



August 18, 2022
City of Orange
Public Works Department (Engineering Department)
300 E. Chapman Avenue
Orange, CA 92866

To Whom it may concern:

Per the requirements indicated by the City of Orange, Public Works Department, the existing sanitary and ultimate design sewer capacity data provided per the enclosed sewer model map has been analyzed to determine the potential impact as a result of the proposed 52 unit residential development located at E. 901 Katella Avenue, Orange. Using the ultimate design and existing capacity information indicated on the sewer model map, the “future” proposed depth of flow has been calculated to determine the capacity of the existing 15” public sewer main located within E. Katella Avenue, approximately 5’ south of the centerline at the anticipated connection point.

Average daily flows were calculated for the existing and proposed site land uses utilizing the sewer generation flow rates per the Orange County Sanitation District (OCSD), Design and Construction for Sanitary Sewer dated November 2014. By applying the difference between the existing and proposed calculated flow rates and combining with the existing flow rate indicated on the sewer model map design, pipe capacity increased by approximately 0.0013 ft (0.0156 in) with a calculated $d/D = 0.4382$.

The increased flow capacity within the existing 15” sewer main is insignificant, and well below the 50% depth to diameter ratio capacity, therefore we do not anticipate any capacity issues based on the point of connection pipe segment.

Thank you,
C&V CONSULTING, INC.

Ryan J. Bittner
RCE 68167

Existing Conditions

Project Data

Project Title: INTR-013

Site Address: 901 E. Katella Avenue Orange, CA 92867

Project Date: Wednesday, August 17, 2022

Notes: Values rounded to the ten-thousandth

Input Parameters

Channel Type: Circular

Pipe Diameter 1.25 ft

Longitudinal Slope: 0.0089 ft/ft

Manning's n: 0.0130

(Manning's n was back calculated based on pipe size, slope and existing flow rate)

Flow 2.4097 cfs

Result Parameters

Depth 0.5465 ft

Area of Flow 0.5157 ft²

Wetted Perimeter 1.8060 ft

Hydraulic Radius 0.2855 ft

Average Velocity 4.6728 ft/s

Top Width 1.2401 ft

Froude Number: 1.2770

Critical Depth 0.6207 ft

Critical Velocity 3.9617 ft/s

Critical Slope: 0.0057 ft/ft

Critical Top Width 1.25 ft

Calculated Max Shear Stress 0.3035 lb/ft²

Calculated Avg Shear Stress 0.1586 lb/ft²

d/D = 0.4371

General Commercial Area (Existing Land Use)

From the OCSD criteria for average daily flow, the coefficient of GPD per acre for general commercial land use is 2,262 GPD with an applied 2.5 peaking factor.

$$A=2.71 \text{ ac}$$

$$(2,262 \text{ gpd}) * (2.71 \text{ ac}) * (2.5) = 15,325 \text{ gpd/ac} = 0.0237 \text{ cfs}$$

Medium Density Residential Area (Proposed Land Use)

From the OCSD criteria for average daily flow, the coefficient of GPD per acre for medium density residential land use is 3,451 GPD with an applied 2.5 peaking factor.

$$A=2.69 \text{ ac (3' R/W dedication along Cambridge)}$$

$$(3,451 \text{ gpd}) * (2.69 \text{ ac}) * (2.5) = 23,208 \text{ gpd/ac} = 0.0359 \text{ cfs}$$

$$\text{Difference: } 0.0359 \text{ cfs} - 0.0237 \text{ cfs} = 0.0122 \text{ cfs}$$

Therefore, the proposed “future” flow after connection will be approximately:

$$2.4097 \text{ cfs} + 0.0122 \text{ cfs} = 2.4219 \text{ cfs}$$

Therefore, the proposed “ultimate” design sewer main flow after connection will be

$$3.0456 \text{ cfs} + 0.0122 \text{ cfs} = 3.0578 \text{ cfs}$$

Proposed “Future” Conditions

Project Data

Project Title: INTR-013

Site Address: 901 E. Katella Avenue Orange, CA 92867

Project Date: Wednesday, August 17, 2022

Notes: Values rounded to the ten-thousandth

Input Parameters

Channel Type: Circular

Pipe Diameter 1.25 ft

Longitudinal Slope: 0.0089 ft/ft

Manning's n: 0.0130

(Manning's n was back calculated based on pipe size, slope and existing flow rate)

Flow 2.4219 cfs

Result Parameters

Depth 0.5478 ft

Area of Flow 0.5174 ft²

Wetted Perimeter 1.8087 ft

Hydraulic Radius 0.2860 ft

Average Velocity 4.6813 ft/s

Top Width 1.2404 ft

Froude Number: 1.2774

Critical Depth 0.6226 ft

Critical Velocity 3.9668 ft/s

Critical Slope: 0.0057 ft/ft

Critical Top Width 1.25 ft

Calculated Max Shear Stress 0.3042 lb/ft²

Calculated Avg Shear Stress 0.1589 lb/ft²

d/D = 0.4382

Proposed Ultimate “Design” Conditions

Project Data

Project Title: INTR-013

Site Address: 901 E. Katella Avenue Orange, CA 92867

Project Date: Wednesday, August 17, 2022

Notes: Values rounded to the ten-thousandth

Input Parameters

Channel Type: Circular

Pipe Diameter 1.25 ft

Longitudinal Slope: 0.0089 ft/ft

Manning's n: 0.0130

(Manning's n was back calculated based on pipe size, slope and existing flow rate)

Flow 3.0578 cfs

Result Parameters

Depth 0.6263 ft

Area of Flow 0.6152 ft²

Wetted Perimeter 1.9661 ft

Hydraulic Radius 0.3129 ft

Average Velocity 4.9704 ft/s

Top Width 1.2500 ft

Froude Number: 1.2486

Critical Depth 0.7031 ft

Critical Velocity 40.3007 ft/s

Critical Slope: 0.0061 ft/ft

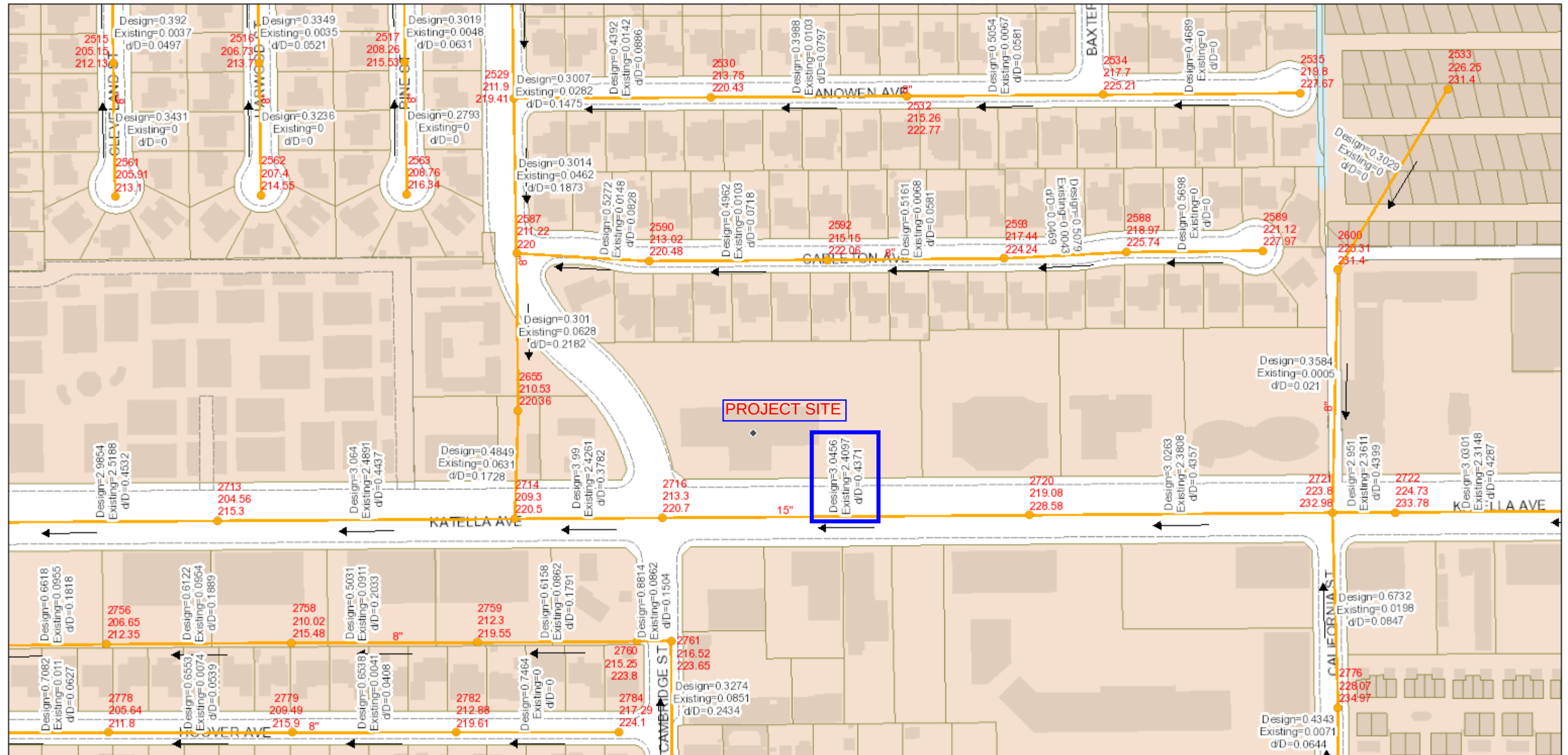
Critical Top Width 1.24 ft

Calculated Max Shear Stress 0.3478 lb/ft²

Calculated Avg Shear Stress 0.1738 lb/ft²

d/D = 0.5010

901 E Katella



August 12, 2022

ssManhole

- City of Anaheim
- City of Garden Grove
- City of Orange
- City of Santa Ana
- City of Tustin
- City of Villa Park
- County of Orange
- East Orange County Water District
- Irvine Ranch Water District
- Orange Park Acres
- Other
- Private
- University of California, Irvine

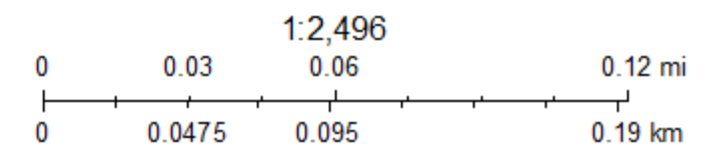
ssGravityMain

- City of Anaheim
- City of Garden Grove
- City of Orange
- City of Santa Ana
- City of Tustin
- City of Villa Park
- County of Orange
- East Orange County Water District
- Irvine Ranch Water District
- Orange Park Acres
- Other
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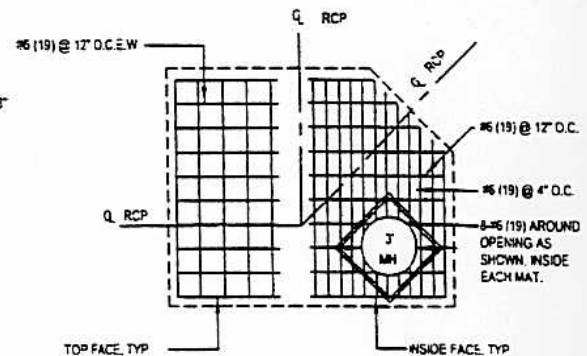
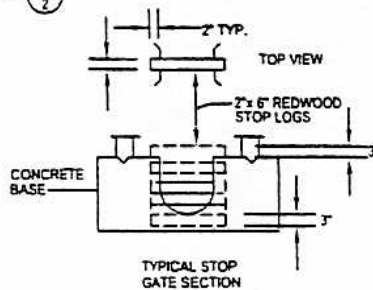
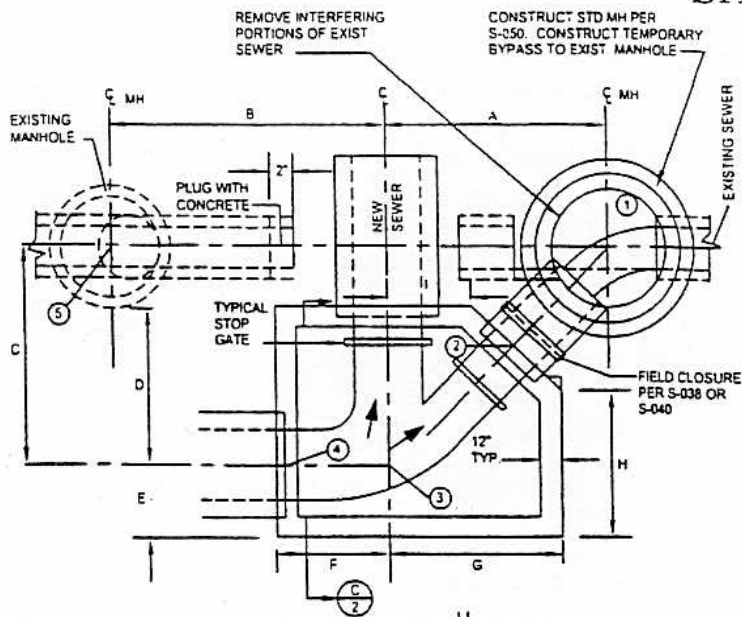
→ orange.DBO.FlowDirection

Gravity Main Existing or Ultimate

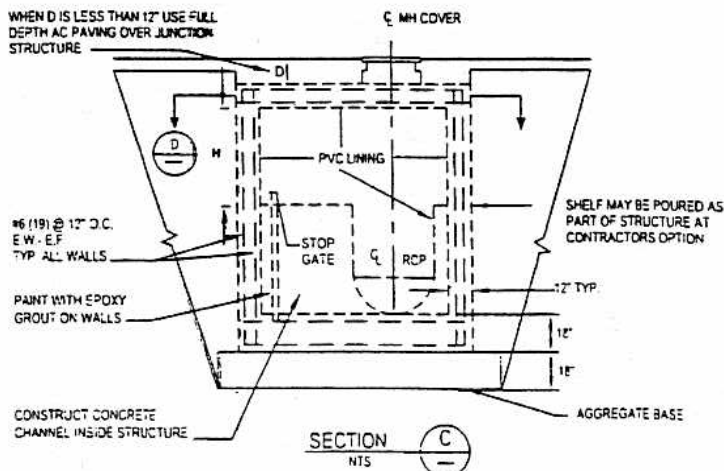
- Existing
- Ultimate



DESIGN and CONSTRUCTION REQUIREMENTS for SANITARY SEWERS



SECTION D
NTS
TOP SLAB ONLY



Orange County Sanitation District
California

November 2014

- Construction notes and numbers shall not be used and all applicable notes of construction shall be called out.

- Typical section, hydraulic data, and benchmark data shall be shown.

- Soil boring information shall be shown on each sheet (if applicable) and shall include the date taken and the firm presenting the soil information.
- Utility locations shall be shown as accurately as possible in both plan and profile in accordance with standard practice for underground utility plans delineations.

3 DETAILS

Applicable detail sheets shall be prepared and should show all necessary details for construction survey controls.

4 SIZE OF PLANS

All plans shall be 22 x 36 inches in size.

5 FINAL APPROVAL

The plans shall be signed by a Civil Engineer Registered in the State of California, under whose jurisdiction the plans were prepared. When final approval for a permit is issued by the District, the Engineer's signature will be shown.

12.3.3 DESIGN

1 CRITERIA FOR AVERAGE DAILY FLOW CALCULATIONS

<u>Land Use</u>	<u>Coefficient GPD Per Acre</u>
Low Density Residential	1488
Medium Density Residential	3451
High Density Residential	7516
Commercial Area	2262
Industrial Area	3167
Open Space	129

2 PEAK FLOW

Average daily flow times two (2) equals peak flow. For a 8-inch pipe use multiplication factor of 2.5. Do not use pipe less than 8 inches in diameter.

3 VELOCITY

Velocity shall not be less than 2 ft /sec. Unless otherwise approved by the Engineer. Maximum slope should not exceed 10 percent.

4 REQUIREMENTS FOR DEPTH OF FLOW (D) VERSUS DIAMETER OF PIPE (D) IN SEWER PIPE.

<u>Diameter of Pipe (d)</u>	<u>Max D/d</u>
8 inches – 18 inches	0.50
21 inches – 60 inches	0.75
Over 60 inches	0.75

5 DEPTH OF COVER

Minimum depth of cover over mainline sewers shall be 7 feet. Unless otherwise approved, depth of laterals at property line shall be a minimum of 5 feet.

6 MANHOLE CRITERIA

Manhole locations:

- At changes of slope
- At changes of direction
- At junction of laterals
- At changes of pipe size
- At termination of sewers
- At special locations as designated by the Engineer
- At changes in type of pipe material, i.e., V.C.P. to D.I.

Maximum distance between manholes:

<u>Pipe Size</u>	
8 inches – 12 inches	400 feet
15 inches – 18 inches	500 feet
18 inches and over	600 feet unless otherwise approved by the Engineer