, and residential uses, though many still define the neighborhood. With the construction of 1-5 in the 1960s, the neighborhood began to decline, but became more populated starting in the late 1970s/early 1980s, and accelerating in the 1990s. Substantial population growth between 1990 and 2007 (21.3%), accompanied by a similar increase in the number of housing units (21.2%), shows its conversion to a mixed use neighborhood, with a large population increase projected for the next twenty years.

Of the many streets studied for this research, the block between Pike and Pine on 12th Avenue summarizes preliminary findings the study most clearly (Figure 10). As seen in the diagrams that combine building and street metrics with pedestrian activity, the east side of 12th was the more utilized and active side of the street (Figure 10). As traffic flowed from all four corners of

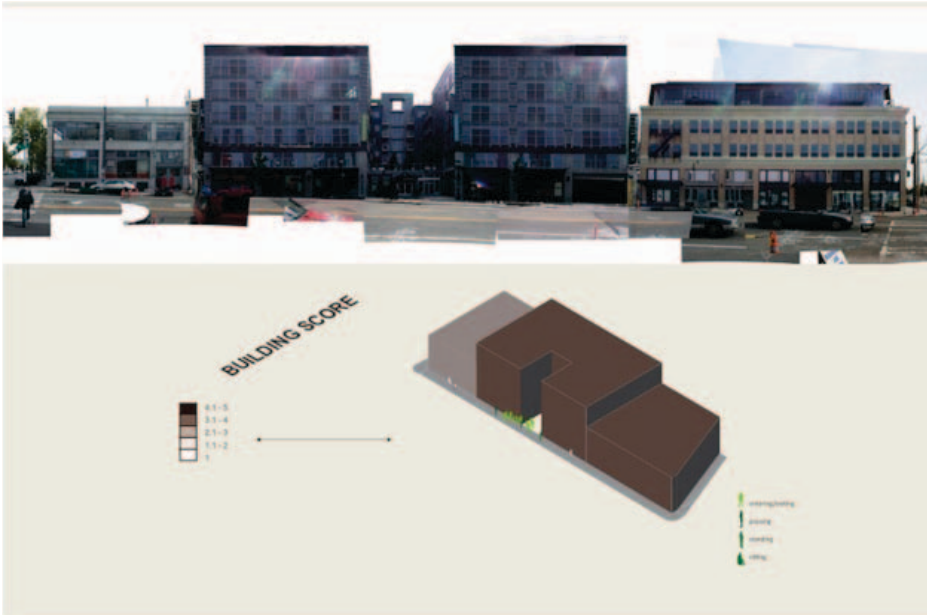


**Figure 10:** A sample GIS map with moving pedestrian count traffic overlaid on overall block ratings Source: (Author, 2010)

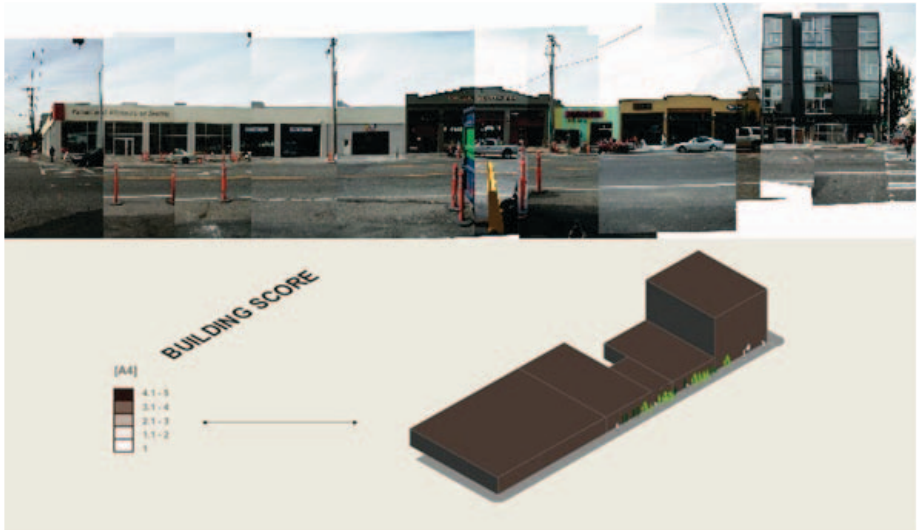
the block, pedestrians tended to cross to the western side to move through the street. Even though both sides of the street were filled with similar functions, the west side with older buildings, finer grain and narrower lots had 46% more pedestrian activity sitting, standing, entering and exiting and pausing on the street. This block also rated highest for granularity, fine grain and older building age. Surrounding streets and metrics taken in the second Seattle neighborhood, Belltown, revealed this was the case in the majority of the streets measured.

These preliminary results indicate that better textured, aged and finer grained streets provide more interesting routes and street activity. Building texture of older buildings provides good sensory experiences through wealth of details and quality of materials, and varied surfaces are permissive in that they invite sensorial interaction. In addition, façade transparency at ground level is a critical determiner of street activity. Pedestrians are often more comfortable knowing what happens inside the buildings they walk past while people inside can passively survey the sidewalk, making for a street that is experienced as safe. Furthermore, the more visual connections between people inside and outside the buildings, the greater the opportunity for social exchange fostering social capital building, a stronger sense of place, and connections within the community at large.

While the east side of the street measured relatively high due to the quality of new construction, it clearly was less occupied – even during the afternoon hours when the building had better quality sunlight. As a newer building, two items rated the building on the low side: building quality and texture, and activity along the street. As seen in the image, the building in the center takes up over 50% of the street façade with a continuous façade of new construction, which in age, grain and texture, rated much lower than its older peers. These characteristics were typical of newer projects which were out of scale with the older fine grained buildings that the made up the historic neighborhood (Figure 11). What did not seem to affect ratings were measurements of material quality, visual quality and transparency, as these can be more integrated into new and older buildings.



**Figure 11:** The east side of 12th in between Pike and Pine showing the new building with a relatively high score of building quality in regards to materials, transparency and functions, but a much lower pedestrian count Source: (Author, 2010)



**Figure 12.** The east side of 12th with new and old buildings that retain the small urban grain. Even though both sides of the street were filled with similar functions, the west side with older buildings and narrower lots had

## CONCLUSION AND FURTHER STUDY

While this study is ongoing, preliminary results of the study provide quantifiable data that suggest a finer grain block with older building ages corresponds to increased pedestrian activity and street vibrancy. Higher ratings were found on blocks that had shorter average building widths that corresponded with older buildings and more durable materials. Blocks that had long, continuous building facades appeared to provide no interest or engagement for the pedestrian, nor did blocks that had open, empty lots, or buildings with poor material quality. As a form of trial and error, many further adjustments in the methodology will be made. Some of these include using a broader study area; recording where bus stops were located; recording business typologies and differentiating between local and chain retail businesses.

While much more analyses of the data and testing needs to be done, the study provides insight into the usefulness of building and pedestrian data and how they can help understand and communicate what makes successful and vibrant urban neighborhoods. In addition, GIS data mapping tools and descriptive graphics provide a dynamic and innovative research tool in assessing and illustrating this information. Further research will include pedestrian demographics, economic data and transportation comparisons. If developed further, these metrics may be useful to help preserve older existing neighborhoods with finer grain in the face of demolition to satisfy urban density development. While density is an important part of our sustainable urban future, livability and quality historic neighborhoods must also exist for a more successful urban future.

### ENDNOTES:

1. <http://www.gehlarchitects.com>
2. Patrice Frey, "Making the Case: Historic Preservation as Sustainable Development" (National Trust for Historic Preservation, 2007).
3. Jane Jacobs, *Death and Life of Great American Cities*. (Random House, Inc. New York, 1961).
4. Jan Gehl, *Life between Buildings* (Copenhagen: Danish Architectural Press, 2003).
5. The study was conducted with a set of baseline measures so the outcome would have consistency