Bohlin Cywinski Jackson (BCJ)

Newport Beach City Hall and Park Development Plan

Drainage Report and Utility Demand Estimation

FINAL

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Drainage Report and Utility Demand Estimation

Prepared for City of Newport Beach Draft EIR

July 2009

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Job number 208597-91

ARUP

Document Verification

Job title	Newport Beach City Hall and Park Development Plan	Job number 208597-91
Document title	Draft Drainage Report and Utilities Demand Estimation	File reference
Document ref		

Revision	Date	Filename	0001_Draft EIR Hydrology Report.doc		
Draft 1	05/07/09	Description	First draft		
			Prepared by	Checked by	Approved by
		Name	Mathew Bamm, Rowan Roderick-Jones, Kirstin Weeks	Nathan Will	John Worley
		Signature			
Draft 2	06/12/09	Filename	DRAFT DRAINAGE AND UTILITIES.doc		
		Description			
			Prepared by	Checked by	Approved by
		Name	Mathew Bamm, Rowan Roderick-Jones, Kirstin Weeks	Nathan Will	John Worley
		Signature			
Draft 3	07/13/09	Filename	DRAINAGE AND UTILITIES.doc		
		Description	Response to LSA second round of comments, received 6/22/09 Response to Fuscoe second round of comments, received 7/08/09		
			Prepared by	Checked by	Approved by
		Name	Mathew Bamm, Rowan Roderick-Jones, Kirstin Weeks	Nathan Will	John Worley
		Signature			
Final	07/23/09	Filename	DRAFT DRAINAGE AND UTILITIES.doc		
		Description	Internal review		
			Prepared by	Checked by	Approved by
		Name	Mathew Bamm, Rowan Roderick-Jones, Kirstin	Nathan Will	John Worley
		Signature			

Issue Document Verification with Document ✓

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1 Introduction

1.1 Purpose

The following report summarizes the preliminary findings of analysis for site hydrology and site utility demand impacts imposed by the City Hall and Park Development Plan project in the City of Newport Beach. This report supplements the environmental documentation being prepared by LSA Associates, Inc under commission by the City of Newport Beach to comply with CEQA requirements for new development.

1.2 Existing Site Conditions

The Newport Beach City Hall and Park Development Plan project resides on approximately 20-acres of undeveloped land in the City of Newport Beach. The site is divided into three parcels, 3.24-acres referred to as north parcel, an approximately 12.82-acre central parcel extending from San Miguel Drive south to the Central Library, and another 4.0-acre southern parcel which is the site of the existing Central Library.

The entire site is bordered by Avocado Ave on the west, MacArthur Boulevard to the east, an Orange County Transportation Agency (OCTA) Transportation Center to the north, and a commercial property immediately to the south, with San Miguel Drive splitting the north and central parcels. The parcels surrounding the City Hall and Park Development Plan site consist primarily of commercial office, mixed-use retail, and single-family residential.

The north project parcel is vacant with a steeply sloping western embankment leading down to a concrete swale adjacent to a gravel shoulder along Avocado Avenue. The central parcel is largely unimproved and contains two existing storm drains that enter from the east and north feeding two major drainage channels. Only the southern channel is named in previously written documents as “Farallon Drain Retarding Basin” (source: El Paseo Storm Drain Design Review Report, John M. Tettemer & Associates, Ltd; July 1989). The channels appear to be natural ravine gullies collecting flows at the western edge of the project site near Farallon Drive. Due to development of surrounding parcels, the southern channel has been improved to provide large storm event retardation through a series of constricted inlets and overflow drainage risers. Flows from the channels ultimately drain into Newport Bay. The last major improvement to the existing drainage channels occurred in 1990 (source: Improvement Plans for Avocado Ave, City of Newport Beach Public Works; Jan 1990).

Dry weather irrigation runoff from upstream MacArthur Boulevard and adjacent residential properties is believed to provide the drainage channels with a constant supply of water during the dry season. Over time, this constant supply of water has generated wetland biology within both channels which is now protected by the US Army Corps of Engineers and the California Department of Fish and Game. As such, the wetlands are present as a result of manmade infrastructure improvements and are not believed to be legacy wetlands.

Concrete storm conveyance trenches and steel drainage risers reside along the southern edge of the central parcel, collecting runoff from the west and south edges of the property. This area also contains high sloping west, east, and south edge embankments ranging from zero to 30-ft in height above the adjacent streets and Central Library.

1.3 Proposed Site Design and Layout

The bulk of proposed development, including the City Hall building and partially underground parking garage, will reside on the central parcel. At the City's request, the limit of work has been expanded to include an addition to the north side of the existing Central Library building, and expansion of existing street width at San Miguel Drive from approximately 500-ft west of Avocado Ave east to MacArthur Boulevard. The north and central parcels will be developed as public open spaces, including two foot bridges and one culvert crossing the wetland regions. A larger pedestrian bridge will span San Miguel Drive, connecting the north and central park regions.

1.4 Record Materials

Materials utilized in preparation of the existing and proposed site conditions for this study have been gathered from the following:

- Aerial topographic survey provided by City of Newport Beach
- GIS-based storm sewer CAD linework provided by City of Newport Beach
- Available record drawings on file with City of Newport Beach
- Preliminary jurisdictional wetland and California Fish & Game delineation provided by LSA Associates, Inc., dated May 8, 2009
- Architectural footprint by Bohlin Cywinski Jackson (BCJ), dated June 8, 2009
- Landscape architecture site plan by Peter Walker & Partners, dated June 2, 2009

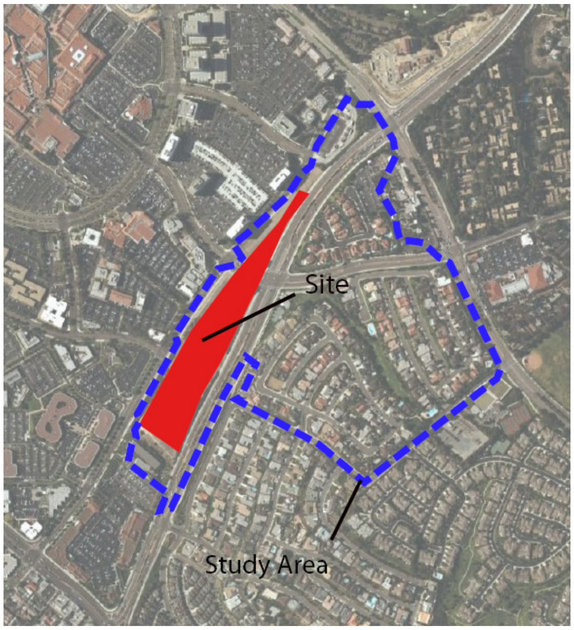
2 Site Hydrology

2.1 Background

The primary goal of this hydrology study is to identify the existing and proposed peak flow rates and total runoff volumes of storm water entering and exiting the site, with the intention of minimizing development impact on the site hydrology and existing wetlands.

The study area includes all of the upstream watersheds contributing to both the north and central site regions (offsite flows), the project site (onsite flows), and portions of the existing Central Library site. Figure 1 approximates the area of study under this assessment.

Figure 1: Hydrology Study Area



2.2 Design Criteria

The following documents have been consulted for preparation of hydrologic assessment of the project:

- Orange County (OC) Hydrology Manual by Orange County Flood Control District (OCFCD), 1986 with 1996 Addendum
- City of Newport Beach Storm Drain Master Plan, May 1999; John M. Tettemer & Associates, Inc. (JMTA)
- El Paseo Storm Drain Design Review Report, July 1989; John M. Tettemer & Associates, Inc. (JMTA)
- Orange County Local Drainage Manual
- City of Newport Beach Utility Design Criteria

2.3 Assumptions & Methodology

2.3.1 Design Assumptions

In compliance with the OC Hydrology Manual, the Soil Conservation Service (SCS) method is utilized in this study to account for rainfall losses due to existing soil types (groups) identified by the National Resource Conservation Service (NRCS) within the area of study. The study area largely identifies with Soil Group D, having small pockets of Soil Group B within existing upstream watersheds and along the western edge of the North Park. A copy of the NRCS Soil Group map is provided in Appendix A. Curve Numbers (CN) are constructed for each watershed and weighted by the area of imperviousness within each soil group.

The Unit Hydrograph Method has been selected as the preferred method of stormwater routing and is modeled under the Infoworks CS (Collection Systems) by Wallingford Software for existing and proposed project site conditions. The Unit Hydrograph Method is acceptable under the OC Hydrology Manual and is widely utilized to route rainfall hydrographs in a variety of storm drainage networks throughout the United States. At the time of this writing, the City of Newport Beach has approved the use of Infoworks CS for modeling of existing and proposed storm networks for this project.

The OC Hydrology Manual requires that the 10-year event be analyzed for conveyance within storm networks, and City design criteria require pipe networks operate in open channel condition. Per the OC Hydrology Manual, the 25-year event must be analyzed in sump conditions, the 50-year event in major drainage channels, and the 100-year event to ensure a minimum 1-ft of freeboard below adjacent building finish floors. The Orange County 1996 Addendum requires smaller rain events also be studied to identify potential flood conditions that may occur only in the smaller events. This study assesses the following storm events; 2-, 5-, 10-, 25-, 50-, and 100-year.

To accommodate tail-water conditions at points of connection to existing storm pipes in the network modeling, a conservative assumption is made that existing Hydraulic Grade Lines (HGLs) at connection points occur at the crown of the downstream pipe for each storm event analyzed. An exception is made at connections to the existing 42-inch RCP mainline at the south side of the Central Library, where existing 100-year HGL's are provided by record drawings.

2.3.2 Methodology

Time of concentration (T_c) is the primary indicator for watershed conveyance into storm networks. In lieu of utilizing the time of concentration nomograph provided by the County Manual, Infoworks calculates time of concentration by the following equation, taken from Giandotti:

$$T_c = 60 \times \frac{0.4 \times \sqrt{S} + 0.0015 \times L}{0.8 \times \sqrt{p \times L}}$$

Where:

T_c is time of concentration in minutes
S is subcatchment surface area in hectares
L is subcatchment length in metres
p is subcatchment slope in m/m

Times of concentration generated by this method yield estimates similar in value to those found in typical urban runoff settings for watersheds of this size.

Rainfall depths have been extrapolated from Table B.2 of the OC Hydrology Manual to prepare peak rainfall intensity curves, and 24-hour rainfall events were generated. Rainfall curves of extrapolated storm events are provided in Appendix A.

2.4 Existing Site Hydrology

A copy of the Flood Insurance Rate Map (FIRM) for the project is provided in Appendix B and indicates that the mapped 100-year flood plain does not occur within the project site.

Upstream site conditions are analyzed to determine existing runoff rates entering the site at three points of connection (nodes A, B, and C) and exiting at five locations (nodes E, F, G, H and J). Two interim points of interest are also analyzed for review, nodes D and WET (wetland).

Figure 2 identifies the location of these existing points of connection.

Technical analysis of drainage conditions downstream of nodes E, F, G, H and J are not provided within the scope of this study however, they are reference from two previous studies prepared by John M. Tettemer & Associates, Inc (JMTA). The El Paseo Storm Drain Design Review Report, July 1989; and City of Newport Beach Storm Drain Master Plan, May 1999 describe the drainage conditions downstream of the site at the time of their publishing.

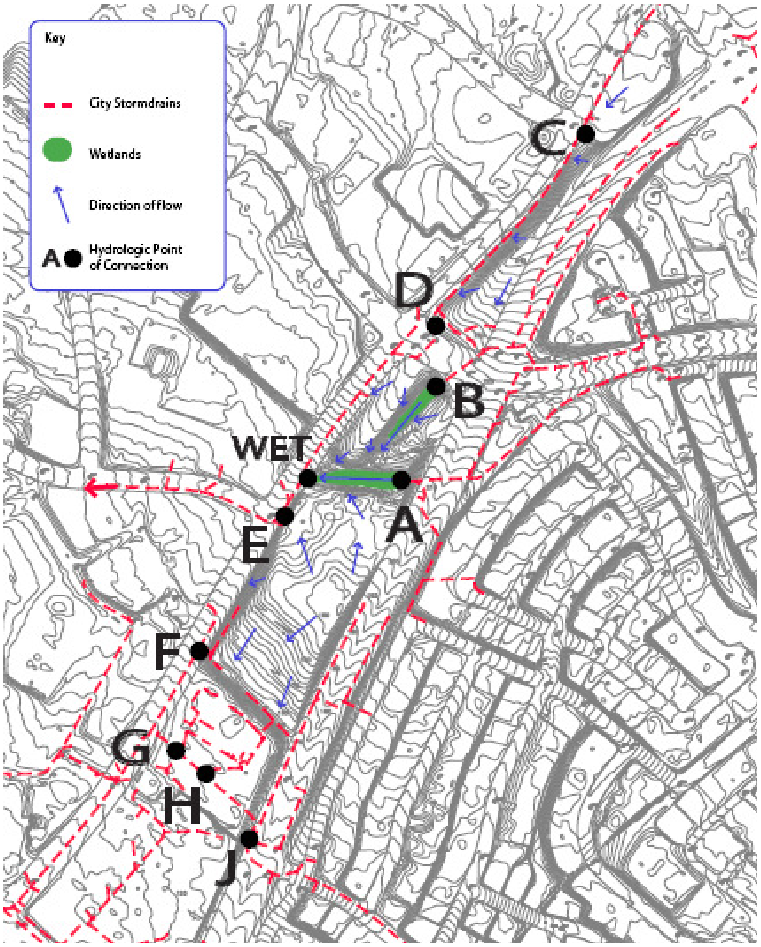
In the El Paseo Storm Drain Design Review Report, July 1989, a proposed Farallon Drive storm drain reach extending from Newport Bay to the project site is analyzed which corresponds to improvements completed by the City in 1996 (source: Storm Drain Improvements for P.C.H. – Irvine Terrace Park – El Paseo Drive – Bulkhead, City of Newport Beach Public Works; Jan 1996). The report notes that the proposed drainage reach from the Newport Bay outlet up to East Coast Highway is adequately sized to handle 25-year storm flows from the entire upstream watershed (Watershed No. 16), which contains the entirety of the City Hall and Park Development Project study area.

The JMTA study also notes that the storm pipe beneath Farallon Drive at Avocado Ave (near node E) is "adequately sized to carry 25-year flows if the retarding basin [on the City Hall site] remains in place" and that "the existing retarding basin [has] sufficient capacity to contain the 100-year storm without overflow." No other specific existing drainage conditions downstream of the project site are noted in the El Paseo study.

The City of Newport Beach Storm Drain Master Plan, May 1999 report was commissioned by the City to provide analysis of drainage conditions throughout the entire City and inform areas that fail to manage the 100-year storm event. This study states that six (6) locations within the greater Watershed No. 16 are considered deficient such that street flooding overtops the curb in the 100-year event. None of the identified locations flood beyond the City right-of-way.

The City Hall project resides within Watershed No. 16, however, precise locations of these deficiencies within the greater watershed are not known at this time. In addition, such deficiencies may have been rectified since the study was published in 1999. Further discussions with City officials are required to determine whether any such deficiencies are relevant to the proposed project conditions.

Figure 2: Existing Stormwater Points of Connection



2.5 Proposed Site Hydrology

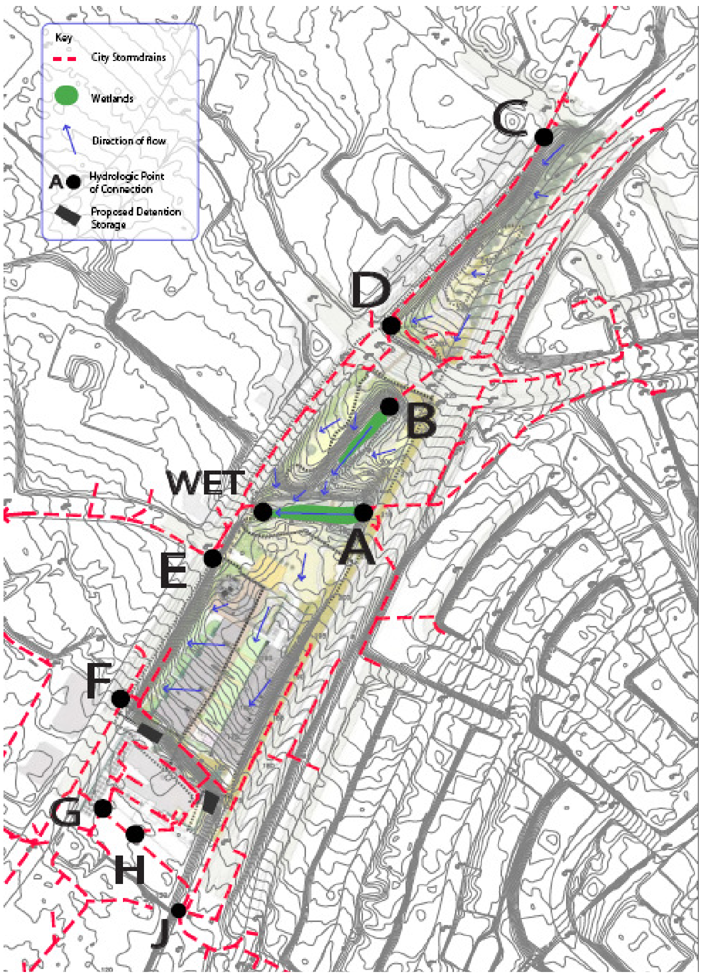
The proposed site modifies hydrologic conditions within the project limits, which includes the north and central parcels, San Miguel Drive enhancement, and portions of the Central Library site. Due to contour modifications within the park regions, two offsite watersheds are adjusted, keeping private runoff contained within the park watersheds that is currently flowing onto MacArthur Blvd. This occurs just north and south of San Miguel Drive. North park watersheds also are adjusted such that the proposed dog park watershed will drain towards Avocado Ave rather than to the existing trunk that feeds the north wetland. The adjustment reduces the total volume of water entering the north wetland by 11%, however insures runoff from the upstream dog park does not negatively impact water quality in the downstream wetlands due to heightened levels of constituents expected at the dog park. This subject is further developed in Section 2.7 below.

The site grading in the central wetlands region is modified in order to install ADA pedestrian pathways, two wetland bridges and one culvert crossing ensuring no earthwork takes place in the delineated jurisdictional wetlands. In concert with a series of passive water quality treatment devices, the wetlands watershed is adjusted to include runoff from adjacent San Miguel Drive enhancement, and portions of Avocado Ave.

The lower central parcel, where the City Hall and parking structure will reside, is separated into two primary watersheds running toward the southwest and southeast corners of the site. The City Hall roof is planned to drain toward the west side of the building for treatment near Avocado Ave. The north entry plaza, the civic green, and the parking structure drain via surface and submerged storm drains toward the southeast site corner, where stormwater combines with portions of the Central Library expansion watersheds. A portion of the existing eastern embankment along MacArthur Blvd is cut away in order to install the parking garage, shifting the top of the watershed boundary and thereby sending some runoff toward the site rather than onto MacArthur Blvd.

At each of the southwest and southeast site corners, underground detention storage tanks are provided to counteract the increased imperviousness of the area and the shifting of watershed boundaries. These facilities are sized to detain up to the 50-year storm event peak discharge to points of connection G and H. Figure 3 below describes the proposed site with the same connection points as identified in the existing condition.

Figure 3: Proposed Stormwater Points of Connection



2.6 Results

The results of the Infoworks CS modeling output are summarized in Table 2 below. A comparison of the existing condition peak discharge rates encountered in this study at node WET was made to the JMTA El Paseo Storm Drain Design Review Report, which found the rates for the 25-year and 100-year storm events to be within 1% and 5% of the JMTA results, respectively. Discharge rates encountered at this node represent approximately 75% of the total drainage area analyzed in the study area, indicating robustness in the results of this study.Table 1 below provides a quick comparison of storm hydrology that has been approved under the previous El Paseo drainage study with that of the current study, and compares the existing and proposed conditions at this node under the current study

Table 1: Comparison of Previous and Current Studies

	El Paseo Report[1]	Existing Condition[2]	Proposed Condition[2]
25-Year	120.0	120.7	120.6
100-Year	141.0	147.4	147.3

[1] El Paseo Storm Drain Design Review Report, John M. Tettemer & Associates, Ltd; July 1989

[2] Arup study

Table 2: Existing and Proposed Hydrologic Assessment Summary

Hydrology Results		2-Year Event				5-Year Event				10-Year Event			
Point of Connection		Existing	Proposed	Change	%Change	Existing	Proposed	Change	%Change	Existing	Proposed	Change	%Change
A (IN)	Peak Discharge, Q (cfs)	47.39	47.28	-0.11	-0.23%	70.77	70.62	-0.15	-0.21%	87.70	87.53	-0.17	-0.19%
	Total Volume, V (cu-ft)	432,880	432,090	-790	-0.18%	658,880	657,670	-1,210	-0.18%	789,470	788,000	-1,470	-0.19%
B (IN)	Peak Discharge, Q (cfs)	6.19	5.51	-0.68	-10.99%	9.16	8.13	-1.03	-11.24%	11.34	10.06	-1.28	-11.29%
	Total Volume, V (cu-ft)	55,520	50,140	-5,380	-9.69%	83,070	74,930	-8,140	-9.80%	98,720	89,190	-9,530	-9.65%
C (IN)	Peak Discharge, Q (cfs)	2.99	2.99	0.00	0.00%	4.40	4.40	0.00	0.00%	5.45	5.45	0.00	0.00%
	Total Volume, V (cu-ft)	27,710	27,710	0	0.00%	41,400	41,400	0	0.00%	49,290	49,290	0	0.00%
D (OUT)	Peak Discharge, Q (cfs)	5.70	4.98	-0.72	-12.63%	8.60	7.51	-1.09	-12.67%	10.85	9.32	-1.53	-14.10%
	Total Volume, V (cu-ft)	45,010	50,110	5,100	11.33%	68,850	76,810	7,960	11.56%	82,700	92,320	9,620	11.63%
E (OUT)	Peak Discharge, Q (cfs)	57.68	58.32	0.64	1.11%	91.08	91.71	0.63	0.69%	113.06	113.91	0.85	0.75%
	Total Volume, V (cu-ft)	591,030	591,410	380	0.06%	900,730	901,860	1,130	0.13%	1,079,720	1,081,280	1,560	0.14%
F (OUT)	Peak Discharge, Q (cfs)	2.58	2.51	-0.07	-2.71%	3.91	3.71	-0.20	-5.12%	5.00	4.61	-0.39	-7.80%
	Total Volume, V (cu-ft)	14,490	21,910	7,420	51.21%	23,130	33,150	10,020	43.32%	28,190	39,630	11,440	40.58%
G (OUT)	Peak Discharge, Q (cfs)	0.78	0.77	-0.01	-1.28%	1.17	1.02	-0.15	-12.82%	1.45	1.20	-0.25	-17.24%
	Total Volume, V (cu-ft)	7,420	9,520	2,100	28.30%	11,190	14,140	2,950	26.36%	13,370	16,790	3,420	25.58%
H (OUT)	Peak Discharge, Q (cfs)	3.89	4.08	0.19	4.88%	5.74	6.06	0.32	5.57%	7.37	6.90	-0.47	-6.38%
	Total Volume, V (cu-ft)	24,180	40,760	16,580	68.57%	37,410	61,780	24,370	65.14%	45,100	73,900	28,800	63.86%
J (OUT)	Peak Discharge, Q (cfs)	2.29	2.15	-0.14	-6.11%	3.38	3.14	-0.24	-7.10%	4.21	3.89	-0.32	-7.60%
	Total Volume, V (cu-ft)	18,740	18,150	-590	-3.15%	28,270	26,960	-1,310	-4.63%	33,770	32,020	-1,750	-5.18%
Wetland (OUT)	Peak Discharge, Q (cfs)	51.22	51.24	0.02	0.04%	80.78	80.74	-0.04	-0.05%	100.38	100.27	-0.11	-0.11%
	Total Volume, V (cu-ft)	510,230	514,185	3,955	0.78%	778,700	784,755	6,055	0.78%	933,860	941,090	7,230	0.77%

Hydrology Results		25-Year Event				50-Year Event				100-Year Event			
Point of Connection		Existing	Proposed	Change	%Change	Existing	Proposed	Change	%Change	Existing	Proposed	Change	%Change
A (IN)	Peak Discharge, Q (cfs)	105.27	105.07	-0.20	-0.19%	118.11	117.89	-0.22	-0.19%	130.59	130.05	-0.54	-0.41%
	Total Volume, V (cu-ft)	1,003,520	1,001,760	-1,760	-0.18%	1,120,220	1,118,180	-2,040	-0.18%	1,282,350	1,280,190	-2,160	-0.17%
B (IN)	Peak Discharge, Q (cfs)	13.73	12.18	-1.55	-11.29%	15.46	13.71	-1.75	-11.32%	17.39	15.41	-1.98	-11.39%
	Total Volume, V (cu-ft)	124,700	112,540	-12,160	-9.75%	138,875	125,270	-13,605	-9.80%	158,530	139,950	-18,580	-11.72%
C (IN)	Peak Discharge, Q (cfs)	6.58	6.58	0.00	0.00%	7.41	7.41	0.00	0.00%	8.33	8.33	0.00	0.00%
	Total Volume, V (cu-ft)	62,190	62,190	0	0.00%	69,200	69,200	0	0.00%	78,960	78,960	0	0.00%
D (OUT)	Peak Discharge, Q (cfs)	13.24	11.36	-1.88	-14.20%	15.03	12.85	-2.18	-14.50%	16.98	14.44	-2.54	-14.96%
	Total Volume, V (cu-ft)	105,490	117,830	12,340	11.70%	117,910	131,740	13,830	11.73%	135,290	151,160	15,870	11.73%
E (OUT)	Peak Discharge, Q (cfs)	136.03	137.11	1.08	0.79%	152.49	153.66	1.17	0.77%	165.99	167.63	1.64	0.99%
	Total Volume, V (cu-ft)	1,373,290	1,375,700	2,410	0.18%	1,533,410	1,536,090	2,680	0.17%	1,755,940	1,759,430	3,490	0.20%
F (OUT)	Peak Discharge, Q (cfs)	6.09	5.58	-0.51	-8.37%	6.90	6.29	-0.61	-8.84%	7.89	7.07	-0.82	-10.39%
	Total Volume, V (cu-ft)	36,570	50,260	13,690	37.44%	41,170	56,060	14,890	36.17%	47,580	64,100	16,520	34.72%
G (OUT)	Peak Discharge, Q (cfs)	1.77	1.42	-0.35	-19.77%	1.98	1.57	-0.41	-20.71%	2.23	1.96	-0.27	-12.11%
	Total Volume, V (cu-ft)	16,930	21,130	4,200	24.81%	18,875	23,480	4,605	24.40%	21,580	26,770	5,190	24.05%
H (OUT)	Peak Discharge, Q (cfs)	8.86	7.52	-1.34	-15.12%	9.94	9.77	-0.17	-1.71%	11.35	11.88	0.53	4.67%
	Total Volume, V (cu-ft)	57,760	93,760	36,000	62.33%	64,690	104,540	39,850	61.60%	74,360	119,600	45,240	60.84%
J (OUT)	Peak Discharge, Q (cfs)	5.08	4.69	-0.39	-7.68%	5.74	5.29	-0.45	-7.84%	6.46	5.95	-0.51	-7.89%
	Total Volume, V (cu-ft)	42,770	40,300	-2,470	-5.78%	47,690	44,820	-2,870	-6.02%	54,490	51,080	-3,410	-6.26%
Wetland (OUT)	Peak Discharge, Q (cfs)	120.70	120.62	-0.08	-0.07%	135.38	135.19	-0.19	-0.14%	147.43	147.33	-0.10	-0.07%
	Total Volume, V (cu-ft)	1,188,290	1,197,620	9,330	0.79%	1,327,090	1,337,400	10,310	0.78%	1,519,870	1,531,890	12,020	0.79%

2.6.1 Detention Storage

Detention criteria for flood control within the existing wetland drainage channels is based on matching peak discharge for post-development condition with that of the existing condition, and is not contingent upon downstream network conditions. Technical analysis of downstream drainage conditions is beyond the scope of this study.

Two underground detention storage tanks are planned for installation at the southwest and southeast site corners to manage increased peak runoff from the highly developed City Hall region. With reduced orifice outlets, they are sized to detain the volume of stormwater necessary to maintain or reduce peak discharge to points of connection G and H up to the 50-year storm event. The detention volume provided at node G is approximately 1,600 cubic-feet (CF) and the volume at node H is roughly 4,000 CF. Downstream tailwater conditions are considered when developing these detention volumes, and shall also be considered during final design.

In concert with the project's water quality objectives, a vegetated bioswale with a series of check dams is planned adjacent to Avocado Ave north of the site wetlands. The swale and check dams are intended to treat stormwater generated by San Miguel Drive and Avocado Ave, however due to site grading around the wetlands and the acceptance of additional runoff from these adjacent streets, the check dams are sized to provide enough detention storage to offset the shifting of peak demands within the wetlands watershed. The check dams generate a net-zero adjustment to the rate of peak discharge feeding the south wetland for all storm events.

2.7 Conclusions

2.7.1 Existing Condition

The results of the site hydrology and pipe hydraulics of the existing site condition, along with maps of drainage boundaries, are provided in Appendix C and summarized in Table 2. The results of this study indicate that for all nodes in the study area, the existing drainage infrastructure is adequately sized, in compliance with the OC Hydrology Manual, to provide flood control for all storm events analyzed. Two storm pipes downstream of the drainage channel under Avocado Ave, two immediately upstream of the drainage channel under MacArthur Blvd, and two reaches on the north side of Central Library are surcharged in the 10-year storm event, meaning these reaches are undersized to meet the City's design criteria for open channel flow. However in 100-year storm event condition, hydraulic grade lines for these reaches are below finish grade, making them adequately sized to provide County mandated flood control.

Technical analysis of drainage capacities downstream of nodes E, F, G, H and J is beyond the scope of this study. However, the results of this study indicate that the hydraulic grade line at nodes F, G, H and J are below finish grades for all storm events analyzed, indicating adequate flood control in existing condition at these points of connection. Refer to Appendix C for mapped summary of these results.

According to the El Paseo Storm Drain Design Review Report, John M. Tettemer & Associates, Ltd (JMTA); July 1989, the existing 48-inch pipe in Farallon Drive west of node E is adequately sized to carry 25-year storm flows so long as the onsite drainage channel provides detention storage (retardation), which has been in operation since channel improvements were made in 1990. Per this study, the hydraulic grade line in the existing condition at node E, downstream of the drainage channel, is below street grade for all storm events analyzed, indicating adequate existing flood control at this point of connection.

Hydraulic grade lines remain below all manhole rims within the site for all storm events analyzed, indicating no flooding of existing site infrastructure, except in the event of detention storage (retardation) provided by the south drainage channel, as designed, during large storm events.

2.7.2 Proposed Condition

The results of the site hydrology and pipe hydraulics of the proposed site condition, along with maps of drainage boundaries, are provided in Appendix C and summarized in Table 2. The results of this study indicate that the proposed drainage infrastructure serving the site is adequately sized to provide flood protection for all storm events analyzed from upstream of the site to nodes E, F, G, H, and J. The same existing downstream and upstream drainage channel pipes, as mentioned above, remain in surcharge for the 10-year event, which does not meet City design criteria for open channel flow. However, their hydraulic grade lines remain below finish grade in the 100-year event, in compliance with OC Hydrology Manual flood control. 10-year event surcharged storm pipes on the north side of Central Library are relieved due to new storm configurations in the proposed condition.

Hydrologic output of proposed offsite condition (nodes A and B) indicates a decrease in peak runoff and volume from upstream watersheds entering the wetlands channel (approximately 0.2% and 11% decrease, respectively). These modifications are considered to provide a less than significant hydrologic impact. No change is imposed by offsite runoff entering at node C since no hydrologic revisions are made upstream of the site to this location.

With respect to the site wetlands, node B feeds the north channel (wetland) and the sum of nodes A and B feeds the south channel (wetland). Due to the shifting of the dog park watershed away from node B to ensure no change in water quality entering the wetlands, the total volume of storm water entering the north wetland is reduced by approximately 11%. Biologists at LSA Associates, Inc. do not believe the 11% reduction will result in a significant adverse biological impact to the north wetland. In addition, since the north park is not currently irrigated, it is believed the reduction will occur only in wet weather flows, and dry weather flows into the wetland will not be impacted by this watershed revision.

The vegetated swale with check dams planned along Avocado Ave provides the precise detention storage volume to generate less than 0.2% decrease in peak discharge to the south wetland which thereby ensures a less than significant hydrologic impact of the shifting of watersheds feeding the south wetland. The total volume of storm water entering the south wetland at node A is reduced by approximately 0.2%. However, due to the addition of street runoff from adjacent Avocado Ave and San Miguel Drive to the wetlands watershed, a net increase in total runoff volume to the south wetland is approximately 0.8%, which is considered insignificant.

Despite the increase in watershed size contributing to node D, a net decrease in peak discharge to this node is encountered due to the increased time of concentration imposed by the very shallow sloping dog park. This decrease of approximately 3 cubic-feet-per-second (CFS) or less for all storm events and is considered less than significant.

An approximate 1% net increase in peak discharge, and less than 0.2% net increase in total volume, is encountered at node E. This modification is considered a less than significant impact.

For node F, a net reduction in peak discharge of less than 1-CFS for all storm events (2-10% reduction) is encountered, generating a less than significant impact for this point of connection.

For nodes G and H, underground tank detention storage is engineered to maintain the same peak discharge in the proposed condition as encountered in the existing condition up to the 50-year storm event, with less than significant increases in small storm events as noted above. For node H, small storm events (2- and 5-year) allow an increase in peak discharge of roughly 5%, which is considered to provide a less than significant impact to existing downstream storm networks.

For node J, a net reduction in peak discharge of 6-8% is encountered, with a net reduction of 3-7% in total volume, generating a less than significant impact for this point of connection.

Due to increased imperviousness of the site draining to nodes F, G, and H, a net increase in total runoff volume at each of these nodes is encountered. While this volume is considered runoff that is not infiltrated into the ground as in the existing condition, it is not considered substantial enough to significantly alter recharging of the underground aquifer, making this condition a less than significant impact. In addition, low permeability of existing site soils[1] would not provide efficient aquifer recharge and doing so would likely generate complications at the adjacent Central Library by generating perched groundwater levels. It is recommended that the additional volume be either retained onsite for potential reuse, or drained to the existing storm network following the detention storage tanks.

The capacity of downstream storm networks is dependent on peak discharge rates generated by upstream watersheds. All points of connection from the project site to the downstream network, except at nodes E and H, represent a net decrease in peak discharge. Runoff at nodes E and H result in negligible increases in peak discharge. While increases in total storm volumes are significantly increased at some nodes, increases in total volume from the site are not believed to impact downstream networks. Decreases and/or negligible increases in peak discharge will not adversely affect the capacity of downstream networks, resulting in the City Hall and Park Development project having negligible impact on downstream drainage conditions.

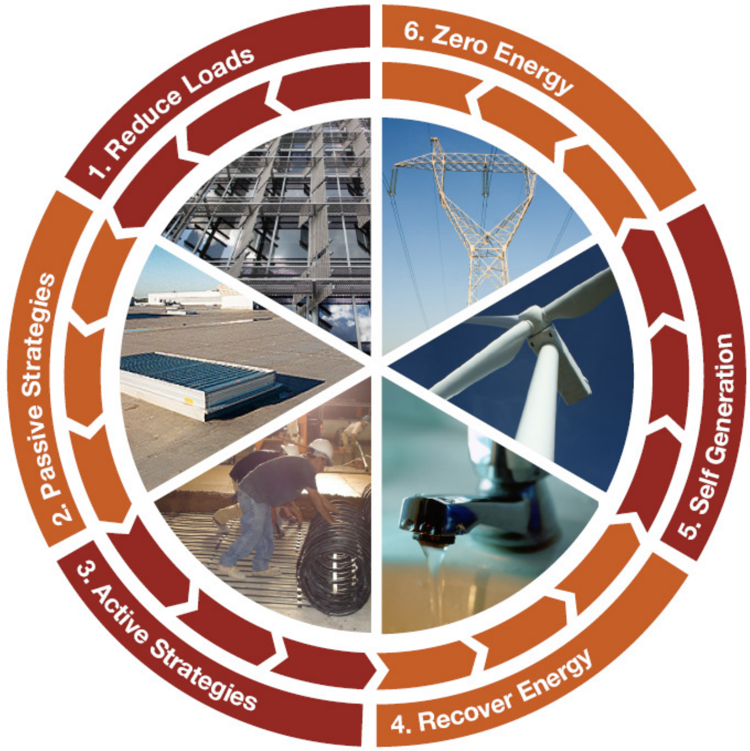
The City Hall and Park development project does not substantially alter existing drainage patterns which would result in substantial erosion or siltation on- or off-site. The project does not increase the rate of runoff which would result in flood conditions onsite, nor does it generate a change in offsite runoff rates.

3 Utilities Planning

The Newport Beach City Hall and Park Development Plan project holds sustainability as a primary goal, and the design team is particularly focused on cost-effective minimization of energy and water use. The team is prioritizing steps following the diagrams shown in figure 4. For both energy and water, reduction in demand is the first step, followed by alternative, more environmentally-friendly supply. As a final step (step 6), carbon offsets and the funding of offsite energy/water reductions are considered as a post-design measure. However, the current intent is to push the onsite alternative supply as far as possible since offsets are not viewed as carrying maximum benefit, nor cost-effectiveness for this particular project.

[1] Geotechnical Study for the Proposed City Hall and Parking Structure for the EIR, Newport Beach, California, prepared for City of Newport Beach by Leighton Consulting, Inc, July 6, 2009; which has determined an infiltration potential of existing soils to be 0.02 gal/SF.

Figure 4: Approach to minimization of energy (top) and water use (bottom).



Water and energy use for the project were estimated using the methods described below for both a conventional construction and a proposed design case. The proposed design case represents the current design intent as closely as possible, whereas the conventional construction case represents a conventional, code-compliant project of the same size, scope and site.

3.1 Water

Water consumption for the project was estimated using a bottom-up approach. Indoor fixture water use was calculated based on average expected daily occupancy for City Hall (500 people including staff and visitors) and maximum flow rates allowable by the Uniform Plumbing Code and the Energy Policy Act of 1992. Mechanical water use is water evaporated or released by the cooling tower (providing energy savings benefits) and is based on an estimated peak cooling load of 75 tons. Both assume 277 work days/year, which is 365 days minus 10 holidays, Sundays and half Saturdays. For the library expansion, an estimated 5% visitor increase was assumed (approximately 127 people daily for 355 days/year, based on an average monthly occupancy of 76200 reported by the City. Irrigation water use is a rough estimate based on the landscape coefficient method for the 537,069 square feet of parkland, gardens and grounds in the project. The bottom-up approach was then checked against the LA CEQA sewage generation factors, which should be more representative of historic usage, and thus higher than the conventional construction case by about 30-40%. Peak water demand was also estimated based on current fixture counts, assumption of rotating irrigation (i.e. not all area irrigated at once) and mechanical water use using the method set forth by the Uniform Plumbing Code to calculate maximum expected simultaneous use.

Project Design Features

Several water conservation measures are a part of the current design, including:

- Low-flow faucets
- Dual-flush WCs and pint (1/8 gallon per flush) urinals
- Water conserving irrigation methods (drip irrigation wherever practical)
- A high percentage of drought-tolerant, native/adapted planting species
- Cooling tower water use reduction via nonchemical water treatment

Table 3 shows primary factors for efficiency improvements between conventional construction and proposed design cases.

Table 3: Basis of water reduction calculations for Project Design Features

		Conventional Construction	Proposed Design
Flow Fixtures	Lavatory Faucets	2.5 gpm	0.5 gpm
	Kitchenette Faucets	2.5 gpm	2 gpm
	WCs	1.6 gpf	Dual flush (average 1.28 gpf)
	Urinals	1 gpf	0.125 gpf
Irrigation	Irrigation	100% Spray	50% Drip, 50% Spray
	Average Plant Factor*	0.6	0.3 (50% less water)
Mechanical	Cooling Tower	3 cycles of concentration	8 cycles of concentration

*In proportion with water demand: 0.1 - 0.3 = low water, 0.4 - 0.6 = moderate water, 0.7 - 0.9 = high water

Figure 5: Example of climate adapted planting (Center Site Planting Character from PWP)

In addition, use of non-potable water to supply some or all irrigation and toilet flushing is planned. This may be accomplished by onsite reuse of rainwater, gray water, and/or capture of dry flows as they exit the site, or by future connection to the municipal reclaimed water supply. These options are being evaluated on a variety of criteria, including energy and environmental performance, cost and maintainability.

3.1.1 Water Consumption and Demand Estimates

The estimated peak water demand is 228 gpm, which indicates a 4" pipe with 3" meter. The total annual water use estimated for the project is 8.4 million gallons, which is 45% below the conventional construction case (15.3 million gallons). Estimated sewage generation for the proposed design is 1.5 million gallons per year, which is 63% below the LA CEQA factor allowance of approximately 4.4 million gallons per year (150 gallons per 1000 square feet).

Figure 6: Conventional construction and proposed design annual water demand estimates

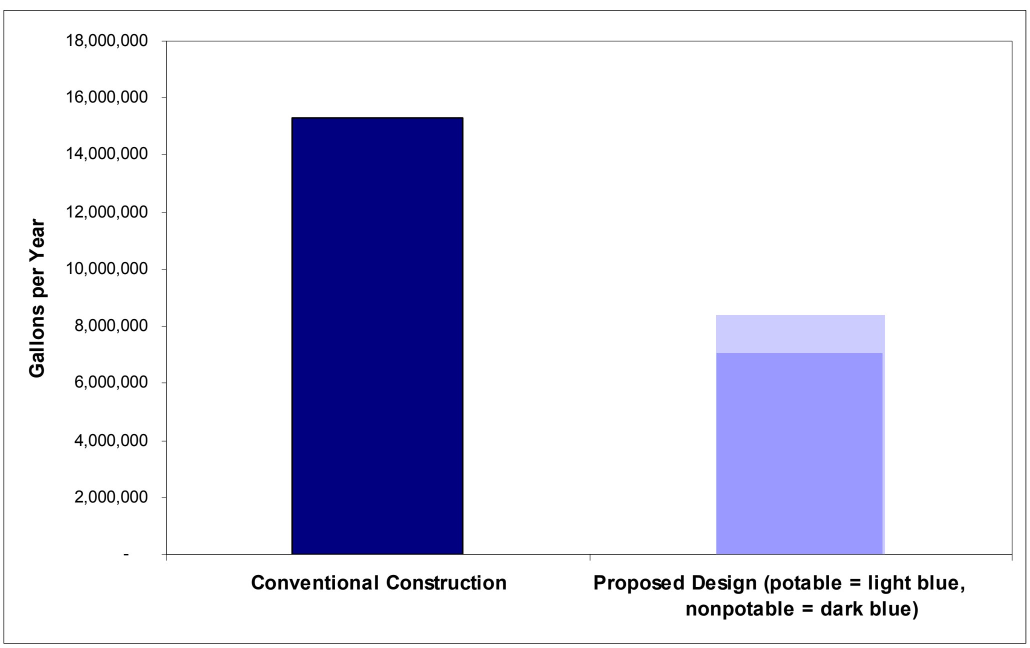
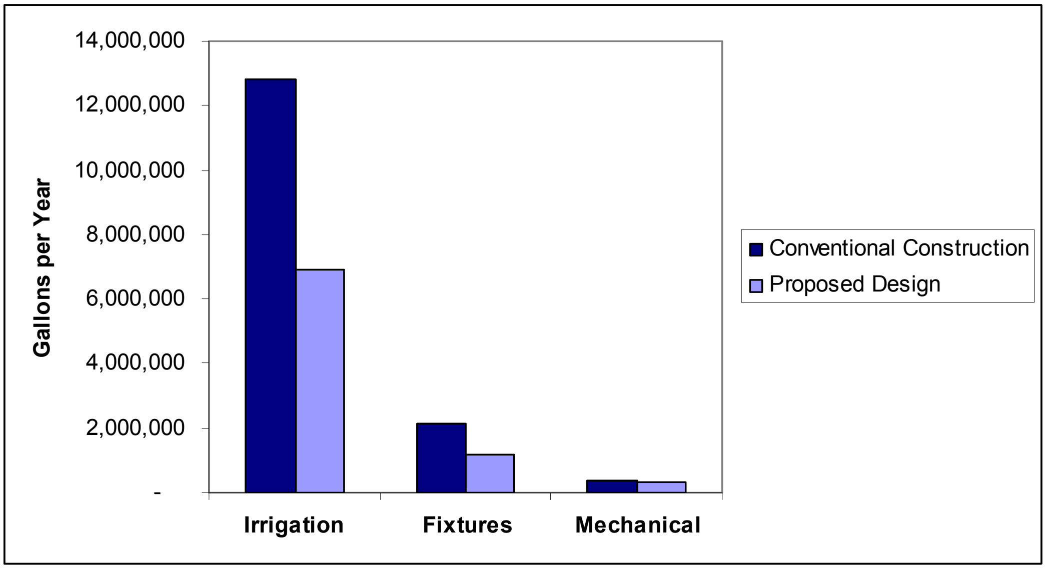


Figure 7: Expected end use breakdown for proposed design



Even after achieving 46% irrigation savings over the conventional construction case, irrigation remains the largest expected water use for the project, which is reasonable given that most of the project area is public parkland. Fixtures are second with cooling tower water uses representing the smallest proportion. The expected design fixture use is 2.1 million gallons, which equates to 15 gallons per occupant per day.

3.2 Energy

Conventional construction energy consumption for the project has been estimated based on a top down benchmarking exercise. The first point of reference used is the Department of Energy's (DOE) Commercial Building Energy Consumption Survey (CBECS) which lists average national electricity and natural gas use by building type. For the purposes of this analysis, the most applicable type is an office building.

To gain more confidence in the consumption of electricity and natural gas in a Southern California climate, energy models from five previous projects with similar uses were referenced as benchmarks. The conventional construction models were all based on either California's Energy Code, Title-24, or ASHRAE Standard 90.1, which have been established as equivalent benchmarks. The average energy consumption of these projects and the CBECS data was utilized to estimate Newport Beach City Hall's utility use. The resulting values used for the conventional construction case energy estimates are 12.78 kWh/sf/yr for electricity and 0.21 therms/sf/yr for natural gas.

The Target Finder program developed by the Energy Star rating system for buildings was used to verify the benchmark estimates. This verification provides confidence that the estimates are inline with similar buildings in the Newport Beach climate because the Target Finder normalizes energy data for each building type by location.

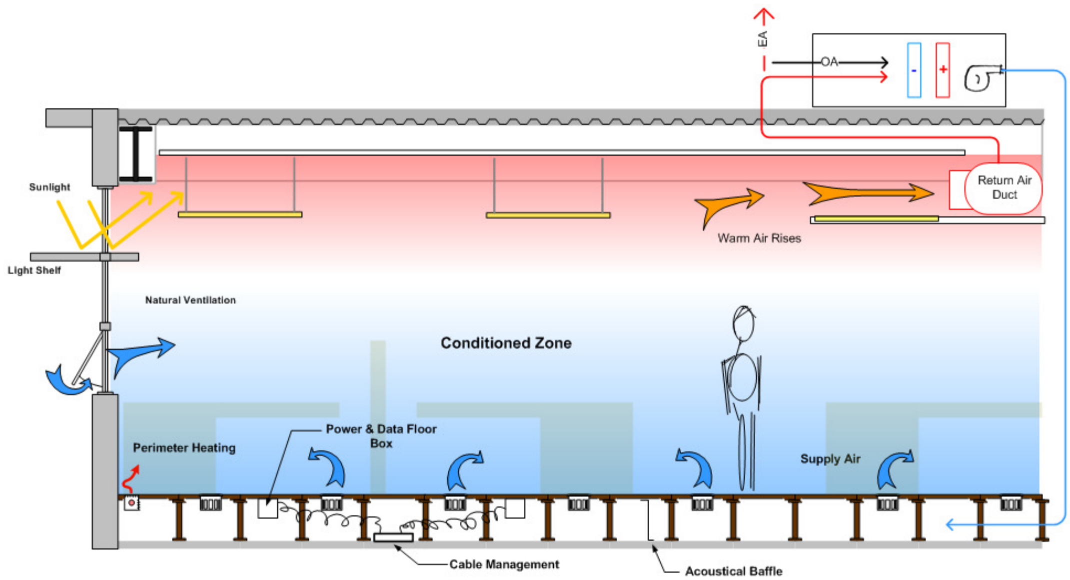
Peak demand (maximum power used at a given time) was estimated based on a bottom up calculation of peak power for plug loads, interior and exterior lighting, HVAC, and elevators; and natural gas for space heating and hot water use by program type, predominantly office and parking garage.

3.2.1 Project Design Features for Energy Conservation

A number of energy conservation measures (ECMs) have been proposed to reduce energy consumption and demand. These include:

- High performance façade
- Mixed mode active and natural ventilation
- Underfloor Air Distribution
- Water-side economizer
- Daylight dimming controls
- Low-wattage light fixtures
- Right sized plug loads

Figure 8: Mixed Mode Underfloor Air Distribution Section



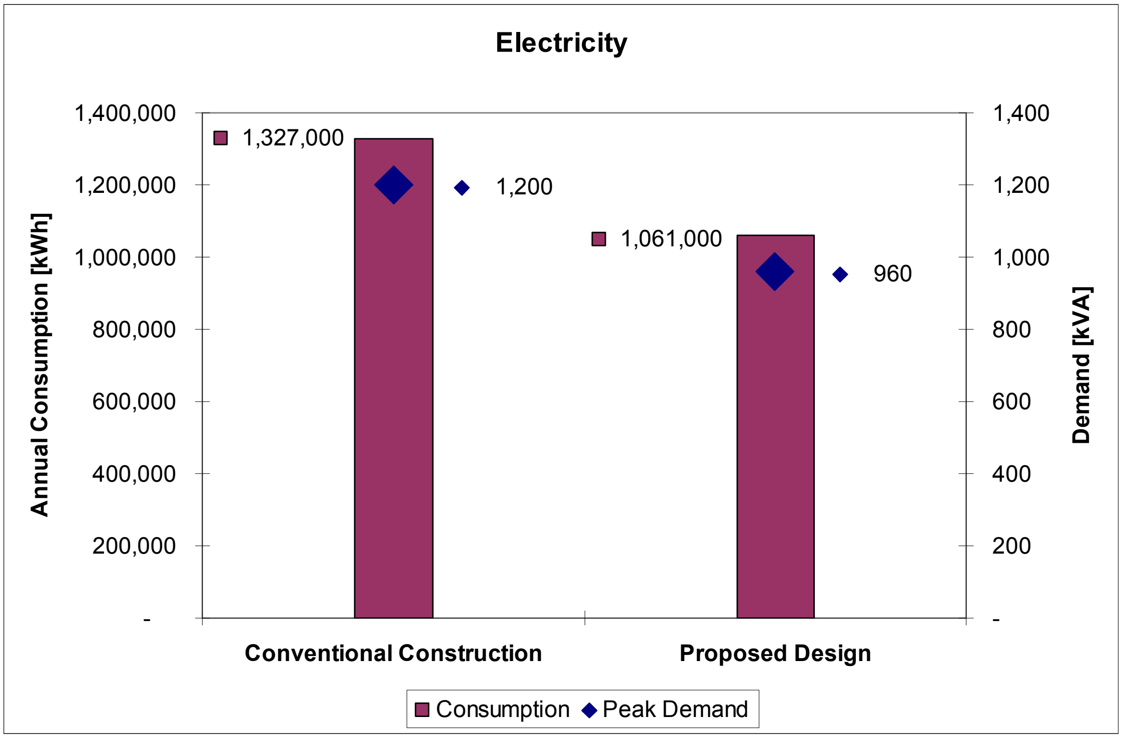
Above is an example section of one of the ECMs, Figure 8 illustrates the mixed mode natural ventilation and underfloor air distribution system. This mechanical system design is expected to reduce energy consumption and demand over a code minimum conventional case by reducing the size and operating hours necessary for fans and chillers.

Considering all of the ECMs in the proposed design, a reduction of energy consumption of 20% below the California Energy Code, Title-24, is expected, which currently has the same energy efficiency goals as ASHRAE Standard 90.1. However, Title-24 looks at the reduction in total energy consumption, whereas ASHRAE Standard 90.1 Appendix G, used for USGBC LEED energy calculations, looks at the reduction in energy cost. Since electricity and natural gas have different costs per unit of energy, a reduction goal below each standard is not exactly equivalent. In addition to a reduction in energy consumption, a 10% reduction in peak demand has been established as a target.

The conventional construction case consumption and demand estimates were reduced by the percentages described above to establish the proposed design energy estimates discussed in the next section.

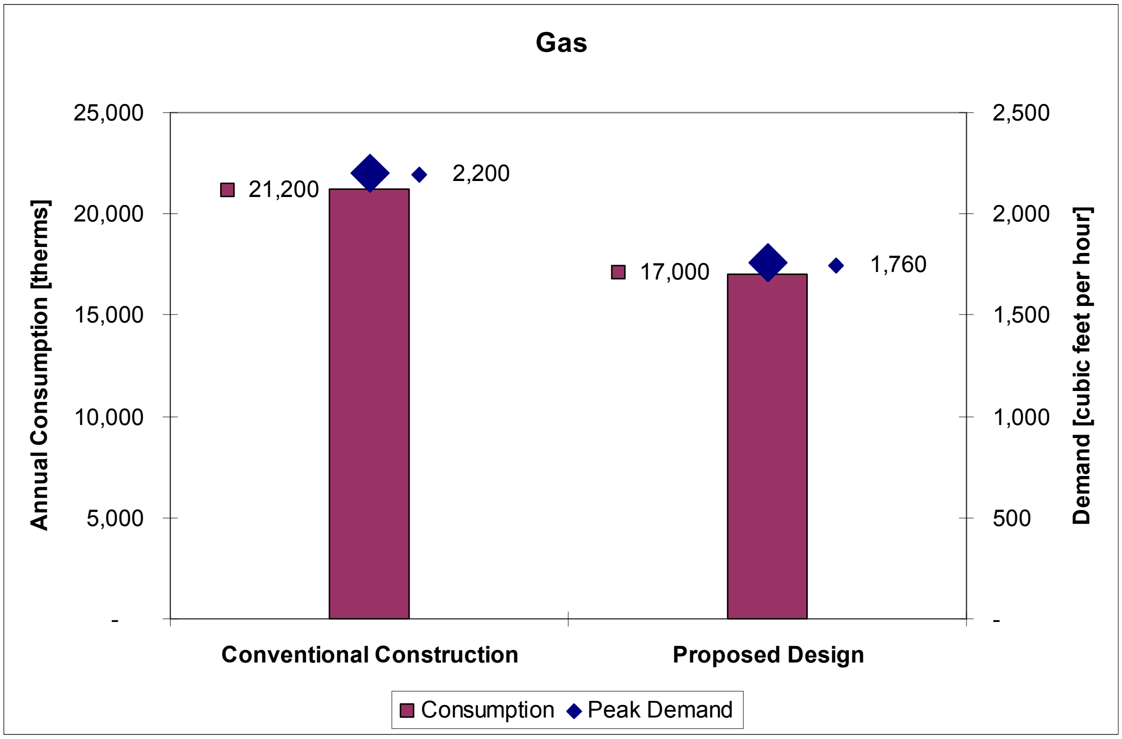
3.2.2 Energy Consumption and Demand Estimates

Figure 9: Conventional Construction and Proposed Design Electricity Consumption and Demand Estimates



As shown in Figure 9 the conventional construction electricity annual consumption and peak demand are estimated to be 1,327,000 kWh/yr and 1,200 kVA, respectively. The target reductions result in consumption and demand of 1,061,000 kWh/yr and 960 kVA for the proposed design.

Figure 10: Conventional Construction and Proposed Design Natural Gas Consumption and Demand Estimates



As shown in Figure 10 the Conventional construction natural gas annual consumption and peak demand are estimated to be 21,200 therms/yr and 2,200 ft^3/hr, respectively. The target reductions result in consumption and demand estimates of 17,000 therms/yr and 1,760 ft^3/hr for the proposed design.

3.2.3 Validation of Estimates

To further validate that the 20% energy reduction target is reasonable, the savings of each energy conservation measure (ECM) was estimated, again using previous data from other projects. There are many variables which affect energy savings provided by ECMs, including, for example, building geometry, orientation, height, glass to wall ratio, type of materials/glass, efficiency of other systems, etc. Therefore the estimates below are meant only to establish confidence that the target is within the right range and achievable. Energy models of the actual building and ECMs will be performed in later phases of the design to produce a more precise estimate.

Figure 11: Energy Reduction Potential of ECMs

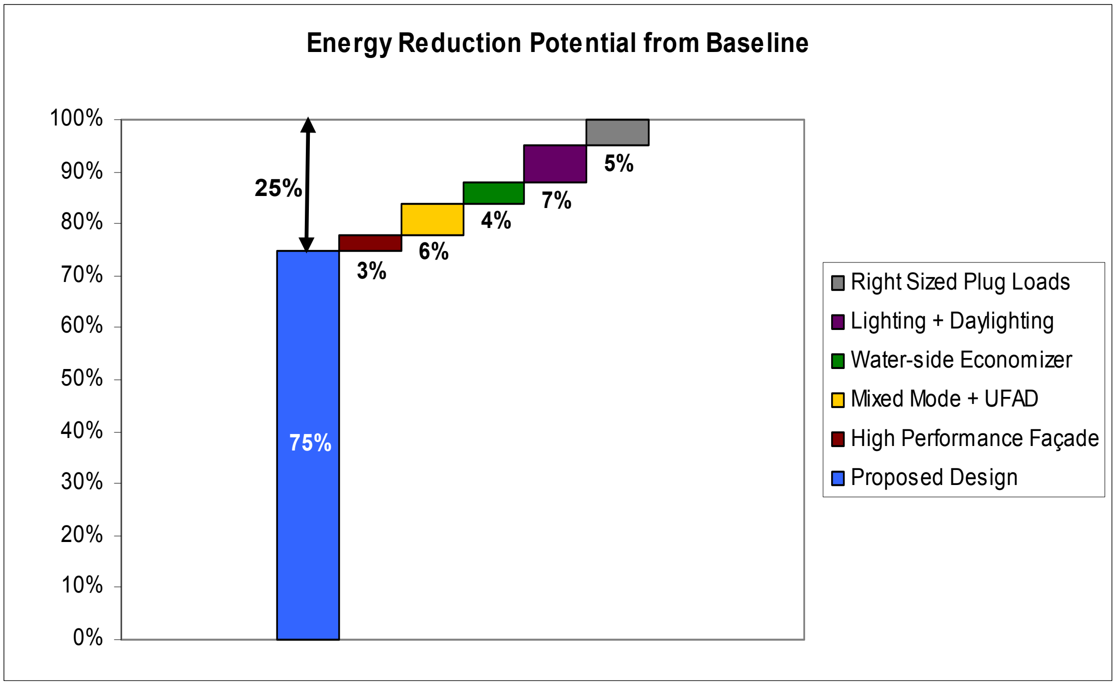


Figure 11 illustrates that the target energy reduction of the project may even be conservative when compared to similar building models in California, and that the project may achieve greater than 20% savings with the proposed design. However, as discussed there are too many variables in the estimation of energy reductions, so it is appropriate to remain conservative at this time.

One more check of the estimates was performed using the Energy Start Target Finder program. The energy estimates were input into the Target Finder program and the conventional construction estimate results in an Energy Star score of 78, which means that the conventional construction building would perform in the 78th percentile when compared to the national existing building stock. The proposed target estimate results in an Energy Star score of 89 (performing better than 89% of building stock), which is in line with the targeted energy reductions.

As a reference the minimum score to achieve an Energy Star rating for an existing building is 75. It is expected that a new building meeting the California Energy Code would be better than this benchmark, and a project pursuing ECMs as described above would be higher performing than most existing buildings.

3.3 Telecommunication

3.3.1 Recommendations

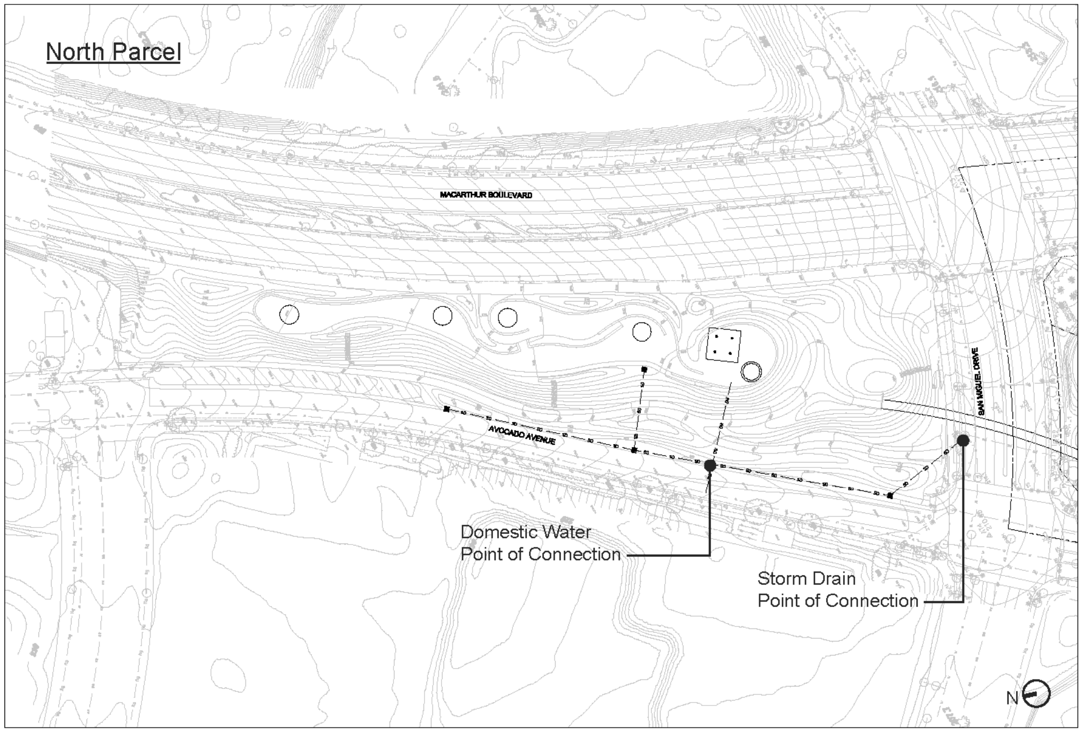
Data services will be required to serve the future City Hall. Two telecommunications providers currently exist in the site vicinity; Cox Communications and Time Warner. Telecom points of connection are typically made by the service provider at the time of service request, and it is recommended that each provider be notified of an approximate project completion date to facilitate accommodations by the appropriate provider.

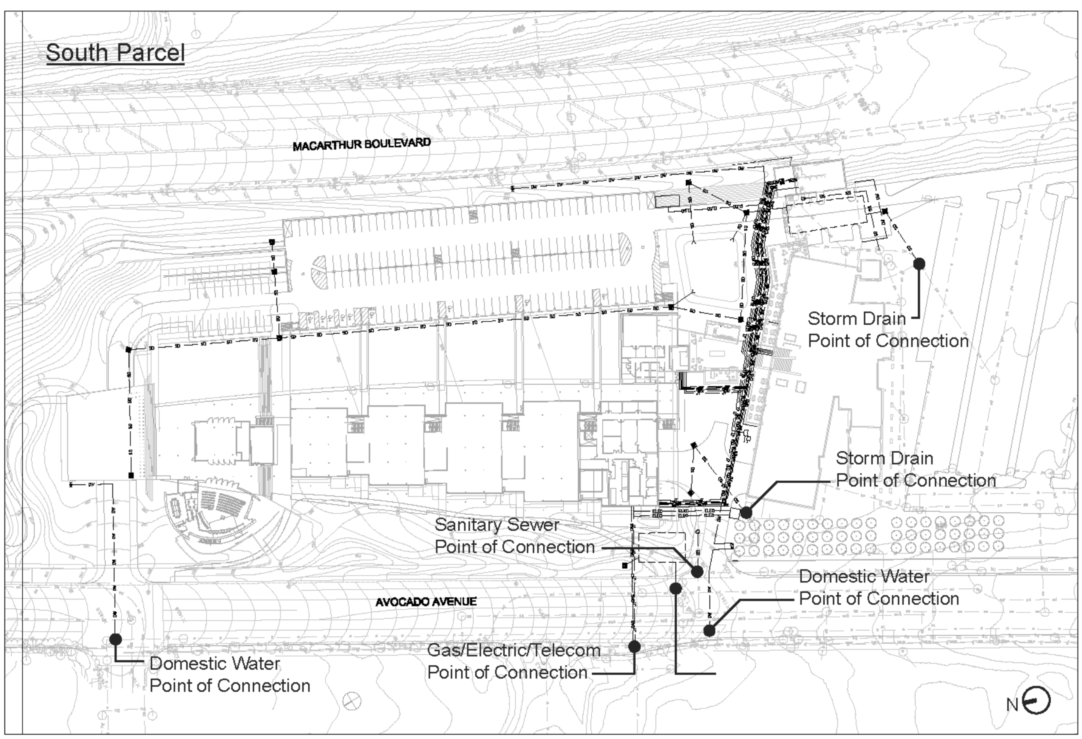
It is recommended that the City Hall be served both fiber-optic and copper data cabling from the point of connection at the street to the building. Four x 4-inch telecom conduit feeds will likely be sufficient to provide the cabling needed for telecom connection.

3.4 Utilities Connection

Figure 12 shows the location of planned points of connection for electricity, natural gas, domestic water, sanitary sewer, storm drain and telecommunications.

Figure 12: Planned Utilities Points of Connection





Appendix A

NRCS Soil Maps and Orange County Rainfall Data

Appendix A is found under separate attachment.

Appendix B

Flood Insurance Rate Map (FIRM)

Appendix B is found under separate attachment.

Appendix C

InforWorks CS Maps and Data Output

Appendix B is found under separate attachment.