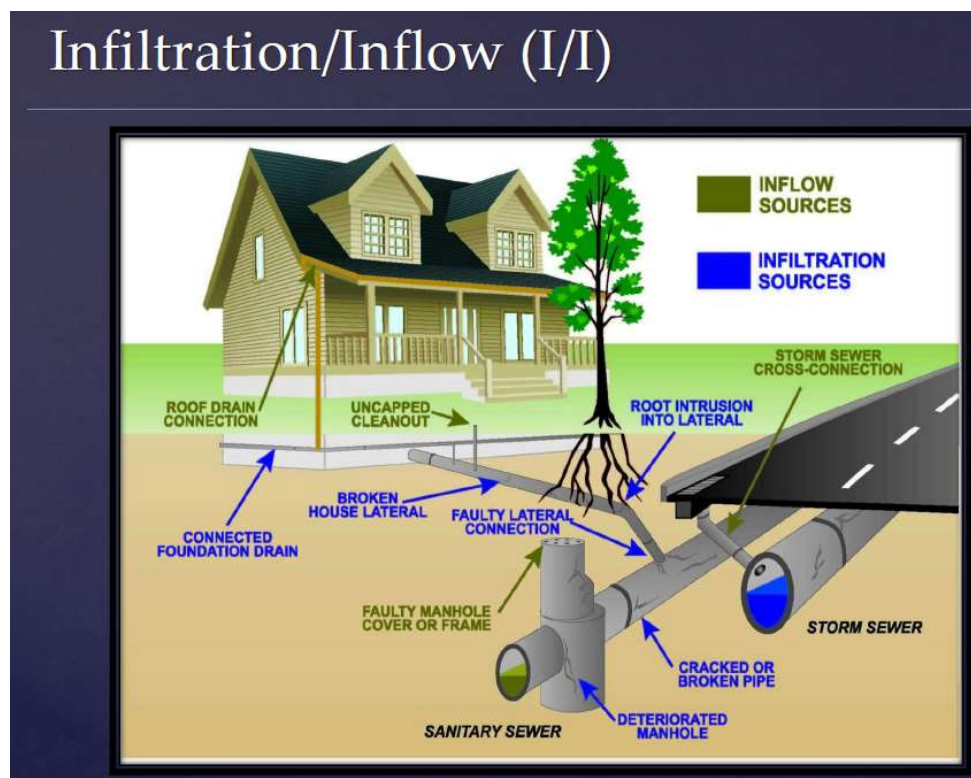


MEMORANDUM

To: Lisa Celaya, Adam Jones, Jill Friedman, Ana Osante, City of San Diego
From: Bill Stannard and John Wright, Raftelis
Date: June 3, 2021
Re: Raftelis Recommendation on Infiltration and Inflow

In the cost-of-service study, 67% of infiltration and inflow was distributed to customer classes based on the number of accounts and 33% was distributed based on relative contributed wastewater volumes. Stantec recommends an allocation of 57% to accounts and 43% to volume. For the reasons discussed in this memorandum, Raftelis believes the original allocation was correct and we do not recommended acceptance of Stantec's proposal.

Infiltration and inflow are two components of water that enter all wastewater collection systems in addition to the sanitary and industrial sewage discharged by customers. Commonly referred to as I/I, these extraneous flows are a result of a variety of factors that are typical of all wastewater systems. Infiltration is groundwater that enters sewer pipes (interceptors, trunk sewers, local collector sewers, manholes, or customer service laterals sewers) through holes, breaks, joint failures, connection failures and other openings. Inflow is surface water that enters the wastewater system from yard, roof, footing drains, and downspouts, and through holes in manhole covers. In San Diego inflow occurs as a result of rainfall. A depiction of the sources of I/I is shown below.



The amount of I/I in San Diego is not a significant portion of the annual amount of wastewater emanating from the City. The estimated amount of I/I in San Diego expressed as a percentage of annual wastewater contributed by customers is 4.5%. It is quite common for I/I in other major wastewater systems in less arid regions of the United States to exceed 25% of contributed wastewater.

Given the low annual rainfall in San Diego, the principal portion of I/I is due to groundwater entering the wastewater collection system. As noted above, the primary source of infiltration is due to customer service laterals and connections, deteriorating manholes and pipe joints. Typically, sewer pipe sections are 8 to 10 feet in length. Manholes are spaced at no more than 400 to 600 feet depending on geography and layout of the pipe network.

I/I volumes are collected and transported to the wastewater treatment plants for treatment and disposal. For this reason, it is appropriate for these costs to be recognized in a wastewater cost of service study and equitably allocated to the various customer classes in a manner that recognizes the relative sources and responsibility for the I/I generated within the wastewater system. Failure to account for I/I in a cost-of-service study has the effect of assigning I/I responsibility solely in proportion to the volume and strengths discharged by each customer.

There is not a direct technical methodology that can exactly determine how much I/I is generated by individual customers. As such, the allocation of I/I among the customer classes requires the use of engineering/technical judgement and available data to achieve a reasonable allocation that recognizes the principal sources of I/I and aligns them with the number of customers and volume of wastewater contributed. The occurrence of I/I is not driven by the quantity of wastewater contributed by customers or customer classes. Rather, it is the number of customer-owned service laterals connected to the City's sewer pipe network and the length of the pipe in that network, which drives the number of individual pipe joints/connections are key factors to be recognized.

In this cost-of-service study, an allocation of 67% of I/I was distributed to customer classes based on the number of accounts and 33% was distributed based on relative contributed wastewater volumes. The use of this allocation basis provides recognition of the sources of I/I as well as the relative use of the collection system based on volume contributed. This allocation basis is commonly used in the wastewater utility industry and also reflected in Water Environment Federation Manual of Practice No. 27, Financing and Charges for Wastewater Systems.

Upon receipt of questions from Stantec regarding the foundation for the allocation factors used in the cost-of-service study, further examination of the available data was conducted. This data included an estimated length of the customer-owned service laterals, the length of the local sewer collection system, and the length of the larger trunk sewers used to convey wastewater to the three wastewater treatment plants. A summary of the data received and analyzed is presented in the following table.

Line	Metric	Units	Calculation
1	Number of Accounts	275,378	
2	Linear Feet of Service Lateral Length per Account (estimated by City Staff/GIS)	75.51	
3	Total Estimated Linear Feet of Customer-Owned Service Laterals	20,793,793	3 = (1*2)
4	Linear Feet of City-Owned Gravity Sewers <= 8" Diameter (Provided by City Staff)	11,499,840	
5	Linear Feet of City-Owned Gravity Sewers > 8" Diameter	3,989,340	
6	Total Linear Feet of Customer Service Laterals and City-Owned Sewers	36,282,973	6 = (3+4)
7	Customer-Owned Service Laterals as a % of Total Length	57.3%	7 = (3/6)
8	(Customer-Owned Service Laterals + City-Owned Gravity Sewers <= 8" Diameter) as a % of Total	89.0%	8 = (3+4)/6
9	Mid-Point of Range	73.2%	9 = Average of 7+8
10	% of City-Owned Gravity Sewers <= 8" Diameter Assumed to be Local Collection	50.0%	10
11	Linear Feet of City-Owned Gravity Sewers <= 8" Diameter Assumed to be Local Collection	5,749,920	11 = (4*1)
12	Linear Feet of Customer-Owned Service Laterals + Assumed City Owned Local Collection Sewers <=8" Diameter	26,543,713	12 = (3+11)
13	(Customer-Owned Service Laterals + City-Owned Local Collection Sewers <= 8" Diameter) as a % of Total	73.2%	13 = (12/6)
14	Mid-Point of Range	65.2%	13 = Average of 7+13

Recognizing the lack of specific data regarding I/I causes and responsibility, it is appropriate to recognize both the number of customers and the volume of wastewater discharged. The number of customers reflects both the length of customer owned service laterals and the length of the local sewer collector mains, both of which are principal sources of I/I. The volume of wastewater discharged by customers is a driver in the sizing of the wastewater collection system and reflects the customer's use of the system. The analysis shown in the above table reflects the % of customer-owned sewer laterals as a percentage of the total gravity sewers in the City's collection system (57.3%) and two separate scenarios. The first scenario is based on the assumption that 100% of all City owned gravity sewers of 8 inches or less in diameter are directly linked to the number of customers served (89.0%). The second scenario is based on the assumption that 50% of those sewers are directly linked to the number of customers served (73.2%) with the balance serving as trunk sewer within the overall pipe network. The midpoint of the ranges between the customer service laterals and the two scenarios are 73.2% and 65.2%, respectively.

Based on the above analysis we believe that the allocation percentages used in the Cost of Service Study are reasonable and provide a fair and equitable allocation of I/I responsibility among the City's customer classes.