APPENDIX H

Sewer Capacity Analysis

Prepared by:

David Evans and
Associates

DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE: June 1, 2018

TO: Brad Merrell, PE
City Engineer
Department of Public Works
City of Monrovia

FROM: David Stuetzel

SUBJECT: Sewer Capcity Analysis – Avalon Bay

PROJECT: Task order 06 – On Call Contract
MONR000-0002

CC: Alex Tachiki, City of Monrovia
Rob Bathke, DEA

As requested by the City of Monrovia, David Evans and Associates was requested to evaluate the feasibility and potential impact of connecting the proposed Avalon Bay Development located at the Northwest corner of Myrtle Avenue and Chestnut Avenue to the City's existing sanitary sewer collection system. Appendix A shows the proposed points of connect to the City sewer system. The proposed project is a 154-unit apartment development, with 3,900 SF of retail and 3,350 SF of amenity areas encompassing a parcel size approximately 2.0 acres. The contributing sewer flows from the proposed development will connect to the existing City sewer at two locations. 50% of the proposed sewer flows will connect to an existing 10" City Sewer pipeline in the alley between Walnut Avenue and Chestnut Avenue west of Myrtle Avenue, and the other 50% of the site sewer flows will connect to an existing 12" City Sewer pipeline in Chestnut Avenue at the intersection with Myrtle Avenue.

The configuration of the City's existing sewer at Myrtle Avenue and the public alley (SMH 143-025) is a diversion manhole. The existing sewer pipeline flow splits at this SMH with existing sewer flows continuing westerly in the public alley westerly and also southerly in Myrtle Avenue. As part of the proposed development, the existing 10" City sewer located within the public alley between Walnut Avenue and Chestnut Avenue 350 ft west of Myrtle Avenue will be abandoned (SMH 143-025 to 142-009). With the alley sewer abandonment, all sewer flows reaching SMH 143-025 will now flow southerly in Myrtle Avenue to Chestnut Avenue. The sewer Capacity analysis prepared for the Avalon Bay Development includes this new flow pattern.

The existing project area where the Avalon Bay Development is proposed is defined in the City's Sewer Master Plan as manufacturing area with a flow demand of 200 gpd/1000 sf. The change in development will result in an increase to the City's SMP design flow of 0.051 mgd. Table 1 summarizes the estimated average wastewater flows for the proposed development based on the proposed land use categories and respective LACSD Unit factors.

Appendix B shows the impacted downstream City sewer.

Appendix C lists the wastewater flow factors for various land use categories published by the Los Angeles County Sanitation Districts (LACSD).

17782 - 17th Street Suite 200 Tustin California 92780 Telephone: 714.665.4500 Facsimile: 714.665.4501

DATE: May 21, 2018 **FROM:** David Stuetzel

TO: Brad Merrell, PE **SUBJECT:** Sewer Capcity Analysis – Avalon Bay

Table 1 – Estimated Wastewater Flows

POC Location	Land Use	Unit Factor (gdp/DU)	Number of Units	Floor Area	Average Flow (gpd)	Peaking Factor*	Peak Flow (mgd)
NW Corner of Myrtle and Chestnut	Apartment	250	154	0	38,500	1.61	0.062 (1)
NW Corner of Myrtle and Chestnut	Retail	250	0	7,250	1,813	1.61	0.003 (1)
NW Corner of Myrtle and Chestnut	Manufacturing (Existing Site)	200 gpd/1000 sf		88,400 sf	17,680	1.61	0.028 (2)

* Developed based on the flow measurements conducted as part of the 2015 Sewer Master Plan

(1) – Proposed site sewer flows are split 50/50 to public alley west of Myrtle Avenue and south of Walnut Avenue and the Myrtle Avenue and Chestnut Avenue intersection.

(2) – Existing site flows from manufacturing site development were removed from City's SMP sewer study analysis.

The previously developed sewer master plan hydraulic model was used to evaluate the hydraulic capacity of the downstream City sewers. The variations of flow were captured in the hydraulic model using diurnal curve method with a peaking factor of 1.61. The peak flows in Table 1 and the previously developed diurnal curve were input at the point of connection along the public alley west of Myrtle Avenue (MH 142-009), and Chestnut Avenue and Myrtle Avenue intersection (MH 143-026) for the proposed Apartment Development in the hydraulic model and the model was run for both existing and proposed flow conditions. Appendix D shows the SMP model results. The following summarizes the major findings of the analysis:

- The City sewers receiving sewer flow from the proposed Development range in size from 10-inch to 24-inch in diameter. According to LACSD, for sewer mainlines less than 15-inch in diameter, the capacity is considered full when the ratio of depth of flow (d) over the pipe diameter (D) is equal to 0.5. Expressed as d/D=0.5. For 15-inch and larger sewers, the full capacity is set at a d/D of 0.75 by LACSD.
- Under the existing flow conditions, the existing d/D was predicted to be the highest at about 0.66 with a predicted flow of 6.372 mgd in an existing 24-inch sewer for pipe segment 172-011 to 172-012 located along Duarte Road at the intersection with Peck Road.
- Under the proposed conditions, overall the model shows little impact on the d/D ratios in all the impacted downstream sewers. The d/D ratio for pipe segment 143-025 to 142-019 from the Myrtle Avenue diversion Sewer Manhole to the intersection of Mayflower Avenue and Maple

Avenue increases from 0.20 to 0.25. The increase in the flow depth ratio is within the requirements established by LACSD and based on these findings, is concluded that the existing City sewers have sufficient capacity to convey additional wastewater flows from the proposed Avalon Bay Development.

Attachments:

Appendix A – Proposed Project Location Exhibit

Appendix B – Impacted City Sewer Locations

Appendix C – LACSD Flow Factors

Appendix D – Capacity Analysis Results

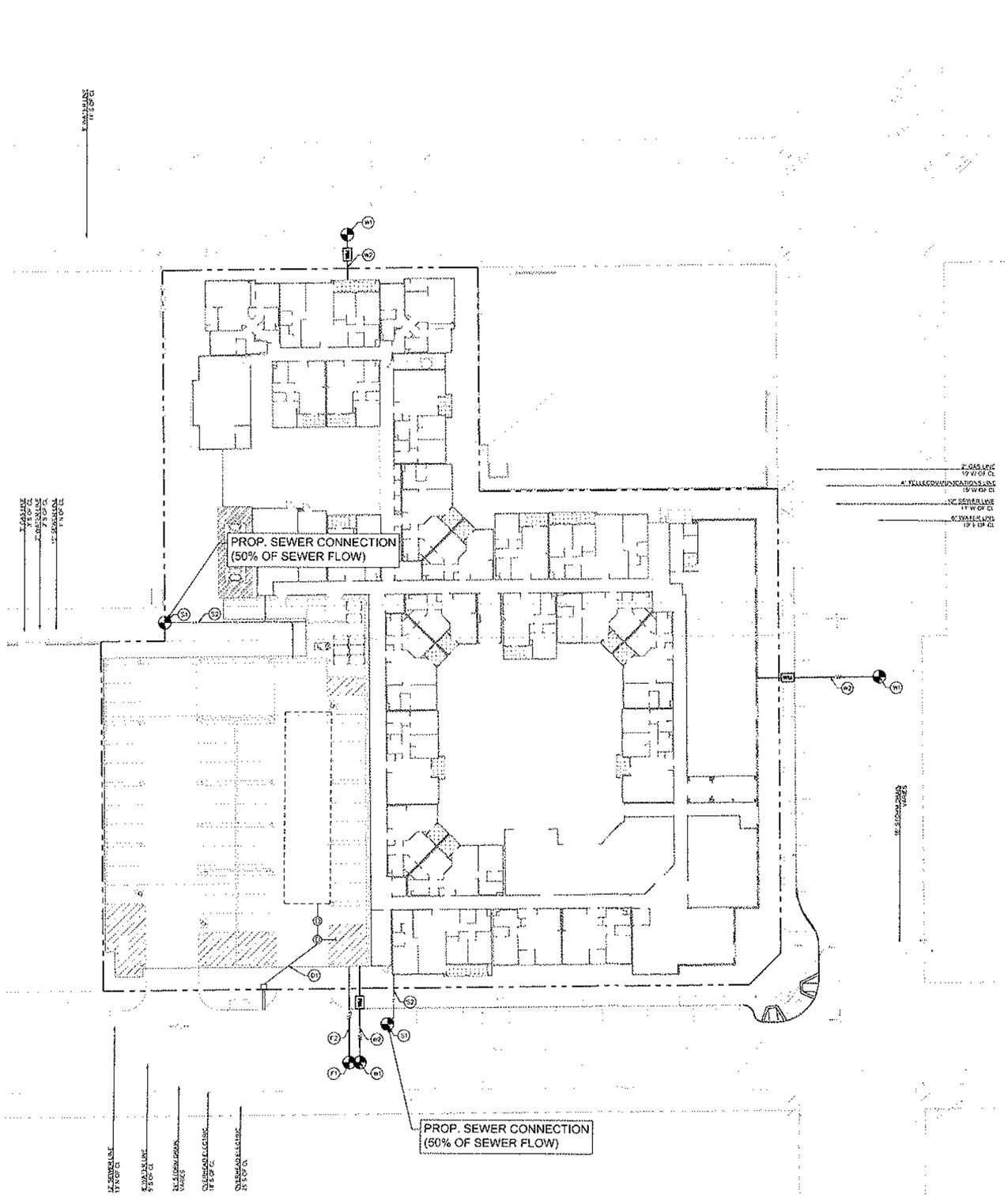
Attachments/Enclosures: List Items

File Path: Document1

Appendix A

Proposed Project Locations and

Points of Connection



NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

DOMESTIC WATER

(W1) CONNECT TO EXISTING WATER LINE. COORDINATE CONNECTION WITH CITY OF MONROVIA.

(W2) INSTALL DOMESTIC WATER LINE. SEE PLUMBING PLANS FOR CONTINUATION.

FIRE WATER

(F1) CONNECT TO EXISTING WATER LINE. COORDINATE TAP WITH CITY OF MONROVIA.

(F2) INSTALL FIRE WATER LINE. SEE PLUMBING PLANS FOR CONTINUATION.

SEWER

(S1) CONNECT TO EXISTING SEWER MAIN PER SSPWC STD PLAN 320-2.

(S2) INSTALL SDR-35 PVC SEWER LATERAL.

STORM DRAIN

(D1) PROPOSED STORM DRAIN PIPING AND APPURTENANCES. REFER TO DRAINAGE PLAN FOR DESIGN INFORMATION.

EXISTING UTILITY NOTE

THE EXISTING UTILITIES SHOWN ON THIS PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.

LEGEND

	PROPERTY LINE
	RIGHT-OF-WAY LINE
	CENTER LINE
	EASEMENT OR SETBACK LINE
S	EXISTING SANITARY SEWER PIPE
SD	EXISTING STORM DRAIN PIPE
W	EXISTING WATER PIPE
G	EXISTING GAS PIPE
T	EXISTING TELECOMMUNICATIONS LINE
OHE	EXISTING OVERHEAD ELECTRIC SERVICES
W	PROPOSED WATER PIPE
FW	PROPOSED FIRE WATER PIPE
SS	PROPOSED SANITARY SEWER PIPE
SD	PROPOSED STORM DRAIN PIPE

Kimley»Horn

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600 S. FIGUEROA STREET, SUITE 2400, LOS ANGELES, CA 90017
PHONE: (213) 261-1500
WWW.KIMLEY-HORN.COM

NO	REVISIONS	DATE

KHA PROJECT	096078001
DATE	3/29/19
SCALE	AS SHOWN
DESIGNED BY	CZK
DRAWN BY	CZK
CHECKED BY	TBC

PRELIMINARY UTILITY PLAN

825 S MYRTLE AVE
PREPARED FOR
AVALON BAY

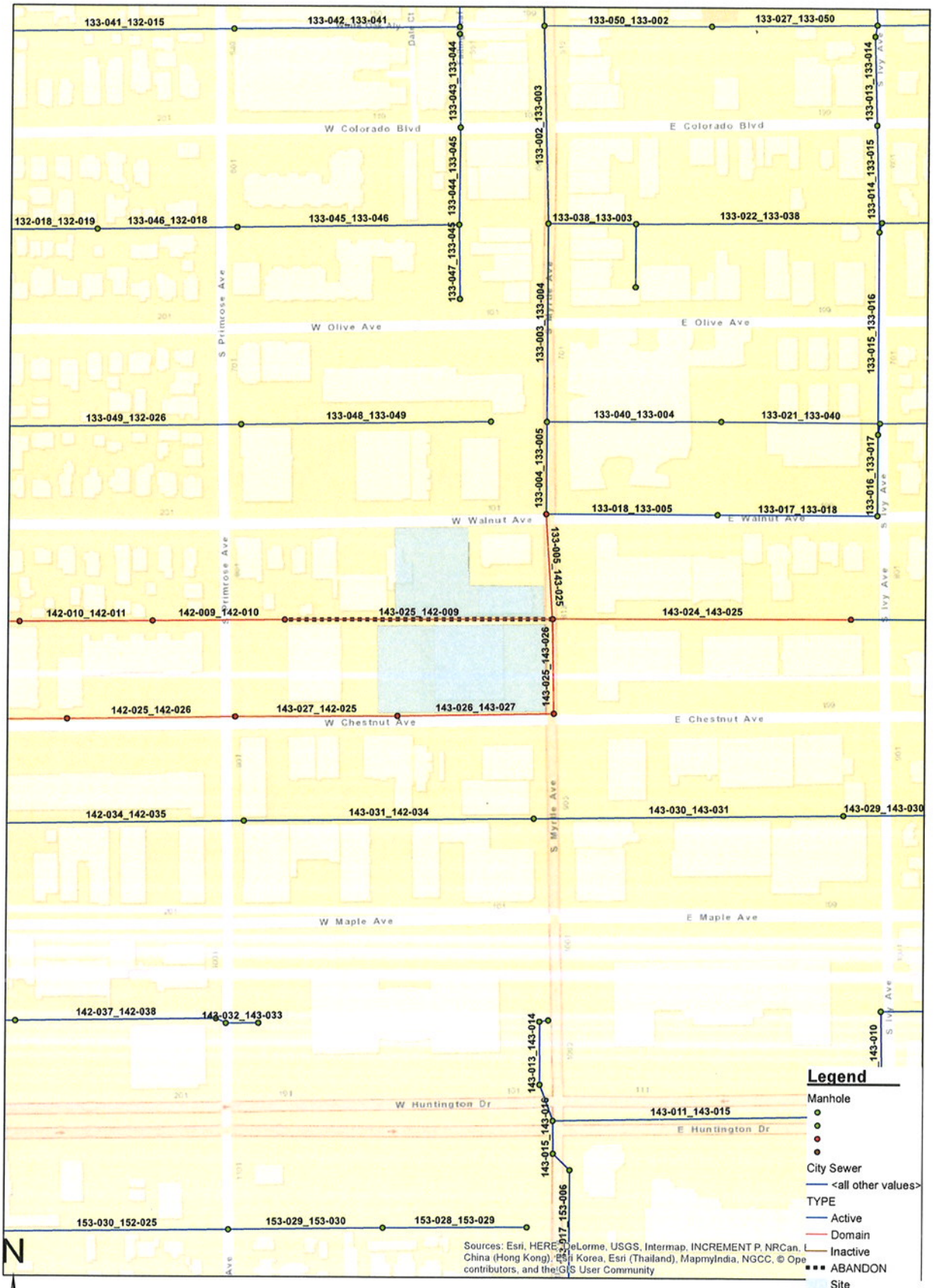
MONROVIA, CA

SHEET NUMBER
EX-1

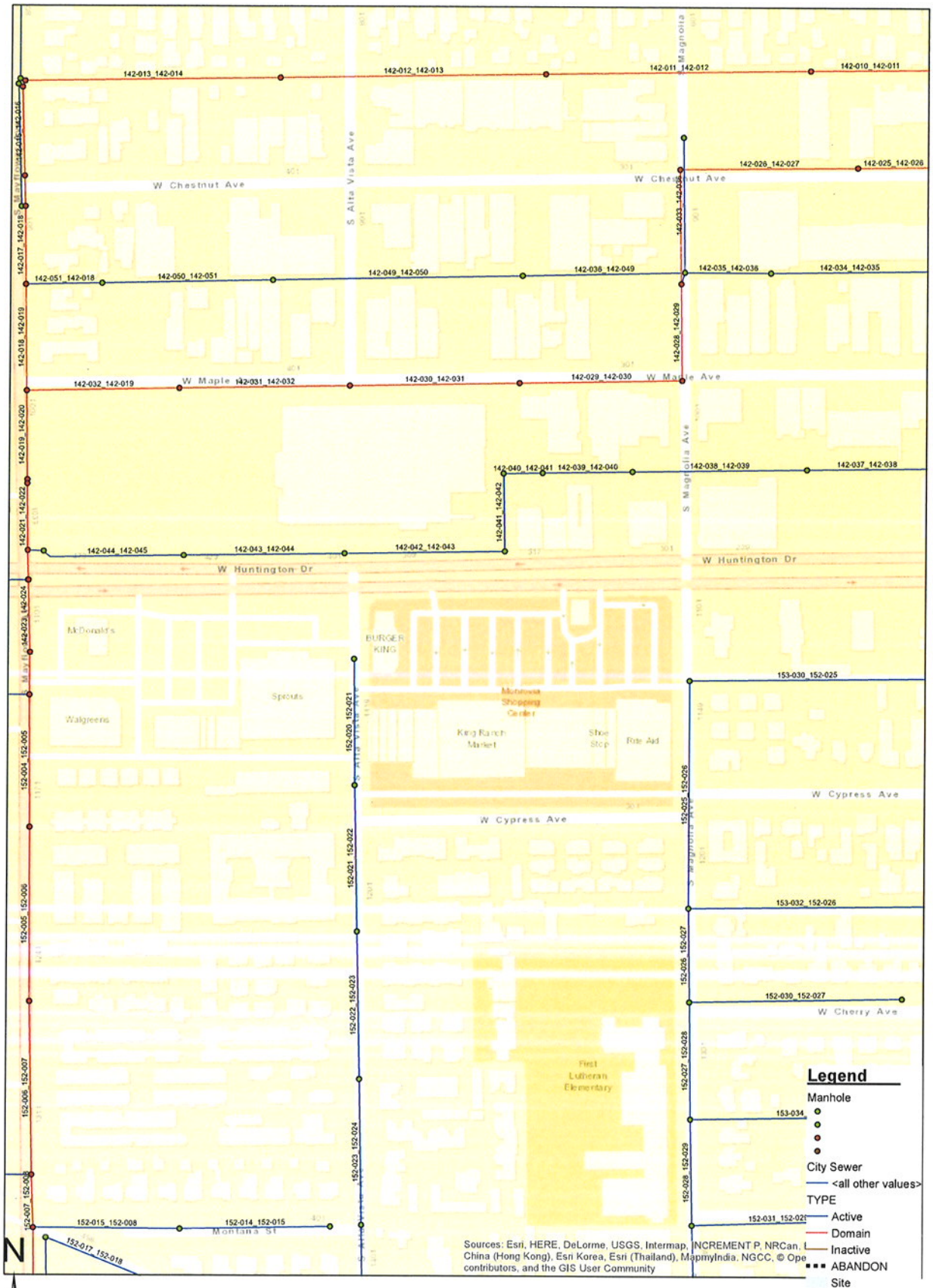
Appendix B

Impacted City Sewer Locations

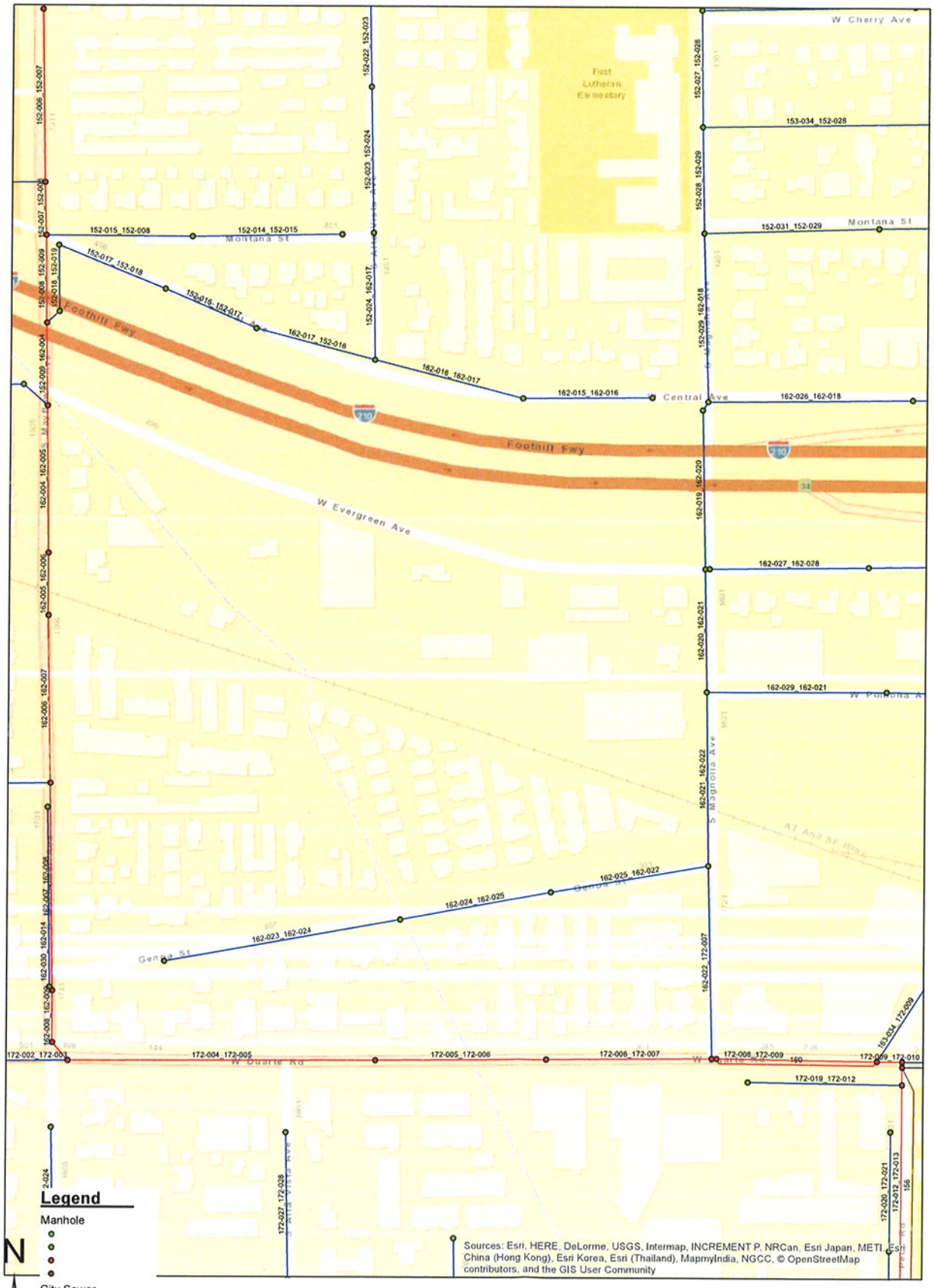
Avalon Bay Sewer Analysis Exhibit



Avalon Bay Sewer Analysis Exhibit



Avalon Bay Sewer Analysis Exhibit



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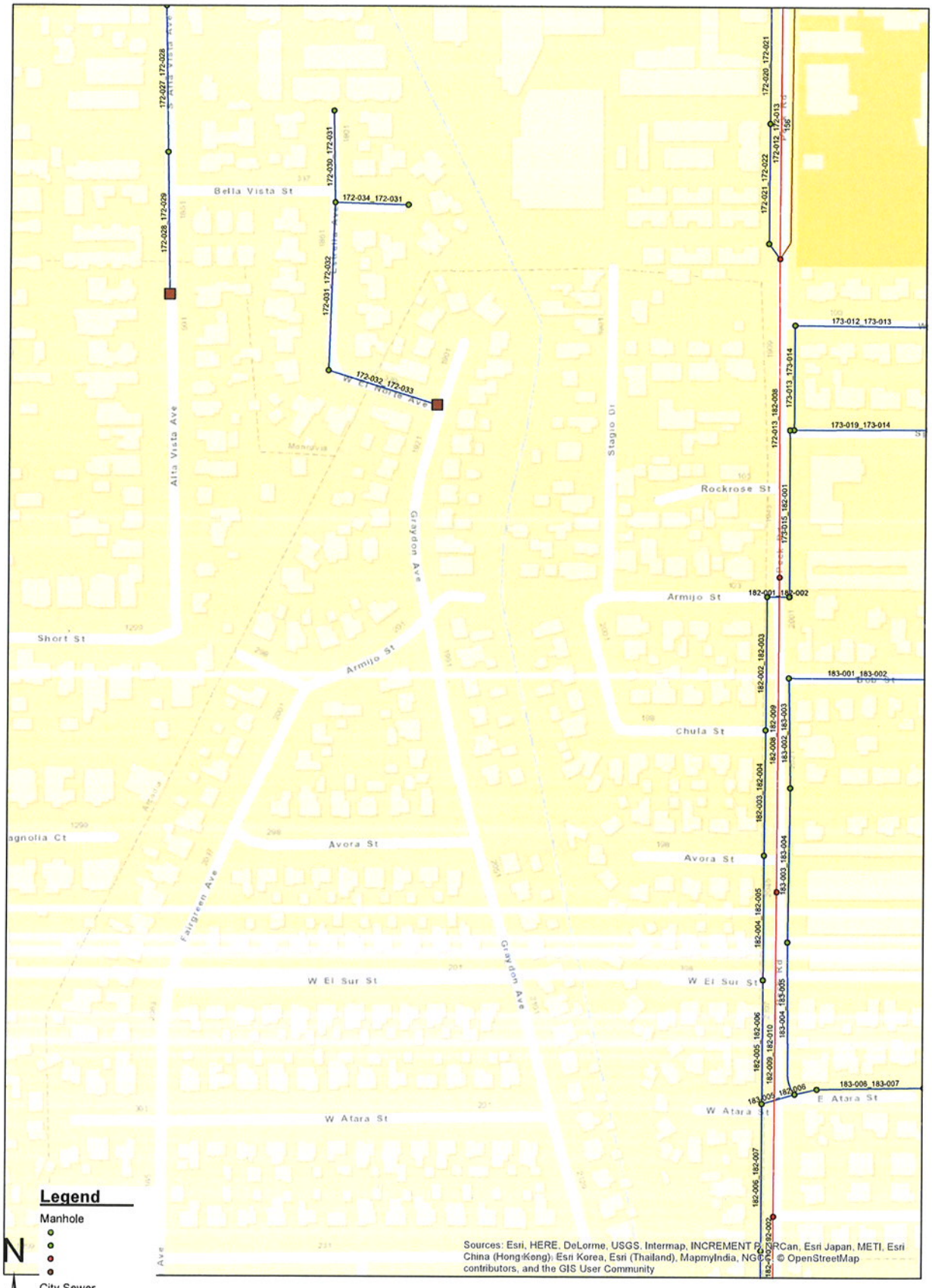

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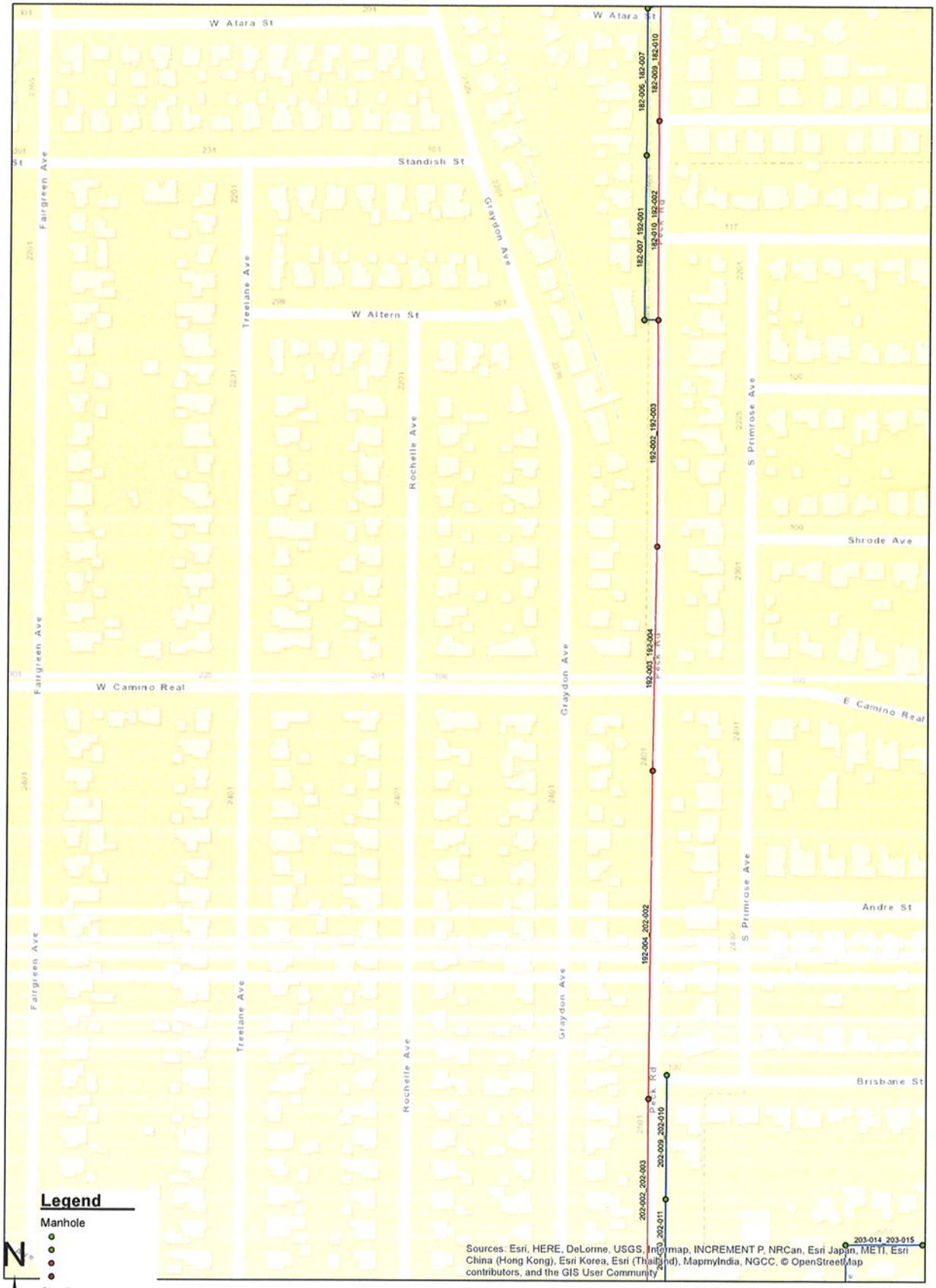

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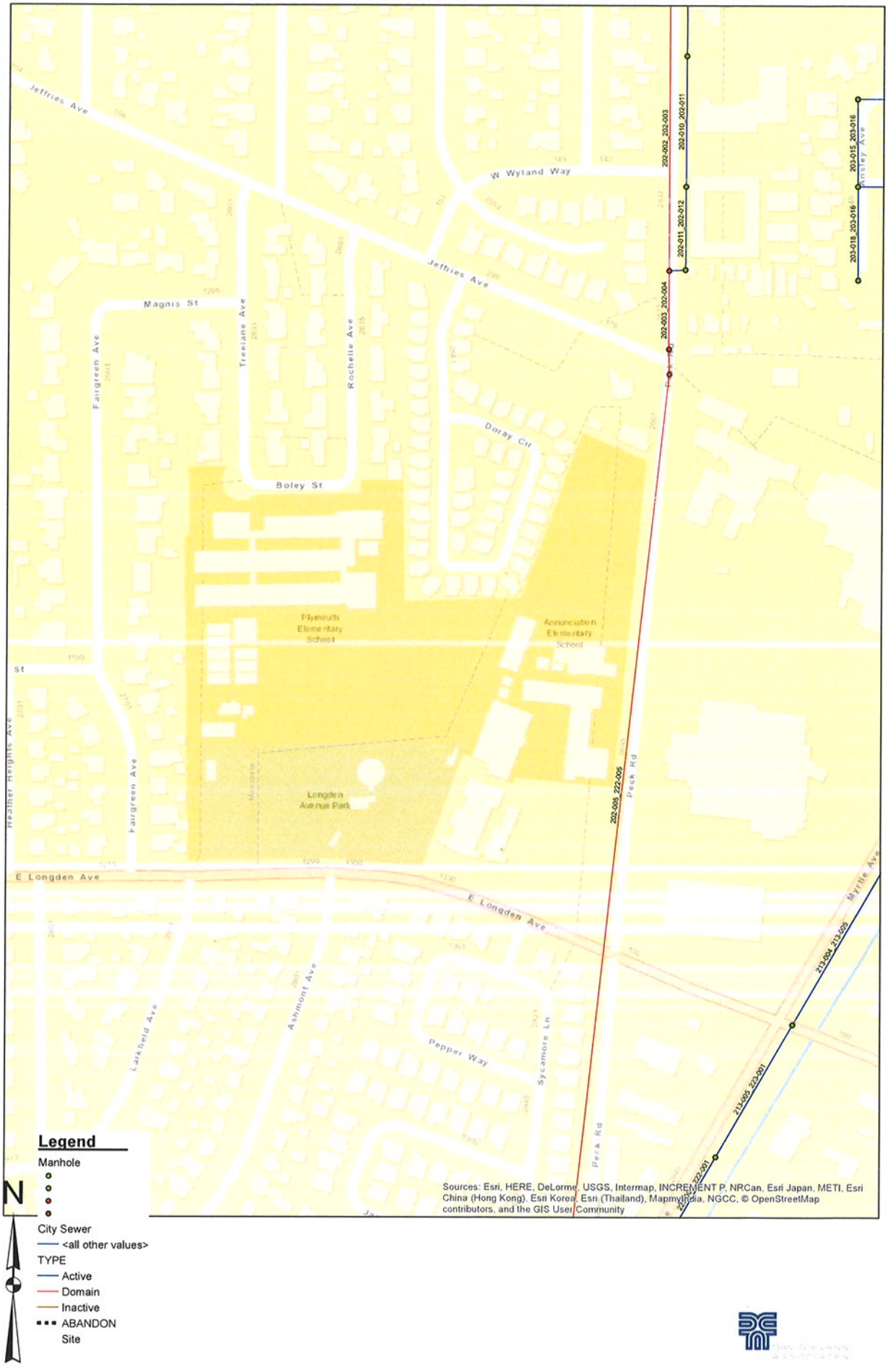

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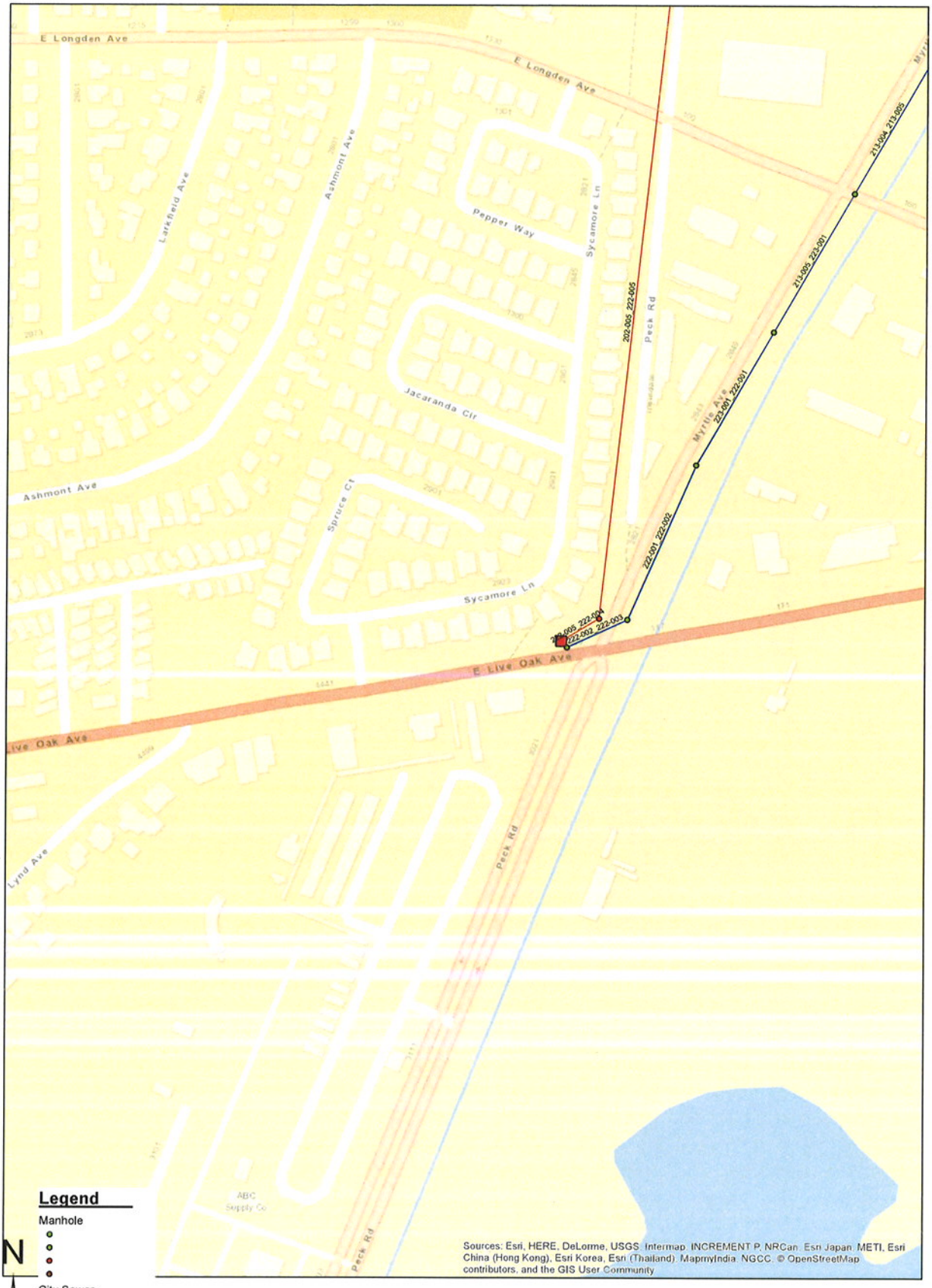

Appendix C

LACSD Unit Factors by

Occupancies and Land Use

Estimated Average Daily Sewage Flows for Various Occupancies

Occupancy	Abbreviation	*Average daily flow	
Apartment Buildings:			
Bachelor or Single dwelling units	Apt	100	gal/D.U.
1 bedroom dwelling units	Apt	150	gal/D.U.
2 bedroom dwelling units	Apt	200	gal/D.U.
3 bedroom or more dwelling units	Apt	250	gal/D.U.
Auditoriums, churches, etc.	Aud	5	gal/seat
Automobile parking	P	25	gal/1000 sq ft gross floor area
Bars, cocktails lounges, etc.	Bar	20	gal/seat
Commercial Shops & Stores	CS	100	gal/1000 sq ft gross floor area
Hospitals (surgical)	HS	500	gal/bed
Hospitals (convalescent)	HC	85	gal/bed
Hotels	H	150	gal/room
Medical Buildings	MB	300	gal/1000 sq ft gross floor area
Motels	M	150	gal/unit
Office Buildings	Off	200	gal/1000 sq ft gross floor area
Restaurants, cafeterias, etc.	R	50	gal/seat
Schools:			
Elementary or Jr. High	S	10	gal/student
High Schools	HS	15	gal/student
Universities or Colleges	U	20	gal/student
College Dormitories	CD	85	gal/student

*Multiply the average daily flow by 2.5 to obtain the peak flow

Zoning Coefficients

Zone	Coefficient (cfs/Acre)
Agriculture	**0.001**
Residential+:	
R-1	**0.004**
R-2	**0.008**
R-3	**0.012**
R-4	**0.016***
Commercial:	
C-1 through C-4	**0.015***
Heavy Industrial:	
M1 through M-4	**0.021***

***Individual building, commercial or industrial plant capacities shall be the determining factor when they exceed the coefficients shown**

+ Use 0.001 (cfs/unit) for condominiums only

TABLE 1

LOADINGS FOR EACH CLASS OF LAND USE

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons Per Day)	COD (Pounds Per Day)	SUSPENDED SOLIDS (Pounds Per Day)
RESIDENTIAL				
Single Family Home	Parcel	260	1.22	0.59
Duplex	Parcel	312	1.46	0.70
Triplex	Parcel	468	2.19	1.05
Fourplex	Parcel	624	2.92	1.40
Condominiums	Parcel	195	0.92	0.44
Single Family Home (reduced rate)	Parcel	156	0.73	0.35
Five Units or More	No. of Dwlg. Units	156	0.73	0.35
Mobile Home Parks	No. of Spaces	156	0.73	0.35
COMMERCIAL				
Hotel/Motel/Rooming House	Room	125	0.54	0.28
Store	1000 ft^2	100	0.43	0.23
Supermarket	1000 ft^2	150	2.00	1.00
Shopping Center	1000 ft^2	325	3.00	1.17
Regional Mall	1000 ft^2	150	2.10	0.77
Office Building	1000 ft^2	200	0.86	0.45
Professional Building	1000 ft^2	300	1.29	0.68
Restaurant	1000 ft^2	1,000	16.68	5.00
Indoor Theatre	1000 ft^2	125	0.54	0.28
Car Wash				
Tunnel - No Recycling	1000 ft^2	3,700	15.86	8.33
Tunnel - Recycling	1000 ft^2	2,700	11.74	6.16
Wand	1000 ft^2	700	3.00	1.58
Financial Institution	1000 ft^2	100	0.43	0.23
Service Shop	1000 ft^2	100	0.43	0.23
Animal Kennels	1000 ft^2	100	0.43	0.23
Service Station	1000 ft^2	100	0.43	0.23
Auto Sales/Repair	1000 ft^2	100	0.43	0.23
Wholesale Outlet	1000 ft^2	100	0.43	0.23
Nursery/Greenhouse	1000 ft^2	25	0.11	0.06
Manufacturing	1000 ft^2	200	1.86	0.70
Dry Manufacturing	1000 ft^2	25	0.23	0.09
Lumber Yard	1000 ft^2	25	0.23	0.09
Warehousing	1000 ft^2	25	0.23	0.09
Open Storage	1000 ft^2	25	0.23	0.09
Drive-in Theatre	1000 ft^2	20	0.09	0.05

TABLE 1
(continued)
LOADINGS FOR EACH CLASS OF LAND USE

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons Per Day)	COD (Pounds Per Day)	SUSPENDED SOLIDS (Pounds Per Day)
COMMERCIAL				
Night Club	1000 ft^2	350	1.50	0.79
Bowling/Skating	1000 ft^2	150	1.76	0.55
Club	1000 ft^2	125	0.54	0.27
Auditorium, Amusement	1000 ft^2	350	1.50	0.79
Golf Course, Camp, and Park (Structures and Improvements	1000 ft^2	100	0.43	0.23
Recreational Vehicle Park	No. of Spaces	55	0.34	0.14
Convalescent Home	Bed	125	0.54	0.28
Laundry	1000 ft^2	3,825	16.40	8.61
Mortuary/Cemetery	1000 ft^2	100	1.33	0.67
Health Spa, Gymnasium				
With Showers	1000 ft^2	600	2.58	1.35
Without Showers	1000 ft^2	300	1.29	0.68
Convention Center, Fairground, Racetrack, Sports Stadium/Arena	Average Daily Attendance	10	0.04	0.02
INSTITUTIONAL				
College/University	Student	20	0.09	0.05
Private School	1000 ft^2	200	0.86	0.45
Church	1000 ft^2	50	0.21	0.11

Appendix D

Capacity Analysis Results

Pipe ID	U/S MH ID	D/S MH ID	Size (inch)	Length (ft)	Slope (ft/ft)	Existing Peak Flow in Model (mgd)	Existing Maximum d/D	Proposed Peak Flow in Model (mgd)	Proposed Maximum d/D	d/D Criteria	Remark
133-005_143-025	133-005	143-025	10	211	0.0157	0.259	0.28	0.259	0.28	0.5	PASS
143-025_142-009	143-025	142-009	10	536	0.0131	0.116	0.19	0.000	0.00	0.5	ABANDONED
142-009_142-010	142-009	142-010	10	264	0.0133	0.121	0.20	0.065	0.15	0.5	PASS
142-010_142-011	142-010	142-011	10	265	0.0139	0.127	0.20	0.071	0.15	0.5	PASS
142-011_142-012	142-011	142-012	10	530	0.0197	0.132	0.19	0.077	0.14	0.5	PASS
142-012_142-013	142-012	142-013	10	531	0.0153	0.142	0.21	0.088	0.16	0.5	PASS
142-013_142-014	142-013	142-014	10	510	0.0153	0.153	0.21	0.098	0.17	0.5	PASS
142-014_142-015	142-014	142-015	10	13	0.0746	0.156	0.15	0.102	0.12	0.5	PASS
142-015_142-016	142-015	142-016	10	179	0.0159	0.157	0.21	0.103	0.17	0.5	PASS
142-016_142-017	142-016	142-017	12	61	0.0489	0.159	0.13	0.105	0.11	0.5	PASS
142-017_142-018	142-017	142-018	24	157	0.0184	1.485	0.20	1.428	0.19	0.75	PASS
142-018_142-019	142-018	142-019	24	213	0.018	1.509	0.20	1.452	0.20	0.75	PASS
142-019_142-020	142-019	142-020	24	179	0.0185	1.742	0.21	1.827	0.22	0.75	PASS
142-020_142-021	142-020	142-021	24	8	0.115	1.743	0.14	1.828	0.14	0.75	PASS
142-021_142-022	142-021	142-022	24	134	0.0169	1.744	0.22	1.829	0.22	0.75	PASS
142-022_142-023	142-022	142-023	24	60	0.0695	1.787	0.16	1.873	0.16	0.75	PASS
142-023_142-024	142-023	142-024	24	145	0.0128	2.044	0.26	2.130	0.26	0.75	PASS
142-024_152-004	142-024	152-004	24	86	0.0155	2.046	0.24	2.132	0.25	0.75	PASS
152-004_152-005	152-004	152-005	24	266	0.0072	2.087	0.30	2.173	0.30	0.75	PASS
152-005_152-006	152-005	152-006	24	350	0.015	2.104	0.25	2.189	0.25	0.75	PASS
152-006_152-007	152-006	152-007	24	348	0.0155	2.121	0.25	2.207	0.25	0.75	PASS
152-007_152-008	152-007	152-008	24	106	0.0104	2.146	0.28	2.232	0.28	0.75	PASS
152-008_152-009	152-008	152-009	24	176	0.0097	2.154	0.28	2.240	0.29	0.75	PASS
152-009_162-004	152-009	162-004	24	166	0.0104	2.248	0.28	2.334	0.29	0.75	PASS
162-004_162-005	162-004	162-005	24	296	0.0074	2.791	0.34	2.877	0.35	0.75	PASS
162-005_162-006	162-005	162-006	24	125	0.01	2.798	0.32	2.884	0.32	0.75	PASS
162-006_162-007	162-006	162-007	24	337	0.0064	2.810	0.36	2.895	0.37	0.75	PASS
162-007_162-008	162-007	162-008	24	416	0.0077	2.857	0.34	2.943	0.35	0.75	PASS
162-008_162-009	162-008	162-009	24	104	0.0093	2.872	0.33	2.957	0.33	0.75	PASS
162-009_172-004	162-009	172-004	24	47	0.0023	2.872	0.48	2.958	0.49	0.75	PASS
172-004_172-005	172-004	172-005	24	614	0.0032	3.658	0.51	3.743	0.51	0.75	PASS
172-005_172-006	172-005	172-006	24	342	0.0022	3.667	0.57	3.752	0.58	0.75	PASS
172-006_172-007	172-006	172-007	24	332	0.0021	3.679	0.58	3.764	0.58	0.75	PASS
172-007_172-008	172-007	172-008	24	10	0.007	3.989	0.42	4.075	0.43	0.75	PASS
160	172-008	172-009	18	308	0.0019	1.710	0.60	1.744	0.61	0.75	PASS
172-009_172-010	172-009	172-010	24	51	0.0069	4.017	0.43	4.103	0.43	0.75	PASS
172-010_172-011	172-010	172-011	24	11	0.0091	4.294	0.41	4.381	0.42	0.75	PASS
172-011_172-012	172-011	172-012	24	35	0.0043	6.286	0.65	6.372	0.66	0.75	PASS
172-012_172-013	172-012	172-013	24	605	0.0045	6.295	0.64	6.382	0.64	0.75	PASS
172-013_182-008	172-013	182-008	24	639	0.0168	6.324	0.43	6.410	0.43	0.75	PASS
182-008_182-009	182-008	182-009	24	632	0.0068	6.328	0.56	6.414	0.56	0.75	PASS
182-009_182-010	182-009	182-010	24	651	0.0115	6.331	0.48	6.417	0.48	0.75	PASS
182-010_192-002	182-010	192-002	24	398	0.0166	6.335	0.43	6.422	0.44	0.75	PASS
192-002_192-003	192-002	192-003	24	453	0.0074	6.446	0.55	6.532	0.56	0.75	PASS
192-003_192-004	192-003	192-004	24	449	0.0072	6.446	0.56	6.532	0.56	0.75	PASS
192-004_202-002	192-004	202-002	24	656	0.0087	6.446	0.53	6.532	0.53	0.75	PASS
202-002_202-003	202-002	202-003	24	652	0.0074	6.446	0.55	6.532	0.56	0.75	PASS
202-003_202-004	202-003	202-004	24	165	0.0076	6.446	0.55	6.532	0.55	0.75	PASS
202-004_202-005	202-004	202-005	24	53	0.0079	6.447	0.54	6.533	0.55	0.75	PASS
202-005_222-005	202-005	222-005	24	2,235	0.0071	6.448	0.56	6.535	0.56	0.75	PASS
222-005_222-004	222-005	222-004	24	88	0.0091	6.448	0.52	6.535	0.52	0.75	PASS
172-008_172-009	172-008	172-009	24	308	0.0019	2.282	0.45	2.334	0.45	0.75	PASS
143-025_143-026	143-025	143-026	12	190	0.0206	0.163	0.16	0.279	0.21	0.5	PASS
143-026_143-027	143-026	143-027	12	313	0.0126	0.167	0.18	0.282	0.24	0.5	PASS
143-027_142-025	143-027	142-025	12	324	0.0128	0.172	0.19	0.314	0.25	0.5	PASS
142-025_142-026	142-025	142-026	12	336	0.0154	0.174	0.18	0.316	0.24	0.5	PASS
142-026_142-027	142-026	142-027	12	356	0.016	0.177	0.18	0.319	0.24	0.5	PASS
142-027_142-028	142-027	142-028	12	230	0.0172	0.178	0.18	0.320	0.24	0.5	PASS
142-028_142-029	142-028	142-029	12	194	0.0201	0.216	0.19	0.359	0.24	0.5	PASS
142-029_142-030	142-029	142-030	12	325	0.018	0.218	0.19	0.360	0.25	0.5	PASS
142-030_142-031	142-030	142-031	12	340	0.0175	0.220	0.20	0.363	0.25	0.5	PASS
142-031_142-032	142-031	142-032	12	340	0.0177	0.226	0.20	0.368	0.25	0.5	PASS
142-032_142-019	142-032	142-019	12	305	0.0182	0.231	0.20	0.373	0.25	0.5	PASS
143-024_143-025	143-024	143-025	6	598	0.018	0.017	0.14	0.017	0.14	0.5	PASS