

## TECHNICAL MEMORANDUM

TO: Brad Shirhall, TLA Engineering & Planning, Inc.  
PREPARED BY: Dylan Merlo, Woodard & Curran  
REVIEWED BY: Chris van Lienden, PE, Woodard & Curran  
DATE: December 8, 2021  
RE: Shea Center Apartments Sewer Capacity Evaluation



### 1. BACKGROUND

Woodard & Curran was asked to analyze the impacts of the proposed Shea Center Apartments development on the City of Roseville's sewer system. The location of the proposed site is shown in Figure 1. The proposed development includes 360 dwelling units spanning 19.5 acres in Roseville on previously undeveloped land. The development would discharge sewer flows into City-owned sewers on Gibson Drive and in undeveloped land to the northwest of the development. A conceptual site plan of the development is included in Appendix A.

Woodard & Curran performed modeling work using InfoWorks ICM software, which provides a fully-dynamic solution for modeling sanitary sewer systems. Woodard & Curran had previously migrated the Roseville sewer system model to Infoworks ICM in 2017. Pipeline information for all trunk sewers (pipes > 10-inches) were previously validated through review of record drawings while smaller diameter sewers were modeled based on pipe diameter and slope information in the City's GIS database. Recalibration was performed based on flow meter data collected during the 2015/2016 wet weather season, and future flows were estimated for 2050 and buildout land use conditions. Future flows previously assumed from the parcels were removed from the model and replaced with flow projections for the proposed development. Subsequently, the South Placer Wastewater Authority (SPWA) sewers were added to the City model.

The purpose of this TM is to document whether the updated sewer model predicts that City and SPWA sewers will have capacity for the proposed development.

### 2. MODEL RESULTS & CONCLUSIONS

Wastewater flow projections for the proposed development were estimated based on the Average Dry Weather Flow (ADWF) unit flow factor of 190 gallons per day per dwelling unit (gpd/DU), resulting in an ADWF of 68,400 gpd. The flows were divided up among the apartment units per the preliminary site plane as in Appendix A. Figure 1 summarizes the loading. For this analysis, a diurnal pattern was applied to the ADWF, as well as projected rainfall-dependent infiltration and inflow (RDI/I) based on the City's standard 10-year 24-hour design event. Modeled flows from the proposed development are summarized in Table 1.

**Table 1: Modeled Shea Center Apartments Sewer Loads**

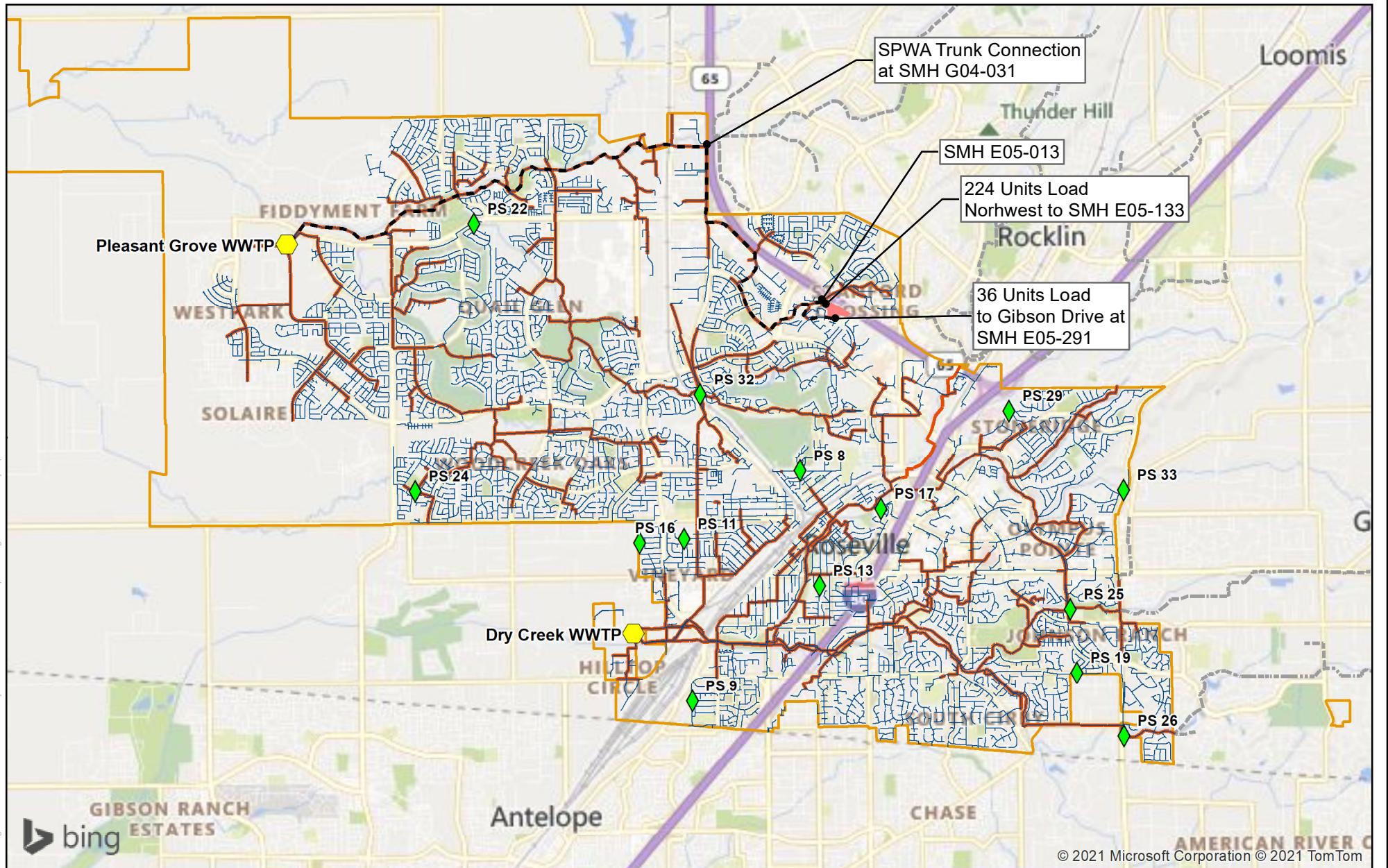
<b>Loading Manhole (Roseville Model/ SPWA Model)</b>	<b>Equivalent Dwelling Units (EDUs)</b>	<b>Average Dry Weather Flow (gpd)</b>	<b>Peak Wet Weather Flow (mgd)</b>
SMH E05-133	224	61,560	0.116
SMH E05-291	36	6,840	0.0129
<b>Total:</b>	<b>360</b>	<b>68,400</b>	<b>0.129</b>

For this evaluation, simulations representing peak wet weather flow under buildout land use conditions have been performed. A profile indicating model results under buildout conditions with the development are indicated in Figures 2 and 3 for loading manholes SMH E05-133 and SMH E05-291, respectively. Note that sewers downstream of the loading manholes connect at manhole SMH E05-013. Figure 4 shows the model results downstream of manhole SMH E05-013 to the SPWA trunk connection at SMH G04-031. Figure 5 shows the SPWA trunk downstream from SMH G04-031 to the Pleasant Grove Wastewater Treatment Plant. Model results indicating d/D performance for each pipe segment for all scenarios is included in Appendix B.

City of Roseville design standards specify that pipes 10-inch diameter or less should have maximum depth of flow under design conditions of 0.7 times the diameter ( $d/D < 0.7$ ). Pipes larger than 10-inches should have a  $d/D < 1.0$ . As indicated in the Figures and Appendix B, the model predicts all sewers downstream of the proposed development would have a  $d/D < 1.0$  or a  $d/D < 0.7$  where pipe diameters are 10-inches or less.

SPWA design standards from the Systems Evaluation indicate that surcharging up to within 5 feet of the manhole rims (ground surface) is considered acceptable under 10-year design storm PWWF, as long as the surcharge (flow height in the manhole) does not exceed 4 feet from the top of the pipe up the manhole. As indicated in the Figures and Appendix B, the model predicts no surcharging in the SPWA trunk downstream of the proposed development ( $d/D < 1.0$  for all downstream sewers).

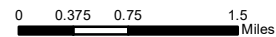
Figure Exported: 12/29/2021 12:00:00 PM By: dmerio Using: \\woodardcurran.net\shared\Projects\0012128\_00\_Shea Properties Mgmt- Sewer Study\wp\GIS\SiteOverview.mxd



**Figure 1**  
**Proposed**  
**Development Location**

**Legend**

- ◆ Modeled Pump Station
- ⬡ WWTP
- Pipes Downstream of Development
- Sewer
- Sewer Trunk Network
- SPWA Trunk (Outside Roseville)
- Shea Estates Development
- Roseville City Boundary



Project #: 0012128  
 Map Created: December 2021

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions. Any reliance upon the map or data contained herein shall be at the users' sole risk.

Figure 2 –Hydraulic Profile (SMH E05-133 to SMH E05-013)

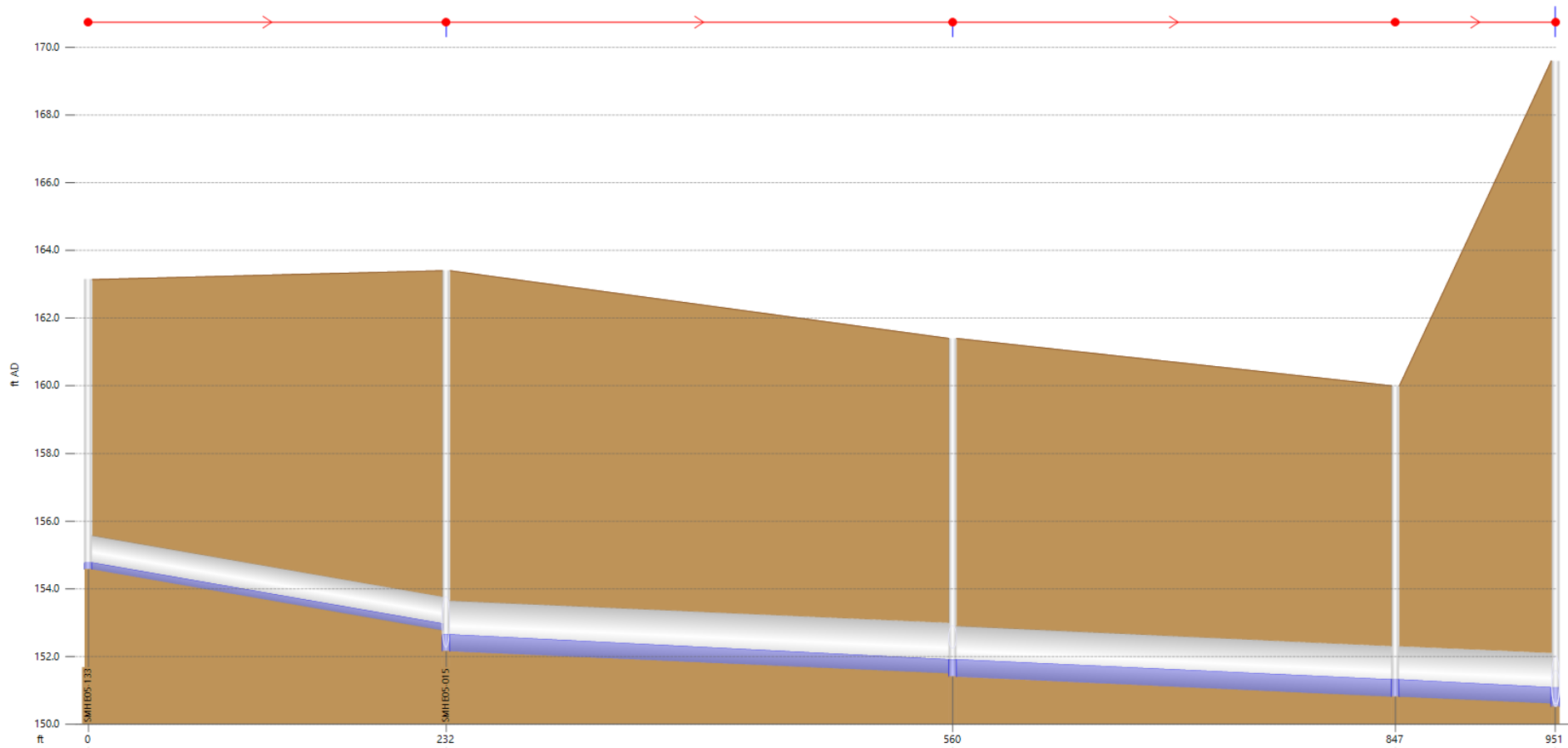


Figure 3 –Hydraulic Profile (from SMH E05-291 to SMH E05-013)

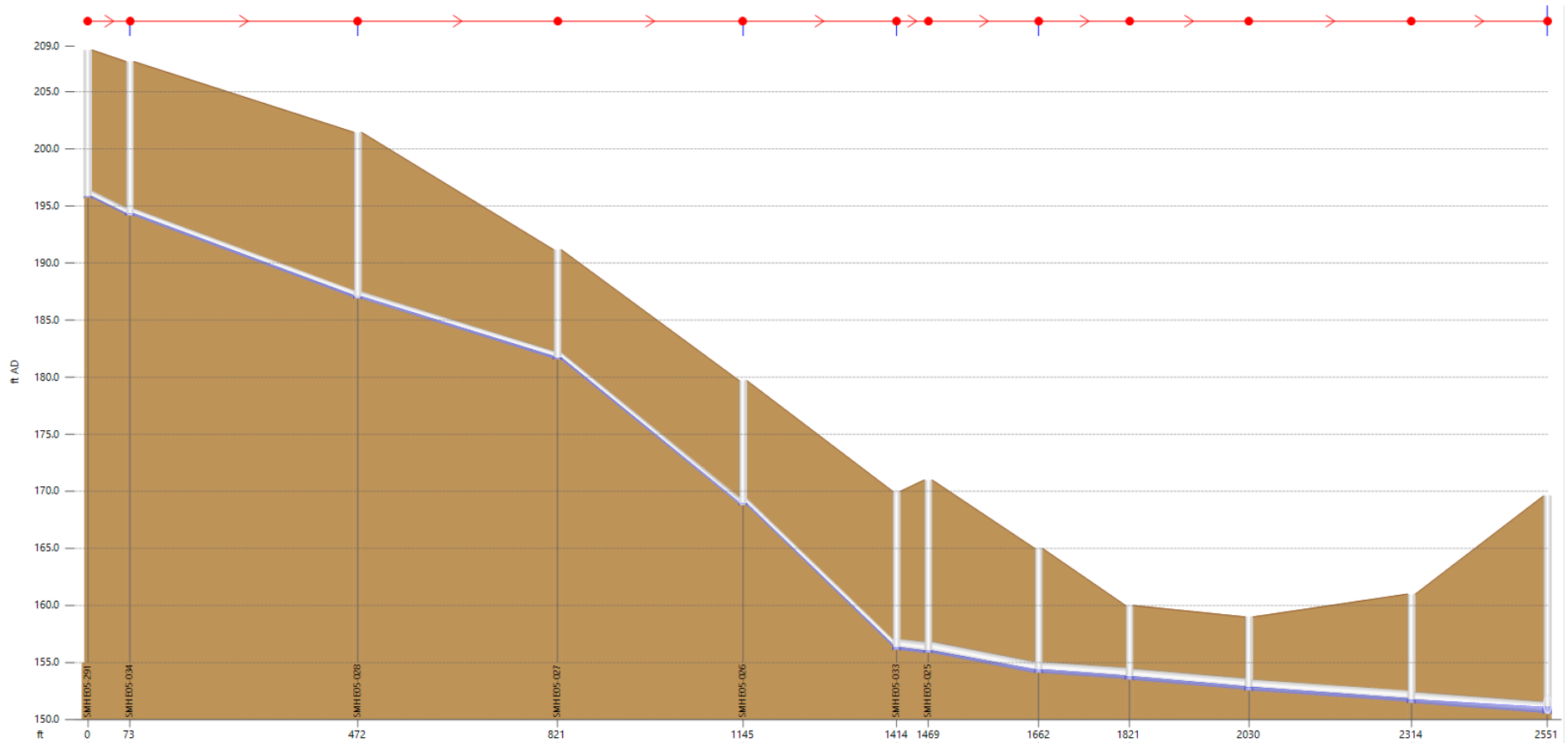


Figure 4 –Hydraulic Profile (from SMH E05-013 to SMH G04-031)

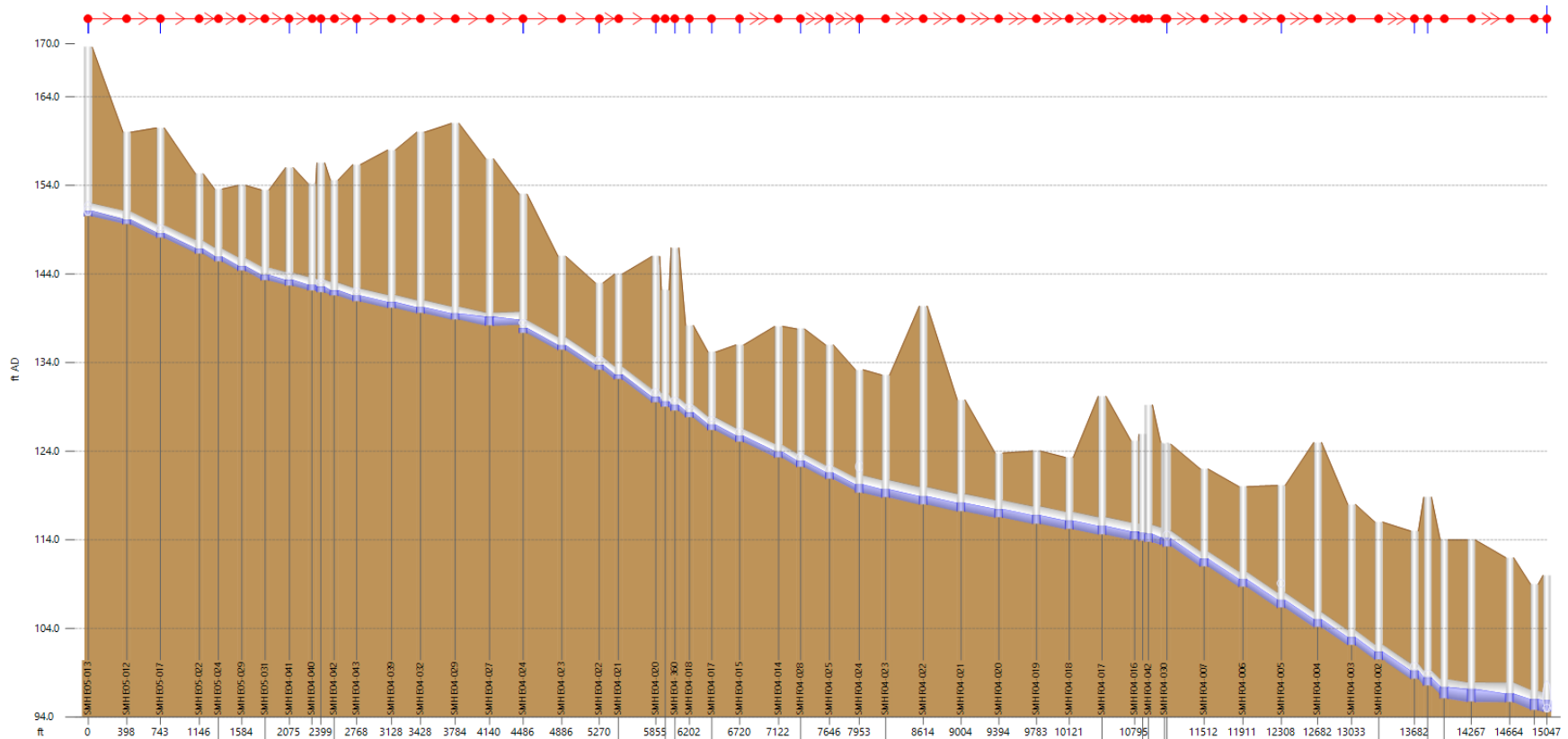
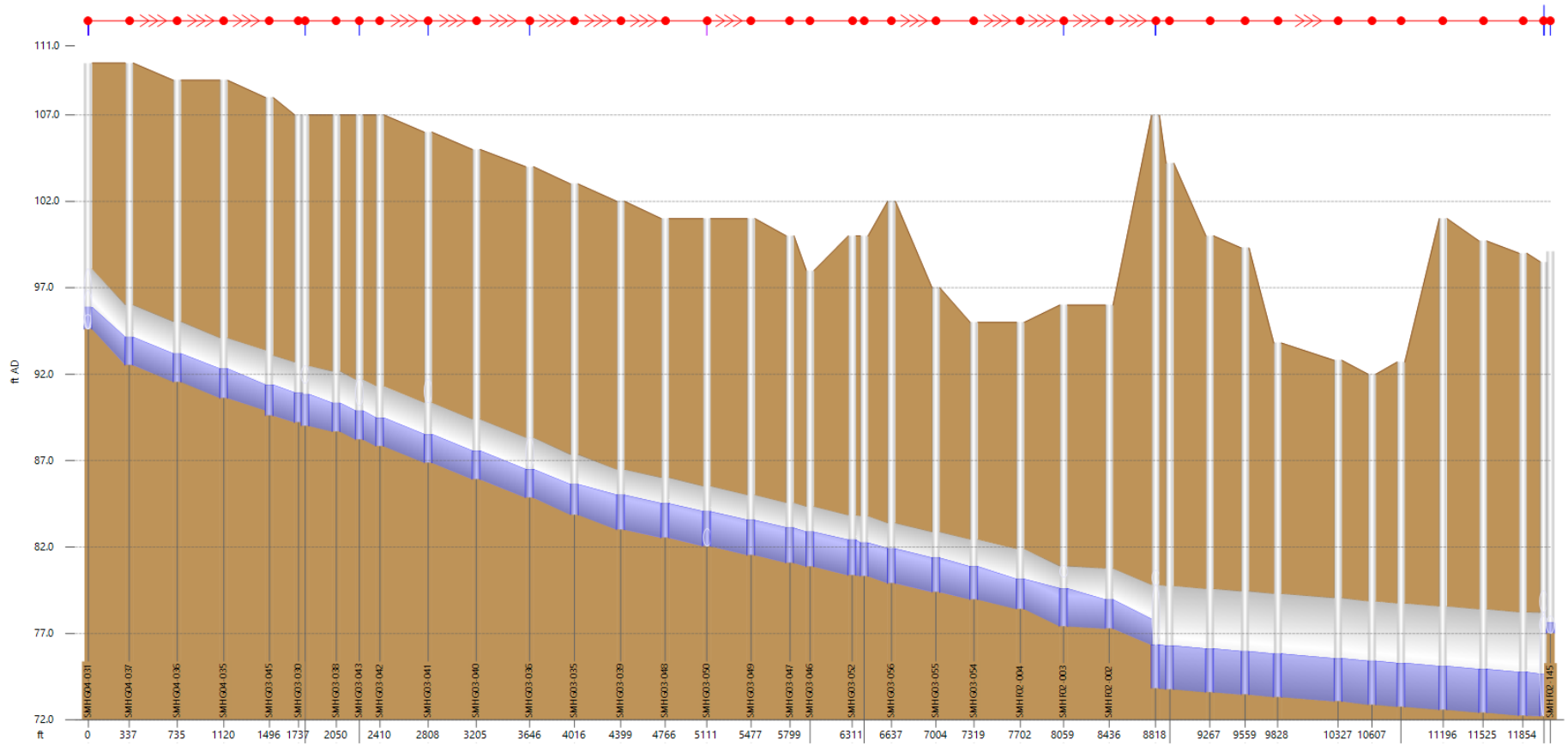
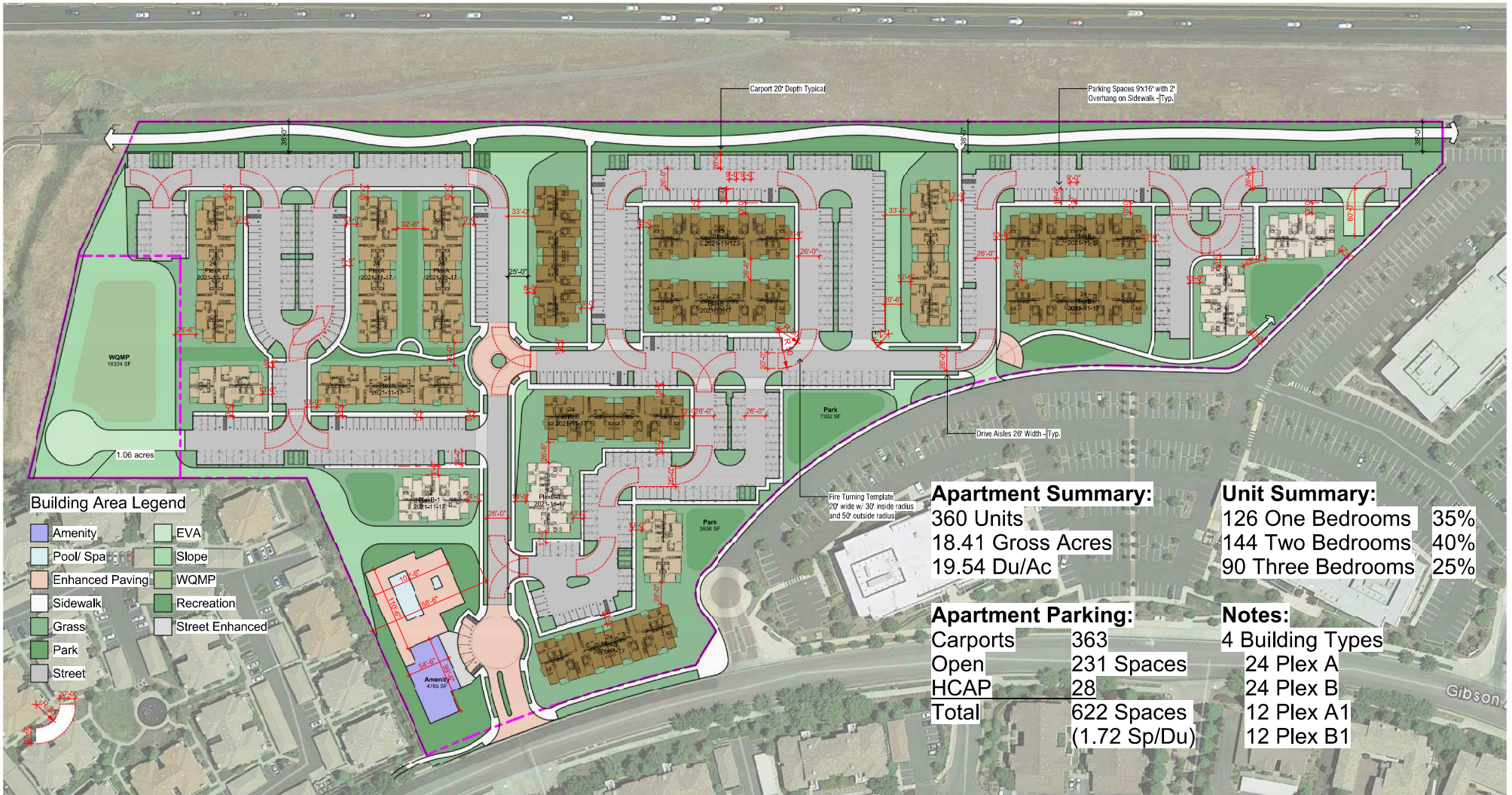


Figure 5 –Hydraulic Profile (from SMH G04-031 to Pleasant Grove WWTP)



## APPENDIX A – CONCEPTUAL SITE PLAN OF PROPOSED DEVELOPMENT



**Building Area Legend**

- Amenity
- EVA
- Pool/ Spa
- Slope
- Enhanced Paving
- WQMP
- Sidewalk
- Recreation
- Grass
- Street Enhanced
- Park
- Street

**Apartment Summary:**

360 Units  
 18.41 Gross Acres  
 19.54 Du/Ac

**Unit Summary:**

126 One Bedrooms	35%
144 Two Bedrooms	40%
90 Three Bedrooms	25%

**Apartment Parking:**

Carpports	363
Open	231 Spaces
HCAP	28
<b>Total</b>	<b>622 Spaces</b>
	<b>(1.72 Sp/Du)</b>

**Notes:**

4 Building Types  
 24 Plex A  
 24 Plex B  
 12 Plex A1  
 12 Plex B1

1 1ST STORY - SITE PLAN  
 1" = 60'-0"

## APPENDIX B – MODEL RESULTS

### Model Results

From MH ID	To MH ID	Pipe Diameter (in)	Pipe Length (ft)	Pipe Slope (%)	Pipe Load: d/D (1 indicates backwater surcharge, 2 indicates insufficient pipe capacity)
SMH E05-291	SMH E05-034	8	73	2	0.13
SMH E05-034	SMH E05-028	8	398.6	1.8	0.24
SMH E05-028	SMH E05-027	8	349.1	1.5	0.25
SMH E05-027	SMH E05-026	8	324.6	3.9	0.21
SMH E05-026	SMH E05-033	8	268.4	4.6	0.2
SMH E05-033	SMH E05-025	12	55.3	0.452	0.2
SMH E05-025	SMH E05-023	12	193	0.912	0.28
SMH E05-023	SMH E05-021	12	158.7	0.321	0.28
SMH E05-021	SMH E05-020	12	209.3	0.401	0.27
SMH E05-020	SMH E05-018	12	284	0.335	0.28
SMH E05-018	SMH E05-013	12	237.4	0.354	0.48
SMH E05-013	SMH E05-012	18	397.8	0.204	0.38
SMH E05-012	SMH E05-017	18	345.4	0.414	0.31
SMH E05-017	SMH E05-022	18	402.4	0.417	0.32
SMH E05-022	SMH E05-024	18	196.1	0.398	0.32
SMH E05-024	SMH E05-029	18	242.2	0.401	0.32
SMH E05-029	SMH E05-031	18	240.5	0.403	0.32
SMH E05-031	SMH E04-041	18	250.4	0.2	0.38
SMH E04-041	SMH E04-040	18	231.4	0.199	0.4
SMH E04-040	SMH E04-377	18	92.6	0.194	0.4
SMH E04-377	SMH E04-042	18	137.6	0.203	0.39
SMH E04-042	SMH E04-043	18	231.7	0.242	0.38
SMH E04-043	SMH E04-039	18	359.8	0.2	0.41
SMH E04-039	SMH E04-032	18	300	0.2	0.41
SMH E04-032	SMH E04-029	18	355.7	0.197	0.42
SMH E04-029	SMH E04-027	18	356.4	0.196	0.65
SMH E04-027	SMH E04-024	18	345.9	-0.029	0.65
SMH E04-024	SMH E04-023	18	399.5	0.483	0.35
SMH E04-023	SMH E04-022	18	384.4	0.583	0.36
SMH E04-022	SMH E04-021	18	199	0.538	0.36
SMH E04-021	SMH E04-020	18	386.1	0.661	0.35
SMH E04-020	SMH E04-019	18	96.9	0.403	0.4
SMH E04-019	SMH E04-360	18	100.4	0.428	0.39

From MH ID	To MH ID	Pipe Diameter (in)	Pipe Length (ft)	Pipe Slope (%)	Pipe Load: d/D (1 indicates backwater surcharge, 2 indicates insufficient pipe capacity)
SMH E04-360	SMH E04-018	18	150	0.433	0.39
SMH E04-018	SMH E04-017	18	230.3	0.59	0.36
SMH E04-017	SMH E04-015	18	287.8	0.42	0.4
SMH E04-015	SMH E04-014	18	401.4	0.419	0.42
SMH E04-014	SMH F04-028	18	227.2	0.423	0.42
SMH F04-028	SMH F04-025	18	297.5	0.42	0.44
SMH F04-025	SMH F04-024	18	306.5	0.421	0.44
SMH F04-024	SMH F04-023	24	273.8	0.197	0.44
SMH F04-023	SMH F04-022	24	387	0.202	0.44
SMH F04-022	SMH F04-021	24	390.5	0.2	0.46
SMH F04-021	SMH F04-020	24	389.8	0.18	0.46
SMH F04-020	SMH F04-019	24	388.4	0.18	0.46
SMH F04-019	SMH F04-018	24	338.2	0.18	0.46
SMH F04-018	SMH F04-017	24	337.8	0.178	0.46
SMH F04-017	SMH F04-016	24	336.8	0.181	0.46
SMH F04-016	SMH F04-015	24	81.3	0.172	0.45
SMH F04-015	SMH F04-042	24	60.5	0.182	0.44
SMH F04-042	SMH F04-030	24	165.3	0.181	0.44
SMH F04-030	SMH F04-029	24	25.8	0.929	0.45
SMH F04-029	SMH F04-007	21	383.7	0.605	0.47
SMH F04-007	SMH F04-006	21	399.4	0.576	0.47
SMH F04-006	SMH F04-005	21	396.9	0.595	0.48
SMH F04-005	SMH F04-004	21	373.6	0.586	0.48
SMH F04-004	SMH F04-003	21	350.9	0.578	0.48
SMH F04-003	SMH F04-002	21	281	0.584	0.49
SMH F04-002	SMH F04-001	21	367.9	0.582	0.49
SMH F04-001	SMH F04-120	21	135.1	0.577	0.49
SMH F04-120	SMH G04-041	21	169.3	0.579	0.49
SMH G04-041	SMH G04-040	27	281.4	0.128	0.63
SMH G04-040	SMH G04-039	27	396.1	0.005	0.63
SMH G04-039	SMH G04-038	27	254.5	0.326	0.49
SMH G04-038	SMH G04-031	27	129.3	0.131	0.56
SMH G04-031	SMH G04-037	42	337.2	0.617	0.46
SMH G04-037	SMH G04-036	42	397.9	0.244	0.46
SMH G04-036	SMH G04-035	42	384.6	0.244	0.48

From MH ID	To MH ID	Pipe Diameter (in)	Pipe Length (ft)	Pipe Slope (%)	Pipe Load: d/D (1 indicates backwater surcharge, 2 indicates insufficient pipe capacity)
SMH G04-035	SMH G03-045	42	376.8	0.188	0.48
SMH G03-045	SMH G03-030	42	240.1	0.162	0.51
SMH G03-030	SMH G03-044	42	55.5	0.378	0.52
SMH G03-044	SMH G03-038	42	257.4	0.124	0.52
SMH G03-038	SMH G03-043	42	190.2	0.247	0.47
SMH G03-043	SMH G03-042	42	170.1	0.223	0.47
SMH G03-042	SMH G03-041	42	398	0.241	0.47
SMH G03-041	SMH G03-040	42	397.7	0.241	0.47
SMH G03-040	SMH G03-036	42	440.8	0.24	0.47
SMH G03-036	SMH G03-035	42	369.9	0.268	0.5
SMH G03-035	SMH G03-039	42	383	0.225	0.57
SMH G03-039	SMH G03-048	42	366.8	0.128	0.57
SMH G03-048	SMH G03-050	42	345.1	0.142	0.58
SMH G03-050	SMH G03-049	42	365.8	0.139	0.58
SMH G03-049	SMH G03-047	42	321.8	0.14	0.58
SMH G03-047	SMH G03-046	42	166.1	0.132	0.57
SMH G03-046	SMH G03-052	42	346.7	0.144	0.58
SMH G03-052	SMH G03-051	42	100	0.05	0.58
SMH G03-051	SMH G03-056	42	225.7	0.182	0.57
SMH G03-056	SMH G03-055	42	366.8	0.139	0.57
SMH G03-055	SMH G03-054	42	314.6	0.137	0.56
SMH G03-054	SMH F02-004	42	383.5	0.143	0.54
SMH F02-004	SMH F02-003	42	356.9	0.28	0.63
SMH F02-003	SMH F02-002	42	377	0.034	0.62
SMH F02-002	SMH F02-055	42	382.2	0.249	0.48
SMH F02-055	SMH F02-056	72	119.7	0.05	0.42
SMH F02-056	SMH F02-057	72	328.8	0.052	0.42
SMH F02-057	SMH G02-001	72	292.3	0.048	0.42
SMH G02-001	SMH G02-002	72	268.7	0.052	0.42
SMH G02-002	SMH F02-058	72	499.6	0.05	0.41
SMH F02-058	SMH F02-059	72	279.8	0.068	0.42
SMH F02-059	SMH F02-060	72	239.6	0.05	0.42
SMH F02-060	SMH F02-061	72	349.3	0.049	0.42
SMH F02-061	SMH F02-062	72	329.3	0.052	0.42
SMH F02-062	SMH F02-063	72	328.7	0.052	0.42

From MH ID	To MH ID	Pipe Diameter (in)	Pipe Length (ft)	Pipe Slope (%)	Pipe Load: d/D (1 indicates backwater surcharge, 2 indicates insufficient pipe capacity)
SMH F02-063	SMH F02-049	72	175.4	0.017	0.42