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Project Name:

Westside Lofts
Costa Mesa, CA

Supervising Engineer:

Trevor Dodson

Date Prepared:

March 2007

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Westside Lofts, Costa Mesa Sewer Capacity Study & Generation Report

Prepared For:	NEXUS Development
Prepared By:	Trevor Dodson, Fuscoe Engineering, Inc.
Date:	March 22, 2007

I. Study Purpose

The City of Costa Mesa has requested NEXUS Development to provide a site specific study, which shows the amount of proposed sewer generated by the development of 151 condominium residential units, five live/work lofts, five office buildings and one coffee/service building and possible impacts to the surrounding city sewer system.

II. Project Location

The proposed Westside Lofts project site is a 6.8-acre parcel in the City of Costa Mesa, CA. The project site is bounded by Monrovia Avenue to the west and Babcock Street to the east, and is situated south of 17th Street.

III. Site Description

Under existing conditions, the project site consists of two large industrial buildings with several smaller buildings and associated parking.

The proposed development is composed of two components, a residential component and an office component. The proposed development includes the demolition of all existing facilities including buildings and appurtenant parking.

Residential Component

The first element is 151 condominiums in a four story building configuration. A separate four level parking structure will be developed adjacent to the residential buildings, resulting in a "wrap" type product. The garage will contain approximately 253 parking stalls. Units will average 800 square feet in size. The architectural style of the project, both interior and exterior, will be a contemporary "loft type" design with average ceiling heights of 10 feet; open floor plans; and individual storage provided within each unit.

The project will offer common recreational and clubhouse amenities, including a pool and fitness center.

In addition, there will be 5 custom lots available for live/work lofts on 4,000 sf lots. The lots will be sold to individuals who will be subject to constructing live/work lofts in accordance with specific architectural design standards.

Office Component

The project consists of a total of 42,000 gross square feet of office/commercial space. There will be 6 individual for sale buildings. One of the buildings is a 2,000 sf space allocated for restaurant use. Four of the buildings will be two stories in height and contain approximately 5,000 square feet each. The fifth office building will be 3-4 stories in height and have 19,500 square feet of building area.

The project site will also feature a fountain and additional landscaping features.

IV. Proposed Sewer System Layout

It is the designer's intention that 100% of the proposed site sewer flow will be directed in a new on-site sewer system to flow southeasterly to the existing 8" public main in Babcock Street. The flow will continue southerly down Babcock Street to the 8" main in 16th Street.

In the actual design phase, it may become necessary to divide the site sewer system into 2 systems because the existing southbound main line in Babcock Street is relatively shallow. If it becomes necessary to divert some of the effluent to the northbound 8" sewer in Monrovia Avenue, the flow to that system would not exceed the existing tabled flow load to that system which is 0.0591 mgd. (see calculations following)

V. Design Criteria

The entire area surrounding this project was originally zoned for industrial use and the existing public sewer system was designed accordingly. The C.M.S.D. (Costa Mesa Sanitary District) expressed concerns of the currently proposed and future rezoning to medium high density residential. Although area-wide future development is unknown at this time, NEXUS Development is being requested by the City of Costa Mesa to provide a localized study for this development and its immediate impacts.

Currently the existing two commercial buildings flow to the northbound sewer main in Babcock and the northbound sewer main in Monrovia Avenue. Both of these sewer mains flow to the eastbound sewer main on 17th Street. During the last week of January the field inspectors from the C.M.S.D. ran flow tests on the sewer main in 17th Street and 16th Street. Their tests showed that during peak hours the 8" main in 17th Street west of Placentia Avenue was at 31% capacity and the 12" main in 17th Street east of Placentia was at 50% capacity. The 8" sewer main in 16th Street measured at 30% capacity both west and east of Placentia Avenue. On 3-26-07 further measurements were done by

C.M.S.D. on the 16th Street Sewer. Those measurements of 3" depth east of Placentia Avenue and 1 1/2 " depth west of Placentia Avenue were used in this report to calculate the existing flow.

Sewer system sizing is limited to the following hydraulic conditions:

- Depth/diameter = $D/d = 1/2$ for pipes \leq 18-inches diameter
- $D/d = 3/4$ for pipes $>$ 18-inches diameter

From this test data, C.M.S.D. highly recommended that this project divert all of the proposed flow to the 16th Avenue sewer main which can accommodate added volume. By diverting the majority of the proposed project flows to 16th Street, it would also alleviate the high capacity volume in 17th Street.

Sewer Duty Factors and Formulas

The C.M.S.D. uses the following duty factors for estimating average sewer flows:

- MI (Light Industrial): 3,500 gpd/acre
- Medium Density Residential: 2,525 gpd/acre
- Condominium Residential = 85 gpd/person x 2.25 persons/unit x number of units
- Office/Loft work = 200gpd/1000sf x sf of buildings
- Restaurant = 300gpd/1000sf x sf of building
- Storm Water Infiltration: 800 gpd/acre

The District's method of estimating peak sewer flow (Q_p) where (Q_a) is the estimated average flow is:

- Peak Flow = $Q_p = 1.84 (Q_a)^{0.92}$ in mgd.

Existing MI (Industrial)

6.8 acres @ 3,500 gpd/acre

$Q_a = 23,800$ gpd average flow = 0.0238 mgd

$Q_p = 1.84 (0.0238)^{0.92}$

$Q_p = 0.0591$ mgd

Plus storm inflow:

$800\text{gpd/acre} \times 6.8 \text{ acres} = 5,440\text{gpd} = 0.0054\text{mgd}$

$0.0591 + 0.0054 = 0.0645$ mgd

Proposed High Density Residential

$$Q_a = 85\text{gpd/person} \times 2.25 \text{ persons} \times (151 + 5)$$

$$Q_a = 29,835 \text{ gpd average flow} = 0.0298 \text{ mgd}$$

$$Q_p = 1.84 (0.0298)^{0.92}$$

$$Q_p = 0.0727 \text{ mgd}$$

Proposed Restaurant

$$Q_a = 300 \text{ gpd}/1000 \text{ sf} \times 2000 \text{ sf}$$

$$Q_a = 600 \text{ gpd average flow} = 0.0006 \text{ mgd}$$

$$Q_p = 1.84 (0.0006)^{0.92}$$

$$Q_p = 0.0020 \text{ mgd}$$

Proposed Office/Commercial

$$Q_a = 200\text{gpd}/1000 \text{ sf} \times 49,500 \text{ sf}$$

$$Q_a = 9,900 \text{ gpd average flow} = 0.0099 \text{ mgd}$$

$$Q_p = 1.84 (0.0099)^{0.92}$$

$$Q_p = 0.0264 \text{ mgd}$$

Total Existing Flow:

$$0.0591 \text{ mgd}$$

Total Proposed Flow:

$$0.0727 + 0.0020 + 0.0264 = 0.1011 \text{ mgd}$$

Plus storm inflow:

$$800\text{gpd}/\text{acre} \times 6.8 \text{ acres} = 5,440\text{gpd} = 0.0054\text{mgd}$$

$$0.1011 + 0.0054 = 0.1065 \text{ mgd}$$

$$100\% \text{ of proposed flow to } 16^{\text{th}} \text{ Street} = 0.1065 \text{ mgd}$$

The reduction of the industrial site from the flow in 17th Street:

$$(- 0.0591 \text{ mgd}) - \text{alleviating high capacity volume}$$

VI. Results and Conclusions

By comparison, the proposed site, with multiple uses including condominium, office and work/live lofts (0.1011 mgd), will produce 42% more sewer flow than as an industrial site (0.0591 mgd).

By directing all of the proposed sewer flow to 16th Street, this project will not have any negative impact on the 17th Street "at capacity" sewer main. The 16th Street sewer has capacity and with the addition of the proposed project will be flowing at 52.8% full, based on flow monitoring done and provided by the Costa Mesa Sanitation District (CMSD). Additionally, with the demolition of the existing two manufacturing buildings, which currently flow to 17th Street, this development will alleviate some of the capacity problems in the 17th Street sewer main, removing 0.0591 mgd from that system.

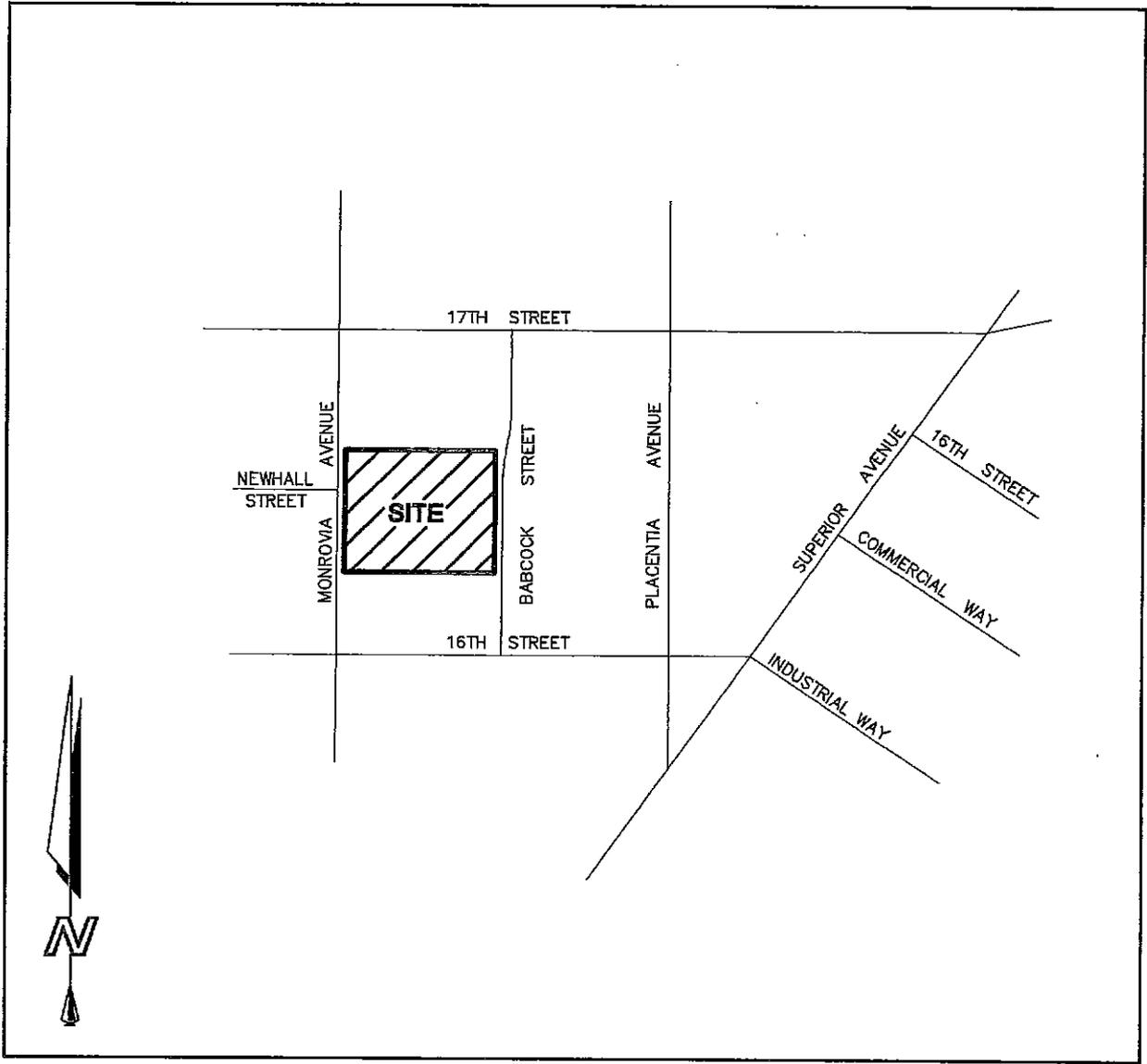
To achieve the proposed redirection of this project's sewer flow, it will be required to have a shallow, minimum sloping sewer system within the project site, which is caused by a relatively shallow sewer main in Babcock Street.

Applying the land uses of the 51.6 acres of land in the cities of Costa Mesa and Newport Beach tributary to the 16th Street sewer along with the storm water infiltration, the existing sewer would be running at 87.4% full.

According to our calculations (see attached) the added sewer flow in the 16th Street sewer main will raise the flow to 52.8% full, which is above the ½ full design criteria, but well within operational limits.

Attachment 1

Vicinity Map



VICINITY MAP

N.T.S.

Attachment 2

Preliminary Utility Layout

LEGEND

- EXISTING SANITARY SEWER
- PROPOSED SANITATION SEWER
- >>> FLOW DIRECTION



GRAPHIC SCALE

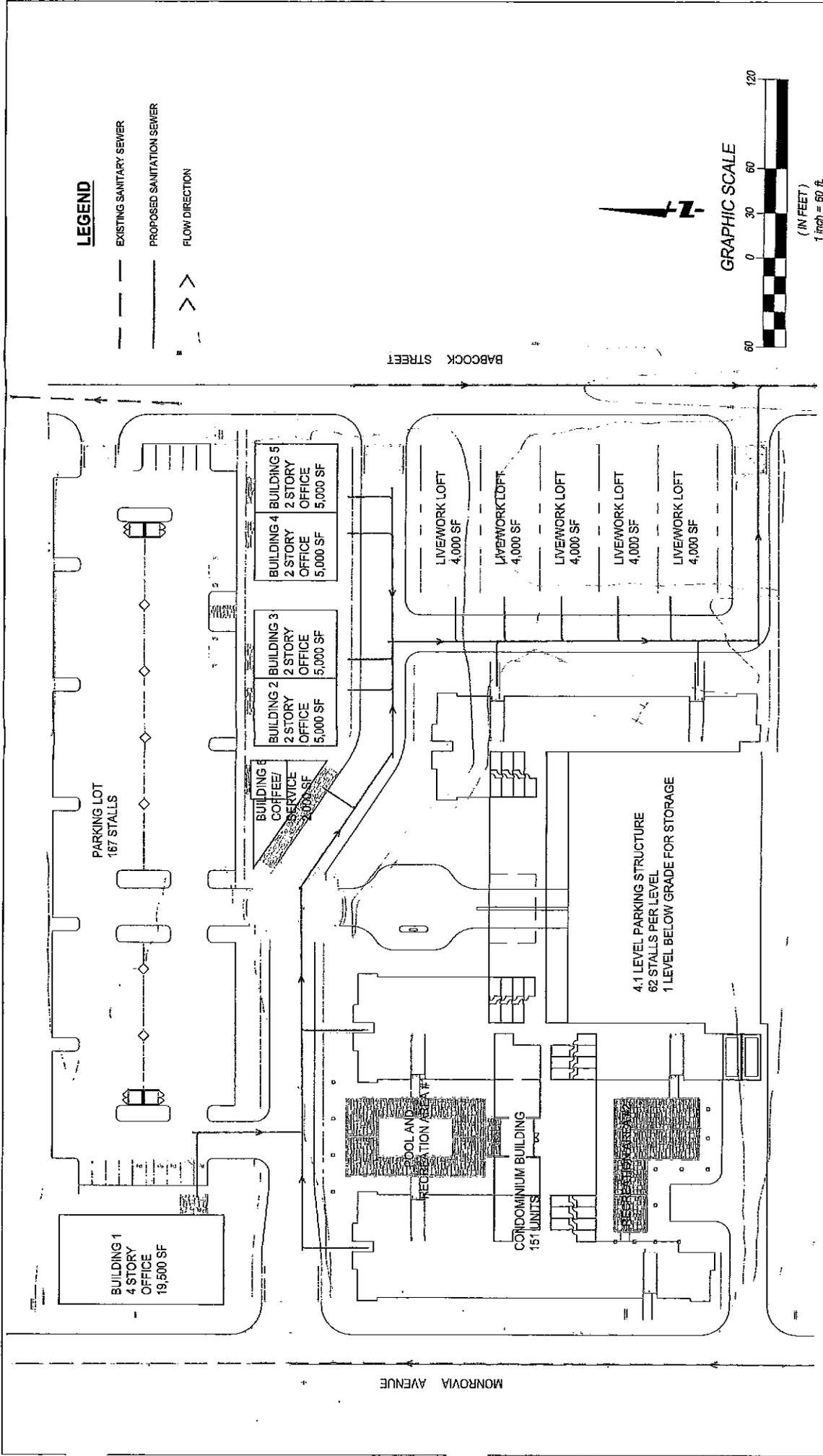


(IN FEET)
1 inch = 60 ft.



Scale: 1" = 60'
Exhibit Date: 03-22-07

PROPOSED SEWER
LAYOUT PLAN
TENTATIVE TRACT
NO. 16999



Attachment 3

Calculations

Existing Condition in 16th Street W. of Placentia on 3-26-07

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00300	ft/ft
Normal Depth	1.50	in
Diameter	8.00	in

Results

Discharge	0.0329	mgd
Flow Area	0.05	ft ²
Wetted Perimeter	0.60	ft
Top Width	0.52	ft
Critical Depth	0.10	ft
Percent Full	18.8	%
Critical Slope	0.00688	ft/ft
Velocity	1.12	ft/s
Velocity Head	0.02	ft
Specific Energy	0.14	ft
Froude Number	0.67	
Maximum Discharge	0.71	ft ³ /s
Discharge Full	0.66	ft ³ /s
Slope Full	0.00002	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	18.75	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Existing Condition in 16th Street W. of Placentia on 3-26-07

GVF Output Data

Normal Depth	1.50	in
Critical Depth	0.10	ft
Channel Slope	0.00300	ft/ft
Critical Slope	0.00688	ft/ft

Messages

Notes

1.5" depth measured on 3-26-07 at
10:00 am and 2:00 pm by Paul
Guzman of the Costa Mesa Sanitary
District

Cross Section for Existing Condition in 16th Street W. of Placentia

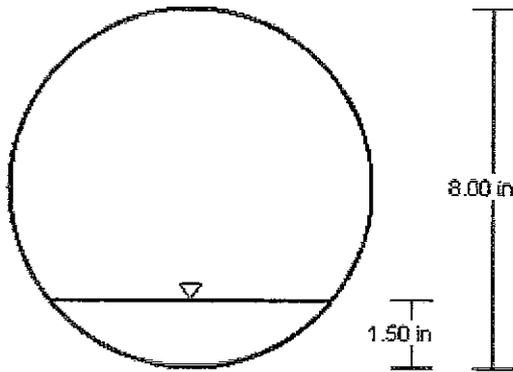
Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00300 ft/ft
Normal Depth	1.50 in
Diameter	8.00 in
Discharge	0.0329 mgd

Cross Section Image



V: 1
H: 1

Existing Condition in 16th Street E. of Placentia 3-26-07

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00300	ft/ft
Normal Depth	3.00	in
Diameter	8.00	in

Results

Discharge	0.1280	mgd
Flow Area	0.12	ft ²
Wetted Perimeter	0.88	ft
Top Width	0.65	ft
Critical Depth	0.20	ft
Percent Full	37.5	%
Critical Slope	0.00642	ft/ft
Velocity	1.66	ft/s
Velocity Head	0.04	ft
Specific Energy	0.29	ft
Froude Number	0.68	
Maximum Discharge	0.71	ft ³ /s
Discharge Full	0.66	ft ³ /s
Slope Full	0.00027	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	37.50	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Cross Section for Existing Condition in 16th Street E. of Placentia

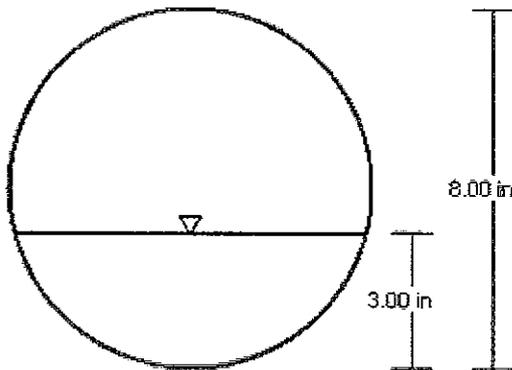
Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00300 ft/ft
Normal Depth	3.00 in
Diameter	8.00 in
Discharge	0.1280 mgd

Cross Section Image



V: 1 
H: 1

Proposed Condition with Added Flow to 16th Street

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00300 ft/ft
Diameter	8.00 in
Discharge	0.2345 mgd

Results

Normal Depth	4.23 in
Flow Area	0.19 ft ²
Wetted Perimeter	1.08 ft
Top Width	0.67 ft
Critical Depth	0.28 ft
Percent Full	52.8 %
Critical Slope	0.00667 ft/ft
Velocity	1.94 ft/s
Velocity Head	0.06 ft
Specific Energy	0.41 ft
Froude Number	0.65
Maximum Discharge	0.71 ft ³ /s
Discharge Full	0.66 ft ³ /s
Slope Full	0.00090 ft/ft
Flow Type	SubCritical

GVF Input Data

Downstream Depth	0.00 in
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 in
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	52.82 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s

Proposed Condition with Added Flow to 16th Street

GVF Output Data

Normal Depth	4.23	in
Critical Depth	0.28	ft
Channel Slope	0.00300	ft/ft
Critical Slope	0.00667	ft/ft

Messages

Notes Q = 0.1280 mgd (existing) + 0.1065
 mgd (proposed added) = 0.1914 mgd
 with Storm Water Infiltration

Cross Section with Added Flow to 16th Street

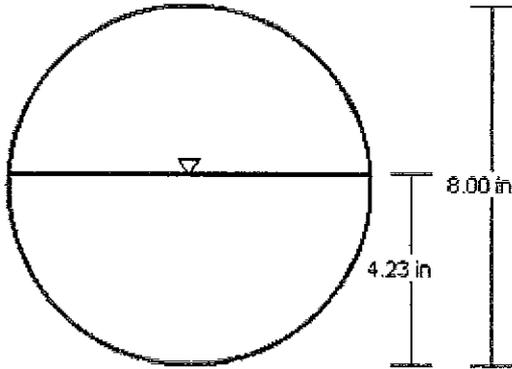
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.00300 ft/ft
Normal Depth	4.23 in
Diameter	8.00 in
Discharge	0.2345 mgd

Cross Section Image



V: 1 
H: 1

Attachment 4

Appendices

Table 1

Costa Mesa Sanitary District

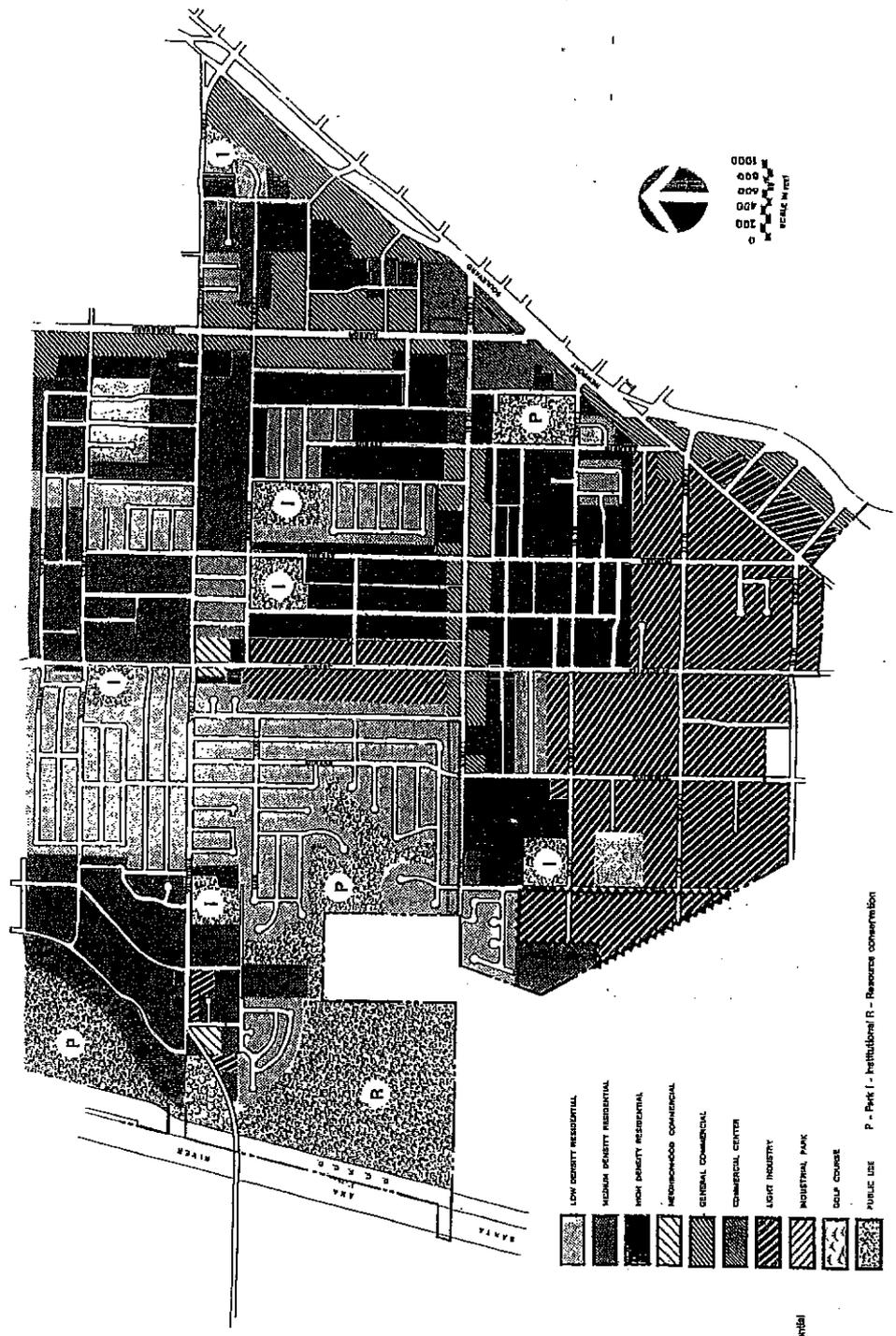
Unit Flow Coefficients for Various Land Uses

	Average Flow
Medium Density Residential	2,525 gpd/acre
Condominiums and Living Area of Lofts	85gpd/person x 2.25 persons
Loft work area	200 gpd/1000 sf
Office	200 gpd/1000 sf
Restaurant	300 gpd/1000 sf
Industrial	3,500 gpd/acre
Storm Inflow	800 gpd/acre

$$\text{Peak Flow (Q}_p\text{) mgd} = 1.84 (\text{Average Flow (Q}_a\text{) mgd})^{0.92}$$

gpd = gallons per day

mgd = million gallons per day



GENERAL PLAN LAND USE ELEMENT PLANNING AREA 1

① TRIBUTARY AREA TO SEWER LINE S-56 FROM ATLAS MAPS 151, 152, 153 (SEE MAPS IN INDEX)

CITY OF COSTA MESA = 37.9 AC - INDUSTRIAL

CITY OF NEWPORT BEACH - 6.1 AC - MEDIUM DENSITY RESID.

7.6 AC - INDUSTRIAL

② INDUSTRIAL RATE : 3,500 gpd/AC

$$Q_A = \frac{3,500 \text{ gpd}}{\text{AC}} \times (37.9 + 7.6) \text{ AC}$$

$$= 159,250 \text{ gpd} = 0.15925 \text{ mgd}$$

MED. DENSITY RESIDENTIAL : 2,525 gpd/AC

$$Q_A = \frac{2,525 \text{ gpd}}{\text{AC}} \times 6.1 \text{ AC} =$$

$$= 15,402.5 \text{ gpd} = 0.01540 \text{ mgd}$$

$$\Sigma Q_A = 0.15925 + 0.01540$$

$$= 0.17465 \text{ mgd (UNPEAKED)}$$

③ PEAKED, W/O STORM WATER

$$Q_P = 1.84 (Q_A)^{.92}$$

$$= 1.84 (0.17465)^{.92}$$

$$= 0.3695 \text{ mgd PEAKED}$$

8" PIPE WOULD BE 21.7% FULL

CITY of NEWPORT BEACH
GENERAL PLAN

Figure 3
WEST NEWPORT INDUSTRIAL

Introduction
This study of the West Newport Industrial Area is a continuation of the City's long-term planning process. The City's General Plan provides the framework for the City's long-term development. The City's General Plan is a statement of the City's vision for the future and provides the framework for the City's long-term development. The City's General Plan is a statement of the City's vision for the future and provides the framework for the City's long-term development.

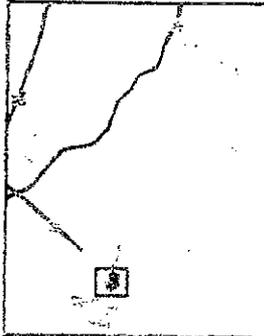
Background
The West Newport Industrial Area is located in the City of Newport Beach. The area is currently zoned for industrial use. The City's General Plan provides the framework for the City's long-term development. The City's General Plan is a statement of the City's vision for the future and provides the framework for the City's long-term development.

Study Area
The study area is located in the West Newport Industrial Area. The area is currently zoned for industrial use. The City's General Plan provides the framework for the City's long-term development. The City's General Plan is a statement of the City's vision for the future and provides the framework for the City's long-term development.

Methodology
The study was conducted using a variety of methods. These methods include site visits, interviews with stakeholders, and analysis of existing data. The City's General Plan provides the framework for the City's long-term development. The City's General Plan is a statement of the City's vision for the future and provides the framework for the City's long-term development.

Findings
The study found that the West Newport Industrial Area is a key component of the City's long-term development. The area is currently zoned for industrial use. The City's General Plan provides the framework for the City's long-term development. The City's General Plan is a statement of the City's vision for the future and provides the framework for the City's long-term development.

Recommendations
The study recommends that the City consider the following options for the West Newport Industrial Area. The City's General Plan provides the framework for the City's long-term development. The City's General Plan is a statement of the City's vision for the future and provides the framework for the City's long-term development.

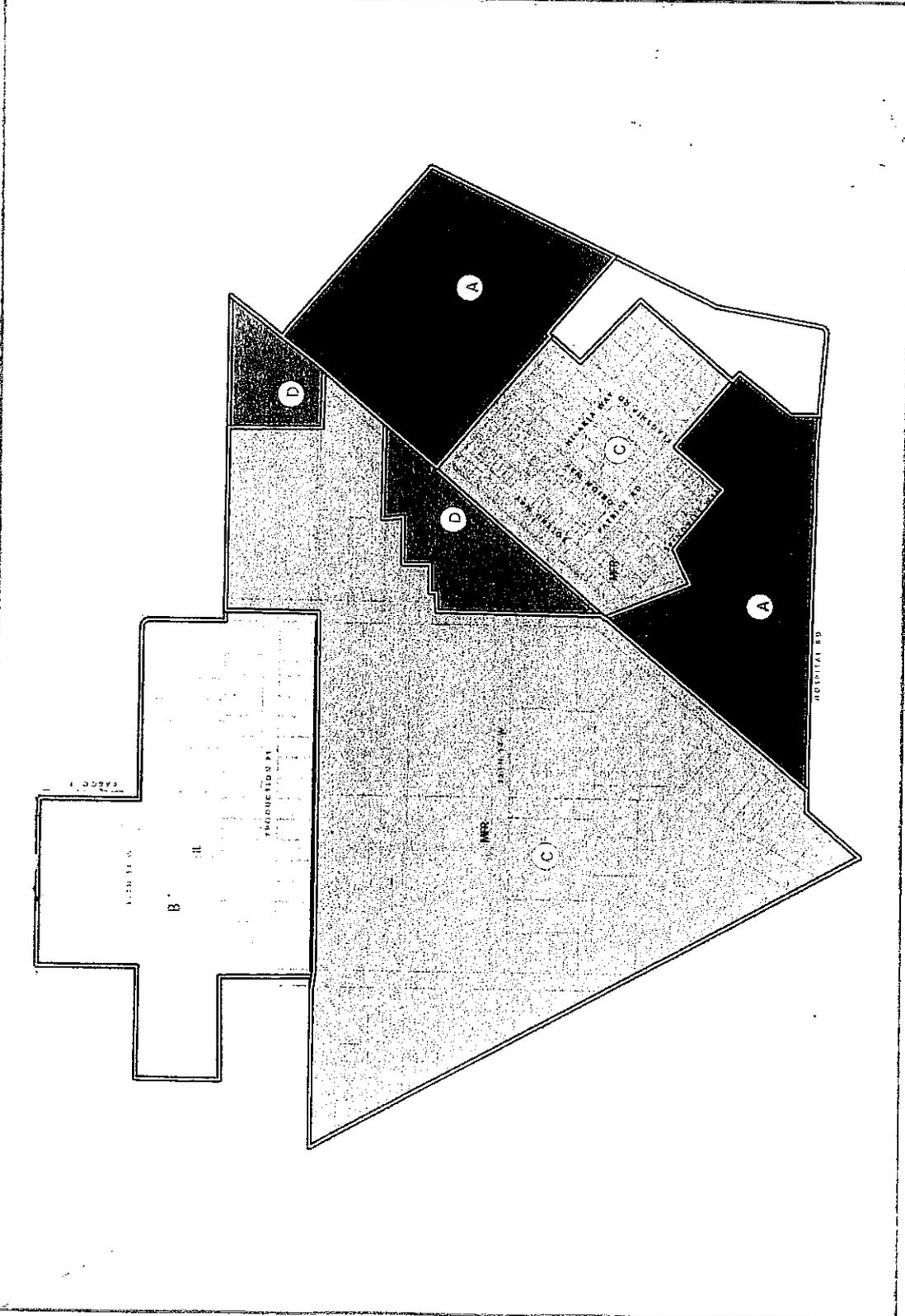


Scale: 1" = 300'

0 175 350 700 Feet

Source: City of Newport Beach and JPB Associates
PROJECT NUMBER: 10578-01
Date: 05/22/05

EIP



LAND USE RECOMMENDATIONS

A Medical-Related Uses
B Light Industrial
(C) Multi-Family Residential
(D) Commercial

④ STORM WATER INFILTRATION

$$\frac{800 \text{ gpd}}{\text{AC}} \times 51.6 \text{ AC} = 41,280 \text{ gpd}$$

$$= 0.0413 \text{ mgd (unpeaked)}$$

⑤ Q_A WITH STORM WATER (STEPS ② + ④)

$$Q_A = 0.0413 + 0.17465$$

$$= 0.21595 \text{ mgd}$$

⑥ PEAKED WITH STORM WATER:

$$Q_P = 1.84(Q_A)^{.92}$$

$$= 1.84(0.21595)^{.92}$$

$$= 0.4492 \text{ mgd (PEAKED)}$$

8" PIPE WOULD BE 87.4% FULL

Design Capacity without Storm Water in 16th Street

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00300	ft/ft
Diameter	8.00	in
Discharge	0.3695	mgd

Results

Normal Depth	5.74	in
Flow Area	0.27	ft ²
Wetted Perimeter	1.35	ft
Top Width	0.60	ft
Critical Depth	0.36	ft
Percent Full	71.7	%
Critical Slope	0.00724	ft/ft
Velocity	2.13	ft/s
Velocity Head	0.07	ft
Specific Energy	0.55	ft
Froude Number	0.56	
Maximum Discharge	0.71	ft ³ /s
Discharge Full	0.66	ft ³ /s
Slope Full	0.00224	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	71.69	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Design Capacity with Storm Water in 16th Street

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00300	ft/ft
Diameter	8.00	in
Discharge	0.4492	mgd

Results

Normal Depth	6.99	in
Flow Area	0.32	ft ²
Wetted Perimeter	1.61	ft
Top Width	0.44	ft
Critical Depth	0.39	ft
Percent Full	87.4	%
Critical Slope	0.00772	ft/ft
Velocity	2.15	ft/s
Velocity Head	0.07	ft
Specific Energy	0.65	ft
Froude Number	0.44	
Maximum Discharge	0.71	ft ³ /s
Discharge Full	0.66	ft ³ /s
Slope Full	0.00331	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	87.41	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

