SFpark

Parking Garage Data Guide

September 26, 2013

SFpark

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1 Introduction

This document describes how garage occupancy, usage and payment data is collected and processed for analysis by SF*park*; it also describes how garage rates and information about the garage location and policies are collected and stored. The SFMTA garage revenue-control vendor collects data on each garage user at the entry, payment and exit points of the garage. The vendor sends that data to the SFpark data warehouse, and the data warehouse receives, reviews, interprets and aggregates that data to create the garage availability feed for web/app developers, occupancy reports, and usage/payment reports in the SFpark Oracle Business Intelligence tool. The data collection process, and SFpark's business rules for the review, interpretation and aggregation of garage data, are discussed below.

1.1 Timeline

Garage data is available for the years 2007 through present. Older data sets are not available for all SF*park* garages.

1.2 Availability of Data

Garage data are available by request. For all data requests and related inquiries, please contact info@sfpark.org and put "SFpark evaluation data request" in the subject line.

Two datasets are readily available: Garage entries and exits and payment transactions for April/May 2011, 2012 and 2013. The file names, formats and sizes are as follows:

- File name: SFpark_GarageData_EntriesExits_20112013.xlsx
- File format: 2010 MS Office Excel Workbook
- File size: 178 KB

- File name: SFpark_GarageData_PaymentTransactions_20112013.csv
- File format: 2010 MS Office Excel Comma Separated Values File
- File size: 73.6 MB

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2 Data Dictionaries

2.1 Entries and Exits

FIELD NAME	DESCRIPTION	EXAMPLE
Facility name	Name of garage	16th & Hoff
Off Street Parking ID	Individual identifying number given to each garage	930
Parking Management District	Name of pilot area in which garage sits	Mission
Usage type	Type of parker (transient, monthly, debit, valet, or undefined)	Transient = all who pay by the hour or day; monthly = all who pay by the month; valet = hotel customers who are valet parked at Union Square garage; debit = debit card used by some drivers to pay for parking, cost is debited from their accounts; undefined = vendor unable to provide usage type
Date	Date	4/1/2011
Total entries	All entries between Midnight and Midnight on Date specified	189.00
Total exits	All exits between Midnight and Midnight on Date specified	161.00

2.2 Payment Transactions

FIELD NAME	DESCRIPTION
Parking Management District	Pilot or control area in which garage is located
Garage name	Name of garage
Entry date and time	Time car entered garage
Exit date and time	Time car exited garage
Payment amount	Amount paid for parking
Payment type	Type of payment (cash, card, or short money)

3 Preliminary considerations

3.1 SFpark collects raw data whenever possible

SFpark collects raw data, rather than derived calculations, whenever possible. The SFpark data warehouse is designed to collect extremely large amounts of data. Because of the possibility of vendor error in creating derived calculations, it was judged to be safer and more responsible to collect raw data and make all derivative calculations from that data.

Some examples of raw data collected instead of derivative calculations:

- Garage occupancy and capacity, rather than a single availability number
- All entries and all exits, rather than full sessions upon a customer's exit
- Separate entry/exit and payment data (linked in the data warehouse by ticket number), rather than receiving all entry/exit and payment data in one feed upon a customer's exit

3.2 Determining accurate garage capacities

Garage parking space availability is the product of two numbers: occupancy (cars in the garage) and capacity (the number of spaces in the garage). Subtracting occupancy from capacity yields the number of available spaces in a garage.

On SFMTA.com, the SFMTA lists estimated capacities for each of the garages under its management, but garage capacity is a fluid number. A garage has a certain number of marked spaces, but it can hold more (or less) than its marked capacity based on a number of factors. These factors include, among other things:

- Valet staffing levels
- Floor openings/closures
- Maintenance/repair work
- Spaces held for special event or monthly parkers

The garage capacity can change during the day, or from one day to the next, based on how many cars can be fit into the garage at any given time. Determining accurate capacity numbers was essential to showing accurate garage availability in the real-time availability feed, which is, in turn, essential for customers using the data feed to find available parking spaces in real time.

SFpark staff worked with each garage operator to determine correct capacities at all garages on all days and at all times of day. Once the capacity numbers for different days and times of day were determined, SFpark staff directed the garage revenue-control vendor to include those in the real-time garage

availability feed. If garage capacity amounts, days or times change (due to, for example, an increase in valet-parker staffing levels), those changes are communicated to SFpark and to the garage revenue-control vendor to update the data feed. If garage capacity changes unexpectedly or temporarily, the garage operator has the ability to update the garage capacity number at the garage location.

SFpark garage capacities, as of March 19, 2013:

GARAGE	CAPACITY
Moscone	752
Lombard	205
Golden Gateway	1150
St. Mary's Square	392, 865 (Mon-Fri, 6am-5pm)
Mission-Bartlett	205, 230 (Fri-Sat 7pm-10pm)
16th & Hoff	58, 70 (Fri-Sat 6pm-10pm)
Japan Center	745
Japan Center Annex	175
Civic Center	843
Union Square	800
Ellis-O'Farrell	661 M-Tu, 691 W-Th, 820 F, 950 Sat, 820 Sun
Sutter Stockton	1650
Fifth & Mission	2585
Performing Arts	600

4 Data collection

4.1 Garage occupancy

4.1.1 Garage car counts

The garage revenue-control vendor keeps track of how many cars are in the garage at any given time using equipment on each entry/exit lane. Entering/exiting cars go through a three-step process:

1. Roll over the “loop counter” (essentially a metal detector) that engages the ticket machine.
2. Hourly parkers press the button for a ticket upon entry, or insert their ticket upon exit. Monthly parkers scan their monthly parker card.
3. The gate goes up to let the car enter or exit the garage, then down once the car has cleared the gate.

Each time this process is completed, the revenue-control system counts a car entering or exiting the garage, and updates the total count of cars in the garage on a proprietary car-counting program. This data is sent to the SFpark data warehouse.

4.1.2 Manual updates to garage car counts

The garage car count process is relatively effective at keeping an accurate count of cars in the garage, but errors can be introduced in the following ways:

- More than one car entering/exiting through the gate at one time
- Cars or motorcycles deliberately avoiding the ticket/gate system when entering/exiting the garage
- Failure of one or more entry/exit gates to count or transmit an entry/exit

To address the potential introduction of error into the car counts, the SFMTA requires garages to count manually the number of cars in the garage at least once per day, and update the car count to match the manual count.

Each manual count update is recorded in the garage system and sent to the SFpark data warehouse.

4.2 Garage usage/payment

The garage revenue-control equipment collects several data points for each car that enters and exits the garage, and sends those data points to the SFpark data warehouse:

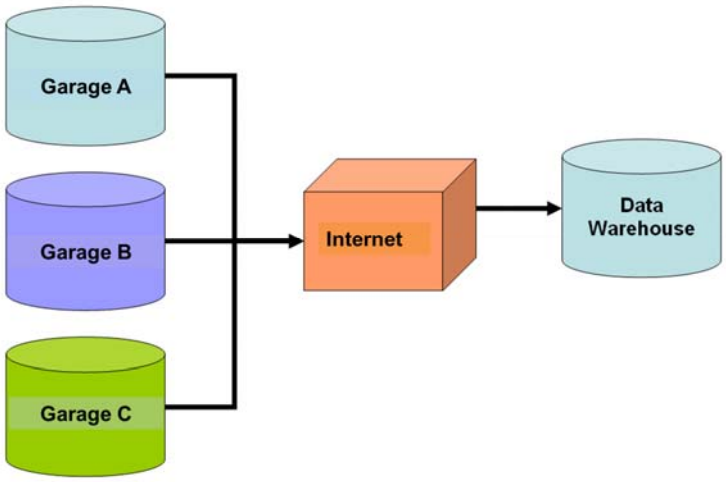
- Upon entry
    - Entry time
    - Ticket number

- Upon exit
    - Entry time
    - Exit time
    - Ticket number
    - Amount paid
    - Discounts received
    - Special rates charged (early bird, special event)
    - Method of payment (cash or card)
    - Pay station used

5 Data feed requirements and specifications

5.1 Garage communications with SFpark data warehouse

To enable the flow of data from garages to the SFpark data warehouse, servers installed in the garage communicate directly with the SFpark servers housed at SFMTA headquarters.



5.2 Garage occupancy

5.2.1 Garage car counts

Every 60 seconds, the garage car counting program automatically sends the following data to the SFpark data warehouse:

FIELD NAME	DEFINITION
VENDOR_ID	Unique vendor identifier
TRANSMISSION_ID	Transmission number generated by vendor; should not be repeated
TRANSMISSION_DATETIME	Date and time of message transmission
OSP_ID	Unique garage identifier (“OSP” = off-street parking)
OCCUPIED_SPACES	Number of cars in garage at time of transmission
CAPACITY	Number of parking spaces in the garage at time of transmission
DISPLAY_STATUS	Not used (set to “null”)

The XML specifications for this “occupancy feed” appear in Appendix A below.

5.2.2 Manual updates to garage car counts

Whenever a garage employee updates the garage car count (i.e., in real-time), the garage sends a transmission to the SFpark data warehouse that includes the following information (elements included in the garage occupancy feed above are not repeated here):

FIELD NAME	DEFINITION
OPERATOR_NAME	Identifier of garage employee logged into garage system at time of manual adjustment to the car count
ADJUSTMENT_TYPE	Whether the adjustment to the car count is either (1) a difference from the current OCCUPIED_SPACES count, (2) a new count of OCCUPIED_SPACES, or (3) a new count for CAPACITY
ADJUSTMENT_VALUE	Amount of car count adjustment (e.g., -10 or 110)

5.2.3 Garage usage/payment data

Garage usage/payment data is divided into four distinct data feeds:

- "Session" – entries and exits
- "Transient payment" – payments by hourly parkers
- "Monthly payment" – payments by monthly parkers
- "Statistic" – aggregated data regarding tickets issued, gate entries/exits, etc., used for auditing purposes

Each data feed includes the elements listed in the data dictionary in section 2 (elements included in the garage car count feed are not repeated here):

SESSION FEED	
FIELD NAME	**DEFINITION**
USAGE_TYPE	Type of customer—e.g., transient (hourly) or monthly
MEDIA_TYPE	Type of ticket/card used for entry (e.g., magnetic stripe, monthly scan card)
FACILITY_CODE	Unique numerical identifier for each garage (not used because duplicative of OSP_ID)
DOC_NUMBER	Ticket or monthly customer identification number
ENTRY_DATETIME	Date and time of customer's entry into the garage
EXIT_DATETIME	Date and time of customer's exit from the garage

TRANSIENT PAYMENT FEED	
FIELD NAME	**DEFINITION**
PAYMENT_DATETIME	Date and time of payment by customer
INVOICE_NUMBER	Numerical identifier attached to payment
STATION	Numerical identifier of payment location (cashier booth or pay station)
CASHIER_ID	Identifier of employee who processed the transaction (if applicable)

RATE_TYPE	Type of rate charged to the customer (e.g., hourly, special event)
AM-OFFPEAK	Whether customer received the AM Off-Peak discount (yes or no)
PM-OFFPEAK	Whether customer received the PM Off-Peak discount (yes or no)
PAYMENT_TYPE	Form of payment used by customer (e.g., card or cash)
PAYMENT_AMOUNT	Total amount paid by customer
DISCOUNT_TYPE_1	Description of any discount (such as a validation) received by the customer
DISCOUNT_AMOUNT_1	Amount of discount received
DISCOUNT_TYPE_2	Description of any additional discount (such as a validation) received by the customer
DISCOUNT_AMOUNT_2	Amount of additional discount received
AUTO	Whether payment was processed automatically: made at a pay station (yes) or to a person (no)

MONTHLY PAYMENT FEED	
FIELD NAME	**DEFINITION**
ACCOUNT_NUMBER	Monthly customer's account number
RATE_TYPE	Type of monthly rate paid (e.g., regular, reserved, carpool)

STATISTIC FEED	
FIELD NAME	**DEFINITION**
STAT_DATE	Date for which garage information is being provided
NUMBER_OF_TICKETS	Number of tickets dispensed by garage ticket machines

NUMBER_OF_GATE_ENTRY	Number of cars through the garage entry gates
NUMBER_OF_GATE_EXIT	Number of cars through the garage exit gates
LOOP_COUNTER_ARMING	Number of times cars rolled over the metal detector in front of garage gates
LOOP_COUNTER_CLOSING	Number of times cars rolled over the metal detector behind garage gates

6 Performance standards and measurement

6.1 Occupancy data

6.1.1 Real-time versus historical uses for the data

The occupancy data serves two principal purposes: (1) to provide real-time parking availability information to potential customers; and (2) to provide the basis for periodic garage parking rate adjustments and other analyses of garage performance. For purpose (1), the occupancy feed must be constantly monitored for real-time delivery and accuracy, and any interruptions in the data feed or failures in data quality must be remedied as quickly as possible. The procedures in place to monitor real-time data delivery and accuracy are described below.

For purpose (2), short data gaps or other minor data-quality issues are less pressing because (a) data analysis is averaged over many hours and days, and (b) when the garage counting program and systems are operating properly, occupancy data is stored in the form of daily logs at the garage location. These daily logs can be loaded into the SFpark data warehouse, and data gaps that result from an interruption of the garage's internet connection can be filled in.

6.1.2 Data review and verification

To check the delivery and quality of the occupancy data feed (which is fed by the garage car-counting program) before making it public, SFpark staff undertook the following verification procedures.

SFpark staff compared manual counts of cars in garages (by SFpark staff) to the count sent in the occupancy feed. This process was only feasible for smaller garages at off hours: larger garages, and garages that operate 24 hours per day, take so long to count that the number of cars in the garage can be significantly different from the start to the end of a manual count. The following garages were checked this way:

- Moscone Center
- Lombard Street

- 16th & Hoff
- Mission-Bartlett
- Civic Center
- Ellis-O'Farrell

For remaining garages, manual update counts by garage staff were compared to the occupancy counts sent to the SFpark data warehouse.

When the occupancy feed count was consistently within 5% of the manual count, the occupancy feed was accepted for release to the public data feed.

SFpark staff reviewed the speed at which the SFpark app updated when cars entered/exited the garage. The app update speed was checked at Lombard Street and Moscone Center Garages: the app updated within 60 seconds of a car entering or exiting a garage.

The garage occupancy feed data was installed on a rolling basis at the garages. In some instances, installation of the occupancy feed revealed that updates needed to be made the garage car-counting program settings. The table below shows the dates upon which the occupancy data is considered operational and reliable for each garage:

GARAGE	DATE
Moscone Center	3/11/2011
Lombard Street	3/19/2011
Ellis-O'Farrell	5/10/2011
16th & Hoff	5/4/2011
Mission-Bartlett	5/17/2011
Civic Center	5/12/2011
Fifth & Mission	7/27/2011
Japan Center	6/19/2011
Japan Center Annex	11/22/2011
Performing Arts	9/13/2011
Sutter Stockton	5/24/2011
Union Square	5/5/2011
St. Mary's	5/4/2011
Golden Gateway	6/3/2011

6.1.3 Data feed maintenance

The occupancy feed can be interrupted for three main reasons: (1) failure of the car-counting application software; (2) failure of the garage workstation/computer; or (3) failure of the garage internet connection. To address these potential interruptions, SFpark has installed alerts and reports to ensure data delivery that is as complete and consistent as possible:

- If more than 8% of feeds are missed in an hour (i.e., more than 5 out of a possible 60 feeds are missed in an hour), an alert is sent.
- The manual adjustment tracking feed shows how often a garage's car count is being updated. If the manual adjustment feed at a garage goes two days without being updated, and alert is sent.

These alerts and reports provide important information about the status of the occupancy feed, and allow SFpark staff to contact the garage data-control vendor or the garage operator to address potential issues with the feed.

6.2 Usage/payment data review and verification

SFpark staff use several procedures on an ongoing basis to review and verify the quality and completeness of the usage and payment data:

- Compare total entries and total transient revenue to garage-issued monthly reports
    - Each garage provides monthly reports (formerly called "DPT Reports," now called "Monthly Summary Reports") showing itemized monthly revenue and usage. These reports are audited by the garage operator for accuracy.
    - Comparing the two independent data sources reveals when data in the feed is missing or duplicated.
- General checks of garages and data types for missing data or abnormalities
    - SFpark staffed have created reports with the business intelligence tool that allow extensive and detailed review of the usage and payment data
    - Abnormalities in the data (e.g., more or fewer entries than expected given the date and time) are analyzed to the transaction level
- Scans by the business intelligence tool use specific criteria to search the entire data feed for missing data or abnormalities. Any days or times flagged can then be analyzed to the transaction level. The searches conducted using this tool:
    - All days with fewer than 5 transient or monthly entries
    - All days with fewer than five transient payment events

- For real-time entry/exit and transient payment data feeds (as opposed to historical data), a report that shows all days where data transmissions deviate by more than 50% from the average number of transmissions on the same day of week for the previous four weeks. For example:

FACILITY NAME	TRANSMISSION DATE	TRANSMISSIONS	FOUR-WEEK AVERAGE TRANSMISSIONS	PERCENTAGE OF FOUR-WEEK AVERAGE
Moscone Center Garage	Thursday, September 26, 2013	1,277	724	176%

7 Business Rules

7.1 Occupancy data

7.1.1 Real-time occupancy feed

The occupancy feed sends two numbers for each garage to the public data feed: occupancy and capacity. The SFpark app and SFpark.org display garage "pins" on the map to indicate the location of the garage. For garages with multiple entrances, a "main" entrance was chosen in consultation with the garage operators. The pins are displayed in three possible colors to indicate the level of parking availability in each garage, with the pin showing as gray when occupancy data is unavailable or unreliable.

The following business rules apply to the display of garage availability on the SFpark app and SFpark.org:

CIRCUMSTANCE	DATA SENT TO PUBLIC FEED	TEXT DISPLAY ON APP AND SFPARK.ORG	GARAGE PIN COLOR
Occupancy < 70% of Capacity (e.g. 100 of 205)	Occupancy and capacity (e.g., 100 and 205)	XXX of XXX spaces available (e.g., 105 of 205 spaces available)	Light blue
Occupancy between 70% and 90% of Capacity (e.g., 175 of 205)	Occupancy and capacity	XXX of XXX spaces available (e.g., 30 of 205 spaces available)	Dark blue
Occupancy > 90% of Capacity (e.g. 200 of 205 spaces)	Occupancy and capacity	XXX of XXX spaces available (e.g., 5 of 205 spaces available)	Red
Occupancy = or > Capacity	Occupancy and capacity	Full	Red

Occupancy < 0	Null	No availability data	Gray
Capacity = or < 0	Null	No availability data	Gray
Occupancy data is over one hour old	Null	No availability data	Gray
Occupancy data is deemed to be incorrect for any reason and data feed is suspended using the business intelligence tool	Null	No availability data	Gray

It is important to note that garage occupancy/availability data is sent 24 hours a day, seven days a week, even for garages that close overnight. The costs of implementing an evening shut-down of the data feed outweighed the benefits, based on the following considerations:

- Garage operating hours are subject to change, and garages may close early or stay open late depending on demand or special events.
- Very few potential hourly customers are attempting to park at garages during their closed hours (if there were demand, the garages likely would be open), so very few potential customers will be affected by posting of availability information when garages are closed.
- Garage hours of operation are included on the SFpark app and SFpark.org, so customers can see whether garages are open for business.

7.1.2 Rules for aggregation of occupancy data

For analysis and reporting purposes, occupancy data is aggregated to the hour. Average occupancy for a particular hour is the average of all occupancy feeds received in that hour. For example, the average occupancy for 6:00pm is the average of all occupancy feeds received between 6:00 and 6:59pm.

Because garages sometimes fail to send an occupancy feed every minute, certain business rules have been developed to handle circumstances of “missing” feeds:

- When calculating an average occupancy for an hour or more, missing occupancy feeds are counted as null (i.e., ignored). They are not counted as zero, because they represent a lack of data, rather than no cars in the garage.
- On all occupancy reports, any hour with more than five missed occupancy feeds (i.e., over 8%) is flagged.

- When calculating average occupancy for rate-adjustment recommendations, any hours with more than five missed occupancy feeds are excluded from the analysis.

7.1.3 Rules for variations in garage capacity counts

Because the capacity of a garage can vary based on several factors (see above), calculating occupancy (or its inverse, availability) varies depending on which measure of capacity is used.

For display purposes, three options are available:

- Maximum regularly scheduled capacity (e.g., capacity at maximum, but regularly scheduled, valet-staffing levels)
- Capacity in effect at a given time (e.g., occupancy at 1:00pm calculated using valet capacity of 800; occupancy at 10:00pm calculated using non-valet capacity of 600)
- Capacity chosen by the creator of the report (e.g., to test garage occupancy if floors were removed from or added to the garage)

When analyzing occupancy for determining rate adjustments, SFpark typically uses the maximum regularly scheduled capacity, for two reasons. (1) If demand required, floors would be opened and valet parkers staffed in order to provide maximum capacity more often, so the maximum capacity is an assessment of what the regular capacity of the garage could be. (2) Using the capacity in effect at any given time, while essential to knowing how many spaces are available in real time, provides a misleading view of how many drivers are using a garage for purposes of long-term historical analysis (e.g., 350 cars in a 392-space garage is 89% full, but 400 cars in that same garage at maximum capacity of 650 cars is only 62% full).

Mission-Bartlett and 16th & Hoff Garages are exceptions, because their valet staffing levels have not been as consistent or regular as other garages. The garage capacity levels used when determining rate adjustments are as follows:

GARAGE	CAPACITY
Moscone	752
Lombard	205
Golden Gateway	1140
St. Mary's Square	865
Mission-Bartlett	205
16th & Hoff	58
Japan Center	745
Japan Center Annex	175
Civic Center	843
Union Square	800

Ellis-O'Farrell	950
Sutter Stockton	1650
Fifth & Mission	2586
Performing Arts	600

7.2 Garage usage and payment data

7.2.1 General rules for data aggregation

As explained above, the usage and payment data goes from the garages to the SF*park* data warehouse in raw form; basic operations like linking a driver's entry/exit time to her payment data, and derivative calculations like length of stay or effective rate, are calculated by the SFpark data warehouse. SFpark uses the following business rules in aggregating the usage and payment data:

TASK/ISSUE	BUSINESS RULE
Minimum aggregation level for data display and reporting	One hour
Link entry/exit times with payment data	Use DOC_NUMBER and ENTRY_DATETIME to link driver entry/exit times with the corresponding payment data
ENTRY_DATETIMEs with no EXIT_DATETIMEs	If there is a later data point with the same ENTRY_DATETIME and DOC_NUMBER and an EXIT_DATETIME, ignore the earlier data point with only ENTRY_DATETIME. If no later feed with EXIT_DATETIME, keep data point with no EXIT_DATETIME
Duplicate records (e.g., same ENTRY_DATETIME and EXIT_DATETIME, same payment amount, etc.)	Ignore, assuming the following data points are the same: ENTRY_DATETIME, EXIT_DATETIME (if applicable), PAYMENT_DATETIME, PAYMENT_TYPE, and PAYMENT_AMOUNT
Two transmissions have same DOC_NUMBER and ENTRY_DATETIME, but different PAYMENT_AMOUNTs	If one PAYMENT_AMOUNT is zero and the other is an amount above zero, use the amount above zero. If there are two PAYMENT_AMOUNTs above zero, select the transmission according to PAYMENT_TYPE, in this order: (1) card, (2) cash, (3) short money, (4) anything else.

7.2.2 Rules for data aggregation in the case of special event parking at garages

During special events (such as performing arts events, baseball games, and festivals), garages are authorized to charge flat special-event rates to all non-monthly customers. Garages often deviate from standard ticket-processing procedures during special events in order to make sure customers are charged the special event rate, or to facilitate speedier entry/exit during these high-demand times:

- Some garages employ a special-event card that triggers the entry gate to issue a pre-paid special event ticket. When that special-event card is used, each entry during a special event will show two passes through the entry gate: the scanning of the special event card, and the issuance of the pre-paid ticket. These special-event cards are assigned particular DOC_NUMBERs to distinguish them from monthly passes and regular tickets. In order to avoid double-counting of entries during special events, SFpark ignores the special-event card scan entry when calculating garage entries.
- Some garages process special event tickets upon a driver's exit from the garage. In this case, the proper procedure is for the cashier at the exit to insert the customer's ticket and then override the normal hourly parking charge by pressing the "special event rate" key on the cashier computer. In many instances, however, cashiers will reverse this process, hitting the special event key and then inserting the ticket. When this occurs, the system generates a second transaction, with the DOC_NUMBER 0-0: this transaction identifies both the entry and exit times as the time of exit (since the transaction is not related to a particular ticket). The original ticket is not processed, so it has no EXIT_DATETIME. As a result, for purposes of entry/exit counts, these types of DOC_NUMBER 0-0 tickets are considered exits, but not entries. Because these types of 0-0 tickets have no corresponding ENTRY_DATETIME, they are ignored for purposes of length of stay calculations.
- In still other situations, special event tickets with DOC_NUMBER 0-0 are issued at the beginning of a parking session and contain a unique ENTRY_DATETIME and EXIT_DATETIME. These 0-0 tickets are considered as both entries and exits.

7.2.3 Rules for calculations of length of stay

One of the derived calculations created by SFpark using the business intelligence tool is length of stay. This calculation is derived from the ENTRY_DATETIME and EXIT_DATETIME for each driver. This derived calculation is, by definition, an average: for example, the average length of stay for all drivers at a particular garage, or the average length of stay for all drivers on a particular day at garages in a chosen neighborhood.

This average calculation can be skewed upward for two reasons:

- Reuse of ticket numbers in garages (i.e., DOC_NUMBERs) can, in some cases, lead to erroneous joining of independent entries and exits, thus incorrectly reporting extremely long stays

in the garage. For example, an entry on April 4, 2009 with DOC_NUMBER 2-34567 has no corresponding exit. If it is joined with an exit date of May 10, 2011 when DOC_NUMBER 2_34567 is reused two years later, it would yield an erroneous length of stay of over two years.

- Some monthly parkers do stay in the garage for extended periods (i.e., weeks or months at a time), which skews average calculations.

To control for these issues, and for analysis purposes, SFpark ignores all stays longer than 96 hours when making a length of stay calculation.

7.2.4 Garage data limitations

The garage gate systems accurately record the vast majority of the activity occurring at the entries and exits to the garage. However, some entries, exits, payments or other data points are missed from time to time. The following are reasons why entry, exit, payment or other similar data points may be inaccurate or missing:

- Monthly customer forgets her monthly card, enters by pulling a ticket. Ticket is not recorded as a standard transient parking ticket, instead given a simple DOC_NUMBER such as 1.
- Lost tickets
- Tickets mangled or demagnetized
- Gate malfunction
- Customer enters or exits without taking/scanning ticket or paying (intentionally or unintentionally)

8 Storing garage parking rates and static garage information

Garage parking rates and static information (e.g., address, phone number) are stored in the SFpark data warehouse and updated through an “inventory” dashboard built with the business intelligence tool.

8.1 Garage parking rates

All garage rates are entered into the inventory dashboard and updated manually by the staff of SFpark. Past, current and future rates can be stored in the inventory dashboard. The rate inventory contains multiple features that impact the display of the rates on the SFpark app and SFpark.org:

CATEGORY	DESCRIPTION
Display group	Type of rate: hourly rate, flat rate/discount, or monthly rate
Effective from/to dates	The date range for which a particular rate is in effect

Rate description	The rate description that will appear on the SFpark app and SFpark.org (e.g., early bird, reserved monthly, etc.)
Time band	Applies only to hourly rates. One of the five rate periods during the course of a day: Midnight-9am, 9am-Noon, Noon-3pm, 3pm-6pm, 6pm-Midnight
Rate	Rate amount
Rate qualifier	Type of rate: per hour, discount ("off total" or "off per hour"), flat rate, per month
Maximum amount	Used for rates with "maximums" or "caps" (e.g., rate is $2 per hour with a $5 maximum)
Rate restrictions	Restrictions or requirements that must be met in order to qualify for a particular rate (e.g., "Mon-Fri: Enter before 8:30am, stay at least 3 hours)
Display code	Controls which information is displayed on the SFpark app and SFpark.org (e.g., do not show rate restrictions)
Rate change reference	Internal notes section, to be used to give each rate adjustment its own reference code

8.2 Static garage information

Information about the garage location, hours and operations are all stored on, and can be updated using, the garage inventory dashboard. The inventory dashboard contains the following information:

CATEGORY	DESCRIPTION
OSP ID	Unique three-digit identifier of the garage
Facility type	Garage or surface lot
Owner	Owner of the garage (though all are managed by SFMTA). Options are SFMTA, Port, CalTrans, or the Recreation and Parks Department
Sensored	Whether or not the garage or lot has individual sensors in parking spaces
Data feed flag	Controls whether garage data is sent to the SFpark app and SFpark.org. Yes = data sent. No = garage does not appear on the app or the SFpark.org map. Suspend = garage appears as gray, with no availability data.

Vehicle and motorcycle entry/exit lanes	Number of lanes for entry/exit of vehicles and motorcycles
Garage fees	Lists fees for vehicle activation, card replacement, late payment, garage reopening after hours, valet service
Facility name	Name of garage (as it will appear on the app and the SFpark.org map)
Street address	Mailing address of the garage (not necessarily the main vehicle entrance)
Location	Main vehicle entrance to the garage
Phone	Garage telephone number
Website	Garage web address
Services	List of services offered in addition to regular hourly/daily/monthly parking for cars: ATM, bike parking, carpool/carshare rate, early bird rate, electric vehicle charger, juror rate, monthly parker shuttle to CPMC, motorcycle rate, reduced night rate, reduced night/wknd rates, special event parking, student rate, valet parking, validation
Capacity	Number of listed spaces in the garage (this is based on a list from the Off-Street Parking Division, and is not used for the analysis described above)
System	Name of garage revenue- and data-control vendor
High volume discount offered	Whether the garage offers a discount program for customers (like hotels) who send high volumes of cars to the garage
Special event pricing	Whether the garage charges special rates during nearby special events
Validation program	Description of any merchant validations honored by the garage
Blockface ID	Unique five-digit number identifying the blockface on which the main garage entrance sits
PM District ID	Unique numerical identifier of the parking management district in which the garage sits
Area type	Whether the garage sits in an SFpark pilot or control area
CNN ID	Unique numerical identifier of the block on which the garage main entrance sits (CNN stands for center-line node network; CNN IDs exist for each block in San Francisco)

Main entrance longitude/latitude	Exact longitude/latitude coordinate for garage main entrance (used for placing the garage pin on the SFpark app and SFpark.org map)
Created on	Date on which garage inventory page was created
Last updated on	Last date for which garage static information was updated
Last updated by	Name of person making the last updated
Last updated through	Method through which last update was made (usually either SQL Developer or the business intelligence tool)

Appendix A – XML specifications

Garage car counts

```
<GARAGE_COUNT>
        <TRANSMISSION_ID>12345678</TRANSMISSION_ID>
        <VENDOR_ID>999</VENDOR_ID>
        <TRANSMISSION_DATETIME>2010-07-10 15:30:02</TRANSMISSION_DATETIME>
        <OSP_ID>111</OSP_ID>
        <OCCUPIED_SPACES>90</ OCCUPIED_SPACES >
        < CAPACITY>100</CAPACITY>
        <OPERATOR_ID>101</OPERATOR_ID>
        <DISPLAY_STATUS>1234</ DISPLAY_STATUS >
</GARAGE_COUNT>
```

Manual updates to garage car counts

```
<GARAGE_COUNT>
        <TRANSMISSION_ID>12345678</TRANSMISSION_ID>
        <VENDOR_ID>999</VENDOR_ID>
        <TRANSMISSION_DATETIME>2010-07-10 15:30:02</TRANSMISSION_DATETIME>
        <OSP_ID>111</OSP_ID>
        <OCCUPIED_SPACES>90</ OCCUPIED_SPACES >
        < CAPACITY>100</CAPACITY>
        <OPERATOR_ID>101</OPERATOR_ID>
        <DISPLAY_STATUS>1234</ DISPLAY_STATUS >
        <OPERATOR_NAME>FSmith</OPERATOR_NAME>
        <ADJUSTMENT_TYPE>NEWOCCUPANCY</ ADJUSTMENT_TYPE>
        <ADJUSTMENT_VALUE>-5</ ADJUSTMENT_VALUE>
</GARAGE_COUNT>
```

Garage usage/payment data

```
<GARAGE_SESSION>
        <VENDOR_ID/>
        <TRANSMISSION_ID/>
        <TRANSMISSION_DATETIME/>
        <GARAGE_ID/>
        <USAGE_TYPE/>
        <MEDIA_TYPE/>
        <FACILITY_CODE/>
        <DOC_NUMBER/>
        <ENTRY_DATETIME/>
        <EXIT_DATETIME/>
</GARAGE_SESSION>

<GARAGE_TRANSIENT_PAYMENT>
```

SFpark

```
        <VENDOR_ID/>
        <TRANSMISSION_ID/>
        <TRANSMISSION_DATETIME/>
        <GARAGE_ID/>
        <MEDIA_TYPE/>
        <FACILITY_CODE/>
        <DOC_NUMBER/>
        <ENTRY_DATETIME/>
        <PAYMENT_DATETIME>
        <INVOICE_NUMBER>
        <STATION/>
        <CASHIER_ID/>
        <RATE_TYPE/>
        <AM_OFFPEAK/>
        <PM_OFFPEAK/>
        <PAYMENT_TYPE/>
        <PAYMENT_AMOUNT/>
        <DISCOUNT_TYPE_1/>
        <DISCOUNT_AMOUNT_1/>
        <DISCOUNT_TYPE_2/>
        <DISCOUNT_AMOUNT_2/>
        <AUTO/>
</GARAGE_TRANSIENT_PAYMENT >

<GARAGE_MONTHLY_PAYMENT>
        <VENDOR_ID/>
        <TRANSMISSION_ID/>
        <TRANSMISSION_DATETIME/>
        <GARAGE_ID/>
        <DOC_NUMBER/>
        <INVOICE_NUMBER/>
        <ACCOUNT_NUMBER/>
        <RATE_TYPE/> <PAYMENT_TYPE/
        <PAYMENT_AMOUNT/>
</GARAGE_MONTHLY_PAYMENT>

<GARAGE_STATISTIC>
        <VENDOR_ID />
        <TRANSMISSION_ID />
        <TRANSMISSION_DATETIME />
        <GARAGE_ID />
        <STAT_DATE />
        <NUMBER_OF_TICKETS />
        <NUMBER_OF_GATE_ENTRY />
        <NUMBER_OF_GATE_EXIT />
        <LOOP_COUNTER_ARMING />
        <LOOP_COUNTER_CLOSING />
</GARAGE_STATISTIC>
```