WATER AND SEWER ANALYSES
For
GOLDEN STATE WARRIORS ARENA
@
Mission Bay Blocks 29-32

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FOR:
STRADA INVESTMENT GROUP

ENGINEERS / SURVEYORS / PLANNERS

DESIGN ENGINEER:
BKF ENGINEERS
255 Shoreline Drive, Suite 200
Redwood City, CA 94065
Sravan Paladugu
P.E. CA 74343

Executive Summary

The Golden State Warriors organization (GSW) proposes to construct a multi-purpose event center and buildings for other uses (Project) on approximately 11-acres located in the Mission Bay South Project Area, a redevelopment area located east of Highway I-280 in San Francisco. The 11-acre site is made up of Blocks 29, 30, 31, and 32 (Blocks 29-32). The proposed Event Center would serve as the new home of the Golden State Warriors, with a maximum seating capacity of 18,500and a total area of approximately 775,000 gross square feet (GSF). The Event Center would host all the home NBA games for the Golden State Warriors, and provide a year-round venue for a variety of other uses including concerts, family shows, conferences, conventions, cultural events and other sporting events.

In addition to Event Center, the Project would include approximately 580,000 total gross square feet in two office buildings The Project would also include retail space of approximately 125,000 gross square feet, of which 62,500 square feet would be used for soft goods retail and the remaining for restaurants.

In a memorandum dated September 12, 2014, the San Francisco Public Utilities Commission (SFPUC) asked GSW to provide anticipated average and peak water and sewer demand for the proposed Project. BKF, on behalf of GSW, provided SFPUC with a report dated November 25, 2014, with the requested information. In the report BKF used California Plumbing Code (CPC) method, which is based on fixture count, to conservatively estimate average and peak demand. After reviewing the report, SFPUC in a meeting on December 12, 2014, asked BKF to provide average and peak estimates using standard land-use demand factors for all proposed uses except the Event Center, i.e., office, retail and restaurant uses. In the meeting, SFPUC agreed that CPC method is appropriate and conservative for estimating average and peak flows from Event Center. This report documents the standard demand factor methodology requested by the SFPUC for estimating average and peak for office, retail and restaurant in conjunction with the CPC method for Event Center.

Several peak scenarios are possible due to the temporal distribution and variety of events at the Event Center, some of which coincide with other proposed land-uses such as office space, retail and restaurant. It is highly unlikely that all facilities operate at full capacity at any given time. However, per the SFPUC's direction, BKF evaluated the scenario where all proposed uses are at full capacity. Based on this scenario, the anticipated average and peak water demands for the proposed land-uses are listed in the table below.

Table 1: Summary of Anticipated Water/Sewer Demand

Project Component	GSF	Demand Factor (gpd/1,000 Sq.Ft.)	Average Flow (gpm)	Peak Flow (gpm)	Peaking Factor
Event Center	775,000	NA	52	529	10
Office	580,000	103	41	145	3.5
Retail	62,500	172	7	26	3.5
Restaurant	62,500	300	13	46	3.5
Total (gpm)			114	746	

Sewer flow is directly related to the water consumed by a project. In general, the peak sewer demand is less than the peak water demand, as unintended storage occurs in the pipes, grease interceptors, manhole, etc, which is associated with open channel flow hydraulics under which these systems operate. Because water systems operate under pressure, there is no storage associated with water in pipes and fittings. However, to be conservative, the average and peak water demands listed in the table above are taken directly as project sewer demand by ignoring reduction in peak.

The proposed Project peak water demand will be served by nine (9) service laterals branching from existing low pressure water lines in the streets surrounding the Project. Unlike water, which is looped around site and fed by single source, sewer in the Project vicinity is split between two sewersheds.

The two sewersheds include the City's Mission Bay Sanitary Pump Station located at Park P15 (MBSPS P15), located northerly from the Project, and the Mariposa Pump Station (MPS), located southerly from the Project. Sewer flow from Blocks 29-32 was originally planned to drain equally between two separate sewersheds. Because the proposed Project would generate higher peak flow than the previously entitled office space, separate discussions between the SFPUC and GSW will be needed to identify options for splitting sewer flow between the two sewersheds.

A. Background

The Golden State Warriors organization (GSW) proposes to construct a multi-purpose event center and buildings for other uses on approximately 11-acres located in San Francisco, California (Project). The 11-acre Project site is made up of land referred to as Blocks 29, 30, 31, and 32 (Blocks 29-32) in the Mission Bay South Project Area, a redevelopment area located east of Highway I-280 in San Francisco. The site is bounded by Terry A Francois Boulevard to the east, 3rd Street to the west, 16th Street to the south and South Street to the north, and is currently vacant except for limited surface parking.

Prior to GSW acquisition of the Project site, Blocks 29-32 were planned to be developed as an office campus. The office campus was studied in the Mission Bay Environmental Impact Report prepared and approved in 1998 (98 EIR) and would have included a gross floor area of one (1) million square feet. The water usage from the entitled office campus was also studied as part of the 98 EIR and was estimated to be approximately 0.15 Million Gallons per Day (MGD). The average and peak waste water generated from the entitled office campus was studied in the Mission Bay Project Separated Sewer Analysis prepared in 2000 and was estimated to be approximately 134 Gallons per Minute (GPM) and 402 GPM, respectively.

The purpose of this report is to estimate future average and peak water, sewer and recycled water demands for the proposed Project and the approach used in estimating the demand. This technical report will assist the San Francisco Public Utilities Commission (SFPUC) in planning for offsite improvements, if necessary, to support the Project and future development planned for the neighborhood.

The SFPUC memorandum dated September 12, 2014, required GSW to include the following as part of the report:

1. Average sanitary flow projection with detailed breakdown (GPM).
2. Peak sanitary flow projection with detailed breakdown. Peak scenario should be ultimate sanitary demand during stadium at full seating capacity including fully active concession stands during championship game or other events that would represent the MAXIMUM demand at any point in time for the facility (GPM).
3. Fixture counts including toilets, urinals, wash stations, concession/kitchen sinks, etc.
4. Peak potable and recycled water demands including water service sizes.
5. Preliminary sanitary sewer(s) sizes, discharge location(s) / connection(s) to the street sewer.
6. Confirmation of below-grade facilities such as basements or underground parking facilities.

These items are discussed in the following sections.

B. Project Description

GSW proposes to construct a multi-purpose event center and ancillary structures including multiple office buildings, retail, restaurants, structure parking, plaza areas, and other amenities on Blocks 29-32. A summary of the various components of proposed Project are included in Table A and are discussed below.

Event Center

The proposed Event Center would have a seating capacity of 18,500, encompassing a gross area of approximately 775,000 square feet. The Event Center would serve as the new home of the Golden State Warriors. The Event Center would host all the home NBA games for the Golden State Warriors, and provide a year-round venue for a variety of other uses including concerts, family shows, conferences, conventions, cultural events and other sporting events.

The Event Center main floor would include a full length NBA basketball court for Warriors basketball games, which can also accommodate a stage for performances. Other supporting Event Center facilities would include player/performer locker rooms, club and press areas, concessions, restrooms, a commissary, and a large marshalling area. The Warriors practice facility and support offices would also be integrated within the Event Center.

The practice facility would include two full-length NBA basketball courts with approximately 21,000 square feet of playing surface, a weight room and medical treatment facilities, locker rooms, and a players' lounge. The support offices would accommodate Warriors management, coaching and operations staff, administration, finance, marketing, broadcasting, merchandising, public relations, and ticket operations. The Event Center would be surrounded by large open plaza areas connected by ramps.

Office, Retail and Restaurant Uses

The Project would include two office buildings, each including a tower eleven (11) stories high, on the northwest and southwest corners of the site. The office buildings would encompass a gross combined area of approximately 580,000 square feet. The Project would also include retail space occupying multiple areas of the site, including the lower floors of the office buildings, within or adjacent to certain plaza-facing areas of the Event Center.

The retail space would be approximately 125,000 square feet, of which 62,500 square feet would be used for soft goods retail and the remaining for restaurants. Approximately 51,500 square feet of the restaurant space would be used for sit-down type restaurant and the other 11,000 square feet would be used for quick serve (fast casual) facilities.

Parking and Open Space

The Project would include 950 parking stalls in a parking structure with below-grade parking and at-grade/below-podium levels, all concealed from the public's view. The total parking and loading area is approximately 475,000 square feet.

The Project open space area would be approximately 180,000 square feet and would consist of large plaza areas, terrace areas at various levels, landscaped areas and green roof areas. The open space at

plaza level is approximately 140,000 square feet. The total landscape area is conservatively estimated to be approximately 30,000 square feet (i.e., 6% of the Project area required for storm water management). Green roof areas are proposed over the two office podiums that are approximately 40,000 square feet in area. The podiums would be at 90-feet above the street level.

Table A below provides a summary of the proposed land-uses, gross square footage, types of events, and number of days that the events are anticipated to occur. The employment and average event attendance figures are provided by GSW for the purpose of calculating water demand.[1]

[1] Based on comparable operational and ticketing data from other NBA venues, and on input from third party promoters in the Bay Area.

Table A: Blocks 29-32 Summary of Proposed Land Uses

Project Component	Floor Area (GSF)	Capacity /No. of Seats	Event Type	No. of Events Per Year	Full-time Employees	Event Employees	Average Attendance
Event Center	775,000	18,500	Pre-season games	3	n/a	1000	11,000
			Regular season games	41	n/a	1000	17,000
			Playoffs (Maximum possible)	16	n/a	1000	18,000
			Total non-Warriors games	161			
			- Concerts	30	n/a	775	12,500
				15	n/a	675	3,000
			- Family Shows	55	n/a	675	5,000
			- Other Sporting Events	30	n/a	675	7,000
			- Conventions/ Corporate Events	31	n/a	675	9,000
Practice Facility & Training Areas (1)	21,000		Practice/training	50	Part of management staff below	30	n/a
Event Management & Team Operations (1)	40,000		Ongoing team/arena operations (Mon-Fri)	240	255	n/a	n/a
Kitchen (1)	32,260			221	n/a	Part of event staff above	n/a
GSW Office Space (1)	25,000			240	Part of management staff above	n/a	n/a
Office Buildings	580,000			260	2,101	n/a	n/a
Retail	62,500			n/a	372	n/a	
Restaurants	62,500			n/a		n/a	
Parking	475,000	950					
Landscape Area (2)	70,000						
Open Space (3)	110,000						

Notes:
(1) The 775,000 GSF noted for the Event Center includes the square footage identified for these uses.
(2) Includes landscape area at all levels (i.e., approximately 30,000 Sq.Ft. of landscape at plaza level and 40,000 Sq.Ft. at all other levels for storm water management.
(3) Open Space excludes 30,000 Sq.Ft. of landscaped area from roughly 140,000 Sq.Ft. (i.e., 3.2 acres) of open space at plaza level.

C. Water Demand

Standard demand factors based on land use type were used to estimate average and peak demand for all proposed land-uses except for the Event Center, i.e., office, retail and restaurant. Because event centers do not operate in a consistent manner, demand was estimated using event frequency and visitor attendance estimates specific to this Project[2]. The methodology used in estimating the average and peak water demand for proposed land uses is described in the following sub-sections.

I. Average Demand Projection

Event Center

A detailed analysis of water consumed by the Event Center was completed recently to support the SFPUC in preparing Water Supply Assessment (WSA) for the Project. The analyses was documented in the Mission Bay Blocks 29-32 – Water Demand Memorandum dated November 14, 2014, prepared by BKF Engineers (2014 WDM), which was approved by SFPUC. The approved analyses estimated water consumption using end-use approach. BKF used the 2014 WDM analyses to estimate the daily average during an event with full occupancy. The daily average demand from the Event Center was estimated to be 52 gallons per minute (GPM).

Office Buildings

A standard demand factor of 103 gallons per day (GPD) per 1,000 square feet is used for office space in the approved 2014 WDM. In the 2014 WDM, the standard demand factor was calculated using the SFPUC "Indoor Water Demand" calculator as a reference without adjusting flow rate for green building code. Table 8 of the 2014 WDM attached here shows the breakdown. A copy of the SFPUC Indoor Water Demand Calculator is also provided here for reference.

To be consistent, BKF used the same demand factor here to estimate the daily average demand for office space.

Retail

Similar, a standard demand factor of 172 GPD per 1,000 square feet, taken from the 2014 WDM, is used to estimate demand for retail space.

Restaurant

The proposed restaurant uses will include quick serve (fast casual) food areas and sit-down restaurants. Standard water consumption factors were used to estimate demand for both types of restaurant uses. A standard consumption factor of 300 GPD per 1,000 square feet taken from Table 6 of LADPW Water Supply Assessment for Convention and Event Center Project dated January 03, 2012, was used to predict restaurant water use.

[2] Note these estimates also reflect the base assumptions currently being utilized for the Project Subsequent Environmental Impact Report (SEIR).

II. Peak Demand Projection

Event Center

As noted previously, a standard demand factor is not available for Event Center because event centers are unique in that they do not operate the same way as more standard land uses. Therefore, peak water demand from the Event Center is estimated using the 2010 California Plumbing Code (CPC) method, which is based on actual fixtures available for various end-uses. Table E of the attachments provide detailed fixture breakdown used for this analyses.

Office, Retail and Restaurant

A peaking factor of 3.5 was applied to the average demand to estimate peak demand for proposed office, retail, and restaurant uses.

The table below lists estimated demand for different land uses using the two methodologies.

Table B: Average and Peak Water Demand

Project Component	GSF	Demand Factor (gpd/1,000 Sq.Ft.)	Average Flow (gpm)	Peak Flow (gpm)	Peaking Factor
Event Center	775,000	NA	52 (i)	529 (ii)	10
Office	580,000	103 (iii)	41	145	3.5
Retail	62,500	172 (iii)	7	26	3.5
Restaurant	62,500	300 (iv)	13	46	3.5
Total (gpm)			114	746	

Notes:

i) Daily average during an event at full capacity. Daily average was estimated from the Water Supply Assessment Water Demand Memorandum dated November 14, 2014, approved by SFPUC.

ii) Peak water demand based on 100% usage of Event Center Fixtures.

iii) Demand factor taken from Table 8 of Water Demand Memorandum dated November 14, 2014 (attached). The base line demand factor for office space is used here without adjustment for green building code.

iv) Demand factor taken from Table 6 of LADPW Water Supply Assessment for the Convention and Event Center Project dated January 3, 2012 (attached).

Several peak scenarios are possible due to the temporal distribution of events at the Event Center and the variety of events coinciding with other proposed land-uses. We evaluate such scenarios and identified that a convention during a weekday would generate the highest peak of all scenarios. However, per SFPUC's direction, the peak demand was estimated assuming 100% of Event Center fixtures are used and the offices, retail and restaurants are all at full capacity. The total shown above assumes that all proposed uses are at their peak which is very unlikely.

III. Water Service

The proposed Project peak water demand will be served by nine (9) service laterals branching from existing low pressure water lines in the streets surrounding the Project. Existing low pressure water lines are located in 3rd Street and South Street, and existing high pressure water

lines are located in 3rd Street. As part of the future 16th Street and Terry A Francois Boulevard improvements, new 12 inch low pressure water mains will be installed in these streets. Existing water laterals that range in size from 4 to 8-inches are located on South Street. New water laterals for domestic and fire water that range in size from 8 to 10-inches are proposed along 16th Street. It is also anticipated that new fire hydrants will be required around the project site. Figure 1, attached, shows the existing and proposed water system surrounding the site.

D. Sanitary Sewer Analyses

Sewer flow from Blocks 29-32 was originally master planned to drain equally between two separate sewersheds. The two sewersheds include the City's Mission Bay Sanitary Pump Station located at Park P15 (MBSPS P15), located northerly from the Project, and the Mariposa Pump Station (MPS), located southerly from the Project. Because the project would generate higher peak than the previously entitled office space, separate discussions will be needed to identify options for splitting sewer flow between the two sewersheds.

I. Average and Peak Demand Projection

Since sewer flow is entirely generated from water consumed by a project, the average and peak water demand estimated in the previous Section C can be used directly to estimate sewer flow. In general, the peak sewer demand is less than the peak water used, as unintended storage occurs in the pipes, grease interceptors, manhole, etc, which is associated with open channel flow hydraulics under which these systems operate. However, the reduction in peak achieved as a result of this is not considered to be conservative. The table below lists average and peak sewer demand for the project.

Table C: Average and Peak Sewer Demand

Project Component	GSF	Demand Factor (gpd/1,000 Sq.Ft.)	Average Flow (gpm)	Peak Flow (gpm)	Peaking Factor
Event Center	775,000	NA	52 (i)	529 (ii)	10
Office	580,000	103 (iii)	41	145	3.5
Retail	62,500	172 (iii)	7	26	3.5
Restaurant	62,500	300 (iv)	13	46	3.5
Total (gpm)			114	746	

Notes:

i) Daily average during an event at full capacity. Daily average was estimated from the Water Supply Assessment Water Demand Memorandum dated November 14, 2014, approved by SFPUC.

ii) Peak water demand based on 100% usage of Event Center Fixtures.

iii) Demand factor taken from Table 8 of Water Demand Memorandum dated November 14, 2014 (attached). The base line demand factor for office space is used here without adjustment for green building code.

iv) Demand factor taken from Table 6 of LADPW Water Supply Assessment for the Convention and Event Center Project dated January 3, 2012 (attached).

II. Sanitary Sewer Service

The Project proposes multiple laterals branching from the existing sanitary sewer lines located in 3rd Street, 16th Street and South Street. New sanitary sewer mains will be installed in Terry A Francois Boulevard with the new street alignment improvements. The sanitary sewer laterals will vary in size from 6 to 12-inches. The attached Figure 2 shows the existing and proposed site sanitary sewer system. The proposed laterals arrangement will be re-configured based on future discussions between SFPUC and GSW on sewer flow split.

E. Recycled Water

Recycled water will be used for flushing toilets (water closet) and urinals, and for irrigation. The peak demand for recycled water occurs when all toilets and urinals in the Event Center, office, retail and restaurant are flushed at the same time. The peak associated with such an event is estimated to be approximately 567 GPM. The City's recycled water supply is not available until 2022. However, the San Francisco Building Code requires provisions be made in new construction to include piping for this purpose. Pipe fittings and valves will be arranged at the flush valve water booster pump to allow for change over from the city water system to the recycled water system in the water entry room. The flush valve water booster pump will then be used to distribute the recycled water to the correct fixtures throughout the building.

Existing 8-inch recycled water mains are located on 3rd Street and South Street. As part of the future 16th Street and Terry A Francois Boulevard improvements, new 8-inch recycled water mains will be installed in these streets. Existing 4-inch water laterals are located on South Street. New water laterals for recycled water are proposed along 16th Street that range in size from 6 to 8-inches. The attached Figure 1 attached shows the existing and proposed recycled water system surrounding the site.

F. Conclusion

Prior to GSW acquisition of the Project site, Blocks 29-32 were planned to be developed as an office campus. The office campus was studied in the Mission Bay Environmental Impact Report prepared and approved in 1998 (98 EIR) and would have included a gross area of one (1) million square feet. The water usage and sewage generation from the entitled office campus was also studied as part of the 98 EIR and in the Mission Bay Project Separated Sewer Analysis prepared in 2000 (2000 SSA), respectively. The previously estimated demands and the proposed Project demands are summarized in Table D below.

Table D: Summary of Average and Peak Projections

Service Type	Previously Entitled Office				Proposed Project			
	Average		Peak		Average		Peak	
	MGD	GPM	MGD	GPM	MGD	GPM	MGD	GPM
Water	0.15	104	0.450	313	0.164	114	1.074	746
Sewer					0.164	114	1.074	746
- Mariposa PS	0.096	67	0.289	201	Unknown			
- MBSPS P15	0.096	67	0.289	201				
Recycled Water							0.816	567

Notes:
i) The 98 EIR and 2000 SSA use a peaking factor of three (3) to estimate peak demand.

Although the proposed Project is anticipated to increase the peak demand when compared to the peak estimated for the entitled office campus, the Project is likely to reduce the peak loading on the existing pump stations. That is because the events that generate the peak flow occur in the evenings when other land uses served by the pump stations are either inactive or not at their peak usage.

G. Attachments

Table E: Blocks 29-32 Fixture Type and Count By Landuse

Reference 1: Hunters Curve from 2010 California Plumbing Code
Reference 2: Table 8 of Mission Bay Blocks 29-32 Water Demand Memorandum
Reference 3: SFPUC Indoor Water Demand Calculator part of Non-Potable Water Calculator
Reference 4: Table 6 of LADPW Water Supply Assessment for Convention and Event Center Project

Figure 1: Existing and Proposed Sanitary Sewer with Demands
Figure 2: Existing and Proposed Water and Recycled Water

H. References

i) 2010 California Plumbing Code, California Building Standard Commissions, January 1, 2011.

ii) American Water Works Association. Commercial and Institutional End Uses of Water, 2000

iii) California Building Standards Commission. 2009. 2008 California Green Building Standard Code. California Code of regulations, Title 24, Part II.

iv) California Department of Water Resources, 2008. Modified text of proposed regulation. California Water Efficient Landscape Ordinance. California Code of Regulations, Title 23, Section 490 – 495. November 2008.

v) City of Los Angeles, 2006. L.A. CEQA Threshold Guide, 2006 Exhibit M.2. - 12 Sewage Generation Factors.

vi) Economic and Planning Systems, 2009. Working Draft Report, Fiscal Analysis of the Candlestick Point – Hunters Point Shipyard Redevelopment Project, updated May 13, 2009.

vii) EPA, 2002. Onsite Wastewater Treatment Systems Manual - February 2002 EPA/625/R-00/008 Lennar, 2008. – 2009.

viii) EPA Water Sense, 2009. Water Efficiency in the Commercial and Institutional Sector: Considerations for a Watersense Program.

ix) Lennar, 2009. Candlestick Point / Hunters Point Shipyard Phase II Administrative Draft EIR. October 2009.

x) Los Angeles Department of Water and Power, 2012. Water Supply Assessment for The Convention and Event Center Project, January 3, 2012.

xi) Pacific Institute, 2003. Waste Not, Want Not: The Potential for Urban Water Conservation in California, November 2003.

xii) US Green Building Council, 2009. 2009 LEED Reference Guide For Green Building Design and Construction.

xiii) San Francisco Green Building Requirements, 2011. Administrative Bulletin Title: Implementation of Green Building Regulations, dated January 1, 2011

xiv) San Francisco Public Utilities Commission, 2011. 2010 Urban Water Management Plan for the City and County of San Francisco.

ATTACHMENTS

Table E - Blocks 29-32 Fixture Type and Count By Landuse

Facility Type	Fixture Type	WSFU	Structure / Building						Total WSFU
			Event Center	Office	Retail	Restaurants	Arena Misc.	Total	
Restroom	Toilet (Water Closet)	5	436	236	6	20	10	708	3,540
	Urinals	4	192	76	4	10	4	286	1,144
	Lavatory Faucet	1	338	192	4	20	4	558	558
	Showerhead	2	40	4	4	0	0	48	96
	Floor Drain	0	261	132	6	10	4	413	0
	Other	3	81	46	0	0	0	127	381
Food Preparation / Cafeteria / Concession / Club Bar / Lounge Kitchen	General Sink Faucet	1.5	176	0	32	17	4	229	344
	Pre-rinse Spray Valve	1.5	0	0	21	15	0	36	54
	Pot & Pan Wash	3	6	0	21	15	0	42	126
	Dishwasher	1.5	2	0	21	15	0	38	57
	Service or Mop Basin	3	37	0	19	15	2	73	219
	Floor Drain	0	232	0	84	64	8	388	0
	Other	3	19	0	0	0	0	19	57
Laundary	Commercial Washers	4	3	0	0	0	0	3	12
		Total Fixtures =	1,823	686	222	201	36	2,968	6,588
		Total WSFUs =	4,074	1,822	289	321	82	6,588	

Notes:

Event Center Demand

- Event Center Total Fixture Units (WSFUs) = 4,074 + 82 = 4,156
- Flow Rate for 4,156 WSFUs using Hunters Curve = 529 GPM (assuming 100% of fixture are in use)

Recycled Water

- Recycled water total project toilets and urinals = 3,540 + 1,144 = 4,684
- Flow Rate for 4,684 WSFUs using Hunters Curve = 567 GPM

REFERENCE 1

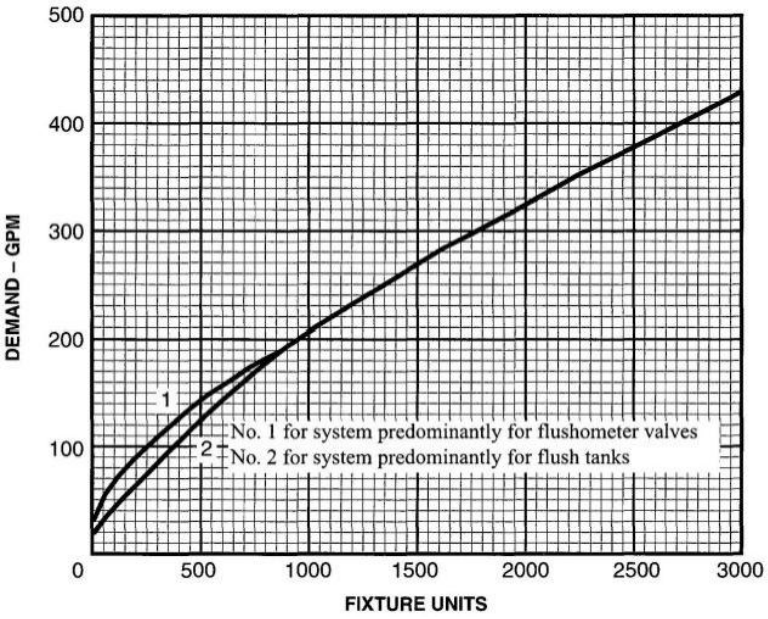


CHART A-2 ESTIMATE CURVES FOR DEMAND LOAD

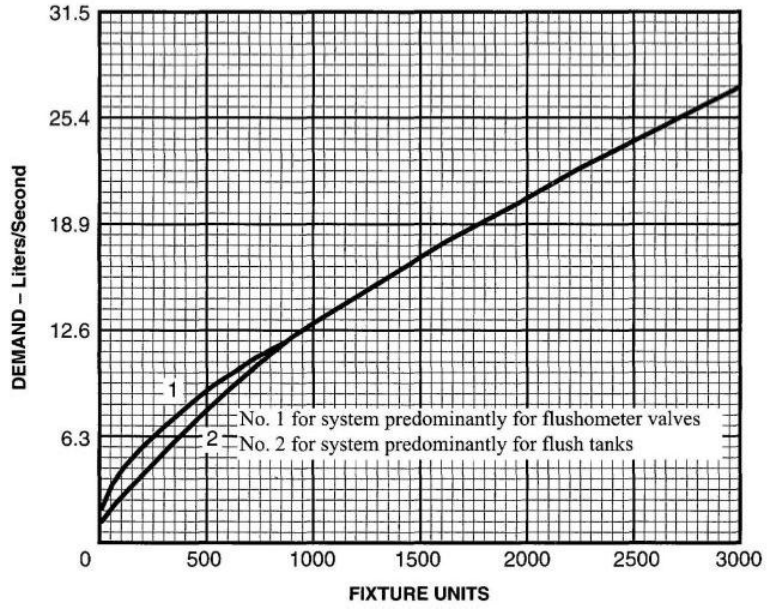


CHART A-2 (Metric) ESTIMATE CURVES FOR DEMAND LOAD

REFERENCE 2

Table 8 - Blocks 29-32 Water Consumption By End-Use (Baseline and Adjusted)

Event Center End Uses

1. Visitors	Baseline						Adjusted for Code		
Type	Baseline Rate [a]	Unit	No. of Units [c]	Unit	Ave Daily Use [c]	GPD per Visitor	Rate (w/ Code) [e]	Unit	GPD per Visitor
Lavatory Faucet	0.5	gal/min	0.25	min	1	0	0.4	gal/min	0
Urinals	1	gal/flush	1	flush	1	1	0.5	gal/flush	1
Toilet (Water Closet)	1.6	gal/flush	1	flush	1	2	1.28	gal/flush	1
Misc						0			0
					Sub-Total =	**3**		Sub-Total =	**2**

2. Full-Time Employees	Baseline						Adjusted for Code		
Type	Baseline Rate [a][b]	Unit	No. of Units [b][d]	Unit	Ave Daily Use [b][d]	GPD per Employee	Rate (w/ Code) [e]	Unit	GPD per Employee
Showerhead	2.5	gal/min	5	min	0.3	4	2	gal/min	3
Lavatory Faucet	0.5	gal/min	0.25	min	3	0	0.4	gal/min	0
Urinals	1	gal/flush	1	flush	2	2	0.5	gal/flush	1
Toilet (Water Closet)	1.6	gal/flush	1	flush	4	6	1.28	gal/flush	5
Kitchen Faucet	2.2	gal/min	0.25	min	1	1	1.8	gal/min	0
Laundry	4	gal/pound	0.5	pound	0.3	1	4	gal/pound	1
					Sub-Total =	**14**		Sub-Total =	**10**

Notes:
(a) Baseline flow rate for showerhead, bathroom faucet, toilet, urinals and kitchen faucet are taken from 2009 LEED Reference Guide For Green Building Design and Construction(WE Table 1).
(b) Gallons of water used by laundry per pound of fabric is taken from webpage @ http://www.allianceforwaterefficiency.org/commercial_laundry.aspx. The equipment type is assumed to be a waher-extractor which is typical fro small to medium size laundires. Laundry is assumed to be generated by players and event performers from showers and other activities. 30% of all the employees are assumed to be players and event performers.
(c) Duration and Average daily use suggested in the 2009 LEED Reference Guide For Green Building Design and Construction (WE Table 2) were increased to be specific to event uses. All visitors/spectators are assumed to use the restrooms.
(d) Duration and Average daily use of fixture flow rates are taken from 2009 LEED Reference Guide For Green Building Design and Construction (WE Table 2). Average daily use of showerhead is increased from 0.1 to 0.3.
(e) Flow rate based on maximum flow rate prescribed by 2011 SF Green Building Requirements (Table 13C.5.303.2.3).

Office End Uses

1. Full-Time Employees	Baseline						Adjusted for Code		
Type	Baseline Rate [a][b]	Unit	No. of Units [b][d]	Unit	Ave Daily Use [b][d]	GPD per Employee	Rate (w/ Code) [e]	Unit	GPD per Employee
Showerhead	2.5	gal/min	5	min	0.3	4	2	gal/min	3
Lavatory Faucet	0.5	gal/min	0.25	min	3	0	0.4	gal/min	0
Urinals	1	gal/flush	1	flush	2	2	0.5	gal/flush	1
Toilet (Water Closet)	1.6	gal/flush	1	flush	4	6	1.28	gal/flush	5
Kitchen Faucet	2.2	gal/min	0.25	min	1	1	1.8	gal/min	0
					Sub-Total =	**13**		Sub-Total =	**10**
					GSF/Employee =	**200**		GSF/Employee =	**200**
					GPD per 1,000 GSF =	**65**		**GPD per 1,000 GSF =**	**49**
2. Dishwasher	11.15	gal/cycle	1	cycle	1	**11**	11.15	gal/cycle	**11**
3. HVAC/Cooling Demand [f]	0.0196	gal/sf	1000	sf	1	**20**	0.0196	gal/sf	**20**
4. Indoor Floor Cleaning [g]	0.75	gal/min	4	min/1,000 sf	0.7	**2**	0.75	gal/min	**2**
5. Misc (assumed to be 5%)						**4**			**4**
					Total GPD per 1,000 GSF =	**103**		**Total GPD per 1,000 GSF =**	**87**

Notes:
(a) Baseline flow rate for showerhead, bathroom faucet, toilet, urinals and kitchen faucet are taken from 2009 LEED Reference Guide For Green Building Design and Construction(WE Table 1).
(b) Gallons of water used by laundry per pound of fabric is taken from webpage @ http://www.allianceforwaterefficiency.org/commercial_laundry.aspx. The equipment type is assumed to be a waher-extractor which is typical fro small to medium size laundires. Laundry is assumed to be generated by players and event performers from showers and other activities. 30% of all the employees are assumed to be players and event performers.
(c) Duration and Average daily use suggested in the 2009 LEED Reference Guide For Green Building Design and Construction (WE Table 2) were increased to be specific to event uses. All visitors/spectators are assumed to use the restrooms.
(d) Duration and Average daily use of fixture flow rates are taken from 2009 LEED Reference Guide For Green Building Design and Construction (WE Table 2). Average daily use of showerhead is increased from 0.1 to 0.3.
(e) Flow rate based on maximum flow rate prescribed by 2011 SF Green Building Requirements (Table 13C.5.303.2.3).
(f) Water demand for cooling is taken from SFPUC Potable Offset Investigation, April 2012. Water required is the average for 12-months.
(g) Indoor cleaning flow rate and time required are taken from www.tomcatequip.com. The specs for MAGNUM floor scrubber dryer recommended for sports arena are used. The suggested cleaning rate is 26,000 sf/hr but 15,000 sf/hr is used for calculations to be conservative.

REFERENCE 2

Table 8 - Blocks 29-32 Water Consumption By End-Use (Baseline and Adjusted)

Retail End Uses

1. Customer	Baseline						Adjusted for Code		
Type	Baseline Rate [a]	Unit	No. of Units [b]	Unit	Ave Daily Use [b]	GPD per Customer	Rate (w/ Code) [c]	Unit	GPD per Customer
Lavatory Faucet	0.5	gal/min	0.25	min	0.5	0	0.4	gal/min	0
Urinals	1	gal/flush	1	flush	0.4	0	0.5	gal/flush	0
Toilet (Water Closet)	1.6	gal/flush	1	flush	0.6	1	1.28	gal/flush	1
					Sub-Total =	**1**		Sub-Total =	**1**
					GSF/Customer =	**10**		GSF/Customer =	**10**
					GPD per 1,000 GSF =	**142**		**GPD per 1,000 GSF =**	**102**

2. Employee	Baseline						Adjusted for Code		
Type	Baseline Rate [a]	Unit	No. of Units [b]	Unit	Ave Daily Use [b]	GPD per Employee	Rate (w/ Code) [c]	Unit	GPD per Employee
Lavatory Faucet	0.5	gal/min	0.25	min	3	0	0.4	gal/min	0
Urinals	1	gal/flush	1	flush	2	2	0.5	gal/flush	1
Toilet (Water Closet)	1.6	gal/flush	1	flush	4	6	1.28	gal/flush	5
					Sub-Total =	**9**		Sub-Total =	**6**
					GSF/Employee =	**300**		GSF/Employee =	**300**
					GPD per 1,000 GSF =	**29**		**GPD per 1,000 GSF =**	**21**
					Total GPD per 1,000 GSF =	**172**		**Total GPD per 1,000 GSF =**	**123**

Notes:
(a) Baseline flow rate for Lavatory faucet, toilet and urinals are taken from 2009 LEED Reference Guide For Green Building Design and Construction(WE Table 1).
(b) Duration and Average daily use of fixture flow rates are taken from 2009 LEED Reference Guide For Green Building Design and Construction (WE Table 2). Average daily use of "Visitor" was used for customers instead of "Retail Customer" uses from WE Table 2 as it seemed more reasonable.
(c) Flow rate based on maximum flow rate prescribed by 2011 SF Green Building Requirements (Table 13C.5.303.2.3).

Washdown & Facility Cleaning

Type	Flow Rate [a][b]	Unit	No. of Units [a][b]	Unit	Ave Yearly Use [c]	GPY per 1,000 GSF
Outdoor Hardscape Washdown	5	gal/min	30	min/1,000 sf	4	600
					Project Annual Water Use (gal) =	**66,000**
					(using harscape area of 110,000 sf)	
Parking Area Washdown	5	gal/min	30	min/1,000 sf	2	300
					Project Annual Water Use (gal) =	**142,500**
					(using parking GSF of 475,000 sf)	
Indoor Floor Cleaning	0.75	gal/min	4	min/1,000 sf	221	663
					Project Annual Water Use (gal) =	**513,825**
					(using GSF of 775,000 sf)	
Misc Cleaning (assumed to be 5%)						**36,116**
					Total GPY =	**758,441**

Notes:
(a) Outdoor power wash flow rate and time required are based on information gathered from local vendors (Puma Power Wash, San Francisco & Clean 'n Seal, Brentwood, CA). A similar flow rate is also provided in the 2008 Watersmart Guidebook prepared by EBMUD.
(b) Indoor cleaning flow rate and time required are taken from www.tomcatequip.com. The specs for MAGNUM floor scrubber dryer recommended for sports arena are used. The suggested cleaning rate is 26,000 sf/hr but 15,000 sf/hr is used for calculations to be conservative.
(c) Outdoor hardscape area cleaning is assumed to be occur 4 times/year. General cleaning practice is 2 to 3 times/year based information provided by local vendors. Indoor floor is assumed to be cleaned after every event.

REFERENCE 3

NON-POTABLE WATER CALCULATOR

Step 2 of 7: Calculate Indoor Water Demand (Indoor Fixtures and Fittings)

Project Name:
Generic Estates

LEGEND:

User Input	
Linked from User Input	
Default Value	
Autogenerated Value	

Instructions:

This Tab calculates annual indoor water demand based on water demand from domestic fixtures and fittings, using assumed usage rates based on the building uses and occupancy profiles entered in Step 1.

User's have the option to manually enter water demand estimates for the site. These estimates could be used to override or replace the auto-calculated estimates. Tab 7 - Project Definition allows the user to choose between the auto-calculated value and the manually entered values.

A. COMMERCIAL WATER DEMAND (No user input needed - auto-calculated from Step 1 inputs)

Total Water Demand (gpd) = (Flow Rate x Duration x Ave Daily Use x No. of FTEs) + (Flow Rate x Duration x Ave Daily Use (Transient FTE) x No. of Transient FTEs)

							SITE: Generic Estates -- 101 Main Street				
Fixture Type	Flow Rate	Unit	Duration	Unit	Ave Daily Use	Ave Daily Use (Transient) [6]	No. of FTEs (MAX)	No. of Transient FTEs (MAX)	Estimated Daily Water Demand (gpd)	Annual Water Demand (gpy)	Allowable End Use for Non-Potable?
Showerhead [1][2][7]	2	gpm	5	min	0.65	0	0	0	0	0	No
Lavatory Faucet [2]	0.4	gpm	0.25	min	3	0.5	0	0	0	0	No
Urinals [4][3]	0.5	gpf	1	flush	1.74	0.4	0	0	0	0	Yes
Toilet (Water Closet) [2][3]	1.28	gpf	1	flush	1.74	0.5	0	0	0	0	Yes
Kitchen Faucet [2][4]	1.8	gpm	0.25	min	1	0	0	0	0	0	No
Low Flow Sprayer - Restaurants [5]	82.51	gal/emp/day	1	-	1	0	0	0	0	0	No
						TOTAL			0	0	
							If manually entering Annual Demand for Urinals and Toilet Water, enter here (gpy):		0	0	

If manual entries are to be used, the user must provide inputs here and then select the "Manual Entry" option to be used in Tab 7 in order to override the automatically calculated values.

Notes:
(1) Applied to 0.5% of FTEs in General Office uses.
(2) Flow rate based on maximum flow rate prescribed by 2011 SF Green Building Requirements for the Prescriptive Approach (Table 13C.5.303.2.3).
(3) Durations and Ave Daily Use (FTE) from 2011 SFPUC Water Demand Conservation Model (Retail Model for Non-Residential).
(4) Applied to General Office, Grocery Store, Medical Office, R&D or Laboratory, and Educational Facilities.
(5) From 2011 SFPUC Water Demand Conservation Model (Retail Model for Non-Residential), Estimated Usage for Nonresidential Low-Flow Sprayers in Restaurants.
(6) From LEED 2009 Water Use Reduction Additional Guidance (Revision 3). Updated July 14, 2011. Table 1. Non-residential Default Fixture Usage Rates
(7) Ave. Daily Use value from 2011 SFPUC Water Demand Conservation Model.

Key
gpm: gallons per minute
gpf: gallons per flush
gal/emp/day: gallons per employee per day

B. MULTI-FAMILY RESIDENTIAL WATER DEMAND (No user input needed - auto-calculated from Step 1 inputs)

Total Water Demand (gpd) = Flow Rate x Duration x Ave Daily Use x No. of Occupants

						SITE: Generic Estates -- 101 Main Street			
Fixture Type (Daily Use)	Flow Rate	Unit	Duration [4]	Unit	Ave Daily Use [4]	No. of occupants	Total Water Demand (gpd)	Annual Water Demand (gpy)	Allowable End Use for Non-Potable?
Showerhead [1]	2	gpm	8.2	min	0.65	0	0	0	No
Bathroom Faucet [2]	1.3	gpm	1.5	min	1	0	0	0	No
Bath [2]	25	gal/bath	1	bath	0.1	0	0	0	No
Washing Machine [3]	36.9	gal/cycle	1		0.31	0	0	0	No
Toilet (Water Closet) [1]	1.28	gpf	1	flush	4.75	0	0	0	Yes
Kitchen Faucet [1]	1.8	gpm	7.82	min	1	0	0	0	No
Dishwasher [3]	11.15	gal/cycle	1		0.04	0	0	0	No
					TOTAL		0	0	
						If manually entering Annual Demand for Toilet Water, enter here (gpy):	0	0	

If manual entries are to be used, the user must provide inputs here and then select the "Manual Entry" option to be used in Tab 7 in order to override the automatically calculated values.

Notes:
(1) Flow rate based on maximum flow rate prescribed by 2011 SF Green Building Requirements (Table 13C.5.303.2.3).
(2) Flow rate from SFPUC 2011 Urban Water Management Plan (UWMP) Retail Demand Model for New Multi-Family Residential Water Use.
(3) Flow rate based on 2010 rate used in the 2010 UWMP Conservation Model.
(4) Flow rate from SFPUC 2010 Urban Water Management Plan (UWMP) Retail Demand Model for New Multi-Family Residential Water Use.
Ave Daily Use for faucets are represented by total average usage per person per day (min/person/day)

Key
gpm: gallons per minute
gal/bath: gallons per bath
gal/cycle: gallons per washing cycle
gpf: gallons per flush

C. HVAC/COOLING DEMAND

Please enter monthly HVAC/Cooling Demands for each site (gal/mo.)

SITE	TOTAL (gal/mo)	January	February	March	April	May	June	July	August	September	October	November	December
SITE: Generic Estates -- 101 Main Street	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (gal/mo):	0	0	0	0	0	0	0	0	0	0	0	0	0

D. OTHER INDOOR DEMANDS THAT CAN BE MET WITH NON-POTABLE SUPPLIES

User Input Instructions:
Please include other indoor demands in your building if applicable.

	SITE: Generic Estates -- 101 Main Street		
Indoor Decorative Water Feature:			
E.g. indoor fountains with no contact	0	gpd	<--Enter the total daily demand in gallons per day for all indoor decorative water features in the building
	0	no. of days	<--Enter the number of days in a year the decorative water features will be operational
	0	gpy	
Commercial Laundry:			
I.e. commercial laundry facilities that are operated by	0	gal/load	<--Typical water use is 17 gals/wash load
designated staff and are not available for general public	0	loads/day	<--Enter estimated number of loads per day
use	0	gpd	
	0	no. of days	<--Enter estimated number of days in a year that laundry facilities will be used
	0	gpy	
Other Non-Potable Demand:			
<Please specify here>	0	gpd	<--Enter estimated daily demand associated with use
	0	no. of days	<--Enter the number of days the demand will be applicable within a year
	0	gpy	
If Manually Entering Annual Demands for all Other Indoor Demands, enter here (gpy):	0	gpy	<--These values could be selected in Tab 7 - Project Definition to replace the values in the table above

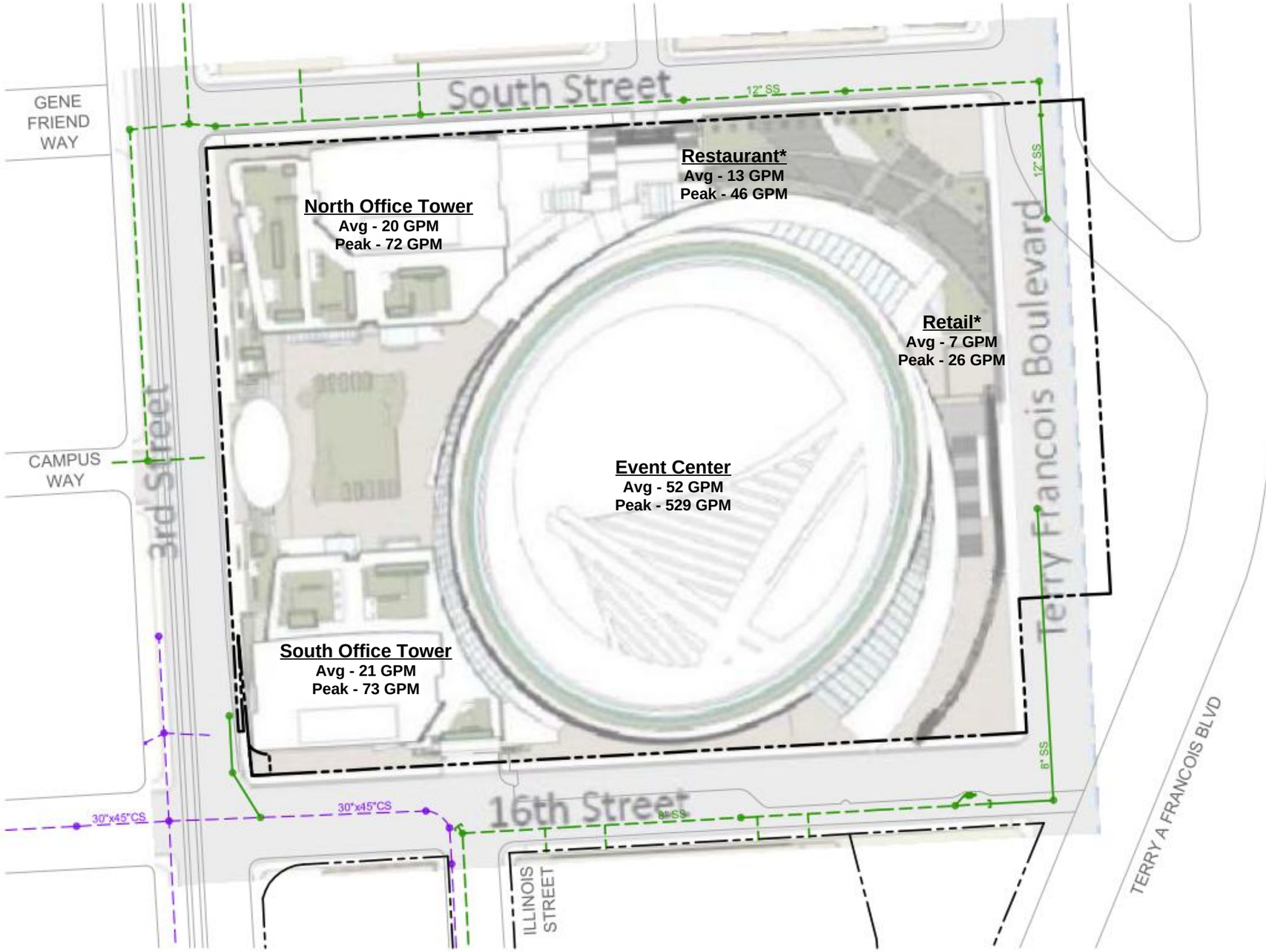
>>> Please proceed on to Step 3: Calculate Indoor Non-Potable Supply

REFERENCE 4

Table 6
OPTION 2: FORECAST OF PROPOSED PROJECT WATER DEMAND BASED ON STANDARD CITY FACTORS

General Consumption						
	Floor Area	Water Consumption/ 1,000 Sq.Ft.	Water Consumption/ Event Day	Number of Event Days	Annual Water Use	
					Gallons	Acre-Feet
Convention Center						
Exhibit Space	780,506	80	62,440	293 [a]	18,294,920	56.14
Meeting Rooms	106,345	150	15,952	142 [b]	2,265,184	6.95
Offices	87,441	150	13,116	312 [c]	4,092,192	12.56
Other (Back-of-House)	525,678	80	42,054	355 [d]	14,929,170	45.81
Restaurant/Commissary/ Food Court	76,500	300 [e]	22,950	355 [d]	8,147,250	25.00
Retail	3,975	80	318	365	116,070	0.36
Bike Station	3,250	80 [e]	260	365	94,900	0.29
Subtotal Convention Center					**47,939,686**	**147.11**

	Attendance [f]	Number of Event Days [f]	Forecasted Annual Attendance [f]	Water Consumption/ Seat	Annual Water Use	
					Gallons	Acre-Feet
Event Center						
Spectator Event Attendance [g]						
Attendance Level 1	72,230	37	2,672,510	4	10,690,040	32.80
Attendance Level 2	55,000	20	1,100,000	4	4,400,000	13.50
Attendance Level 3	35,000	10	350,000	4	1,400,000	4.30
Subtotal		67	4,122,510		16,490,040	50.60



* Restaurant & retail are spread across the perimeter of the site.

LEGEND

- PROPOSED COMBINED SEWER
- EXISTING COMBINED SEWER
- COMBINED SEWER MANHOLE
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- SANITARY SEWER MANHOLE

GRAPHIC SCALE
50 0 50 100

NORTH

MANICA
architecture

BkF
ENGINEERS / SURVEYORS / PLANNERS
1650 Technology Drive, Suite 650
San Jose, California 95110
T: (408)467-9100
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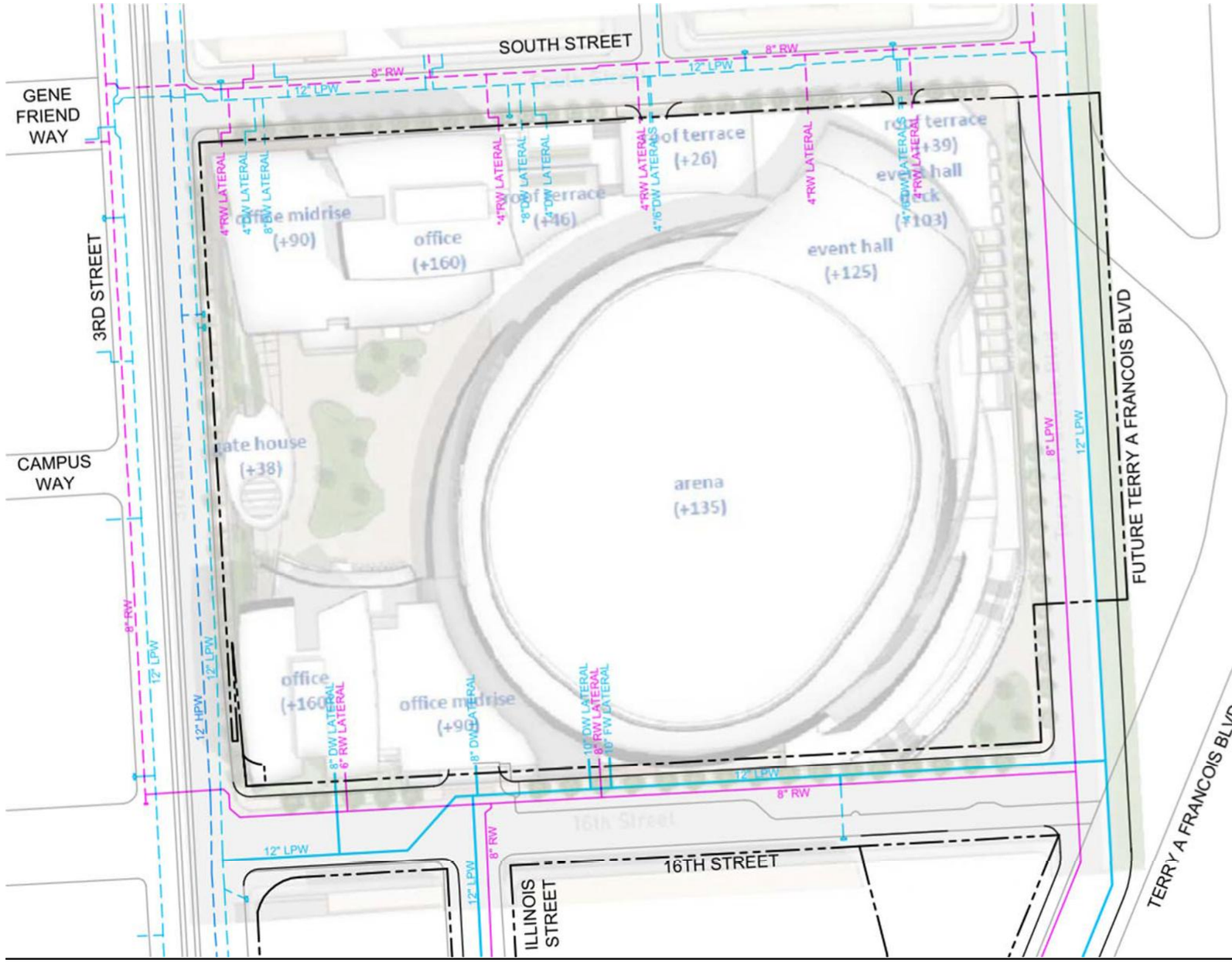

LOW PRESSURE WATER OVERVIEW

THE LOW PRESSURE WATER (LPW) SYSTEM PRIMARILY SERVICES DOMESTIC WATER USE AND FIRE PROTECTION SYSTEMS. THERE ARE EXISTING LPW MAINS IN 3RD STREET AND SOUTH STREET CONSISTENT WITH THE MISSION BAY SOUTH INFRASTRUCTURE PLAN.

THE FOLLOWING INFRASTRUCTURE IMPROVEMENTS WILL TAKE PLACE DURING THIS MAJOR PHASE:

- THE EXISTING LPW MAIN IN 16TH STREET WILL BECOME THE RECLAIMED WATER MAIN AND A NEW LPW MAIN WILL BE INSTALLED
- A NEW LPW MAIN WILL BE INSTALLED IN THE FUTURE TERRY A FRANCOIS BLVD
- MULTIPLE SERVICE LATERALS WILL BE INSTALLED TO ACCOMMODATE THE ARENA AND MULTIPLE BUSINESSES, RETAIL STORES, ETC.

HIGH PRESSURE WATER OVERVIEW

THE HIGH PRESSURE WATER SYSTEM, ALSO REFERRED TO AS THE AUXILIARY WATER SUPPLY SYSTEM (AWSS) IS USED SOLELY FOR FIRE PROTECTION. THERE IS AN EXISTING AWSS MAIN IN 3RD STREET CONSISTENT WITH THE MISSION BAY SOUTH INFRASTRUCTURE PLAN.

NO OTHER IMPROVEMENTS TO THE EXISTING AWSS SYSTEM ARE REQUIRED DURING THIS MAJOR PHASE.

RECLAIMED WATER OVERVIEW

THERE IS AN EXISTING RECLAIMED WATER MAIN IN 3RD STREET AND SOUTH STREET CONSISTENT WITH THE MISSION BAY SOUTH INFRASTRUCTURE PLAN.

THE FOLLOWING RECLAIMED WATER IMPROVEMENTS WILL OCCUR DURING THIS MAJOR PHASE:

- THE EXISTING LPW MAIN IN 16TH STREET WILL BECOME THE RECLAIMED WATER MAIN
- A NEW RECLAIMED WATER MAIN WILL BE INSTALLED IN THE FUTURE TERRY A FRANCOIS BLVD
- MULTIPLE SERVICE LATERALS WILL BE INSTALLED TO ACCOMMODATE THE VARIOUS POTENTIAL RECLAIMED WATER USES (I.E. TOILET SYSTEMS, LANDSCAPE IRRIGATION, ETC.)

LEGEND

- PROPOSED LOW PRESSURE WATER
- EXISTING LOW PRESSURE WATER
- PROPOSED HIGH PRESSURE WATER
- EXISTING HIGH PRESSURE WATER
- PROPOSED RECLAIMED WATER
- EXISTING RECLAIMED WATER