The Villas by the Sea
Planning Sewer Study

1. Population Determination (Proposed Site)

This project proposes 40 residential units and 4 commercial units (2,986 sf). Using the City of San Diego Sewer Design Manual, (Table 1-1) the 40 residential units in zone RM-2-5 are assigned a population of 3.0 per dwelling unit resulting in total residential population of 120. The 4 commercial units are designated to have a population of 43.7/ac. Therefore, the population from the commercial units are (43.7 x 2,986 /43,560 = 3.0). This results in a total population for the site of 123 persons, equivalent population.

2. Population Determination (Existing tributary to sewer main in alley fronting project)

The sewer within the alley adjacent to the project site that currently accepts effluent from the site begins easterly as an 8" PVC main in the alley, just westerly of Gresham Street and continues westerly to a manhole just easterly of the project site, where the main becomes 10" PVC and continues to a sewer manhole in Cass Street, westerly of the site. It continues both westerly and then southerly as a 10" PVC main. The areas tributary to the main, upstream and across the alley from the site, are comprised of areas zoned RM-1-1, RM-2-5 and CC-4-2. From zoning information RM-1-1 has a density of one half of zone RM-2-5. Table 1-1 provides an equivalent population for RM-2-5 of 87 per acre so zone RM-1-1 is assigned an equivalent population of 43.5 per acre and Zone CC-4-2 an equivalent population of 43.7 per acre. The RM-1-1 zone is comprised of 237,500 sf (5.45 ac), zone RM-2-5 is comprised of 218,750 sf (5.02 ac) and zone CC-4-2 is 43,750 sf (1.00 ac). Using the populations and areas for each zone results in a population for zone RM-1-1 of 240; RM-2-5 of 437 and zone CC-4-2 of 44. The total pre-development population (including the site) is 721. The current site population (24,400/43560 x 43.7) is 24.5. The proposed site population (see above) is 123, an increase of 98.5. The total population for the site is 123 equivalent population. The total post-development population contributing to the sewer is 819.5 (say 820).

3. *Volume Calculations*

Using the equivalent population and the Peak to Average formula found in Figure 1-1 of the City of San Diego Sewer Design Manual (Peak Factor = 6.2945 x $(pop)^{-0.1342}$) the pre-development (721 population) Peaking Factor was determined to be 2.6 and post-development (820 population) was determined to be 2.55. Using the Peaking Factor and the standard 80 gal/day/capita pre development daily volume of flow was determined (721 x 80 x 2.6 = 149,968 gpd) and post-development (820 x 80 x 2.56 = 167,280 gpd). These values, when converted to cubic feet per second are 0.23 cfs pre-development and 0.26 cfs post development. The 10" sewer main has a slope of 1.03% and so has the capacity to convey 2.23 cfs when flowing full and so when limited to flowing at half its diameter can convey 1.12 cfs. The increase in effluent from the site of 0.03 cfs represents 2.68%. Total flow from the site (not simply the increase) is (123 x 80 x 2.56 = 25,190 gpd) is 0.039 cfs which represents 3.48% of the potential capacity of the main. Section 1.7.1 of the Sewer Manual states if new flow is less than 10% of the total flow there is no need to perform additional downstream analysis. Therefore, the existing sewer main is capable of conveying this slight increase in expected effluent from the project (0.03 cfs).

Antony K. Christensen
RCE 54021
Exp. 12-31-21

07-07-21
Date

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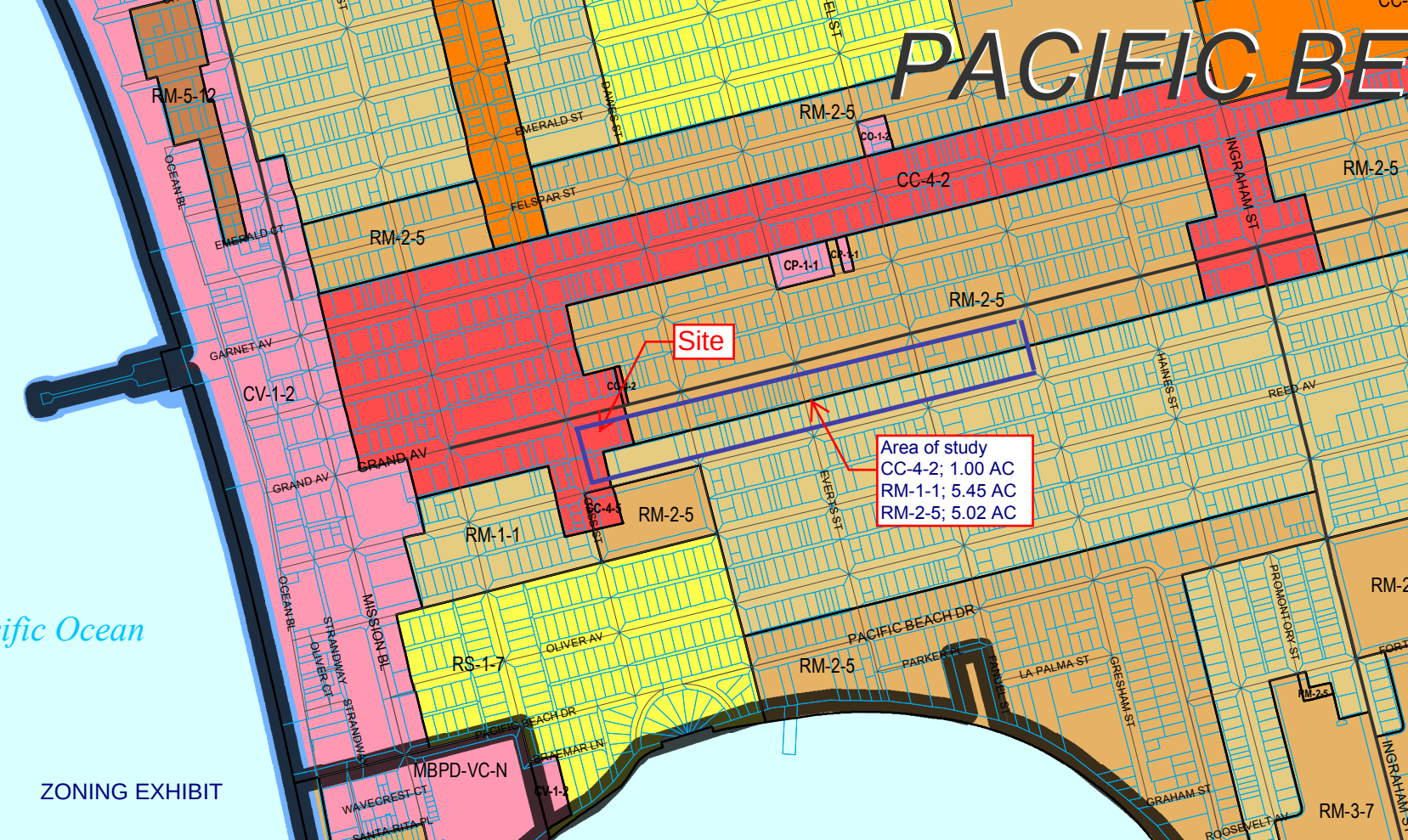
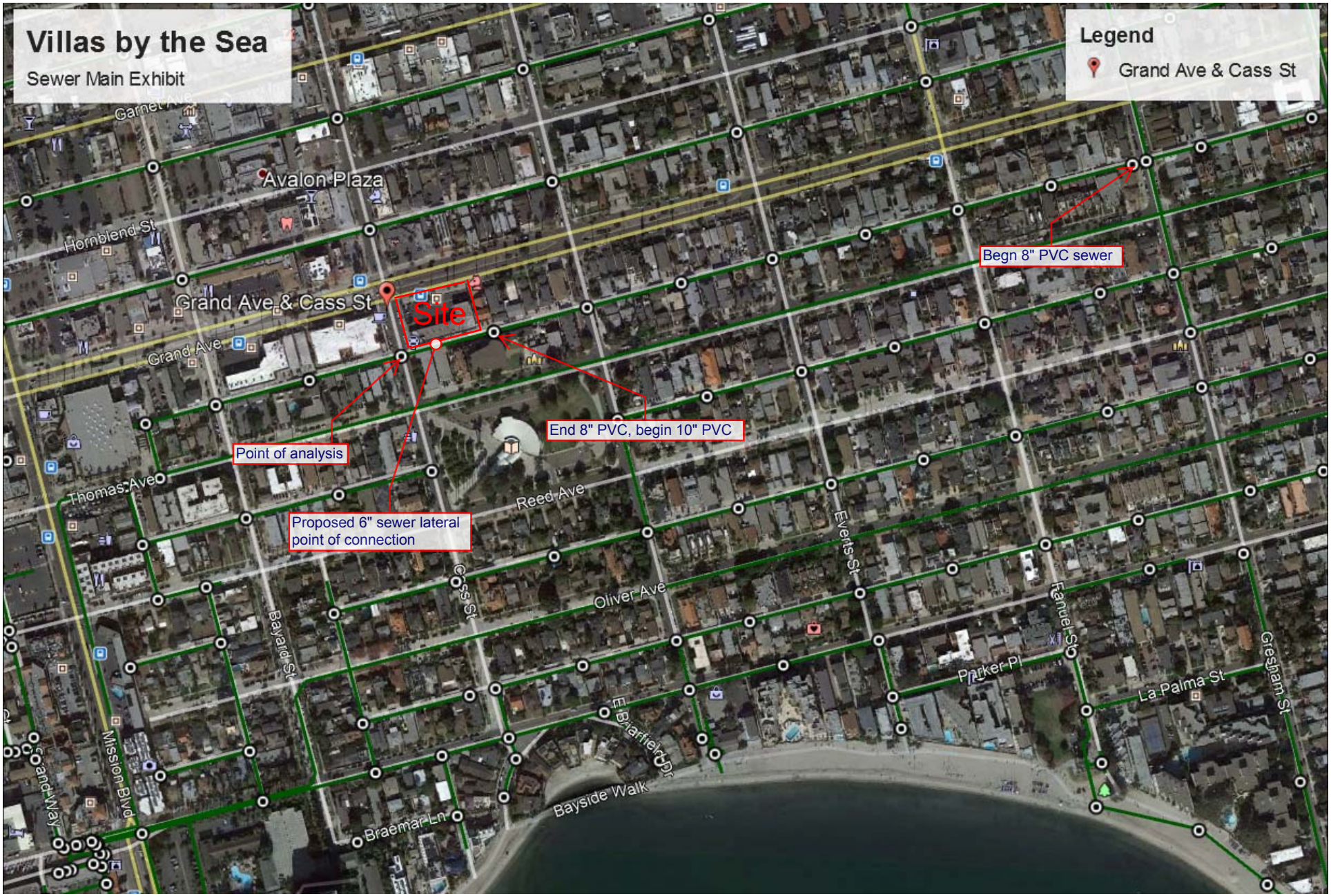

PACIFIC BE
Site
Area of study
CC-4-2; 1.00 AC
RM-1-1; 5.45 AC
RM-2-5; 5.02 AC
RM-5-12
RM-2-5
CO-1-2
CC-4-2
CP-1-1
CV-1-2
RM-1-1
RS-1-7
MBPD-VC-N
OCEAN BL
EMERALD CT
EMERALD ST
DARNELL ST
FELSPAR ST
INGRAHAM ST
GARNET AV
GRAND AV
OLIVER CT
OLIVER AV
STRANDWAY
MISSION BL
PACIFIC BEACH DR
GRAEMAR LN
WAVECREST CT
SANTA RITA PL
EVERS ST
HAINES ST
REED AV
PARKER ST
LA PALMA ST
GRESHAM ST
PROMONTORY ST
GRAHAM ST
ROOSEVELT AV
RM-3-7
ZONING EXHIBIT


Villas by the Sea
Sewer Main Exhibit
Legend
Grand Ave & Cass St
Avalon Plaza
Hornblend St
Grand Ave & Cass St
Site
Grand Ave
Begn 8" PVC sewer
End 8" PVC, begin 10" PVC
Point of analysis
Thomas Ave
Proposed 6" sewer lateral point of connection
Reed Ave
Cass St
Bayard St
Oliver Ave
Everts St
Fanuel St
Parker Pl
La Palma St
Gresham St
Mission Blvd
Grand Way
Braemar Ln
Bayside Walk

population for a given land use. These tabulated figures represent a general case analysis. When more accurate or detailed information, such as fixture unit counts, is available, Table 1-1 shall not be used. For more information on the requirements of the zones shown in Table 1-1, refer to Chapter 13 of the City of San Diego Municipal Code.

1.7 REQUIRED CAPACITY IN EXISTING SEWER SYSTEMS DOWNSTREAM OF NEW FACILITIES

1.7.1 Required Capacity Downstream of New Gravity Sewers

For a new development, the projected peak wet weather flow from the proposed system (ref. Subsection 1.3.2.2) will be added to the field measured maximum flow in the downstream sewer to determine if the projected d_n/D is in compliance with the depth criterion described in Subsection 1.3.3.3. If this criterion is not met, a comprehensive sewer study of the area shall be prepared.

The downstream system shall be studied to the point in the system where the projected peak wet weather flow from the proposed new development is less than 10% of the total flow. All sewers to this point are required to carry the total flow per the depth criterion described in the above paragraph. The existing system to be studied shall not be less than two pipe reaches (i.e. manhole to manhole) from the point of discharge of the new development into the existing system.

1.7.2 Required Capacity Downstream of New Pump Stations

In developed lands, the discharge of the pump station design capacity from the proposed new development will be added to the field measured maximum flow in the existing downstream sewer to determine if the projected d_n/D will comply with the depth criteria described in Subsection 1.3.3.3. If these criteria are not met, a comprehensive sewer study of the area shall be prepared.

The sewer system downstream of the pump station shall be designed for cyclical pumping operation (i.e. on-off pumping). Use the design discharge capacity of the pump station for the tributary area. As a rule of thumb, the cyclical effect in single family residential may be considered negligible when the pump station's discharge is less than 10% of the total flow. For other density types consult with the Senior Engineer. All sewers to this point are required to carry the total flow per the depth criterion described in the above paragraph. The proposed new system shall discharge at a point not less than two pipe reaches (i.e. manhole to manhole) away the existing system.

TABLE 1-1
CITY OF SAN DIEGO SEWER DESIGN GUIDE
DENSITY CONVERSIONS

Zone	Maximum Density (DU/Net Ac)	Population per DU	Equivalent Population (Pop/Net Ac)
AR-1-1, RE-1-1	0.1	3.5	0.4
RE-1-2	0.2	3.5	0.7
AR-1-2, RE-1-3	1	3.5	3.5
RS-1-1, RS-1-8	1	3.5	3.5
RS-1-2, RS-1-9	2	3.5	7.0
RS-1-3, RS-1-10	3	3.5	10.5
RS-1-4, RS-1-11	4	3.5	14.0
RS-1-5, RS-1-12	5	3.5	17.5
RS-1-6, RS-1-13	7	3.5	24.5
RS-1-7, RS-1-14	9	3.5	31.5
RX-1-1	11	3.4	37.4
RT-1-1	12	3.3	39.6
RX-1-2, RT-1-2, RU-1-1	14	3.2	44.8
RT-1-3, RM-1-2	17	3.1	52.7
RT-1-4	20	3.0	60.0
RM-1-3	22	3.0	66.0
RM-2-4	25	3.0	75.0
RM-2-5	29	3.0	87.0
RM-2-6	35	2.8	98.0
RM-3-7, RM-5-12	43	2.6	111.8
RM-3-8	54	2.4	129.6
RM-3-9	73	2.2	160.6
RM-4-10	109	1.8	196.2
RM-4-11	218	1.5	327.0

TABLE 1-1
CITY OF SAN DIEGO SEWER DESIGN GUIDE
DENSITY CONVERSIONS (Continued)

Zone	Maximum Density (DU / Net Ac)	Population Per DU	Equivalent Population (Pop/Net Ac)
Schools/Public	8.9	3.5	31.2
Offices	10.9	3.5	38.2*
Commercial/Hotels	12.5	3.5	43.7*
Industrial	17.9	3.5	62.5*
Hospital	42.9	3.5	150.0*

Figures with asterisk (*) represent equivalent population per floor of the building.

Definitions:
DU = Dwelling Units
Ac = Acreage
Pop = Population

Net Acreage is the developable lot area excluding areas that are dedicated as public streets in acres. Gross Area is the entire area in acres of the drainage basin, including lots, streets, etc.

For undeveloped areas, assume Net Acreage = 0.8 x Gross Area in Acres

For developed areas, calculate actual Net Acreage.

Tabulated figures are for general case. The tabulated figures shall not be used if more accurate figures are available.

Population is based on actual equivalent dwelling units (EDU) or the maximum estimate obtained from zoning.

Conversion of Fixture Units to Equivalent Dwelling Units (EDU): The Water Meter Data Card, maintained by the Development Services Department, contains a table of plumbing fixtures that should be used for determining the equivalent dwelling units (EDU's) for the purpose of estimating the rate of wastewater generation in residential, commercial, or industrial areas. Currently, the basis for conversion is: 20 fixtures = 1 EDU and 1 EDU = 280 gallons of wastewater per day.

In high rise building areas, flow rates shall be based on the most current, adopted edition of the applicable Plumbing Code, assuming one lateral per area. The most conservative flow rate shall govern.

PUBLIC UTILITIES DEPARTMENT

PEAKING FACTOR FOR SEWER FLOWS
(Dry Weather)

Ratio of Peak to Average Flow*
Versus Tributary Population

Population	Ratio of Peak to Average Flow	Population	Ratio of Peak to Average Flow
200	4.00	4,800	2.01
500	3.00	5,000	2.00
800	2.75	5,200	1.99
900	2.60	5,500	1.97
1,000	2.50	6,000	1.95
1,100	2.47	6,200	1.94
1,200	2.45	6,400	1.93
1,300	2.43	6,900	1.91
1,400	2.40	7,300	1.90
1,500	2.38	7,500	1.89
1,600	2.36	8,100	1.87
1,700	2.34	8,400	1.86
1,750	2.33	9,100	1.84
1,800	2.32	9,600	1.83
1,850	2.31	10,000	1.82
1,900	2.30	11,500	1.80
2,000	2.29	13,000	1.78
2,150	2.27	14,500	1.76
2,225	2.25	15,000	1.75
2,300	2.24	16,000	1.74
2,375	2.23	16,700	1.73
2,425	2.22	17,400	1.72
2,500	2.21	18,000	1.71
2,600	2.20	18,900	1.70
2,625	2.19	19,800	1.69
2,675	2.18	21,500	1.68
2,775	2.17	22,600	1.67
2,850	2.16	25,000	1.65
3,000	2.14	26,500	1.64
3,100	2.13	28,000	1.63
3,200	2.12	32,000	1.61
3,500	2.10	36,000	1.59
3,600	2.09	38,000	1.58
3,700	2.08	42,000	1.57
3,800	2.07	49,000	1.55
3,900	2.06	54,000	1.54
4,000	2.05	60,000	1.53
4,200	2.04	70,000	1.52
4,400	2.03	90,000	1.51
4,600	2.02	100,000+	1.50

***Based on formula:** **Peak Factor = $6.2945 \times (pop)^{-0.1342}$**
(Holmes & Narver, 1960)

FIGURE 1-1

Type of conveyance is a: 10: Sewer Main
Diameter of conveyance equals .833333 Feet
Slope of conveyance equals 1.03 %
Roughness equals .013
Flow quantity equals 2.229605 CFS
Area equals .545415 Square Feet
Velocity equals 4.087905 FPS