



Appendix F-1 Preliminary Hydraulic Study



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TECHNICAL MEMORANDUM

JN: 172326

To: Minoo Ashabi, AIA, City of Costa Mesa
From: Alex Maher, P.E., Michael Baker International
Date: April 30, 2020
cc: Kristen Bogue, Michael Baker International
Subject: Preliminary Hydraulic Study for the One Metro West Development Project in the City of Costa Mesa



I. INTRODUCTION

The One Metro West Development (Project) site is a 16.2-acre industrial area located North of Interstate 405, bounded by Sunflower Avenue and the South Coast Collection commercial development to the east and industrial uses to the west. The Project will occupy 15.75 acres and consist of three residential apartment buildings comprised of 1,057 dwelling units, and 6,000 square feet of specialty retail. A fourth building will contain 25,000 square feet of commercial creative office space (office space). Each building is equipped with parking options: below grade parking structure, above grade parking structure, or at-grade parking stalls. The One Metro West Development will also have 1.5 acres of publicly irrigated open space, plus an additional 0.75 acres of landscaped median along Sunflower Avenue.

Michael Baker previously developed a Water Supply Assessment for Mesa Water District (Mesa Water) in January 2020. The Water Supply Assessment determined that Mesa Water has sufficient storage and is able to supply required demands to the Project. This preliminary study is being conducted to determine if improvements are required for the existing water distribution system due to the One Metro West Development. If it is determined that improvements are required, those improvements will be indicated herein and addressed in the CEQA process. Water service for this Project will be provided by the Mesa Water.

This preliminary study is based on preliminary information provided by the Developer and assumptions stated herein. A final hydraulic analysis, conducted using architectural drawings and civil improvement plans, will be conducted per Mesa Water requirements prior to finalization of the development plans.

II. DEMAND ESTIMATES FOR THE PROPOSED DEVELOPMENT

The proposed demands were estimated based upon demand factors and peaking factors established in the Mesa Water 2014 Water Master Plan (2014 WMP). The 2014 WMP does not include specific irrigation demand factors based on land use type; however, it is Michael Baker's understanding that the demand factors listed in the 2014 WMP account for both indoor water consumption and outdoor water consumption immediately adjacent to structures, and does not include common irrigated areas. Since common irrigated area is a significant portion of the total development area, Michael Baker estimated a separate irrigation demand factor for this development. The irrigation demand factor is consistent with hydraulic analyses previously conducted for Mesa Water. See Table 1 for the water demand factors used in this analysis.

Note: More detailed demand calculations are presented in the One Metro West Water Supply Assessment Section 3.0.

Table 1: Water Demand Factors ^[1]

Land Use Classification	Average Annual Demand Factor (AAD)	Max Day Demand Factor ^[2] (MDD)	Peak Hour Demand Factor ^[3] (Peak Hour)
Residential			
Low Density Residential (≤ 25 DU's/Ac)	2,500 gpd/acre	3,750 gpd/acre	5,620 gpd/acre
Mid/High Density Residential (> 25 DU's/ Ac)	4,500 gpd/acre	6,750 gpd/acre	10,125 gpd/acre
Non-Residential			
Commercial	2,500 gpd/acre	3,750 gpd/acre	5,620 gpd/acre
Industrial	3,000 gpd/acre	4,500 gpd/acre	6,750 gpd/acre
Irrigation ^[3]	2,400 gpd/acre	--	--

[1] Source: Mesa Water 2014 Water Master Plan Technical Memoranda No. 1.2

[2] MDD = (AAD x 1.5)

[3] Peak Hour = (MDD x 1.5)

[4] Irrigation demands applied to common area acreage.

Residential demand factors for were converted from gpd/acre to gpd/DU in order to make a direct comparison to the information available for the Project. Domestic water demand factors were applied to the land use and residential unit quantities to obtain the proposed water demands. Table 2 contains the proposed water demands.

Table 2: Project Water Demands [1]

Land Use	Category	DU	Area (Ac)	Average Day Demand		Maximum Day Demand		Peak Hour Demand
				(gpd)	(gpm)	(gpd)	(gpm)	(gpm)
Residential	Mid/High	1,057	--	190,260	132.1	285,390	198.2	297.3
Commercial	--	--	0.71	1,779	1.2	2,669	1.9	2.8
Irrigation [2]	--	-	2.25	5,400	3.8	13,500	9.4	25.0
Total				197,439	137.1	301,559	209.5	325.1

[1] Demand and peaking factors based on Table 1.

[2] Irrigation peaking factors based on previous analyses conducted for Mesa Water. Maximum Day = 2.5 x AAD.
Peak Hour = MDD x 2.67.

Fire flow requirements within Mesa Water’s service area, are developed using the California Fire Code Appendix B (CFC). The CFC organizes fire flow into two tables for one- and two-family dwelling units, and other structures, the Project buildings fall into the other structures category.

A Specific Plan and Master Plan were developed for the One Metro West Development. Each containing information required to estimate the required fire flow for the Project. The One Metro West Specific Plan (Specific Plan) indicates that all buildings will be equipped with fire suppression systems; therefore the critical structure is the one with the largest floor area. The One Metro West Master Plan indicates that the building with the largest square footage is Building A with 969,660 square feet. The Specific Plan and Master Plan do not indicate construction type for the buildings; therefore, Michael Baker assumes the buildings are in the Type V-B construction category.

Equipping buildings with fire suppression systems typically allows for a reducing in total fire flow required, and the duration of the fire event. Allowable reduction is up to 75%, and is made at the discretion of the local fire authority. Michael Baker will assume that a 50% reduction will be allowed, but the local fire authority will have the final recommendation on the required fire flow. See Table 3 for fire flow requirements for each structure.

Table 3: Required Fire Flow Summary

Building	Type of Construction	Building Floor Area (SF)	Fire Flow (gpm)	Required Fire Flow Duration (hrs)	Equipped with Fire Sprinklers?
Building A	IV and V-A	969,660	4,000	4	Yes
Building B	IV and V-A	549,880	4,000	4	Yes
Building C	IV and V-A	495,100	4,000	4	Yes
Commercial Office Space	IV and V-A	25,000	2,250	2	Yes

III. HYDRAULIC ANALYSIS

Michael Baker performed a preliminary hydraulic analysis by applying the Project’s demands in the water distribution system hydraulic model provided by Mesa Water. For this analysis, we assumed there will be two points of connection to the existing 24-inch water distribution main in

Sunflower Avenue. At this time, there are no onsite improvement plans, and it is unknown if onsite pipelines will be publicly or privately maintained. Therefore, we included a 12-inch onsite pipeline loop between the two points of connection to simulate additional onsite system headloss. See Exhibit 1 for the Project site plan with hydraulic schematic overlay. Three demand scenarios were analyzed as follows:

1. Baseline System Maximum Day Demands (Prior to Project)
2. Maximum Day Demand
3. Maximum Day Demand Plus Fire Flow

The Scenario 1 model run provides a baseline to verify that the existing distribution system operates within Mesa Water’s criteria prior to adding demands for the proposed Project. A maximum day demand scenario (Scenario 2) verified that the distribution system can supply the project under normal operational conditions. Finally, a model run (Scenario 3) applying max day demand plus fire flow conducted to verify that the system can supply the required emergency fire flow demands without adversely impacting the off-site distribution system. Table 4 summarizes the results of the hydraulic analysis.

Table 4: Scenario Results Summary

Scenario	Node / Pipe ^[1]	Max Pressure (psi)	Min Pressure (psi)	Max Flow (gpm)	Max Velocity (ft/s)
1. Baseline Pressure	POC 1	96.8	91.1	--	--
	J-OMW-DEV_03	96.7	91.0	--	--
	P-OMW-DEV_01	--	--	0	0
2. Maximum Day Demand	POC 1	96.7	90.8	--	--
	J-OMW-DEV_03	96.7	88.9	--	--
	P-OMW-DEV_01	--	--	292	0.8
3. Maximum Day Demand Plus Fire Flow	POC 1	96.7	87.2	--	--
	J-OMW-DEV_03	94.7	83.5	--	--
	P-OMW-DEV_01	--	--	2,451	7.0

[1]J-OMW-DEV_3 is the demand node, P-OMW-DEV_01 is the critical pipe in the system

The data from the hydraulic analysis were analyzed based on Mesa Water’s operational criteria, summarized below.

Maximum Day Service Criteria

Minimum Allowable Pressure: 40 psi
Maximum Pipeline Velocity: 7 fps

Maximum Day Plus Fire Flow Service Criteria

Minimum Allowable Pressure: 20 psi
Maximum Pipeline Velocity: 15 fps

IV. CONCLUSION AND RECOMMENDATIONS

The analysis indicates that the minimum residual pressure in Mesa Water's distribution system will be maintained above 40 psi under maximum day demand conditions, and above 20 psi under maximum day plus fire flow conditions. In addition, the model results confirm that the pipeline velocities will not exceed 15 fps in both scenarios..

Based on the results of the preliminary hydraulic analysis, the estimated demands of the Project will not have any adverse impacts on Mesa Water's existing distribution system, and no additional off-site improvements are required to serve the proposed development..

This study is based on preliminary information provided by the Developer and assumptions stated herein. It is our understanding that once architectural plans and civil site plans are prepared, a final hydraulic analysis will be conducted in conjunction with the final design, including pipe sizing and alignment, of onsite water facilities and connections to the Mesa Water distribution system.

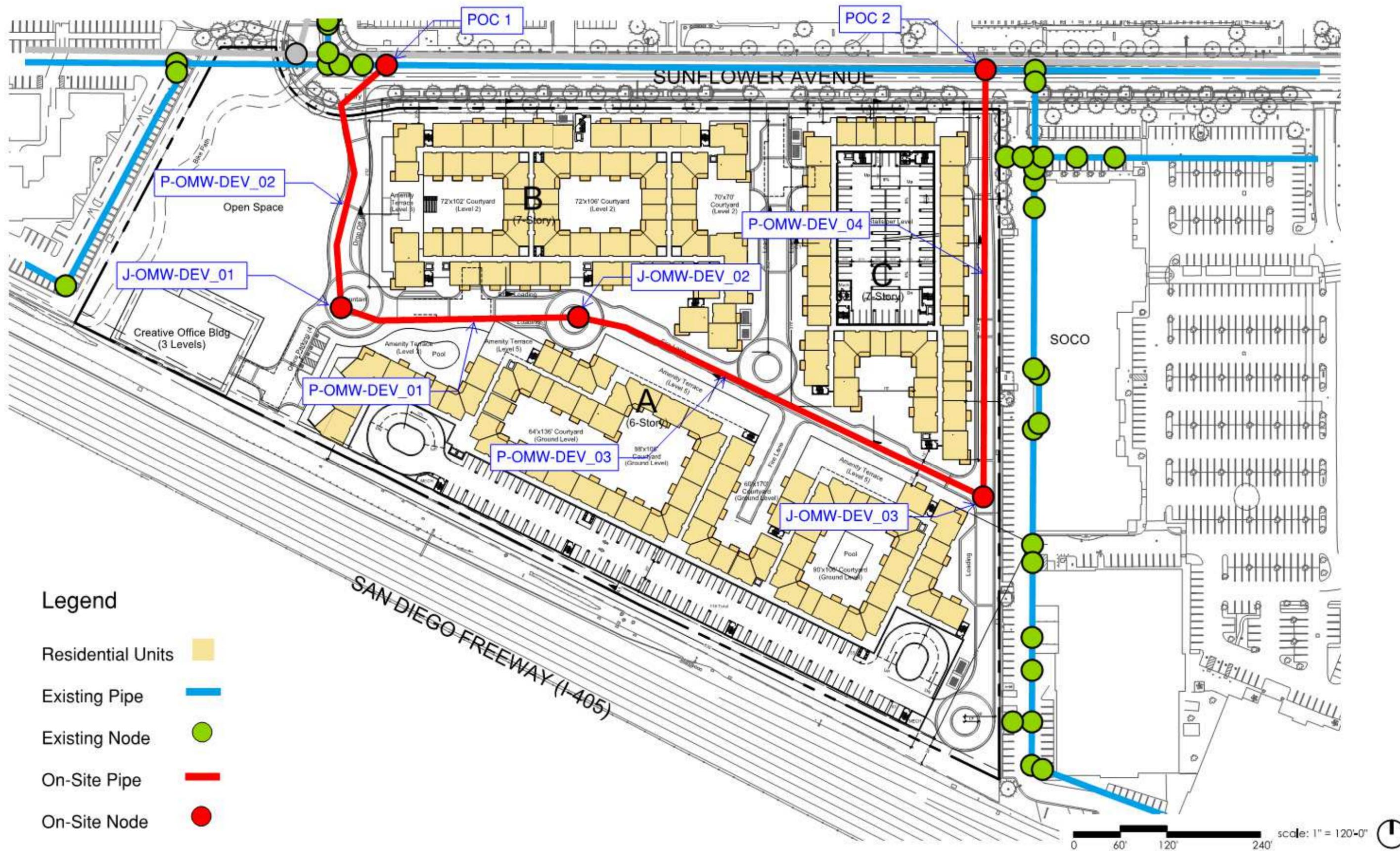


EXHIBIT 1: SITE PLAN AND HYDRAULIC SCHEMATIC