



Salesforce Transit Center Park Methods

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This investigation was conducted as part of the Landscape Architecture Foundation's 2021 *Case Study Investigation* (CSI) program. CSI matches faculty-student research teams with design practitioners to document the benefits of exemplary high-performing landscape projects. Teams develop methods to quantify environmental, social, and economic benefits and produce Case Study Briefs for LAF's *Landscape Performance Series*.

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The full case study can be found at: <https://landscapeperformance.org/case-study-briefs/salesforce-transit-center-park>

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Environmental Benefits

- ***Manages an estimated 67% of stormwater runoff annually or 2.3 million gallons, equivalent to 3.4 Olympic-size swimming pools. The green roof reduces 53% more annual stormwater runoff than a conventional roof.***

Method: A hydrological model was created for the site using the construction documents through the use of the EPA’s National Stormwater Calculator (SWC) software application. The application uses input data to estimate the annual amount of rainwater and frequency of runoff for a site. Estimates are based on local soil conditions, land cover, historic and rainfall records, in addition to user-supplied data for land cover and low impact development (LID) controls employed.

Using EPA’s National Stormwater Calculator, two site development scenarios were estimated. The current scenario is based on the existing site design in which 56% of the roof is covered in vegetation. The baseline scenario is a conventional roof design utilizing 100% impervious materials. The baseline scenario represents a “typical” approach to development, which was previously considered as a realistic alternative for this site. Parameters used for the calculations are listed below.

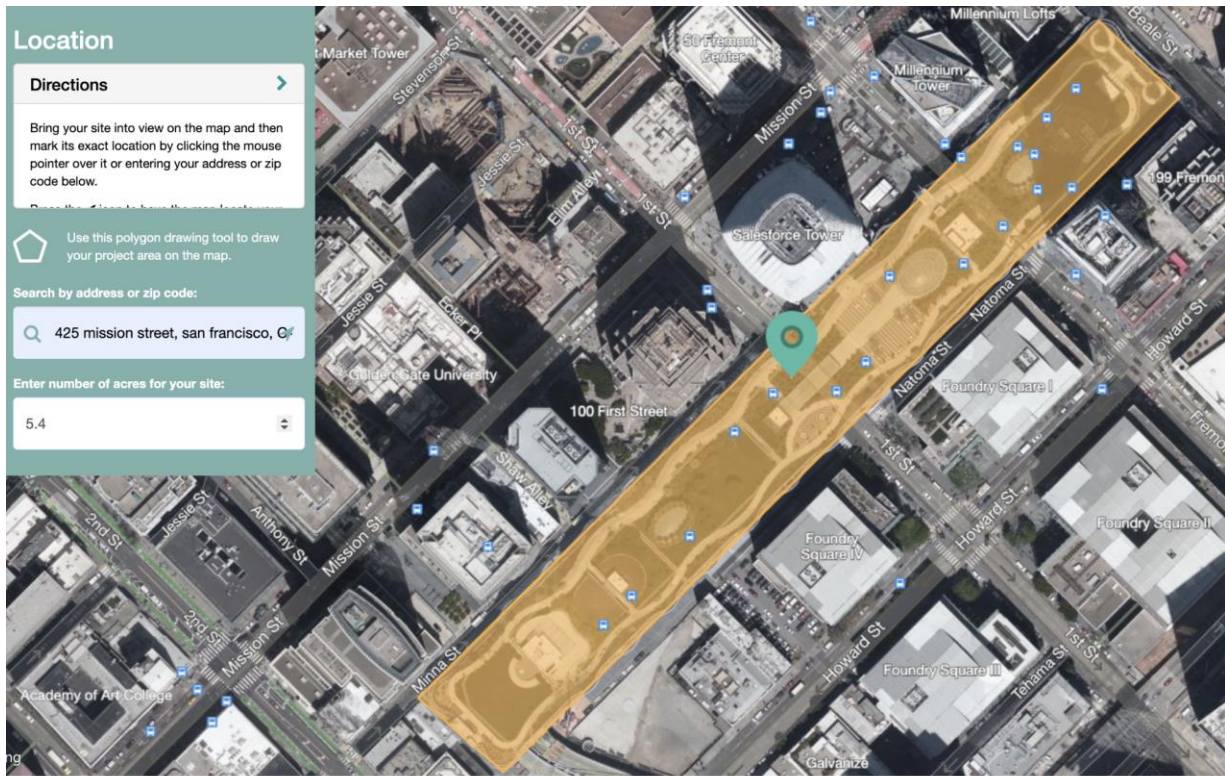


Figure 1: Site location and size

Parameter	Current Scenario	Baseline Scenario
% Forest	5	0
% Meadow	35	0
% Lawn	11	0
% Desert	5	0
% Impervious	44	100
% Rain Gardens	0	0
% Green Roofs	80 / 100	0
% Street Planters	0	0
% Infiltration Basins	0	0
% Permeable Pavement	0	0

Table 1: Land Cover - Current (green roof) and Baseline (conventional roof) scenarios

Calculations: The model results from the National Stormwater Calculator analysis were used to determine the percentage of average annual rainfall captured, infiltrated, and evaporated on the site through the green roof. Calculation results are illustrated with charts and are as following:

Statistic	Current Scenario	Baseline Scenario
Average Annual Rainfall (inches)	22.96	22.96
Average Annual Runoff (inches)	7.48	19.77
Days per Year with Rainfall	43.47	43.47
Days per Year with Runoff	21.59	37.17
Percent of Wet Days Retained	50.34	14.48
Smallest Rainfall w/ Runoff (inches)	0.12	0.10
Largest Rainfall w/o Runoff (inches)	0.55	0.21
Max Rainfall Retained (inches)	3.23	0.18

Table 2: Stormwater performance comparison between current (green roof) and baseline (conventional roof) scenarios

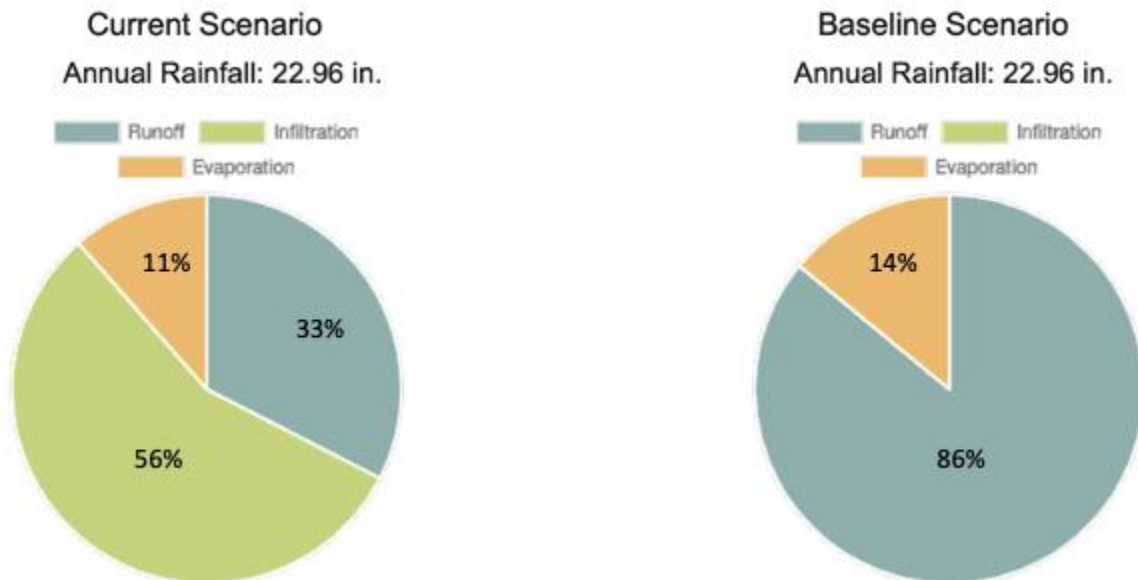


Figure 2: Stormwater performance comparison between Current (green roof) and Baseline (conventional roof) scenarios

Amount of stormwater runoff managed annually onsite in the current scenario is: **56% (infiltration) + 11% (evaporation) = 67%**

Reduced amount of annual stormwater runoff in gallons = (Average annual rainfall – Average annual runoff) * Area of the site * Conversions

Current Scenario: $(22.96 - 7.48) * 0.083 \text{ in/ft} * 5.4 \text{ acres} * 43,560 \text{ sf/acre} * 7.48 \text{ liquid gallon/cu.ft.} = \mathbf{2,260,645 \text{ gallons}}$

An Olympic-sized pool measures 50 meters long and 25 meters wide, and is a minimum of 2 meters deep. Therefore, an Olympic-sized pool holds 660,430 gallons of water. Therefore, 2,260,645 gallons / 660,430 gallons = **3.42 Olympic-size pools**

Percentage of stormwater managed in current (green roof) scenario (67%) minus percentage of stormwater managed in baseline (conventional roof) scenario (14%) = **53% percent additional reduction of stormwater runoff annually with a green roof.**

Sources: *National Stormwater Calculator Mobile Web-Based App (Version 3.2.0). United States Environmental Protection Agency, Accessed July 27, 2021.*

<https://www.epa.gov/water-research/national-stormwater-calculator>

Limitations:

To conduct calculations using EPA National Stormwater Calculator, the percentages of types of land cover on the site are necessary. Because of information limitations, the areas of various land covers were traced and measured using AutoCAD based on the construction documents provided by the design firm, hence, human errors were inevitable, which is a limitation to this part of the calculations.

The Low Impact Development strategies calculated in this analysis (green roofs) were based on information provided by the landscape architect and civil engineer. These calculations do not account for changes in the field during construction or ongoing maintenance, replacement, or repair. Additionally, this analysis was not field verified.

- ***Provides habitat for at least 47 observed bird species including 4 endangered species/species of concern at a federal and/or state level. The site serves as a stopover for 17 migratory birds such as the hooded oriole, Pacific-slope flycatcher, and Townsend's warbler.***

Method:

Bird species counts were based on data from eBird. eBird is an online database that integrates birders' knowledge and experience and documents bird distribution, abundance, habitat use, and trend. A citizen science tool, this global online database allows local birders to collect observations on the presence and abundance of bird species and submit their data. Bird observations were made by the public and entered into the eBird website between August of 2018 and July of 2021. Species detected at Salesforce Park include four state- or federally-listed birds. These include the brown pelican (*Pelecanus occidentalis californicus*, state and federally endangered), the yellow warbler (*Dendroica petechia*, state species of concern), the peregrine falcon (*Falco peregrinus*, state protected), and the willow flycatcher (*Empidonax traillii*, state endangered).

Additionally, a number of migratory birds have been documented using Salesforce Park as a stopover site during migration. These birds were observed at the park itself, not just flying over. They are included in Table 3 below.

hooded oriole	Pacific-slope flycatcher	Townsend's warbler
ruby-crowned kinglet	golden-crowned sparrow	white-throated sparrow
red-breasted sapsucker	western tanager	Nashville warbler
fox sparrow	Lincoln's sparrow	yellow warbler
Wilson's warbler	willow flycatcher	black-throated gray warbler

Table 3: Migratory birds observed at Salesforce Park on eBird

Limitations:

Due to project constraints, the data reported above was not independently verified by the CSI research team.

eBird data is not comprehensive, nor does it include all birds potentially on-site. The outcome is based on the birders' park visit frequency, ability to recognize birds, knowledge of eBird, availability to report birds, etc. The use of eBird has increased as it has gained in popularity.

Bird abundance (number of individuals of a given species) is not considered, just species richness.

Sources:

Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. *Biological Conservation* 142: 2282-2292. Accessed July 18, 2021.

<https://ebird.org/hotspot/L7830130?yr=all&m=&rank=hc>

- **Saves an estimated 36,100 kWh or \$6,500 annually in energy costs as compared to a conventional dark roof.**

Method: Green Roof Energy Calculator by Urban Climate Research Center – Arizona State University was adapted for the calculation. This online tool allows users to enter project-specific information and compare the annual estimated energy performance of a building with a vegetative green roof to the same building with either a dark roof or a white roof.

As specified in the parameters, the site is a **New Office Building in San Francisco, CA** with a total roof area of 218,441 sf. The green roof specified for this building has a growing media depth of 11.5 inches, a **Leaf Area Index** of 1.71, covers approximately 56% of the total roof area (the rest being a white roof), and is **irrigated**. Green areas of the rooftop are all covered with plants adapted to a Mediterranean climate and/or turfgrass. We utilized a mean LAI of 1.71 for the functional type of "Mediterranean Shrubland," derived from Asner et al.,2003 and modified for ASLA LATIS (McCoy 2018, p. 57).

Calculations: The output from the Green Roof Energy Calculator is as following:

**Annual Energy Savings compared to a Dark Roof
(albedo = 0.15)**

Electrical Savings:	36090.9 kWh
Gas Savings:	-0.1 Therms
Total Energy Cost Savings(1):	\$6473.18

Table 4: Output from the Green Roof Energy Calculator showing annual energy savings between a green roof and a conventional dark roof

Sources: McCoy, E. (2018). ASLA LATIS. *A Landscape Performance + Metrics Primer For Landscape Architects: Measuring Landscape Performance On The Ground*

Sailor, D., Bass, B. “Green Roof Energy Calculator.” Arizona State University, Urban Climate Research Center. Accessed July 27, 2021. <https://sustainability-innovation.asu.edu/urban-climate/green-roof-calculator/>

Limitations:

The deepest growing media depth allowable in the calculator is 11.5 in. The green roof at Salesforce Park has an average depth of 3 ft. There is the potential for more energy savings to have been realized if the true depth of the growing media had been used in the calculator.

LAI was estimated (and not field verified) based on the functional type of “Mediterranean Shrubland,” which reflects a generalized representation of plants on the green roof but does not include the full spectrum of plants on the site.

The calculator does not allow simulation of different types of vegetation or growing media which may affect stormwater runoff and the surface energy balance in ways that are not captured simply by varying LAI and growing media depth.

The calculator does not allow the user to explore variations in irrigation schedules. Rather, it is simply assumed that the roof is either irrigated using a standard schedule in summer or not irrigated.

The calculator presents results for only two specific buildings—a 4-story apartment building and a 3- story office building.

Social Benefits

- ***Attracts an average of 1,067 weekday visitors and 917 weekend visitors during summer months and hosts more than 30 regularly scheduled classes and events annually.***

Method: Biederman Redevelopment Ventures, a placemaking consulting firm that creates, redevelops, and operates parks and public spaces conducted annual surveying and visitor counts in Salesforce Transit Park in 2018 and 2019. They shared their surveying results and visitor counts from 2018 and 2019 (the most recently available information not during the COVID-19 pandemic) with the CSI research team.

Counts of individual park activities were taken by Biederman Redevelopment Ventures the course of 2018 and 2019. Attendance, weather, and descriptions of activities were recorded for each activity throughout 2018 and 2019.

Biederman Redevelopment Ventures is responsible for all park programming and events within Salesforce Park; the park's event calendar is available online. Events within the park are broken into 6 general categories: Arts & Culture; Children & Families; Fitness & Wellness; Hobbies & Interests; Music, Theater, and Dance. The different types of events posted to the park's event calendar were summed for calendar years 2018 and 2019.

Calculations:

Thursday	8/30	70, partly sunny	650	66	268	918
Friday	8/31	Very sunny, high	840	Mid 60s	318	1158
Monday	9/3					0
Tuesday	9/4		615		232	847
Wednesday	9/5	High 50s overca	474	Cool, high 50s	213	687
Thursday	9/6	High 50s overca	500	Cool, high 50s	196	696
Friday	9/7	Sunny hot Low 6	735	60s sunny	225	960
Monday	9/10	Mid 60s sunny n	670	mid 60s sunny	170	840
Tuesday	9/11	mid 60s	856	Mid 60s	296	1152
Wednesday	9/12	Warm, high 60s	1042	Chilly 60s	250	1292
Thursday	9/13	Warm, high 60s	850	Chilly 60s	272	1122
Friday	9/14	High 60s - low 7	837	high 60s	251	1088
Monday	9/17	high 50s	584	High 50s, windy	139	723
Tuesday	9/18	high 50s breezy	699	high 50s	152	851
Wednesday	9/19	Sunny and hot. L	823	Very warm high	309	1132
Thursday	9/20	High 70s very hc	844	Mid 70s	287	1131
Friday	9/21	warm with a coo	1033	Cold, high 50s, s	220	1253
Monday	9/24	High 70s	648	low 60s and bree	138	786
						1,062.61 Avg. number of visitors/day on weekdays
WEEKDAYS - 2019						
DAILY COUNTS		12:30 PM		5:30 PM		
Day of Week	Date	Weather	Total	Weather	Total	DAILY TOTALS
Tuesday	8/13		80	1074	70	334
Wednesday	8/14		85	859	75	631
Thursday	8/15		85	985	75	457
Friday	8/16		85	863	65	256
Monday	8/19		65	661	55	143
Tuesday	8/20		80	624	65	322
Wednesday	8/21		80	886	75	344
Thursday	8/22		75	818	65	414
Friday	8/23		80	923	60	424
Monday	8/26		70	1235	60	172
Tuesday	8/27		70	802	60	256
Wednesday	8/28		70	516	60	416
Thursday	8/29		70	851	70	382
Friday	8/30		77	834	65	302
Monday	9/2		60	424	60	42
Tuesday	9/3		65	620	65	223
Wednesday	9/4		65	518	65	285
Thursday	9/5		65	759	60	337
Friday	9/6		70	600	60	299
Tuesday	9/10		70	797	70	308
Wednesday	9/11		75	747	75	352
Thursday	9/12		80	850	80	372
Friday	9/13		85	654	80	547
Monday	9/16		65	503	65	160
Tuesday	9/17		65	786	65	292
Wednesday	9/18		75	501	65	262
Thursday	9/19		75	640	65	321
Friday	9/20		80	663	65	425
Monday	9/23		80	1165	80	203
Tuesday	9/24		100	382	100	311
						1,071.07 Avg. number of visitors/day on weekdays

Table 5: Counts of weekday visitors in 2018/2019 provided by Biederman Redevelopment Ventures

DAILY COUNTS		12:30 PM		3:30 PM				
Day of Week	Date	Weather	Total	Weather	Attendance	TOTALS		
Saturday	8/18		592		909	1501		
Sunday	8/19	Low 70s, Sunny		Mid 70s, Sunny	1074	1580		
Saturday	8/25	65		Low 70s, Sunny	818	1316		
Sunday	8/26	66			679	1154		
Saturday	9/1	Low 60s, Overca		mid 60s, Sunny	731	1289		
Sunday	9/2				891	1419		
Saturday	9/8	sunny, mid 70s		sunny, mid 70s	596	993		
Sunday	9/9	sunny, mid 70s		sunny, mid 70s	538	986		
Saturday	9/15	mid 60s		mid 60s	582	891		
Sunday	9/16	Mid 60s sunny		Mid 60s Sunny	482	866		
Saturday	9/22	Sunny mid 60s v		Sunny mid 60s v	492	884		
Sunday	9/23	high 64 very sun		high 64 very sun	353	780		
						1138.25	Avg. number of visitors	
2019 - WEEKENDS								
DAILY COUNTS		12:30 PM		3:30 PM				
Day of Week	Date	Weather	Total	Weather	Attendance	TOTALS		
Saturday	8/17		75		75	551	1001	
Sunday	8/18		70		70	450	736	
Saturday	8/24		75		75	412	753	
Sunday	8/25		70		70	374	632	
Saturday	8/31		80		80	358	669	
Sunday	9/1		75		75	438	763	
Saturday	9/7		60		60	261	439	
Sunday	9/8		70		70	397	707	
Saturday	9/14		75		75	320	595	
Sunday	9/15		75		75	360	637	
Saturday	9/21		75		75	277	506	
Sunday	9/22		70		70	356	878	
						693	Avg. number of visitors	

Table 6: Counts of weekend visitors in 2018/2019 by Biederman Redevelopment Ventures

Sources:

Biederman Redevelopment Ventures. Salesforce Park Programming and Parkwide Counts 2018; Excel Spreadsheet.

Biederman Redevelopment Ventures. Salesforce Park Programming and Parkwide Counts 2019; Excel Spreadsheet.

Events Calendar: <https://salesforcetransitcenter.com/events/>

Limitations:

Only a few months are accounted for in the counts in 2018 due to wildfires and the resulting smoke in late summer.

Attendance was likely inflated in 2018 because the park had just opened.

Visitor numbers were not taken during summers of 2020 and 2021 due to the COVID-19 pandemic.

- **Improves mood, with 95% of 87 visitors intercepted in the park reporting medium (53%) or high (42%) levels of happiness, while people intercepted at street level below the park reported neutral (22%) or medium (65%) levels of happiness.**

Method:

An online survey app was utilized by the research team to gauge how survey respondents were feeling at that moment. People at street level and people in the park were asked to answer the single question, “How are you feeling right now?” by selecting one of five “smiley face” emoticons, spanning a range of emotions. This intuitive and visual method encouraged interaction and delivered a high response rate by people asked to participate.

The research team administered the survey through iPads and smartphones on two weekend days (a Saturday and a Sunday) at lunch time (between 12 and 1:30pm) and on one weekday (a Monday), also during the lunch period in July. 87 people were sampled at the park level and 40 people were sampled at the street level.

Calculations:

Responses between the two groups (street level and park level) were compared to determine differences in overall emotions between the two groups.

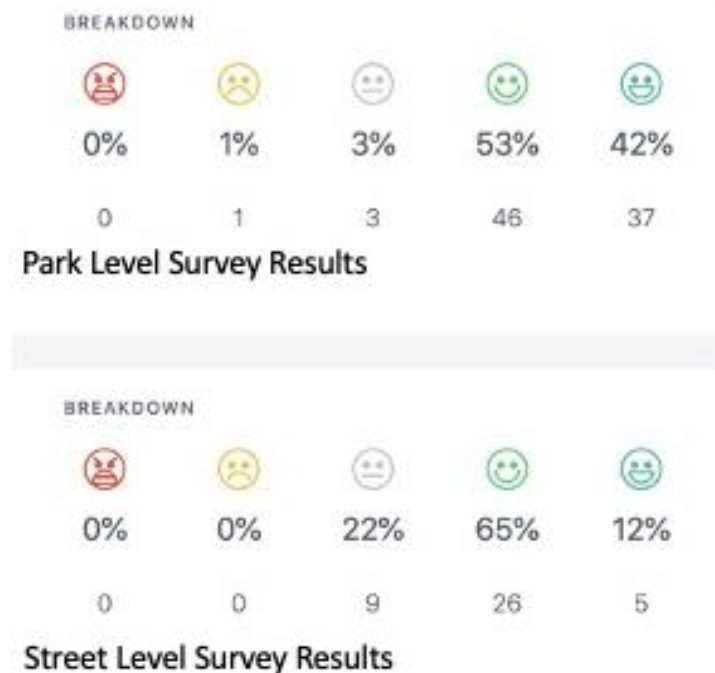


Figure 3: Overview of results from smiley survey at park level and at street level

Park level survey responses:

0 (0%) Very unhappy, 1 (1%) Unhappy, 3 (3%) Neutral, 46 (53%) Happy, and 37 (42%) Very happy

% of happy people + % of very happy people = % people who are happy or very happy.

53% + 42% = **95% of people surveyed at the park level reported feeling happy or very happy**

Street level survey responses:

0 (0%) Very unhappy, 0 (0%) Unhappy, 9 (22%) Neutral, 26 (65%) Happy, and 5 (12%) Very happy

% of neutral people = **22% of people surveyed at street level reported neutral emotions**

% of happy people = **65% of people surveyed at street level reported happy emotions**

Sources:

Surveyapp

https://www.surveyapp.io/offline-survey-app-for-ios-android-devices/?gclid=CjwKCAjwi9-HBhACEiwAPzUhHOMAJeZvO7t-3WVJ1Oaocrf8a_xEgt0wuDvYDeXgV4qE6SF-faj9nxoCi08QAvD_BwE

Limitations:

CSI research team surveyed more people at park level than at street level. This is most likely because there were fewer people to respond to the survey on the street due to COVID-19 and the number of people working from home. The number of park-level visitors was also likely affected by the pandemic.

The sample size was limited due to the number of hours the CSI research team could spend on the site. The research team was aware of bias that can occur with convenience sampling. The team inquired with as many visitors as possible in order to obtain respondents for the survey. Administering the survey during one weekday during work hours and two weekend days affected the cross-section of visitors captured.

It can be difficult to quantify the range of emotion related to the survey question: “How are you feeling right now?”

- ***Supports health and well-being, with 76% of 21 surveyed visitors reporting that the park improved their mental health and well-being. 37% of surveyed visitors reported that they experience high or moderate stress levels at street level, while only 5% of those visitors reported that they experience moderate stress levels and none reported that they experience high stress levels while in the park.***

Background:

Research has shown that time spent in nature can have a positive impact in reducing stress, anxiety, and depression.

Method:

The onsite survey was conducted over four days in July (two week days and two weekend days) by two members of the research team. CSI researchers utilized paper surveys at the park level to collect direct responses from visitors. The survey consisted of nine questions covering two main topics: utilization of Salesforce Park and quality of life (health & well-being). 21 onsite survey responses were retrieved. Survey responses were collected at park level and analyzed to determine visitors' overall mental health and well-being and compared to that of other parks and street level. Results were manually input into Google Forms to quantify responses and determine visitor perceptions of health and well-being while in the park.

Calculations:

Question 1:

- *How has Salesforce Park affected your life in the following aspects?*
 - *Mental health and well-being (Degraded, Neutral, Improved, Does not apply)*

How has Salesforce Park affected your life in the following aspects?

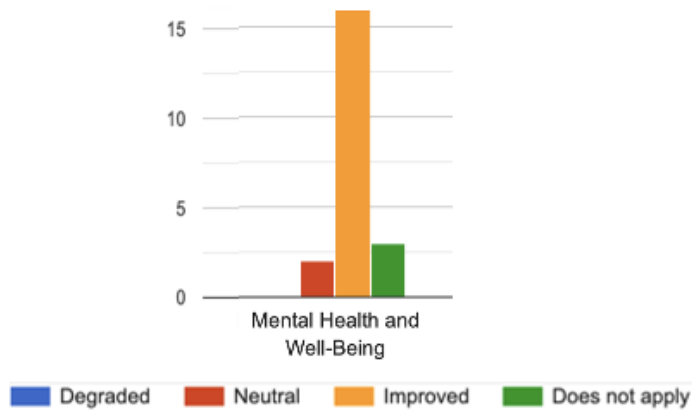


Figure 4: Survey results for Question 1

Survey responses: 2 (10%) Neutral, 16 (76%) Improved, and 3 (14%) Does not apply

76% of survey respondents reported that Salesforce Park improved their mental health and well-being.

Question 2:

Please assess your level of stress on the street and in the neighborhood surrounding the park:

21 responses

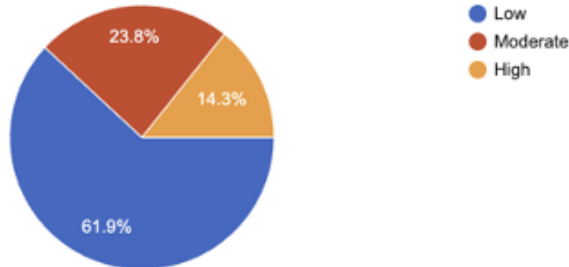


Figure 5: Survey results for Question 2

Survey responses for self-reported levels of stress on the street: 13 (62%) Low, 5 (24%) Moderate, and 3 (14%) High

% of moderately stressed people + % of highly stressed people = % of people reporting moderate to high levels of stress at street level

24% + 14% = 38% of people reported moderate to high levels of stress on the street and in the neighborhood surrounding the park

Question 3:

Please assess your level of stress while in the park:

21 responses

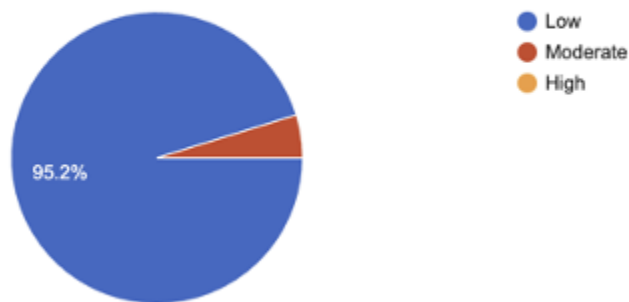


Figure 6: Survey results for Question 3

Responses: 20 (95%) Low, 1 (5%) Moderate, and 0 (0%) High

% of moderately stressed people + % of highly stressed people = % of people reporting moderate to high levels of stress at park level

5% + 0% = 5% of people reported moderate to high levels of stress while in the park

Supplemental information

Questions 4 & 5

Please rate the following statements: (Strongly agree, Agree, Neither agree or disagree, Disagree, Strongly disagree)

- Visiting the park improved my sense of well-being
- Visiting the park helps reduce my stress

Please rate the following statements:

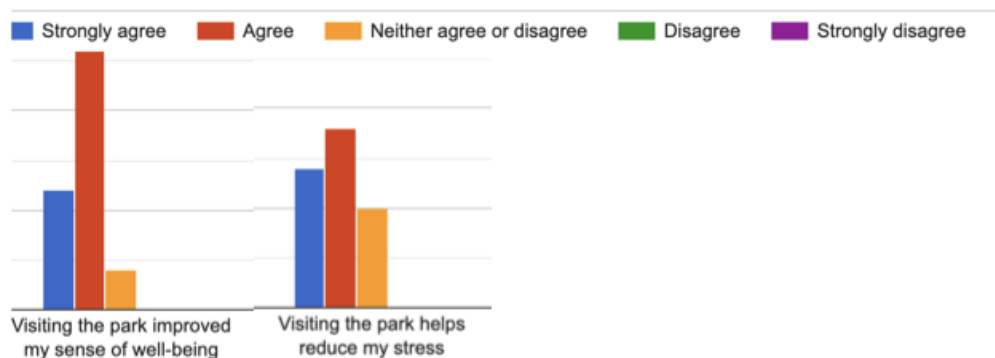


Figure 7: Survey results for Questions 4 & 5

Question 4: *Visiting the park improved my sense of well-being*

Responses: **6 (29%) Strongly agree** **13 (62%) Agree**, and **2 (9%) Neutral**

% of people who strongly agree + % of people who agree = % of people who agree that visiting the park improves their sense of well-being

29% + 62% = 91% of surveyed visitors reported that visiting the park improves their sense of well-being

Question 5: *Visiting the park helps reduce my stress*

Responses: **7 (33%) Strongly agree** **9 (43%) Agree**, and **5 (24%) Neutral**

% of people who strongly agree + % of people who agree = % of people who agree that visiting the park helps reduce their stress

33% + 43% = 76% of surveyed visitors reported that visiting the park helps reduce their stress

Sources:

Salesforce Transit Park CSI Survey Questionnaire

Limitations:

Questions comparing stress level on the ground vs. the park do not account for a number of other variables such as visit intention, work, recreation etc.

The sample size was limited due to a) the number of hours the CSI research team could spend on the site and b) the reduced number of visitors to the park as a result of the COVID-19 pandemic and people working from home. The research team was aware of bias that can occur with convenience sampling. The team inquired with as many visitors as possible in order to obtain respondents for the survey.

The survey was only conducted in July, which cannot capture seasonal variation in users.

- ***Enhances educational opportunities, with 68% of 82 observed visitors stopping for an average of 33 seconds to read interpretive signs on a summer afternoon. 86% of 21 surveyed visitors agreed that they learned something while visiting the park, and 52% believed that visiting the park improved their educational opportunities.***

Background:

In a 2017 Transbay public outreach results memo, researchers from Biederman Redevelopment Ventures, a placemaking consultancy running the Park's programming, outlined the results of a focus group exercise held before park construction to determine the types of programs that might draw residents to the park. Following exercise classes and food-related activities, "Walking Tours" was the third most popular activity, demonstrating a desire by residents and visitors to learn more about the park and its surroundings. For this reason, the educational opportunities provided by the site were of interest to the CSI team.

Methods:

The CSI team used an observational method recognized by the National Science Foundation to conduct an evaluation based on how participants are attracted to signage, how long it holds their attention, and for how long they interact with it (Socolofsky 1997). On three days in July (7/12, 7/14, and 7/17), researchers observed visitors as they walked by two interpretive signs placed in front of gardens along the Park's main pathway. All three days were cloudy and cool, with temperatures in the low 60's. The first sign contains information about the monkey puzzle tree featured in the garden behind it. The second sign highlights the earthquake expansion joint that had been integrated into the design of the park.

Researchers positioned themselves between the monkey puzzle tree sign and the seismic sign so they could observe visitors' reactions to both. As people approached the signs, researchers noted the following: number of people, whether or not they stopped to read the sign, and how long they spent interacting with the sign and garden display. They used a stopwatch to record

the amount of time spent in front of each of the two signs.

To determine whether park visitors learned something while visiting the park and if they valued the educational opportunities presented within the park, researchers utilized an intercept survey. The onsite survey was conducted over four days in July (two weekdays and two weekend days) by two members of the research team. A random selection of park visitors were asked if they would be willing to fill out a 2-page paper survey. The survey consisted of nine questions covering two main topics: utilization of Salesforce Park and quality of life (health & well-being). 21 onsite survey responses were retrieved.

Calculations:

During the three days of signage data collection, a total of 82 people were observed walking by the signs. 38 people were observed on 7/12, 21 people on 7/14, and 23 people on 7/17.

Of the 82 people observed, 26 did not stop to look at either of the signs. The remaining 56 stopped for a duration of between 5 seconds and 2 minutes and 20 seconds.

Monkey Puzzle Tree Interpretive Sign			Monkey Puzzle Tree Interpretive Sign			Monkey Puzzle Tree Interpretive Sign		
Date	Time Stopped	# of People	Date	Time Stopped	# of People	Date	Time Stopped	# of People
7/12	0:15	1	7/14	1:20	2	7/17	0:15	2
	0:25	4		0:00	3		1:00	3
	0:00	1		0:00	1		0:00	2
	0:05	3		0:25	4		1:20	4
	0:00	2		0:05	1		0:05	2
	0:11	1		0:33	1		0:00	2
	0:00	1		0:00	2		1:35	2
	0:00	2		0:00	2		0:00	1
	0:05	3		0:45	2		0:22	1
	0:00	1		0:00	1		0:45	3
	0:13	3	0:00	2	0:20	1		
	0:08	2						
	0:11	1						
	2:20	5						
	0:00	3						
	0:05	3						
0:05	2							

Table 7: Observational data sheets recording the duration and number of visitors stopping to look at the monkey puzzle tree interpretive sign

Number of people stopping / Total number of people observed =
 Percentage of observed visitors stopping to look at signs

56 people stopping / 82 total people observed = .68

68% of 82 observed visitors stopped to observe signs.

Total amount of time stopped in front of signs / Total number of groups stopping =
 Average duration of time spent interacting with interpretive signs and garden displays:

12:26 minutes / 24 groups = Average of 33 seconds

Observed visitors stopped for an average of 33 seconds to read interpretive signs in front of a garden display.

To determine the impact of the signs and the educational value of the park, researchers employed a survey instrument. The following two questions were used to gather the relevant information.

Question 1

- *How has Salesforce Park affected your life in the following aspects?*
 - *Educational opportunities (Degraded, Neutral, Improved, Does not apply)*

How has Salesforce Park affected your life in the following aspects?

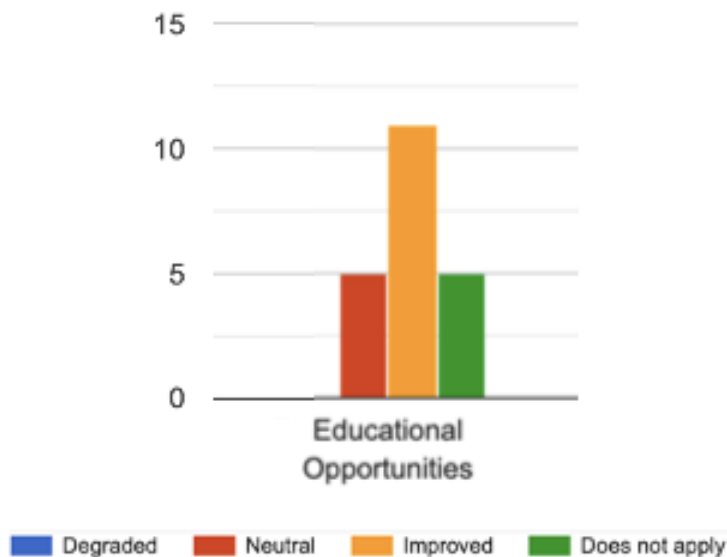


Figure 8: Survey results for Question 1

Survey responses:

5 (24%) Neutral, 11 (52%) Improved, and 5 (24%) Does not apply

52% believed that the park improved their educational opportunities

Question 2

- *Please rate the following statement: "I learned something while visiting the park"*
(Strongly agree, Agree, Neither agree or disagree, Disagree, Strongly disagree)

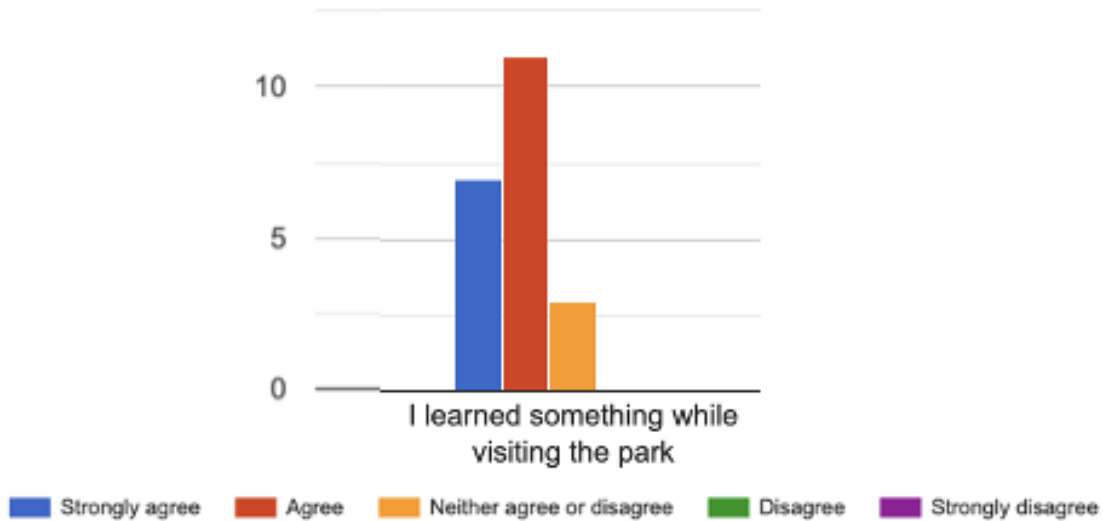


Figure 9: Survey results for Question 2

Survey responses:

7 (33%) Strongly agreed, 11 (53%) Agreed, and 3 (14%) Neither agreed or disagreed

% of people who strongly agreed + % of people who agreed = % people who learned something while visiting the park

33% + 53% = 86% of people surveyed learned something while visiting the park

Sources: Socolofsky, Kathleen. Greenhouse, Ruth, “Successful Exhibit Strategies Utilized in the Desert Botanical Garden” Excerpts from Report to National Science Foundation, Informal Science Education Division, 1997.

Salesforce Transit Park CSI Survey Questionnaire

Limitations:

The sample size was limited due to the number of hours the CSI research team could spend on the site. The research team was aware of bias that can occur with convenience sampling. The team inquired with as many visitors as possible in order to obtain respondents for the survey.

Administering the survey during one week day during work hours and two weekend days affected the cross-section of visitors captured.

- **Reduces noise levels by up to 7.65 decibels compared to the street level, achieving a clearly noticeable change. 67% of 21 surveyed visitors agreed that they hear the sounds of the city less when they are in the park.**

Background:

Street sounds can be absorbed and mitigated by abundant plants on green roofs and distance

from the street. The EPA recommends that urban residential noise levels range between 45-55 decibels (dB) so as not to cause long-term hearing loss, activity interference and annoyance, with a maximum 24-hour exposure of 70dB.

A 3 decibel increase or decrease is the threshold of human ability to perceive it, while a 5 decibel change is clearly noticeable to an average person. A sound seems twice (or half) as loud with a change of 10 decibels.

Method:

Decibel readings were taken with the Decibel Meter dB sound detector 2.5 on an iPhone at a single point in two different zones: one at the roof park level and one at street level. One minute measurements were taken once per day for four days at approximately the same time in both zones on two weekdays and two weekend days (7/11, 7/12, 7/14, 7/17).

To determine the perceived noise reduction of being in a rooftop park, researchers utilized an intercept survey tool. The onsite survey was conducted over four days in July (two weekdays and two weekend days) by two members of the research team. The survey consisted of nine questions covering two main topics: utilization of Salesforce Park and quality of life (health & well-being). 21 onsite survey responses were retrieved.

Calculations:

Decibel levels were averaged using their logarithmic values across observation periods to arrive at a single decibel average for each area.

To determine the difference in decibel levels between the roof level and the street level, the average lower decibel range on the park was subtracted from the lower decibel range at street level.

Roof Recording 1 min	avg dB-A range	Street Recording 1 min	avg dB-A range		
1	49.18 - 51.60	1	45.91 - 61.24		
2	47.3-53.59	2	51.82 - 67.12		
3	49.02 - 53.04	3	47.54 - 60.63		
4	51.09-60.02	4	51.06 - 59.83		
				Difference in range	
TOTAL AVG RANGE	49.14 - 54.56		49.08 - 62.21	00.06- 7.65	14.00%

Table 8: Average dB ranges of park and street level and difference in the range



Filter	Peak	Avg AF	Time
dB-A	51.41	52.03	43 7/14/2021 4:30:52 PM
dB-A	52.77	52.07	48 7/14/2021 4:30:53 PM
dB-A	51.98	52.04	43 7/14/2021 4:30:53 PM
dB-A	51.37	51.87	32 7/14/2021 4:30:53 PM
dB-A	51.74	51.82	43 7/14/2021 4:30:53 PM
dB-A	52.57	51.82	37 7/14/2021 4:30:53 PM
dB-A	51.70	51.76	37 7/14/2021 4:30:53 PM
dB-A	52.26	51.83	59 7/14/2021 4:30:53 PM
dB-A	51.97	51.84	26 7/14/2021 4:30:53 PM
dB-A	52.97	52.07	118 7/14/2021 4:30:53 PM
dB-A	51.40	52.07	86 7/14/2021 4:30:53 PM
dB-A	53.57	52.15	43 7/14/2021 4:30:53 PM
dB-A	63.71	53.33	102 7/14/2021 4:30:54 PM
dB-A	54.28	53.62	37 7/14/2021 4:30:54 PM
dB-A	53.16	53.76	48 7/14/2021 4:30:54 PM
dB-A	54.25	53.93	91 7/14/2021 4:30:54 PM
dB-A	49.65	53.72	43 7/14/2021 4:30:54 PM
dB-A	52.88	53.78	43 7/14/2021 4:30:54 PM
dB-A	53.75	53.96	37 7/14/2021 4:30:54 PM
dB-A	50.83	53.75	37 7/14/2021 4:30:54 PM
dB-A	51.35	53.74	64 7/14/2021 4:30:54 PM
dB-A	54.85	53.87	43 7/14/2021 4:30:54 PM
dB-A	51.92	52.69	43 7/14/2021 4:30:54 PM
dB-A	50.62	52.33	75 7/14/2021 4:30:55 PM
dB-A	53.30	52.34	43 7/14/2021 4:30:55 PM
dB-A	53.34	52.25	53 7/14/2021 4:30:55 PM
dB-A	51.05	52.39	75 7/14/2021 4:30:55 PM
dB-A	51.82	52.28	150 7/14/2021 4:30:55 PM
dB-A	50.95	52.00	43 7/14/2021 4:30:55 PM
dB-A	50.78	52.00	80 7/14/2021 4:30:55 PM
dB-A	51.32	52.00	64 7/14/2021 4:30:55 PM
dB-A	49.91	51.50	43 7/14/2021 4:30:55 PM
dB-A	52.54	51.56	43 7/14/2021 4:30:55 PM
dB-A	50.10	51.51	37 7/14/2021 4:30:55 PM
dB-A	51.77	51.36	48 7/14/2021 4:30:56 PM
dB-A	51.17	51.14	48 7/14/2021 4:30:56 PM
dB-A	52.08	51.24	43 7/14/2021 4:30:56 PM
dB-A	50.27	51.09	37 7/14/2021 4:30:56 PM

A)

B)

Figure 10: A) Decibel and frequency recording taken on 7/14/2021 from rooftop park, and B) Corresponding analysis.

To determine the perceived noise reduction of being in a rooftop park, researchers employed a survey instrument. See above Educational Benefit for full survey methods. One question was used to gather the relevant information.

Question 1

Please rate the following statements: *I hear the sounds of the city less when I am in the park.*

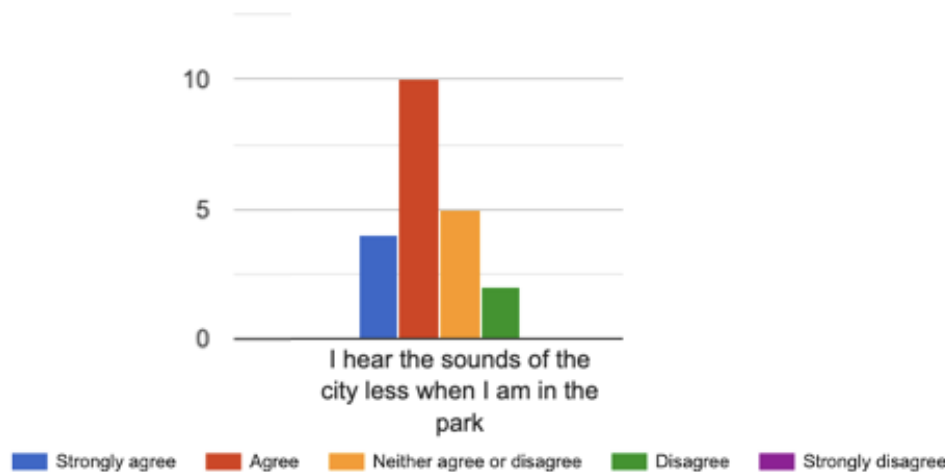


Figure 11: Survey results for Question 1

Survey responses:

4 (19%) Strongly agreed, 10 (48%) Agreed, 5 (24%) Neither agreed or disagreed, and 2 (9%) Disagreed

% of people who strongly agreed + % of people who agreed = % people who believe they hear the sounds of the city less when they are in the park.

19% + 48% = 67% of people surveyed agreed that they hear the sounds of the city less when they are in the park.

Sources:

Decibel Meter dB sound detector 2.6

Salesforce Transit Park CSI Survey Questionnaire

Limitations:

CSI research team only had one iPhone with the decibel application which thus necessitated taking rooftop and street level noise readings one after another rather than simultaneously.

The precision and accuracy of the application is limited to the device microphone capabilities. It is not, therefore, recommended to use the app as a high quality professional grade meter. Professional equipment might produce more accurate results.

The dB reading obtained from the app is between 20 to 120 decibels without any calibration. Audible frequencies are limited to the standard range of 20 to 20,000 Hz.

Economic Benefits

- ***Contributed to a \$60,000 higher assessed property value on average, or \$40 more per sf, for condos with views of Salesforce Park compared to similarly sized condos overlooking the street.***

Background:

Research demonstrates that properties located near parks or open space derive a value premium. In addition, people are often willing to pay more for a home with a view overlooking green space.

Method:

Analysis was performed on 13 condo units at one of the residential buildings adjacent to and overlooking Salesforce Park. The 13 condos were selected based on the following factors: square footage, number of bedrooms and bathrooms, location within the building (street view or park view), and floor level (any units below the 5th floor were eliminated from the comparison because the park is above the 4th story of the Transit Center). The similarly sized 2 bedroom/two bath J (1245 sf) and G (1246 sf) units in the building were then selected for the

comparison. G units overlook the street, and J units have views of the park.

Using the Zillow “Off Market” function, the CSI research team was able to determine the estimated value of seven J units and six G units that matched the team’s search criteria.



Figure 12: Floor plan of condo units in a residential building adjacent to Salesforce Park. G units overlook the park. J units overlook the street.

Calculations:

ESTIMATED VALUE OF SIMILAR SIZED APTS @ 301 MISSION						
UNIT	Square Footage	Zillow Est. Price		UNIT	Square Footage	Zillow Est. Price
14J	1245 SF	\$1,321,600.00		10G	1246 SF	\$1,331,000.00
23J	1245 SF	\$1,371,700.00		9G	1246 SF	\$1,439,600.00
7J	1245 SF	\$1,403,200.00		21G	1246 SF	\$1,460,600.00
25J	1245 SF	\$1,424,900.00		19G	1246 SF	\$1,462,800.00
17J	1245 SF	\$1,425,200.00		20G	1246 SF	\$1,472,300.00
24J	1245 SF	\$1,440,800.00		11G	1246 SF	\$1,525,900.00
6J	1245 SF	\$1,447,900.00				
		\$1,397,900.00	AVG. VALUE			\$1,448,700.00
						AVG. VALUE

Table 9: Comparison of estimated values of similarly sized condos

1245-sf J units, which do not have views of the park, varied in price from \$1,321,600 to \$1,447,900, with an average estimated value of \$1,397,900 by Zillow. 1246-sf G units overlooking the park varied in price between \$1,331,000 to \$1,525,900, with an average estimated value of \$1,448,700.

(Avg Value G Unit - Avg Value J unit = \$ Increase in assessed value of units with park view)
 (\$1,448,700 - \$1,397,900 = **\$50,800 higher average assessed value of units with park view**)

Average cost per square foot

Avg Value G unit / Total SF (\$1,448,700 / 1246 = \$1162 per square foot for a G Unit)

Avg Value J Unit / Total SF (\$1,397,900 / 1245 = \$1122 per square foot for a J Unit)

\$1162 - \$1122 = **\$40 more per square foot for a G unit than a J unit**

Sources:

Zillow: <https://www.zillow.com/b/301-mission-st-san-francisco-ca-5Xj395/>

Millennium Tower San Francisco: <https://www.millenniumtowersanfrancisco.com/floorplans.html>

Limitations:

Zillow property assessments are only as accurate as the data behind them, meaning they may be outdated or incorrect. There may be mistakes in property taxes paid or tax assessments, and estimates may not include any upgrades or improvements made by homeowners.

CSI team was only able to base comparison of J and G units on square footage and location within the building (overlooking or not overlooking the park. Several other variables could also have affected the estimated value of the two condo types.

It was impossible to find two types of units that were identical to each other except for their views. Unlike the J units, which run along the side of the building, the G units wrap around a corner. This corner location could also potentially explain their higher assessed value.

Features

- ***Created a total of 96,432 sf of pollinator and wildlife habitat encompassing 45% of the rooftop. This includes 11 California native tree species and 34 California native herbaceous plant species.***

Background:

Primarily native plants were selected in order to optimize the amount of habitat created for native wildlife species.

Method:

The CSI team selected plant species considered to be habitat for beneficial pollinators or other species of interest within the site's ecoregion. Project documents, plant lists, and site observations were utilized to identify the pollinator habitat areas on the project site.

The total square footage of pollinator and wildlife habitat was calculated using AutoCAD. Paved areas (paths, walkways, plazas, play area) were excluded from the calculation, as were expanses of lawn. Gardens utilized in the calculation included the following: Mediterranean Basin, Australian Garden, South African Garden, Chilean Garden, Fog + Wind Garden, Oak Meadow, California Garden, Redwood Forest, and Wetland Garden.

Calculations:

Utilizing existing plant lists and project documents, the CSI Research Team **identified 11 California native tree species and 34 native herbaceous plant species in the park.**

<i>Aesculus californica</i>	<i>Quercus agrifolia</i>
<i>Calocedrus decurrens</i>	<i>Quercus engelmannii</i>
<i>Cupressus macrocarpa</i>	<i>Quercus tomentella</i>
<i>Lyonothamnus floribundus</i>	<i>Sequoia sempervirens</i>
<i>Pinus torreyana</i>	<i>Sequoiadendron giganteum</i>
<i>Platanus racemosa</i>	

Table 10: California native tree species in Salesforce Park (11)

<i>Arctostaphylos 'Howard McMinn'</i>	<i>Iris douglasiana</i>
<i>Arctostaphylos 'John Dourley'</i>	<i>Juncus effusus 'Quartz Creek'</i>
<i>Arctostaphylos pajaroensis 'Paradise'</i>	<i>Juncus patens 'Elk Blue'</i>
<i>Calamagrostis foliosa</i>	<i>Lupinus albifrons</i>
<i>Ceanothus arboreus "Cliff Schmidt"</i>	<i>Lupinus arboreus</i>
<i>Ceanothus 'Concha'</i>	<i>Mimulus aurantiacus</i>
<i>Ceanothus 'Frosty Blue'</i>	<i>Muhlenbergia rigens</i>
<i>Ceanothus 'Ray Hartman'</i>	<i>Myrica californica</i>
<i>Ceanothus 'Yankee Point'</i>	<i>Rhamnus californica 'Eve Case'</i>
<i>Cornus sericea 'Isanti'</i>	<i>Rhus integrifolia</i>
<i>Erigeron glaucus</i>	<i>Ribes aureum</i>
<i>Eriogonum giganteum</i>	<i>Ribes californicum</i>
<i>Eriogonum grande rubescens</i>	<i>Ribes sanguineum</i>
<i>Eriogonum latifolium</i>	<i>Romneya coulteri</i>
<i>Eriophyllum nevinii 'Canyon Silver'</i>	<i>Rubus parvifolius</i>
<i>Festuca californica</i>	<i>Salvia apiana</i>
<i>Garrya elliptica</i>	<i>Salvia clevelandii 'Winnfred Gilman'</i>
<i>Heteromeles arbutifolia</i>	<i>Symphoricarpos albus</i>
<i>Heuchera 'Santa Ana Cardinal'</i>	<i>Woodwardia fimbriata</i>

Table 11: California native herbaceous plant species in Salesforce Park (34)

Sources:

"Transbay Roof Park Landscape Maintenance Manual." PWP Landscape Architecture, December, 2019.

Limitations:

The CSI research team was unable to verify quantities of each of the species planted on the site.

The inclusion of pollinator plant species in the park doesn't necessarily indicate that pollinators are visiting those plants. This can be especially true in a roof garden situation where pollinators must first be able to locate and reach the roof.