WALKFIRST

Where People Walk:

Methodology for Determining Pedestrian Activity Factors

Part I: Background on the WalkFirst Project

The goal of the WalkFirst project is to improve walking conditions in San Francisco, and encourage walking as a way of getting around the city. The project will identify where people walk, and prioritize how to make safety improvements to best serve pedestrians.

Project Deliverables

- Map of key walking streets in San Francisco
- Method for prioritizing the most important safety improvements
- Preliminary list of pedestrian safety upgrades
- Draft policies to guide City decisions about pedestrian safety and walking conditions
- Examples of street designs to improve the walking environment

Determining priority locations for pedestrian improvements

The WalkFirst project will help the City prioritize where to make pedestrian improvements, informed by four factors: pedestrian activity; pedestrian safety; street characteristics; and project readiness.

- *Pedestrian activity*: Factors (e.g. land use, transit) that determine where people are walking, or where people would walk, given good pedestrian infrastructure.
- *Pedestrian safety and security*: Factors (e.g. locations of pedestrian collisions, injury severity) that determine where there is a need for pedestrian safety improvements.
- *Street Characteristics*: Factors (e.g. sidewalks, crosswalks) that determine the relative state of pedestrian infrastructure, and where there are gaps in that infrastructure. The data for this category is incomplete.
- *Project readiness*: Factors (e.g. available funding, coordination with existing projects) that determine how well positioned a specific project is to be funded and built.

Based on these factors, WalkFirst will create a map of key walking streets in San Francisco and a capital project list of pedestrian improvements. The project list will be preliminary and incomplete, as we do not currently have all the data regarding street characteristics.

Part II: Determining Pedestrian Activity Locations

The following steps will help us identify locations with factors that contribute to high pedestrian activity, and to create a map of key pedestrian streets in San Francisco:

Step 1: Identify Factors that Contribute to Walking

We identified seven **categories** of criteria that relate to where people are walking, or where they *would likely* walk if conditions were better. Categories are *unranked* (not listed in order of importance); however, they will be *weighted* in a later step.

Within each of the 7 categories below, we are considering multiple **factors**. For example, within the category "Access/Need to Walk," we are looking at two factors: % of people who *walk to work* and % of people who take *transit to work*.

Categories and Factors

1. Access/Need to Walk
    - % of people who walk to work
    - % of people who take transit to work
2. Transit Ridership (total number of boardings and alightings)
3. Density of People
    - Population density
    - Job density
4. Pedestrian Generators
    - Tourist destinations
    - Colleges and universities
    - Hospitals, clinics & MOD service providers
    - Public & private schools
    - Parks and open space
    - Shopping districts
    - Senior Centers
5. Vulnerable populations
    - Density of seniors
    - Density of youth
    - Density of persons with disabilities
6. Income
7. Street Slope

Step 2: Determine How to Measure and Score Factors for Each Category

Once we have identified the key categories and factors that contribute to walking, we can measure how each street segment within the city performs for that category.

The descriptions below describe how individual factors for each category would be measured to determine an overall score for the category. All categories will be scored out of a total of 10 points.

Category 1: Access/Need to Walk

"Access/Need to Walk" measures the locations where people are dependent on walking or transit for their daily trips. We are measuring two factors within this category: the percentage of people who walk to work and the percentage of people who take transit to work, for every census block group[1] in the city. These two factors are added together to get a total number for the block group. For each block group, the data has been divided into ten natural breaks[2], and assigned a score of 1 to 10 for the category. The score for that block group is then assigned to each street segment within the block group.[3]

[1] Block groups are the smallest area of measurement in the U.S. Census. This project is using data from the 2000 Census and the 2005-2009 American Community Survey, and will update with 2010 Census data when it is available.
[2] Natural breaks is a data classification method designed to determine the best arrangement of values into different classes, based on where the natural breaks in the data occur.
[3] Streets that form the boundary between two block groups are given the score for the higher of the two.

Category 2: Transit Ridership

"Transit Ridership" measures daily ridership (boardings and alightings) for each stop on Muni bus, MUNI Metro, BART, Caltrain, Transbay Terminal, and Ferry Terminal. For each stop the total ridership has been calculated. 1/8 and 1/4 mile buffers have been applied to each stop, and then points were assigned to the street segment, as shown in the table below. The final street segment score is the greater of the two points (1/8-mile or 1/4 -mile).

Daily Ridership for all Stops within buffer	< 1/8 mile buffer Street Segment points	<1/4 mile buffer Street Segment points
>12,000	10	7
6,001 - 12,000	5	3
1,000 – 6,000	2	1
< 1,000	0	0

Category 3: Density of People

"Density of People" measures the number of people who live or work in each block group. We added together number of residents per acre and the number of employees per acre to get a total number of people per acre for each block group. For each block group, the data has been divided into ten natural breaks, and assigned a score of 1 to 10 for the category. The score for that block group is then assigned to each street segment within the block group. We've also looked at projected future population and jobs for the year 2025, as certain areas of the city are expected to grow considerably.

Category 4: Pedestrian Generators

"Pedestrian Generators" look at the different types of activities or land uses which attract pedestrians. Scores are assigned based on the importance of the pedestrian generator, and the distance from the generator. Categories of pedestrian generators include tourist destinations, colleges and universities, hospitals, clinics, and service providers, public & private schools, parks and open space, shopping districts, and senior centers. Within each of these factors, each pedestrian generator is given a designation based on the scale of the attraction: "regional", "district", or "local."

Pedestrian Attractor	**Scale**	**Criteria**	**Examples/Notes**
Tourist Sites: Average Daily Attendance *Hotels: Estimated # Rooms*	Regional	Tourist Sites: >1,200 visitors Hotels: >500 rooms	Based on survey of top tourist destinations in San Francisco according to SFVCB. Attendance ranged from 1,350-12,877 average daily weekday visitors. e.g. Palace Hotel, Fisherman's Wharf, De Young Museum
	District	Hotels: 100-499 rooms	e.g. St Regis Hotel, Marriott Fisherman's Warf
	Local	Hotels: <100 rooms	e.g. Presidio Inn, Travel Lodge Golden Gate
Colleges & Universities	Regional	All	City College, CCA, USF, UCSF, Academy of Art, University of the

			Pacific
	District	NA	
	Local	NA	
Hospitals: # of beds	Regional	>300 Beds	SF General , Kaiser, CPMC, UCSF, Laguna Honda
	District	<250 Beds	St. Luke's, St Marys'
Medical Clinics	Local		Department of Public Health, and Community Health Network Clinics, MOD service providers
Public & Private Schools	Regional	NA	
	District		Public & Private Elementary, Middle and High Schools
	Local	NA	
Parks & Open Space, Playgrounds	Regional	Large Parks	Regional attracting parks: GGP (entrances only), GGNRA, Presidio, McLaren Park, Candlestick Point Recreation Area
	District	All other parks	Alamo Square, Dolores Park, Franklin Square, etc.
	Local	Playgrounds	Gilman Playground, Esprit Park
Senior Centers	Regional	NA	
	District	NA	
	Local	All	Dunn & Bradstreet data & Community center data from DPH.
Shopping Districts: Zoning Districts	Regional	C-3-R	Downtown shopping: area adjacent to Union Square
		C-2	Fisherman's Wharf and Stonestown(other C-2 areas (NE Embarcadero and Executive Park) are office/commercial, limited retail)
	District	NC-S	Shopping centers
		NC-3, NCT-3	Large-scale neighborhood commercial districts
		NC-2, NCT-2	Medium-scale neighborhood commercial districts
		NCD, NCT	Named neighborhood commercial district
		CVR, CCB	Chinatown commercial districts
	Local	NC-1, NCT-1	Small-scale neighborhood commercial districts

Based on the geographic scale of the destination (regional, district, local) and distance from the destination, we will give each street segment a score from 1 to 10, according to the table below. The final street segment score is the greater of the two points (1/8-mile or 1/4 -mile) for the highest scale attraction within these distances.

Scale	< 1/8 mile	< ¼ mile
Regional	10	7
District	5	3
Local	2	1

Category 5: Vulnerable Populations

"Vulnerable Populations" measures the number of seniors, youth and persons with a disability[4] in each census tract. This category is intended to give added weight to locations with high populations of people who are more dependent on walking and/or transit as well as affected by pedestrian safety. Based on data availability, youth and seniors are measured at the block group level, and persons with a disability are measured at the census tract level. For each category, the data has been divided into ten natural breaks, and assigned a score of 1 to 10 to the street segment. The street segment score for youth and seniors is added to the street segment score for persons with disabilities. Then the total score is divided into ten natural breaks, and that number is the final street segment score for this category.

Category 6: Income

"Income" measures median household income for each block group. This category is included as an equity consideration, to make sure key walking streets are located in all areas of the city, especially areas with lower median household income. For each block group, the data has been divided into ten equal intervals[5], and assigned a score of 1 to 10 for the category. The score for that block group is then assigned to each street segment within the block group.

Category 7: Street Slope

"Street Slope" measures the slope of each street segment within the city. This category is included because people may make choices about which route they walk on based on how steep a street is. For each street segment, the data has been divided into three categories, and assigned a score of 0, 5 or 10 based on the street slope.

% change in street slope	*Street Segment Points*
0-5%	10
6-10%	5
>11%	0

[4] This category includes the following disabilities: sensory disability, physical disability, mental disability, self-care disability, go-outside-home disability, and employment disability. (2000 U.S. Census)

[5] Equal intervals creates categories that are equally spaced from each other numerically, regardless of the distribution of the data. Equal intervals was used, rather then natural breaks, to highlight the income disparities among different areas in San Francisco. The equal intervals approach helps to ensure that the extremes (lowest and highest) are captured in separate categories while the natural breaks approach might group them with nearby data which would diminish some of the disparities.

Step 3: Score Each Street Segment

In Steps 2 and 3, we determined a score for each category for every street segment in the city. By adding together the street segment score for each category, we can provide an overall score for each street segment in the City. This score represents the relative importance of that street segment in terms of contributing to pedestrian activity. This information is shown in what we are referring to as the "Composite Map".

Step 4: Refine Map Based on Public Input and Technical Analysis

Some streets that score high may currently have high levels of pedestrian activity, while others may have low pedestrian activity, even though they scored highly. This may have to do with the pedestrian conditions, which we will also look at as part of this project. That is, some areas have many factors that would contribute to high levels of walking, but people aren't walking there because they don't feel safe or comfortable walking on those particular streets.

The imbalance between a street segment's score and its actual relative levels of pedestrian activity may also be due to factors that our scoring system did not catch. For example, there may be an un-crossable barrier (such as a rail line or a steep hill) that means people could not access a particular destination from a nearby street. We will look at these factors and see if we need to adjust any of the scoring or add any factors in determining a final map.