City of Edgewood

Meridian Avenue Sewer LID No. 1
Evaluation of Oversizing Costs

June 17, 2014

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EVALUATION OF OVERSIZING COSTS

JUNE 17, 2014

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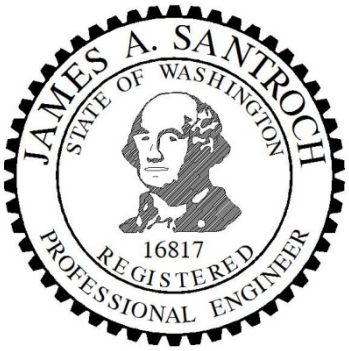
The engineering material and data contained in this report were prepared under the supervision and direction of the undersigned, whose seals as registered professional engineers are affixed below.



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City of Edgewood
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EXECUTIVE SUMMARY

The City of Edgewood incorporated in 1996 with on-site sewage disposal systems for sewage treatment. No general sewer plan was in place to provide for a future modern sewer collection system and point of treatment. In 2004, the City published its first General Sewer Plan (GSP). The 2004 GSP, which was revised in 2007, identified the area within the City of Edgewood where sewer service is to be provided. This area is referred to as the Edgewood Service Area.

A local improvement district, known as Meridian Avenue Sewer LID No. 1 (LID1), was formed after the GSP was adopted to install a sewer system for a portion of the Edgewood Service Area. These gravity sewers, pump stations and force mains serve an area referred to as the LID1 Service Area. Although this system provides current service for the LID1 Service Area, the facilities that were constructed were sized with a capacity to accommodate future flows when the entire Edgewood Service Area has been sewered.

After sewer construction for LID1 was completed, LID1 participants were issued assessments based on the total project cost. Some property owners within the LID protested their assessments, pointing out the system has the ability to accommodate the entire Edgewood Service Area, but that costs were borne only by those within the LID1 service area. Costs associated with building the larger facilities to accommodate future Edgewood Service Area flows (referred to in this report as oversizing costs) were not separately calculated as part of the project. Following a court order, the City requested a determination of the total project cost that was associated with oversizing the system to provide capacity for flows from the entire Edgewood Service Area instead of just of the LID1 Service Area.

DESIGN FLOWS

The first step in determining oversizing costs was to determine the peak sewage flows that would be expected at the three pump stations constructed in the LID1 Service Area if only the properties within that service area were contributing sewage. Table ES-1 compares the original project design flows at each pump station for the full Edgewood Service Area to the newly determined flows for the LID1 Service Area alone.

TABLE ES-1.
DESIGN FLOWS

	Edgewood Service Area		LID1 Service Area	
	million gallons/day	gallons/minute	million gallons/day	gallons/minute
Pump Station 1	3.684	2,558	1.934	1,343
Pump Station 2	3.296	2,289	1.578	1,096
Pump Station 3	1.713	1,190	0.745	517

SYSTEM DESIGN CHANGES

An analysis was performed to determine changes that could have been made to the LID1 sewer system to reduce facility size and construction costs while providing capacity for the design flows calculated for the LID1 Service Area alone. Key changes identified are as follows:

- Smaller pipe could have been used for 11,905 feet of gravity sewer, allowing reduced material costs. Some of this pipe would have had to be buried deeper to achieve required slopes, but the added cost for the deeper construction was not calculated.
- Pump Stations 1 and 2 could have been built with one 6-inch force main and one 8-inch force main, rather than the 6-inch and 12-inch force mains that were actually constructed.
- Pump Station 3 could have been built with one 6-inch force main, rather than the 6-inch and 8-inch force mains that were actually constructed.
- Pump Station 3 could have been sized for two pumps rather than three. This would allow a smaller wet well, valve vault and meter vault. Future work could be avoided by sizing the pumps for the full LID1 Service Area design flow. This would make these pumps larger than the pumps that actually were installed, because they were designed for a lower flow, with the assumption that they would be upgraded as needed in the future.

OPINION ON COSTS ASSOCIATED WITH OVERSIZING

The oversize project costs for construction are the difference in costs to construct the system that was actually installed versus the system that would have been sufficient to serve the LID1 Service Area only. Other assessed costs, beyond construction cost, include costs for project development, preliminary and final design, easement acquisition, permitting, formation of the LID and associated cost assessment, and financing. Design costs were affected by the design effort to calculate flows for areas outside the LID1 boundaries and evaluate how those flows would be delivered to the sewer system. Financing costs were affected by increased loan amounts, which resulted in added interest payments. No oversizing costs are attributable to the project development or the LID formation and assessment process.

As shown in Table ES-2, these costs are estimated to be about $805,687, which is 3.8 percent of the $21,238,268 total project cost.

TABLE ES-2.
OVERSIZING PROJECT COST SUMMARY

Gravity Sewers	$195,968
Force Mains	$308,505
Pump Stations	$74,550
Construction Oversizing Cost Subtotal	**$579,023**
Sales Tax @ 9.5%	*$55,007*
Total Construction Oversizing Cost	**$634,030**
Project Development	$0
Design/Easements/Permitting	$81,650
LID Formation and Assessment Process	$0
Financing	$90,007
Total Project Oversizing Cost	**$805,687**

CHAPTER 1.
INTRODUCTION

BACKGROUND

City of Edgewood Sewer Planning

The City of Edgewood incorporated in 1996 with on-site sewage disposal systems for sewage treatment. No general sewer plan was in place to provide for a future modern sewer collection system and point of treatment. In 2002, the City completed the first draft of a General Sewer Plan (GSP) to bring a modern sanitary sewer system to the City to allow property owners to fully utilize their properties under the new city's zoning and land use plan. The GSP focused on bringing sewers to the City's Meridian Corridor. A modern sanitary sewer system would promote economic development along the Meridian corridor by allowing the properties in the City's high density and business district zoning to develop to their "highest and best use" potential. In 2004, the City's first GSP was published and then revised in 2007. In 2006, the City established a Sewer Utility, anticipating the completion of the GSP. Three primary areas were identified for sewer service:

- The Phase 1 Core service area, which includes many of the commercial and multi-use zoned properties in the city. This area could begin connecting to the system beginning with the approval of the GSP.
- The Phase 2 service area, which is located around the periphery of the Phase 1 Core service area and includes mostly residentially zoned parcels. This area could begin connecting to the system in 2027, 20 years following the approval of the City's first GSP.
- The Phase 3 service area which is the remainder of the city limits and is mostly zoned residential. This area could begin connection to the system in 2057, 50 years following the approval of the City's first GSP.

The combined Phase 1 Core and Phase 2 service areas are referred to in this report as the Edgewood Service Area.

Meridian Avenue Sewer LID No. 1 Sewer Project

Following the adoption of the GSP by the City of Edgewood, a Local Improvement District was formed, known as Meridian Avenue Sewer LID No. 1 (referred to in this report as LID1) and was the beginning of a sewer system in the City of Edgewood. LID1 included most but not all of the Phase 1 Core area identified in the GSP (see Figure 1). The service area for LID1 is referred to in this report as the LID1 Service Area.

A sewer system was constructed within LID1, consisting of gravity sewers, pump stations and force mains. The gravity sewers and force mains were installed with capacity to convey the full level of sewage flow that will be generated in the Edgewood Service Area in the future, when the area is fully developed as allowed by zoning limits in place at the time of construction. The pump stations were sized to provide more capacity than required for the initial flows from development in place when the system began operation, but less capacity than will be required with the full development of the LID1 Service Area. Upgrades to the stations were planned in the future to handle the wide range of expected flows.

LID Assessment

After sewer construction for the LID1 was completed, LID1 participants were issued assessments based on the total project cost of $21,238,268. The costs that were included in the assessment were separated into five categories (see Appendix A) as follows:

- Project development (GSP preparation and grant and loan applications)—$86,645
- Design, easement acquisition and permitting—$4,029,385
- Construction (including administrative costs)—$13,496,493
- LID formation and assessment—$1,253,121
- Financing—$2,372,624

A few members of LID1 protested their assessments, pointing out that the system has the ability to accommodate the entire Edgewood Service Area, but that costs were borne only by those within the LID1 service area.

Following a court order, the City requested a determination of the total project cost that was associated with oversizing the system to provide capacity for flows from the entire Edgewood Service Area instead of just of the LID1 Service Area. The costs for building the larger facilities to accommodate future Edgewood Service Area flows were not separately calculated or tracked during the design and construction of the project. Therefore, the following approach was used to evaluate the costs to serve the LID1 Service Area only instead of the entire Edgewood Service Area.

APPROACH

The City hired BHC Consultants, LLC and Tetra Tech, Inc. (referred to in this report as “the Consultant”) to develop an opinion on the portion of project cost assessed to the LID that is associated with the oversizing. The analysis evaluated the five components of the costs included in the LID1 assessments. Most of the impact of the oversizing pertained to the construction costs, which represents about two-thirds of the total project cost. The Consultant’s analysis of the oversizing of the facilities and its development of an opinion of the construction oversizing costs were performed as follows:

- Determine the design flows (the flow expected with full development allowed by zoning) for the LID1 Service Area only.
- Determine the gravity sewer pipe sizes needed to collect flows from the LID1 Service Area only.
- Determine the size of the wet well, site piping, and pumps, as well as other miscellaneous equipment at Pump Stations 1, 2, and 3 needed to serve the LID1 Service Area only.
- Determine the force main pipe sizes needed to convey the flows from each pump station for the LID1 Service Area only.
- Develop an opinion of construction oversizing costs associated with the gravity sewers, force mains, and pump stations.

In developing the opinion of construction oversizing costs, actual construction cost information from the final pay estimates for the pipeline and pump station contracts was used where it was available. Since the oversizing costs were not specifically identified in the bid documents or tracked during construction, this information was not always available. In addition, the actual construction cost information may not have been sufficiently detailed to adequately determine some of the component costs that changed as a result of

the oversizing. Therefore, additional resources were utilized, including bid prices from similar projects, quotes from material supplies, and the Consultant's experience on similar project.

The opinion on the portion of cost associated with oversizing for the other components of the LID assessment was developed based on the portion calculated for construction cost and a qualitative analysis of the work included in those other components.

SUMMARY OF FINDINGS

The Consultant's findings, based on the approach described above, is that the portion of the $21,238,268 LID1 project costs associated with oversizing the system is about 3.8 percent of the total project cost.

CHAPTER 2.
DESIGN FLOW ANALYSIS

The analysis and calculations to determine design flows for the LID1 Service Area conformed to the GSP and the Washington Department of Ecology's 2008 *Criteria for Sewage Works Design* (referred to in this report as the "DOE Standards"). To determine the design flows for the LID1 Service Area, the Consultant removed the non-LID1 parcels from the original flow calculation spreadsheet. The zoning in place at the time of the original design was then used[1], along with an average population of 2.54 people per equivalent residential unit (as defined in the GSP), to determine the design flows for the LID1 Service Area. The zoning is summarized in Table 1. Details of the flow analysis are provided in Appendix B.

TABLE 1.
ZONING CRITERIA

Zoning	Population Density (equivalent residential units/acre)	Flow Factor[a]	Commercial Flow/Acre[b] (gallons/acre)
BP	0	1.0	3,000
C	8	0.5	3,000
MR-M	8	0.5	2,500
MUR	6	0.5	2,500
P	0	0.0	0
SF-H	5	1.0	0
SF-M	3	1.0	0
TC	10	0.5	3,000
TCO	16	0.5	3,000

a. Per the GSP, flows were adjusted on the basis that mixed use, commercial, and industrial areas are in use only during business hours.
b. Per the GSP

Average daily flows were computed based on the following:

- 100 gallons per capita per day for residential flows (per Table G2-2 in the DOE Standards (Design Basis for New Sewage Works). This factor includes allowances for normal infiltration)
- The gallons per acre in Table 1 for commercial flows.

Peak design flows were computed using a peaking factor of 3.5, which was determined from Figure C1-1 in the DOE Standards (Ratio of Peak Hourly Flow to Design Average Flow). This is the same approach that was used during the original design of the facilities for the entire Edgewood Service Area. Table 2

[1] Later zoning as discussed in the court decision provided for greater population densities that would may have resulted in higher LID1 costs than discussed in this report. The higher densities were not factored into this report's analysis of the oversizing costs.

compares the original design flows for the Edgewood Service Area and the design flows for the LID1 Service Area at each pump station that was constructed.

TABLE 2.
DESIGN FLOWS

	Edgewood Service Area			LID1 Service Area		
	Design Flows		Equivalent	Design Flows		Equivalent
	million gallons/day	gallons/minute	Residential Units Served	million gallons/day	gallons/minute	Residential Units Served
Pump Station 1	3.684	2,558	2,548	1.934	1,343	848
Pump Station 2	3.296	2,289	2,500	1.578	1,096	824
Pump Station 3	1.713	1,190	1,378	0.745	517	420

The City has contracted with Lakehaven Utility District to receive and treat these flows. The current contractual limit on these flows is 1.1 million gallons per day (mgd). As Table 2 shows, this contractual limit is less than the calculated design flows for the LID1 Service Area. For reasons described in Chapter 3, the design flows in Table 2 reflect flows that would result from the maximum allowable development of the area tributary to the sewer system under the zoning in place when the project was designed. This means that eventually, the City of Edgewood will need secure additional capacity from Lakehaven Utility District or others. The costs associated with that additional capacity would be borne by future connections to the system and was not included in the LID1 assessments.

CHAPTER 3.
CONVEYANCE SYSTEM DESIGN

Once the design flows were established, the Consultant determined the size of the facilities that would have been needed to convey the flows from the LID1 Service Area only. The Consultant used the same approach that was used to size the as-constructed facilities, only with the reduced flows for the LID1 Service Area. A copy of the design calculations is provided in Appendix C.

Per Section C1-3 of the DOE Standards, collection sewers must be designed for the maximum allowable development of the tributary areas. The sizing of trunk and interceptor sewers must consider economic factors (such as the comparative costs of staged construction), the effects of future construction on the neighborhood and streets, the potential for solids deposition, odor, and pipe corrosion that may occur during initial operation when flows are lower because the area is not fully developed, and the accuracy of the population and economic growth projections. Many of the trunk sewers extend along SR 161, and in order to avoid disturbing the state highway in the future, the system along this corridor was designed to accommodate the maximum development of the parcels it serves. This decision was reinforced by Washington State Department of Transportation's plans for extensive improvements to SR 161 shortly after the sewers were constructed.

GRAVITY SEWER CONVEYANCE SYSTEM

Evaluation Criteria

The flows identified in Table 2 were used to size the pump stations and the force mains. However, the design flows in the gravity sewer collection system, and hence the size the pipe, will depend on the number of properties that are directly connected to or upstream of each run of pipe. The Consultant assigned each property to the specific run of pipe to which it would be connected, then sized that run of pipe based on those flows and any upstream tributary flows. A run of pipe was determined to be any length of pipe between two manholes. The LID1 Service Area has less tributary area than the Edgewood Service Area. Therefore, the resultant flows are lower in each run of pipe, and the pipes in the gravity sewer collection system could have smaller diameters. The following criteria were used to size the pipe:

- For the gravity sewer collection facilities, changes were limited to the diameter and depths of the pipe. No changes were made to the alignment of the facilities.
- Per Section 1-4 of the DOE Standards, Manning's equation with a roughness coefficient (n) of 0.013 was used to compute the maximum capacity of each run of pipe at the designed slope versus the design flow for that run of pipe. This ratio had to be at least 1.0, or a larger diameter pipe was selected.
- Per Section C1-4.1 of the DOE Standards, the diameters of the gravity sewers were not allowed to be less than 8 inches.
- The depth of the pipe was only changed when a reduction in the pipe size required an increase in the pipe slope to avoid violating the minimum slope requirements for gravity sewers (See Table C1-1 of the DOE Standards (Minimum Slope of Sewers, by Size Assuming Full Flow)).

Total Length of Oversized Gravity Sewer

Table 3 summarizes the diameter and length of gravity sewer pipes that were oversized for the LID1 Service Area.

TABLE 3.
GRAVITY SEWER PIPE OVERSIZING SUMMARY

Edgewood Service Area Pipe Size (As-Built Size)	LID1 Service Area Pipe Size (Reduced Size)	Pipe Length (feet)
18-inch	10-inch	1,349
18-inch	12-inch	1,426
16-inch	12-inch	1,480
15-inch	8-inch	60
15-inch	10-inch	615
15-inch	12-inch	271
12-inch	8-inch	1,350
10-inch	8-inch	5,354
Total		**11,905**

Pipe Depth Considerations

If the smaller pipe sizes had been used, the depth of the pipe would have had to be increased to maintain minimum slopes at the following locations:

- Approximately 970 feet of 10-inch-diameter gravity sewer pipe was installed at slopes of 0.0030 to 0.0038 feet/foot along Meridian Avenue from 32nd Street (MH B27) to 29th Street East (MH B24). Adjusting the slope of this stretch of pipe to meet the minimum slope requirements for 8-inch-diameter pipe increased the depth of the pipe by 0.60 to 2.10 feet.
- Approximately 660 feet of pipe from MH B24 to MH B22 (approximately 660 feet north of 29th Street East) had to be lowered 1.9 feet to accommodate the deeper sewers upstream from MH B24 to MH B27.
- Approximately 160 feet of 10-inch diameter gravity sewer pipe was installed at a slope of 0.0038 feet/foot along Meridian Avenue between MH B3 (11th Street East) and MH B4 (south of 11th Street). Adjusting the slope of this stretch of pipe to meet the minimum slope requirements for 8-inch-diameter pipe increased the depth of the pipe by 0.10 to 0.20 feet.
- Approximately 1,205 feet of pipe from MH B4 to B7 (approximately 295 feet south of 13th Street East) had to be lowered about 0.2 feet to accommodate the deeper sewers upstream from MH B3 to MH B4.

Increasing the trench depths to meet the minimum slope criteria would increase construction costs, since it would take longer to excavate the deeper trenches and require additional backfill. However, the additional time required to lower the pipe less than two feet would not be substantial. Therefore, the increased costs are considered relatively minor. Because the cost data available from the construction contracts is insufficiently detailed to identify those minor costs, the oversizing cost analysis accounted for the reduction in pipe diameters, but ignored the increased construction costs associated with the deeper trenches.

PUMP STATIONS AND FORCE MAINS

Design Goals

The pump stations and force mains that were constructed as part of the LID1 project were designed to meet several competing goals. For instance, per Section C2-3.2 of the DOE Standards, a minimum velocity of 2 feet per second (fps) and a maximum velocity of 8 fps had to be maintained, with preferred velocities of 3.5 to 5 fps. These target velocities reduce operation and maintenance costs and prevent the accumulation of solids in the pipe. Higher velocities reduce solids deposition, but result in higher operating costs due to increased friction in the force mains. Lower velocities increase detention times in the force mains, increasing potential for odors and corrosion in the system. Odor and corrosion issues had to be mitigated by the design, especially during times of the low initial flows and in summer, when infiltration and inflow factors are at their lowest levels. The design also had to provide flexibility for operating and maintaining the pumps and force mains. These goals were achieved as follows:

- Dual force mains at each station. Each pump station was designed with dual force mains—a 6-inch main for use during low initial flows and summer flows, and a larger diameter force main for moderate pipe velocities as the design flows are approached. The 6-inch force main provides good scour velocities and minimum detention times for low flows, and it mitigates hydrogen sulfide formation and odor and corrosion problems. The dual force mains offer better control of velocities in the pipe and increased operational flexibility by providing the ability to divert flows into one of the force mains while the other is being cleaned or repaired.
- The flow meter vaults were sized for both force mains, with a separate flow meter for each pipe. By installing flow meters on both force mains, the City can monitor flows through either main, and hence better monitor the flows.
- Crossover piping between the force mains was provided for flexible operation of the pumps and force mains and to optimize performance and facilitate force main maintenance.
- The wet wells and valve vaults were sized for three pumps. Triplex pump stations can match incoming flows better than duplex pump stations, thus improving pump station efficiency. The use of three pumps provides operational flexibility and longer equipment life cycles by allowing the lead and lag pumps to be alternated.
- Due to the range between the low initial flows and the full design flows for the Edgewood Service Area, smaller, lower horsepower pumps were installed to better convey the initial flows. The electrical gear and standby power systems were sized to support these smaller pumps with the understanding that eventually, as flows increase, the pumps will need to be replaced with larger pumps, along with larger electrical gear and standby power systems.

Pump stations and force mains designed to serve the LID1 Service Area only would have to meet these same goals. The following sections describe changes that would be associated with pump stations and force mains sized for the flows from the LID1 Service Area only.

Pump Stations 1 and 2

Dual force mains would still be needed to meet the design goals for Pump Stations 1 and 2. However the design flows from the LID1 Service Area could be accommodated by 6-inch and 8-inch force mains instead of 6-inch and 12-inch force mains. The associated valves and fittings would likewise be reduced. The 6-inch flow meter would remain unchanged while the 12-inch flow meter would be reduced to an 8-inch meter. The size of the wet well would remain unchanged, since three pumps would still be required to convey the full design flows for the LID1 Service Area in the future. The initial pumps, electrical gear and standby power would also be the same size as equipment that was actually installed since the installed

equipment was sized to accommodate less than the design flow and is not oversized for the LID1 Service Area.

Pump Station 3

A single 6-inch force main instead of dual 6- and 8-inch force mains would be sufficient for Pump Station 3 to convey the full design flow for the LID1 Service Area while still meeting the design goals identified above. A single 6-inch force main would have the same detention times and scouring velocity as the installed force mains at the low initial flows (3.5 fps). In addition, the single 6-inch force main would have an acceptable velocity (5.9 fps) at the full design flow for the LID1 Service Area.

The pumping heads at the full design flows for the LID1 Service Area through a 6-inch force main would be similar to the pumping heads of the full design flows for the Edgewood Service Area through 6-inch and 8-inch force mains. Therefore, Pump Station 3 could be designed as a duplex station instead of a triplex station. With only two pumps needed, the wet well housing the pumps could be reduced from 12-foot to 8-foot diameter. The valve vault and meter vault could also be downsized, since valves, piping, and flow meters would only be necessary for two pumps and one force main.

The two initial pumps (duty and standby), riser pipes, and electrical gear would be sized for the full design flows from the LID1 Service Area, avoiding the need for a future upgrade. Therefore, they would be larger pumps than the pumps that were actually installed, which were not sized for future design flows. The installed pumps are Cornell model 4NNT-25 hp at 300 gpm. Pumps for the LID1 Service Area only would be Cornell model 4NHTA-40 hp at 517 gpm, or equal.

Summary

Table 4 summarizes the design flows at each pump station along with the corresponding force mains that would be required to convey those flows at reasonable pressures at each station. Table 5 summarizes the length of force main that would be reduced in size for each pump station.

TABLE 4.
DESIGN FLOW REQUIREMENTS, FORCE MAIN SIZE, AND VELOCITY

	Design Flow		Force Main Size		Design Flow Velocity
	(mgd)	(gpm)	Diameter (inches)	Total Cross-Section Area (square feet)	(fps)
Pump Station 1					
LID1 Service Area	1.934	1,343	6 & 8	0.545	5.5
Edgewood Service Area	3.684	2,558	6 & 12	0.982	5.8
Pump Station 2					
LID1 Service Area	1.578	1,096	6 & 8	0.545	4.5
Edgewood Service Area	3.296	2,289	6 & 12	0.982	5.2
Pump Station 3					
LID1 Service Area	0.745	517	6	0.196	5.9
Edgewood Service Area	1.713	1,190	6 & 8	0.545	4.9

TABLE 5.
FORCE MAIN SIZE AND LENGTH

	Size Required for Edgewood Service Area	Size Required for LID1 Service Area	Length of Each Force Main
Pump Station 1 Force Main	6" & 12"	6" & 8"	4,243
Pump Station 2 Force Main	6" & 12"	6" & 8"	3,553
Pump Station 3 Force Main	6" & 8"	6"	3,095
Total			**10,891**

CHAPTER 4.
OPINION ON PROJECT OVERSIZING COSTS

CONSTRUCTION OVERSIZING COSTS

Once the facilities that were oversized to serve the Edgewood Service Area were identified, the Consultant developed an opinion on the construction costs associated with oversizing those facilities. Unit price bids or schedules of values from the actual construction contracts were used where feasible. This information was sometimes insufficiently detailed to determine actual oversizing costs. When this was the case, the Consultant used current cost information obtained from suppliers, unit price bid information from similar projects, or its experience on similar projects. Current cost information was adjusted to November 2009 costs using the Engineering News Record (ENR) Material Cost Index. (November 2009 is the time when the construction bids were opened). The ENR Material Cost Index resulted in a 0.88 ratio being applied to the 2014 material prices to convert them to 2009 prices. Findings are summarized below. Details of the cost opinion are provided in Appendix C.

Gravity Sewers

The costs for constructing the gravity sewer system are composed of the material costs for the items that were installed and the labor and equipment costs to install those items. The pipeline construction contract included unit price bids for each type of gravity sewer trench that was installed. However, these unit prices were not separated into material, labor, and equipment costs. Therefore, the Consultant's experience on similar projects and quotes from material suppliers were used to supplement the unit prices as needed.

The Contractor used the same equipment and crew to construct all gravity sewers, regardless of the diameter of the pipe. The variables were the time it took to excavate the trench, assemble the pipe and then place and compact the backfill, as well as the cost of the materials being installed.

Trench Width

The construction contract required a minimum trench width of the pipe's outside diameter plus 1 foot and a maximum width of the pipe's outside diameter plus 2 feet. Detailed records of the actual trench widths that were constructed were not kept. Therefore, for the purposes of calculating trench quantities for oversizing costs, the maximum allowable width of the trench was used. This approach resulted in calculated trench widths that varied from 32 inches to 42 inches for the 8-inch to 18-inch diameter gravity sewer pipe that was installed. This range decreases to 32 inches to 36 inches for the diameters of pipe that would be needed to serve the LID1 Service Area only. Subtracting the maximum allowable trench widths for each size of pipe required for the LID1 Service Area from the maximum allowable trench widths of the installed pipe, results in the oversized trench width ranging from 0 to 8 inches.

Given the depths of the gravity sewers, the trenches had to be shored during construction. Standard trench box were used for the shoring systems, which would further restrict variations in the trench width. Therefore, the difference in time required to excavate and backfill a trench that is only 0 to 8 inches narrower is minimal and would not affect the labor or equipment costs bid by Contractors. Therefore, the only costs associated with oversizing would be material costs such as the costs of the pipe and fittings and the costs of the bedding and imported backfill.

Pipe Material

Table 3 summarizes the lineal footage of pipe that could be downsized to serve the LID1 Service Area. Because the Contractor's bid prices did not delineate material prices, costs for the pipe were obtained by contacting a local supplier. These costs were then converted to November 2009 prices using the ENR Material Cost Index. The difference in the cost of the pipe that was installed versus the cost of the pipe required to serve the LID1 Service Area was calculated for each run of pipe. These differences were then added to obtain an opinion of the total cost associated with oversized pipe material.

Bedding Material

The depth of bedding was calculated as the pipe diameter plus 6 inches above and below the pipe. The volume of bedding required was then calculated using the trench widths discussed above, the depth of the bedding, and the length of the pipe. The volume was converted to tons using conversion factors of 1.2 for swell and 1.6 tons per cubic yard. Because the bid items from the construction contract did not identify a unit cost for the bedding material (it was required to be incidental to the unit cost of the pipe), a unit price of $16 per ton, which was used in the project design engineer's projection of probable construction cost, was used to estimate the oversizing costs associated with the bedding.

Backfill Material

A similar process was used to estimate the additional backfill material associated with the wider trenches that were constructed for the oversized pipe. The backfill depth was calculated as the average distance from the ground surface to the top of the bedding for each run of pipe. The depth was then multiplied by the difference in trench width and converted to tons using factors of 1.2 for swell and 1.6 tons per cubic yard. The unit price of $16 per ton for bank-run gravel, from the Contractor's bid, was then used to determine the oversizing costs associated with the increased backfill material.

Summary

A summary of the opinion of oversizing costs for the gravity sewers is provided in Table 6.

TABLE 6.
GRAVITY SEWER OVERSIZING COSTS

Pipe Material	$142,011
Bedding	$14,917
Imported Backfill	$39,040
Construction Cost Total	**$195,968**
Sales Tax @ 9.5%	*$18,617*
Total	**$214,585**

Force Mains

Pump Station 1 Force Mains and Pump Station 2 Force Mains

For the Pump Station 1 force main and the Pump Station 2 force main, a similar approach was used in developing an opinion of the force main oversizing costs for the pipe material, bedding and import backfill material. The Contractor's unit price bids did not contain a breakdown of the pipe material, bedding, and backfill costs. Therefore, material prices for the pipe were obtained from a local supplier

and then converted to November 2009 prices using the ENR Material Cost Index. The oversizing pipe material costs were computed as the difference in the material prices of the pipe, multiplied by the length of the force main. The $16 per ton unit price for bedding that was used in developing the project design engineer's projection of the probable construction costs at the time the contract was bid was used to determine the oversized bedding costs. The Contractor's bid of $16 per ton for imported bank-run gravel was used for the oversize backfill costs.

Because detailed records of the actual trench widths that were constructed were not kept, the maximum allowable trench widths contained in the construction contract were used in the oversizing calculations. The maximum allowable trench widths for the force mains required to serve the LID1 Service Area only were computed and then subtracted from the maximum allowable trench width for the force mains that were actually installed. This difference in trench width represents the oversizing width of the trenches and was used to compute the oversizing costs for bedding and backfill.

In addition, the force main cost analysis accounted for the oversizing costs for fittings and pipe joint restraints, which are significant components in force main piping. Each force main contained several ductile iron fittings, as well as restraints on each fitting and on each pipe joint within 60 feet of either side of each fitting. Because the unit prices furnished by the Contractor contained insufficient detail to determine the actual costs for the fittings and pipe restraints, these costs were obtained from a local supplier and converted to November 2009 prices by applying the ENR Material Cost Index. The oversizing costs were then determined by multiplying the number of fittings installed on each force main by the difference in cost between the installed size of fittings and the size of fittings required to serve the LID1 Service Area.

Pump Station 3 Force Mains

The force main sizing analysis indicated that a single 6-inch force main was sufficient at Pump Station 3 to serve the LID1 Service Area. The second, larger-diameter force main would not be required. Because dual force mains would require more time to construct than a single force main, labor and equipment costs had to be estimated. The Contractor's unit price bids for each trench type were used as the starting point for this analysis. To account for labor and equipment costs, the pipe material prices described above, along with the material costs for tracer wire and tracer wire stations used by the project design engineer to develop the projection of probable construction costs at the time of the bid, were subtracted from the Contractor's unit price bids. The remaining unit price (the trench work unit price) represents an estimate of the Contractor's labor and equipment costs to excavate the trench, assemble the force mains, and then place and compact the backfill.

The Consultant then computed the trench volumes associated with the force main configuration that was actually installed and the force main configuration that would be required to serve the LID1 Service Area. The ratio of these trench volumes was applied to the trench work unit price to determine the reduced labor and equipment costs to install the single force main. The costs for the tracer wire, and tracer wire stations were then added back to the reduced trench work unit price to develop an estimate of the cost to construct the single force main. The difference between the trench work unit prices bid by the Contractor and the computed trench work unit costs for the single force main was then computed and summed to determine the opinion of the oversizing costs associated with Pump Station 3's force main.

The Consultant also accounted for the oversizing costs associated with the imported backfill, since this item was paid separately under the construction contract. The quantity of imported backfill was estimated as the difference in the backfill volume of the dual force mains that were actually installed and the single force main that would be required to serve the LID1 Service Area. The Contractor's unit price of $16 per ton was then applied to this difference to estimate the imported backfill oversizing costs.

Summary

A summary of the opinion of force main oversizing costs is provided in Table 7.

TABLE 7.
FORCE MAIN OVERSIZING COSTS

Pipe Material (Pump Station 1, 2 and 3 Force Mains)	$124,392
Fittings (Pump Station 1, 2 and 3 Force Mains)	$31,110
Bedding (Pump Station 1 and 2 Force Mains)	$15,036
Imported Backfill (Pump Station 1 and 2 Force Mains)	$13,305
Trench Work (Pump Station 3 Force Main)	$72,928
Imported Backfill (Pump Station 3 Force Main)	$51,734
Total Oversizing Costs for Force Mains	**$308,505**
Sales Tax @ 9.5%	*$29,308*
Total	**$337,813**

Pump Stations

The Consultant developed an opinion on the oversizing costs for each of the three pump stations. The schedule of values from the pump station construction contract was used where feasible. Where the schedule of values lacked sufficient detail to determine the oversizing costs, the Consultant used current cost information from suppliers, unit cost information the 2014 USA Blue Book, cost information from similar projects, and previous project experience to estimate the costs. Current cost information was adjusted to November 2009 costs using the ENR Material Cost Index. The cost of most items in the Contractor's final pay request for each pump station would not change, because they are unaffected by the changes discussed in this report. Costs that would change are described in the following sections.

Pipe, Fittings, and Flow Meters

The oversizing costs presented above for force mains are for offsite piping. Changes in the onsite pipe, fittings, and flow meters also needed to be addressed. For the piping, fittings, and flow meters at Pump Stations 1 and 2, the oversize costs are based on difference in material costs associated with the reduced diameters of pipe, fittings, and flow meters. At Pump Station 3, the cost difference for piping is based on the reduced length of pipe that would result from connecting Pump Station 3 to only one force main rather than two. The cost difference in fittings, valves, and flow meters is based on a the reduced number of fittings and valves required to connect to the single force main and the elimination of one flow meter.

Cost information was obtained from a local supplier or the 2014 USA Blue Book. These material costs were then multiplied by 1.15 for Contractor overhead and profit and then adjusted to November 2009 costs with the ENR index. Mechanical installation costs are unchanged except for deleted items, which were multiplied by 1.5 to account for the labor and equipment costs to assemble the fittings. Trenching and earthwork costs are assumed to be unchanged, based on factors similar to those discussed above for the force main oversizing costs. The pipe fittings are flange-by-flange, standard-weight ductile iron, with epoxy coating and stainless steel fasteners, which are much heavier and more expensive than the compact ductile iron mechanical joint fittings used in Schedule A and B force mains. Therefore, these fittings had different unit costs than the fittings identified above for the offsite force mains.

Wet Wells

The wet wells at Pump Stations 1 and 2 would remain the same size, so there are no oversizing costs associated with those wet wells. The wet well at Pump Station 3 could be reduced to an 8-foot diameter structure, and oversizing costs were estimated for this reduction. The cost for the Pump Station 3 wet well was reduced proportionate to the wet well diameter, resulting in a 33 percent reduction. An alternate approach of reducing the cost proportionate to the wet well footprint area was rejected, since most of the wet well installation costs, such as submittals, sheeting and shoring, dewatering, and crane mobilization, would not vary with the footprint area.

Wet Well Pumps and Piping

There were no oversizing costs associated with the wet well pumps and piping at Pump Stations 1 and 2 since the equipment that was installed was not oversized for the LID1 Service Area. However, at Pump Station 3, changing the station from a triplex station to a duplex station creates cost differences. To estimate these costs, the cost for the Pump Station 3 pumps and piping was increased to address the larger pumps that would be used to meet the design flows for the LID1 Service Area. Because the pumps are larger, the riser pipes would be upsized from 4-inch to 6-inch diameter pipes. Costs for the submersible pump guide rails and mounting brackets are unchanged. These material costs were then multiplied by 1.15 to account for the Contractor's overhead and profit and then adjusted to November 2009 costs with the ENR index. Mechanical installation costs are unchanged, because the labor and equipment needed to install the slightly larger pumps and riser pipes would be unchanged. The cost of the deleted riser (associated with the elimination of the third pump) was determined by multiplying the material price by 1.5 to account for mechanical installation costs.

Valve Vaults

There are no oversizing costs associated with the valve vaults and meter vaults at Pump Stations 1 and 2. The minor reductions in the diameter of pipe and fittings would not have changed the size of the vaults that were required. However, at Pump Station 3, the elimination of the second force main and changing to a duplex station would impact the size of the vaults. Therefore, the oversizing costs for the valve vaults and meter vaults were estimated by reducing the contractor's bid costs for these vaults proportionate to the total vault lengths required to house the single force main and flow meter versus the total vault lengths that were actually installed. The installed vaults had a total length of 19 feet (8 feet for the meter vault and 11 feet for the valve vault), whereas the reduced vaults would have a total length of 16 feet (8 feet for the meter vault and 8 feet for the valve vault). Dividing the reduced vault length by the installed vault length results in a 16 percent reduction in the contractor's bid price. An alternate approach of reducing the cost proportionate to the vault footprint area was rejected, because most of the associated costs, such as submittals, dewatering, crane mobilization and access hatches, would not vary with the footprint area.

Summary

A summary of the opinion of pump station oversizing costs is provided in Table 8.

TABLE 8. PUMP STATION OVERSIZING COSTS	
Pump Station 1	$15,449
Pump Station 2	$13,334
Pump Station 3	$45,767
Total Oversizing Costs for Pump Stations	**$74,550**
Sales Tax @ 9.5%	*$7,082*
Total	**$81,632**

Construction Administration

The LID assessments included the following construction-related costs other than those incurred by the contractors:

- Managing the project during the construction phase
- Administering the construction contract
- Observing the contractor's work for compliance with the construction contracts
- Preparing construction record drawings that reflect changes to the design that occurred during construction.
- City staffing costs during construction.

These costs are not impacted by oversizing, as the costs that were incurred are independent of the size of the facilities that were constructed. Therefore, no oversizing credit for these costs is required.

Construction Oversizing Cost Summary

The system that was constructed under the Meridian Avenue Sewer LID No. 1 Project was oversized to convey design flows from the entire Edgewood Service Area. The oversizing costs are the difference in costs to construct the system that was actually installed versus the system that was needed to serve the LID1 Service Area only. As shown in Table 9, the construction oversizing costs are estimated to be $634,030, which is 5.9 percent of the $10,820,334 construction cost (excluding construction administrative costs, which were not affected by the oversizing).

TABLE 9. CONSTRUCTION OVERSIZING COST SUMMARY	
Gravity Sewers	$195,968
Force Mains	$308,505
Pump Stations	$74,550
Construction Oversizing Cost Subtotal	**$579,023**
Sales Tax @ 9.5%	*$55,007*
Construction Administration	*$0*
Total Construction Oversizing Cost	**$634,030**

PROJECT DEVELOPMENT OVERSIZING COSTS

Project development costs include the preparation of the GSP, applying for grants and loans to finance the design and construction of the project, and City labor costs to administer the project. The GSP defined sewer service areas within the City and development densities within those service areas. The GSP also defined how the area was to be served, how to develop the design flows, and where the sewage would be conveyed for treatment. The City spent $103,524 preparing the 2004 GSP and the 2007 amended GSP. Though the GSP and the subsequent amendment was developed for the entire City's sewer service area and not just the area within the LID, a significant reason for preparing these documents was LID1. Therefore, the City calculated a prorated amount of its total costs for preparing the GSP and included this prorated amount of $29,264 in the assessments for LID1. The cost for preparing the GSP was unrelated to the size and extent of facilities that were constructed as part of the Meridian Avenue LID No. 1 project, so the prorated costs do not include any oversizing components.

Similarly, costs associated with applying for grants and loans to finance the design and construction of the project are unaffected by the size and extent of the facilities. The only difference in the loan and grant applications would be the size of the loan or grant that was requested. The process and costs for applying for those grants and loans would be the same. Therefore, no credits for oversizing are required for this component of the assessment.

DESIGN, EASEMENT, AND PERMITTING OVERSIZING COSTS

Prior to the start of construction, the project required design work, acquisition of easements, and permit application and acquisition. The City hired consultants to complete these processes, which included the following elements:

- A preliminary design was developed to identify the facilities to be constructed for LID1 and to establish design flows to use in sizing those facilities.
- Final design was completed by refining the preliminary design to produce the plans and specifications that were used to bid and construct the project.
- The following investigations were performed to facilitate the design and permitting of the facilities:
  - Survey data was collected.
  - An environmental investigation was performed to identify wetlands, streams, and other environmentally sensitive areas within the project limits and to assess potential impacts on those areas. A report was prepared to present the results of this investigation.
  - A geotechnical investigation was performed to classify the soils in the area and to identify geotechnical issues that may impact the design and construction of the facilities. A report was prepared to present the results of this investigation.
- Once the design was completed and the environmental and geotechnical reports were developed, the design team applied for and obtained the permits that were needed to construct to improvements.
- Easements from private property owners were acquired in areas where the new sewer facilities were outside the public right of way.

The only elements of this work that are impacted by oversizing are the preliminary and final design efforts, since costs were incurred to compute the anticipated flows from areas outside the LID1 boundaries and to determine how those areas would be served and the resultant flows would be delivered to the system that was being constructed under LID1. The project survey, environmental and geotechnical

investigations, easement acquisition, and permitting were limited to the areas directly impacted by the facilities being constructed under LID1, all of which were located within the LID1 boundary, so no oversizing costs are associated with these efforts.

Costs associated with these efforts were not tracked separately, so the design cost associated with oversizing was estimated using the percentage of construction oversizing costs relative to the total construction cost (5.9 percent, as described in the section on construction oversizing costs). The result is summarized in Table 10.

TABLE 10.
DESIGN OVERSIZING COSTS

Preliminary Design	$88,582
Final Design (Plans, Specifications)	$1,304,845
Design Total	***$1,393,427***
Design Cost Associated with Oversizing (5.9% of Design Total)	**$81,650**

LID FORMATION AND ASSESSMENT OVERSIZING COSTS

The use of local improvement districts as a financing tool for cities is enabled by state statutes (RCW Chapters 35.34 through 35.56). An LID allows the costs of a public improvement project to be apportioned and assessed against the real property within its boundaries. The work associated with forming the LID and developing and levying assessments in accordance with the LID statutes was reviewed to identify elements that might be impacted by oversizing the LID (the elements are presented in *Local and Road Improvement Districts Manual* published by the Municipal Research and Services Center and sponsored by the Washington State Chapter of the American Public Works Association). No evidence was found that the work associated with forming LID1 and levying the assessments was affected by oversizing the sewer system. The process of forming LID1 was independent of the size of the facilities being installed.

FINANCING OVERSIZING COSTS

The LID1 assessments included the following costs associated with financing the project:

- Bond anticipation note financing during the design and construction phases
- Interfund Loan and Public Works Trust Fund loan interest
- Permanent financing setup and interest
- The LID guaranty fund.

The size of these loans and the resultant interest costs are directly affected by the amount of money needed to finance the project; therefore, financing costs are directly affected by oversizing. If the facilities had not been oversized, the size of the loans would be reduced and the resultant interest would be lower. The portion of financing costs attributable to oversizing was calculated as follows:

- The oversizing costs, excluding financing costs, are those previously presented for construction ($634,030) and for design ($81,650)—a total of $715,680, which is 3.8 percent of the $18,865,644 total project cost included in the LID assessment, excluding financing.[2]
- The total financing cost included in the LID assessment is $2,372,624.
- Financing cost attributable to oversizing is 3.8 percent of the total financing cost, or $90,007.

PROJECT OVERSIZING COST SUMMARY

The system that was constructed under the Meridian Avenue Sewer LID No. 1 Project was oversized to provide capacity for design flows from the entire Edgewood Service Area. The oversize costs are the difference in costs to design, permit, construct, and finance the system that was actually installed versus the system that was needed to serve the LID1 Service Area only. As shown in Table 11, these costs are estimated to be $805,687, which is 3.8 percent of the $21,238,268 total project cost included in the assessments.

TABLE 11.
PROJECT OVERSIZING COST SUMMARY

Project Development	$0
Design/Easements/Permitting	$81,650
Construction	$634,030
LID Formation and Assessment Process	$0
Financing	$90,007
Total	**$805,687**

[2] Because the financing was responsible for the entire project cost and not just the construction costs, the oversizing included in the financing is a function of the total project cost and not just the construction costs. Therefore, a factor of 3.8 percent was used to represent the oversizing portion of the project costs, excluding finance costs instead of a factor of 5.9%, which represents the oversizing portion of the construction costs only.

FIGURE 1
CITY OF EDGEWOOD - MERIDIAN AVENUE SEWER SERVICE AREA
JUNE 2014

NORTH AREA INSET

Discharge to Lakehaven Utility District 18" Sewer

KING COUNTY
PIERCE COUNTY

0 900 1,800 Feet

FM Discharge to Lakehaven Utility District's 18" Sewer at 19th Way S. (See North Area Inset)

KING COUNTY
PIERCE COUNTY

PS 1

PS 2

PS 3

CITY OF MILTON

CITY OF EDGEWOOD

CITY OF EDGEWOOD

Surprise Lake

Lake Chalet

Simons Creek

COUNTY LINE RD E
JOVITA BLVD E
COMET ST
DIAMOND LP
28TH AV E
105TH AV E
107TH AVCT E
109TH AVCT E
108TH AVCT E
106TH AVCT E
111TH AV E
4TH ST E
5TH STCT E
114TH AV E
117TH AV E
LOCK DR
107TH AV E
108TH AVCT E
109TH AVCT E
110TH AVCT E
8TH ST E
9TH ST E
10TH ST E
11TH ST E
11TH STCT E
10TH STCT E
108TH AV E
26TH AVCT
28TH AVCT
NEVADA STCT
23RD AV
QUEENS WY
13TH STCT E
13TH ST E
REDWOOD ST
110TH AV E
15TH ST E
TAYLOR ST
TAYLOR ST E
19TH AVCT
24TH AVCT
97TH AV E
99TH AV E
100TH AVCT E
104TH AVCT E
105TH AV E
16TH ST E
94TH AV E
92ND AV E
95TH AVCT E
18TH STCT E
96TH AVCT E
MERIDIAN AV E
18TH ST E
20TH ST E
20TH STCT E
22ND ST E
93RD AVCT E
95TH AV E
96TH AVCT E
23RD STCT E
24TH ST E
24TH STCT
25TH STCT E
21ST STCT E
116TH AV E
91ST AV E
92ND AV E
93RD AV E
28TH ST E
28TH STCT E
29TH STCT E
29TH ST E
31ST ST E
31ST STCT E
32ND ST E
33RD ST E
34TH ST E
34TH STCT E
35TH STCT E
36TH ST E
38TH ST E
91ST AVCT E
94TH AV E
97TH AV E
99TH AVCT E
103RD AVCT E
112TH AV E
27TH STCT E
30TH ST E
30TH STCT E

Legend

- City of Edgewood
- Core I
- Core II
- LID No. 1
- Water Bodies
- Water Courses

Existing Sewer System

- Pump Station
- Gravity Sewer Manhole
- 6" & 8" Force Main
- 6" & 10" Force Main
- 6" & 12" Force Main
- 8" Gravity Sewer
- 10" Gravity Sewer
- 12" Gravity Sewer
- 16" Gravity Sewer
- 18" Gravity Sewer
- Oversized Gravity Sewer
- Oversized Force Main

Future Sewer Improvements

- Future Pump Station
- Future Forcemains
- Future Pipes

Presented by:

BHC CONSULTANTS

TETRA TECH

Base & Parcel data: Pierce County GIS 2010
This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

MAP DATE: JUNE 2014

0 450 900 1,800 Feet

N W E S

Map Coordinate Ref - Projected Coordinate System: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet

P:\Mapping\Maps_Generated\Edgewood\14-10351.00\003\maps\Meridian Ave Sewer Sizing 11x17.mxd 6/6/2014 ctolentino

APPENDIX A.
LID ASSESSMENT COST BREAKDOWN

City of Edgewood LID No 1
LID Costs
June 17, 2014

Cost Description	TetraTech	Other Providers	City Cost	To Date	Estimated/ Future	Total Cost	City Contribution	LID Total	Oversizing Costs	LID Total w/o Oversizing
1. Project Development										
General Sewer Plan		29,264.54		29,264.54		29,264.54		29,264.54	-	29,264.54
Grant & Loan Applications	14,500.00	-		14,500.00		14,500.00		14,500.00	-	14,500.00
City Costs				-		-		-	-	-
Labor			42,880.60	42,880.60		42,880.60		42,880.60	-	42,880.60
Sub-Total	14,500.00	29,264.54	42,880.60	86,645.14	-	86,645.14	-	86,645.14	-	86,645.14
2. Design/Easements/Permitting										
Project management	257,885.29			257,885.29		257,885.29		257,885.29	-	257,885.29
Preliminary Design	88,581.70			88,581.70		88,581.70		88,581.70	5,190.55	83,391.15
Plans, Specifications and Bidding	1,304,844.70			1,304,844.70		1,304,844.70		1,304,844.70	76,458.91	1,228,385.79
Environmental/Permitting	166,728.31		14,989.25	181,717.56		181,717.56		181,717.56	-	181,717.56
Geotechnical and Contaminated Soils Investigations	144,457.91			144,457.91		144,457.91		144,457.91	-	144,457.91
Design Surveying	401,592.78			401,592.78		401,592.78		401,592.78	-	401,592.78
Easements & Right of Way	215,005.24		754,951.00	969,956.24	20,000.00	989,956.24		989,956.24	-	989,956.24
Agency Review/Permitting (Includes LUD & PC)	285,393.59		167,307.15	452,700.74		452,700.74		452,700.74	-	452,700.74
City Cost During Design				-		-		-	-	-
Permits			36,124.96	36,124.96		36,124.96		36,124.96	-	36,124.96
Labor			171,523.00	171,523.00		171,523.00		171,523.00	-	171,523.00
Sub-Total	2,864,489.52		1,144,895.36	4,009,384.88	20,000.00	4,029,384.88	-	4,029,384.88	81,649.46	3,947,735.42
3. Construction						-		-		
Project Management	131,839.00			131,839.00		131,839.00		131,839.00	-	131,839.00
Collection System & Conveyance (Including Sales Tax)				7,447,722.57	50,000.00	7,497,722.57		7,497,722.57	552,397.94	6,945,324.64
Pump Stations (Including Sales Tax)				3,322,611.63		3,322,611.63		3,322,611.63	81,632.25	3,240,979.38
Restoration and School Mitigation (Including Sales Tax)					90,000.00	90,000.00		90,000.00	-	90,000.00
Construction Administration & Inspection	2,089,258.93			2,089,258.93		2,089,258.93		2,089,258.93	-	2,089,258.93
Record Drawings						-		-	-	-
Additional Engineering During Construction						-		-	-	-
City Costs During Construction						-		-	-	-
Labor			171,522.00	171,522.00		171,522.00		171,522.00	-	171,522.00
Expenses			193,538.53	193,538.53		193,538.53		193,538.53	-	193,538.53
Sub-Total	2,221,097.93		365,060.53	13,356,492.66	140,000.00	13,496,492.66	-	13,496,492.66	634,030.19	12,862,462.48
4. LID Formation and Assessment Process						-		-		
LID Management (Prelim. & Final)	208,688.57	65,185.00		273,873.57	30,000.00	303,873.57		303,873.57	-	303,873.57
City Costs and (ads, misc supplies)					5,000.00	5,000.00		5,000.00	-	5,000.00
Labor			61,745.53	61,745.53	40,000.00	101,745.53		101,745.53	-	101,745.53
Expenses						-			-	-
Special Benefit Analysis		198,558.00		198,558.00	39,106.00	237,664.00		237,664.00	-	237,664.00
Legal Fees						-		-	-	-
City Attorney		104,973.38		104,973.38	10,000.00	114,973.38		114,973.38	-	114,973.38
Hearing Examiner					25,000.00	25,000.00		25,000.00	-	25,000.00
Court Reporter					10,000.00	10,000.00		10,000.00	-	10,000.00
Bond Counsel		15,000.00		15,000.00	39,865.00	54,865.00		54,865.00	-	54,865.00
Reserve for Final Hearing Process						-		-	-	-
Assessment Contingency					200,000.00	200,000.00		200,000.00	-	200,000.00
Legal Fees					150,000.00	150,000.00		150,000.00	-	150,000.00
Appraiser					50,000.00	50,000.00		50,000.00	-	50,000.00
Sub-Total	208,688.57	383,716.38		654,150.48	598,971.00	1,253,121.48	-	1,253,121.48	-	1,253,121.48
5. Financing										
BAN Financing (During Design & Construction)			482,517.89	482,517.89		482,517.89		482,517.89	18,304.61	464,213.28
Estimated Interest thru 9-30-11					325,000.00	325,000.00		325,000.00	12,329.07	312,670.93
Interfund Loan and PWTF Interest			31,873.78	31,873.78	27,500.00	59,373.78		59,373.78	2,252.38	57,121.40
Permanent Financing Setup						-		-	-	-
LID Guaranty Fund					1,505,732.00	1,505,732.00		1,505,732.00	57,120.86	1,448,611.14
Sub-Total			514,391.67	514,391.67	1,858,232.00	2,372,623.67	-	2,372,623.67	90,006.92	2,282,616.75
Grand Total	**5,308,776.02**	**412,980.92**	**2,067,228.16**	**18,621,064.83**	**2,617,203.00**	**21,238,267.83**	**-**	**21,238,267.83**	**805,686.56**	**20,432,581.27**

APPENDIX B.
FLOW ANALYSIS

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
May 14, 2014

Zoning Criteria

Zoning	Density (ERU/acre)	Factor	Factor (gal/ac)
BP	0	1	3,000
C	8	0.5	3,000
MR-M	8	0.5	2,500
MUR	6	0.5	2,500
P	0	0	0
SF-H	5	1	0
SF-M	3	1	0
TC	10	0.5	3,000
TCO	16	0.5	3,000

Min Pipe Slope per DOE

Diameter (in)	Slope (ft/ft)
8	0.0040
10	0.0028
12	0.0022
15	0.0015
18	0.0012
21	0.0010
24	0.0008

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Phase 1 -LID Area Flow Calculations
May 14, 2014

Residential Flow Rate = 100 gpcpd
Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
2	0420032111	BP	166,413	3.82	0	1.0	2.54	0.00	0	11,461	11,461	0.040	61
3	0420032021	BP	294,496	6.76	0	1.0	2.54	0.00	0	20,282	20,282	0.071	61
4	0420032083	BP	122,209	2.81	0	1.0	2.54	0.00	0	8,417	8,417	0.029	59
5	0420032057	BP	16,144	0.37	0	1.0	2.54	0.00	0	1,112	1,112	0.004	59
6	0420032081	BP	97,879	2.25	0	1.0	2.54	0.00	0	6,741	6,741	0.024	59
7	0420032080	BP	85,947	1.97	0	1.0	2.54	0.00	0	5,919	5,919	0.021	59
8	0420032056	BP	125,701	2.89	0	1.0	2.54	0.00	0	8,657	8,657	0.030	57
9	0420032004	BP	194,920	4.47	0	1.0	2.54	0.00	0	13,424	13,424	0.047	57
9	0420032004	SF-M	59,552	1.37	3	1.0	2.54	10.42	1,042	0	1,042	0.004	57
10	0420032013	BP	38,639	0.89	0	1.0	2.54	0.00	0	2,661	2,661	0.009	56
11	0420036056	BP	44,990	1.03	0	1.0	2.54	0.00	0	3,098	3,098	0.011	56
12	0420036059	BP	15,910	0.37	0	1.0	2.54	0.00	0	1,096	1,096	0.004	56
13	0420032028	BP	46,621	1.07	0	1.0	2.54	0.00	0	3,211	3,211	0.011	56
13	0420032028	C	13,806	0.32	8	0.5	2.54	3.22	322	475	797	0.003	56
14	0420032119	BP	4,440	0.10	0	1.0	2.54	0.00	0	306	306	0.001	56
15	0420032118	BP	19,109	0.44	0	1.0	2.54	0.00	0	1,316	1,316	0.005	56
16	0420032029	BP	10,226	0.23	0	1.0	2.54	0.00	0	704	704	0.002	56
17	0420032159	C	46,130	1.06	8	0.5	2.54	10.76	1,076	1,589	2,664	0.009	55
18	0420036060	C	36,436	0.84	8	0.5	2.54	8.50	850	1,255	2,105	0.007	55
19	0420036058	C	58,705	1.35	8	0.5	2.54	13.69	1,369	2,022	3,391	0.012	54
24	0420032158	C	57,098	1.31	8	0.5	2.54	13.32	1,332	1,966	3,298	0.012	53
44	0420032115	C	107,701	2.47	8	0.5	2.54	25.12	2,512	3,709	6,221	0.022	50
45	0420032053	C	83,566	1.92	8	0.5	2.54	19.49	1,949	2,878	4,827	0.017	50
58	6575000010	C	24,530	0.56	8	0.5	2.54	5.72	572	845	1,417	0.005	50
59	6575000022	C	23,788	0.55	8	0.5	2.54	5.55	555	819	1,374	0.005	50
60	6575000030	C	32,203	0.74	8	0.5	2.54	7.51	751	1,109	1,860	0.007	49
61	6575000040	C	30,082	0.69	8	0.5	2.54	7.02	702	1,036	1,738	0.006	49
69	6575000021	C	12,439	0.29	8	0.5	2.54	2.90	290	428	718	0.003	38
75	0420033077	C	94,015	2.16	8	0.5	2.54	21.93	2,193	3,237	5,430	0.019	39
75	0420033077	MR-M	31,230	0.72	8	0.5	2.54	7.28	728	896	1,625	0.006	39
77	0420033040	C	0	0.00	8	0.5	2.54	0.00	0	0	0	0.000	39
78	0420033026	C	4,147	0.10	8	0.5	2.54	0.97	97	143	240	0.001	39
79	0420033029	C	19,954	0.46	8	0.5	2.54	4.65	465	687	1,153	0.004	39
80	0420033083	C	118,739	2.73	8	0.5	2.54	27.69	2,769	4,089	6,858	0.024	40
81	0420037050	C	60,526	1.39	8	0.5	2.54	14.12	1,412	2,084	3,496	0.012	40
81	0420037050	MR-M	8,780	0.20	8	0.5	2.54	2.05	205	252	457	0.002	40
82	0420033084	MR-M	197,282	4.53	8	0.5	2.54	46.01	4,601	5,661	10,263	0.036	40
83	0420037049	C	18,550	0.43	8	0.5	2.54	4.33	433	639	1,071	0.004	40
84	0420037045	C	51,339	1.18	8	0.5	2.54	11.97	1,197	1,768	2,965	0.010	40
84	0420037045	MR-M	9,820	0.23	8	0.5	2.54	2.29	229	282	511	0.002	40
85	0420037046	C	186,317	4.28	8	0.5	2.54	43.46	4,346	6,416	10,762	0.038	41
85	0420037046	MR-M	0	0.00	8	0.5	2.54	0.00	0	0	0	0.000	41
86	0420037048	C	28,233	0.65	8	0.5	2.54	6.59	659	972	1,631	0.006	41
86	0420037048	MR-M	275,251	6.32	8	0.5	2.54	64.20	6,420	7,899	14,319	0.050	41
87	0420037047	C	91,479	2.10	8	0.5	2.54	21.34	2,134	3,150	5,284	0.018	42
87	0420037047	MR-M	1,747	0.04	8	0.5	2.54	0.41	41	50	91	0.000	42
88	0420033072	C	14,128	0.32	8	0.5	2.54	3.30	330	486	816	0.003	43
89	7420000010	C	12,116	0.28	8	0.5	2.54	2.83	283	417	700	0.002	43
90	7420000011	C	3,231	0.07	8	0.5	2.54	0.75	75	111	187	0.001	43
91	7420000020	C	13,023	0.30	8	0.5	2.54	3.04	304	448	752	0.003	43
92	0420033007	C	217,560	4.99	8	0.5	2.54	50.74	5,074	7,492	12,566	0.044	45
93	0420033045	P	15,043	0.35	0	0.0	2.54	0.00	0	0	0	0.000	47
94	0420102024	C	14,774	0.34	8	0.5	2.54	3.45	345	509	853	0.003	47
95	0420102099	C	14,493	0.33	8	0.5	2.54	3.38	338	499	837	0.003	47
96	0420102007	C	195,068	4.48	8	0.5	2.54	45.50	4,550	6,717	11,267	0.039	37
97	0420106020	C	21,995	0.50	8	0.5	2.54	5.13	513	757	1,270	0.004	36
98	0420106021	C	9,787	0.22	8	0.5	2.54	2.28	228	337	565	0.002	36
99	0420102105	C	89,923	2.06	8	0.5	2.54	20.97	2,097	3,097	5,194	0.018	36
100	0420102060	C	13,859	0.32	8	0.5	2.54	3.23	323	477	800	0.003	35
101	0420102059	C	13,810	0.32	8	0.5	2.54	3.22	322	476	798	0.003	35
102	0420102098	C	6,933	0.16	8	0.5	2.54	1.62	162	239	400	0.001	35
103	0420102021	C	21,884	0.50	8	0.5	2.54	5.10	510	754	1,264	0.004	35
104	0420102025	C	21,987	0.50	8	0.5	2.54	5.13	513	757	1,270	0.004	34
105	0420102019	C	22,040	0.51	8	0.5	2.54	5.14	514	759	1,273	0.004	34
106	0420102008	TC	207,676	4.77	10	0.5	2.54	60.55	6,055	7,151	13,206	0.046	34
106	0420102008	MR-M	276,971	6.36	8	0.5	2.54	64.60	6,460	7,948	14,408	0.050	34
107	0420102102	TC	209,975	4.82	10	0.5	2.54	61.22	6,122	7,231	13,352	0.047	33
107	0420102102	MR-M	257,842	5.92	8	0.5	2.54	60.14	6,014	7,399	13,413	0.047	33
108	0420102104	TC	211,903	4.86	10	0.5	2.54	61.78	6,178	7,297	13,475	0.047	33
108	0420102104	MR-M	137,013	3.15	8	0.5	2.54	31.96	3,196	3,932	7,127	0.025	33
109	0420102087	MR-M	55,680	1.28	8	0.5	2.54	12.99	1,299	1,598	2,896	0.010	33
110	0420102103	TC	13,563	0.31	10	0.5	2.54	3.95	395	467	862	0.003	29A
111	0420102033	TC	82,102	1.88	10	0.5	2.54	23.94	2,394	2,827	5,221	0.018	29A
111	0420102033	MR-M	182,579	4.19	8	0.5	2.54	42.59	4,259	5,239	9,498	0.033	29A
112	0420106029	TC	32,436	0.74	10	0.5	2.54	9.46	946	1,117	2,063	0.007	29B
113	0420106030	TC	21,326	0.49	10	0.5	2.54	6.22	622	734	1,356	0.005	29B
114	0420106031	TC	22,809	0.52	10	0.5	2.54	6.65	665	785	1,450	0.005	29B
117	0420102012	TC	150,332	3.45	10	0.5	2.54	43.83	4,383	5,177	9,560	0.033	29B
117	0420102012	P	192,700	4.42	0	0.0	2.54	0.00	0	0	0	0.000	29B
118	0420102013	TC	21,345	0.49	10	0.5	2.54	6.22	622	735	1,357	0.005	20
119	0420102031	TC	19,634	0.45	10	0.5	2.54	5.72	572	676	1,249	0.004	20

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120	0420102040	TC	20,585	0.47	10	0.5	2.54	6.00	600	709	1,309	0.005	20
121	0420102039	TC	20,556	0.47	10	0.5	2.54	5.99	599	708	1,307	0.005	19
122	0420102041	TC	35,771	0.82	10	0.5	2.54	10.43	1,043	1,232	2,275	0.008	19
123	0420103086	TC	31,653	0.73	10	0.5	2.54	9.23	923	1,090	2,013	0.007	20
124	0420103139	TC	33,102	0.76	10	0.5	2.54	9.65	965	1,140	2,105	0.007	20
125	0420107030	TC	166,249	3.82	10	0.5	2.54	48.47	4,847	5,725	10,572	0.037	19
126	0420103145	TC	48,585	1.12	10	0.5	2.54	14.17	1,417	1,673	3,090	0.011	16
127	0420103031	TC	42,654	0.98	10	0.5	2.54	12.44	1,244	1,469	2,712	0.009	16
128	0420103027	TC	42,511	0.98	10	0.5	2.54	12.39	1,239	1,464	2,703	0.009	16
129	3625000375	TC	140,364	3.22	10	0.5	2.54	40.92	4,092	4,833	8,926	0.031	15
130	3625000374	TC	124,244	2.85	10	0.5	2.54	36.22	3,622	4,278	7,901	0.028	14
131	3625000373	MUR	23,563	0.54	6	0.5	2.54	4.12	412	676	1,088	0.004	13
133	3625000372	MUR	49,529	1.14	6	0.5	2.54	8.66	866	1,421	2,288	0.008	13
133	3625000372	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
134	0420103106	MUR	33,690	0.77	6	0.5	2.54	5.89	589	967	1,556	0.005	12
135	0420103074	MUR	9,606	0.22	6	0.5	2.54	1.68	168	276	444	0.002	12
136	0420103013	MUR	9,212	0.21	6	0.5	2.54	1.61	161	264	426	0.001	12
137	0420103078	MUR	8,160	0.19	6	0.5	2.54	1.43	143	234	377	0.001	12
138	0420103045	MUR	13,806	0.32	6	0.5	2.54	2.42	242	396	638	0.002	12
139	0420103065	MUR	5,922	0.14	6	0.5	2.54	1.04	104	170	274	0.001	12
140	0420103097	MUR	24,342	0.56	6	0.5	2.54	4.26	426	699	1,124	0.004	11
140	0420103097	SF-M	24,562	0.56	3	1.0	2.54	4.30	430	0	430	0.002	11
141	0420103026	MUR	36,283	0.83	6	0.5	2.54	6.35	635	1,041	1,676	0.006	11
142	0420103023	MUR	21,748	0.50	6	0.5	2.54	3.80	380	624	1,005	0.004	11
143	0420103042	MUR	22,638	0.52	6	0.5	2.54	3.96	396	650	1,046	0.004	11
143	0420103042	SF-M	28,958	0.66	3	1.0	2.54	5.07	507	0	507	0.002	11
144	0420103072	MUR	49,612	1.14	6	0.5	2.54	8.68	868	1,424	2,292	0.008	9
145	0420103011	MUR	33,380	0.77	6	0.5	2.54	5.84	584	958	1,542	0.005	7
146	0420152137	MUR	15,883	0.36	6	0.5	2.54	2.78	278	456	734	0.003	7
147	0420152138	MUR	7,078	0.16	6	0.5	2.54	1.24	124	203	327	0.001	7A
148	0420152068	MUR	36,399	0.84	6	0.5	2.54	6.37	637	1,045	1,681	0.006	7
159	0420091050	P	26,062	0.60	0	0.0	2.54	0.00	0	0	0	0.000	35
160	0420091064	C	30,631	0.70	8	0.5	2.54	7.14	714	1,055	1,769	0.006	47
161	0420095011	C	14,389	0.33	8	0.5	2.54	3.36	336	496	831	0.003	35
162	0420095010	C	14,215	0.33	8	0.5	2.54	3.32	332	489	821	0.003	35
163	0420095009	C	41,309	0.95	8	0.5	2.54	9.63	963	1,422	2,386	0.008	35
164	0420091030	C	15,487	0.36	8	0.5	2.54	3.61	361	533	895	0.003	34
165	0420091024	C	26,910	0.62	8	0.5	2.54	6.28	628	927	1,554	0.005	34
166	0420091020	C	19,661	0.45	8	0.5	2.54	4.59	459	677	1,136	0.004	34
167	0420091004	TC	15,064	0.35	10	0.5	2.54	4.39	439	519	958	0.003	34
168	3630000012	TC	5,674	0.13	10	0.5	2.54	1.65	165	195	361	0.001	34
169	3630000090	TC	19,495	0.45	10	0.5	2.54	5.68	568	671	1,240	0.004	33
170	0420091134	TC	318,254	7.31	10	0.5	2.54	92.79	9,279	10,959	20,238	0.071	33
171	0420091032	TC	42,631	0.98	10	0.5	2.54	12.43	1,243	1,468	2,711	0.009	33
172	0420091012	TC	131,959	3.03	10	0.5	2.54	38.47	3,847	4,544	8,391	0.029	31
173	0420091029	TC	25,723	0.59	10	0.5	2.54	7.50	750	886	1,636	0.006	29A
174	0420091051	TC	47,352	1.09	10	0.5	2.54	13.81	1,381	1,631	3,011	0.011	31
175	0420091083	TC	25,682	0.59	10	0.5	2.54	7.49	749	884	1,633	0.006	29A
176	0420091084	TC	78,409	1.80	10	0.5	2.54	22.86	2,286	2,700	4,986	0.017	30B
177	0420091013	TC	92,827	2.13	10	0.5	2.54	27.06	2,706	3,197	5,903	0.021	30B
178	0420095026	TC	37,094	0.85	10	0.5	2.54	10.81	1,081	1,277	2,359	0.008	32A
179	0420095025	TC	114,164	2.62	10	0.5	2.54	33.28	3,328	3,931	7,260	0.025	28
180	0420091052	P	38,279	0.88	0	0.0	2.54	0.00	0	0	0	0.000	28
181	0420091027	TC	11,428	0.26	10	0.5	2.54	3.33	333	394	727	0.003	28
182	0420091016	TC	12,207	0.28	10	0.5	2.54	3.56	356	420	776	0.003	21
183	0420091028	P	7,981	0.18	0	0.0	2.54	0.00	0	0	0	0.000	21
184	0420091025	P	39,477	0.91	0	0.0	2.54	0.00	0	0	0	0.000	22
185	0420091022	TC	49,127	1.13	10	0.5	2.54	14.32	1,432	1,692	3,124	0.011	22
186	0420091019	TC	8,810	0.20	10	0.5	2.54	2.57	257	303	560	0.002	22
187	0420091014	P	27,336	0.63	0	0.0	2.54	0.00	0	0	0	0.000	25
188	0420091011	P	597,075	13.71	0	0.0	2.54	0.00	0	0	0	0.000	32A
190	0420091010	SF-H	125,571	2.88	5	1.0	2.54	36.61	3,661	0	3,661	0.013	24
190	0420091010	SF-M	85,595	1.96	3	1.0	2.54	14.97	1,497	0	1,497	0.005	24
191	0420091111	SF-H	123,987	2.85	5	1.0	2.54	36.15	3,615	0	3,615	0.013	23
191	0420091111	SF-M	43,095	0.99	3	1.0	2.54	7.54	754	0	754	0.003	23
211	0420094070	SF-H	42,513	0.98	5	1.0	2.54	12.39	1,239	0	1,239	0.004	23
217	0420094138	SF-H	18,862	0.43	5	1.0	2.54	5.50	550	0	550	0.002	23
218	0420094139	SF-H	17,130	0.39	5	1.0	2.54	4.99	499	0	499	0.002	24
219	0420094141	SF-H	15,311	0.35	5	1.0	2.54	4.46	446	0	446	0.002	24
221	0420094049	SF-H	48,415	1.11	5	1.0	2.54	14.12	1,412	0	1,412	0.005	24
225	0420094018	SF-H	66,492	1.53	5	1.0	2.54	19.39	1,939	0	1,939	0.007	24
226	0420094125	SF-H	176,683	4.06	5	1.0	2.54	51.51	5,151	0	5,151	0.018	25
229	0420094115	TC	203,027	4.66	10	0.5	2.54	59.19	5,919	6,991	12,911	0.045	27
232	0420094144	TC	75,780	1.74	10	0.5	2.54	22.09	2,209	2,610	4,819	0.017	21
233	0420094143	TC	57,180	1.31	10	0.5	2.54	16.67	1,667	1,969	3,636	0.013	16
234	0420094142	TC	61,724	1.42	10	0.5	2.54	18.00	1,800	2,125	3,925	0.014	17
235	0420094034	TC	29,967	0.69	10	0.5	2.54	8.74	874	1,032	1,906	0.007	17
236	0420094135	TC	39,327	0.90	10	0.5	2.54	11.47	1,147	1,354	2,501	0.009	15
237	0420094136	TC	22,413	0.51	10	0.5	2.54	6.53	653	772	1,425	0.005	15
238	0420094015	TC	65,741	1.51	10	0.5	2.54	19.17	1,917	2,264	4,180	0.015	14
239	0420098022	MUR	46,099	1.06	6	0.5	2.54	8.06	806	1,323	2,129	0.007	13

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Residential Flow Rate = 100 gpcpd
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ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
240	0420098023	MUR	37,043	0.85	6	0.5	2.54	6.48	648	1,063	1,711	0.006	13
241	0420094080	MUR	82,503	1.89	6	0.5	2.54	14.43	1,443	2,368	3,811	0.013	12
241	0420094080	SF-M	48,833	1.12	3	1.0	2.54	8.54	854	0	854	0.003	12
242	0420094023	MUR	37,595	0.86	6	0.5	2.54	6.58	658	1,079	1,736	0.006	12
243	0420094079	MUR	13,067	0.30	6	0.5	2.54	2.29	229	375	604	0.002	11
244	0420098026	MUR	43,409	1.00	6	0.5	2.54	7.59	759	1,246	2,005	0.007	11
244	0420098026	SF-M	3,026	0.07	3	1.0	2.54	0.53	53	0	53	0.000	11
245	0420098013	MUR	32,149	0.74	6	0.5	2.54	5.62	562	923	1,485	0.005	10
246	0420094041	MUR	24,291	0.56	6	0.5	2.54	4.25	425	697	1,122	0.004	10
247	0420094100	MUR	13,653	0.31	6	0.5	2.54	2.39	239	392	631	0.002	10A
248	0420094046	MUR	27,107	0.62	6	0.5	2.54	4.74	474	778	1,252	0.004	8
249	0420094035	MUR	13,866	0.32	6	0.5	2.54	2.43	243	398	640	0.002	8
250	0420161020	MUR	10,624	0.24	6	0.5	2.54	1.86	186	305	491	0.002	8
251	0420161022	MUR	14,483	0.33	6	0.5	2.54	2.53	253	416	669	0.002	8
252	0420161024	MUR	3,846	0.09	6	0.5	2.54	0.67	67	110	178	0.001	7A
Totals			**10,750,391**	**246.80**				**2,152.96**	**215,296**	**337,088**	**552,384**	**1.933**	

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Phase 1 Non-LID Area Flow Calculations
May 14, 2014

Residential Flow Rate = 100 gpcpd
Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1	0420041195	BP	10,044	0.23	0	1.0	2.54	0.00	0	692	692	0.002	61
20	0420036022	C	0	0.00	8	0.5	2.54	0.00	0	0	0	0.000	54
20	0420036022	MR-M	1,395	0.03	8	0.5	2.54	0.33	33	40	73	0.000	54
21	0420036024	MR-M	3,405	0.08	8	0.5	2.54	0.79	79	98	177	0.001	38
22	0420036025	MR-M	10,152	0.23	8	0.5	2.54	2.37	237	291	528	0.002	38
23	0420036023	MR-M	86,249	1.98	8	0.5	2.54	20.12	2,012	2,475	4,487	0.016	38
25	0420032016	C	47,629	1.09	8	0.5	2.54	11.11	1,111	1,640	2,751	0.010	53
25	0420032016	MR-M	5,918	0.14	8	0.5	2.54	1.38	138	170	308	0.001	53
26	0420032022	P	44,329	1.02	0	0.0	2.54	0.00	0	0	0	0.000	49
27	0420032134	MR-M	16,146	0.37	8	0.5	2.54	3.77	377	463	840	0.003	49
28	0420032133	MR-M	18,831	0.43	8	0.5	2.54	4.39	439	540	980	0.003	49
29	0420032094	MR-M	13,444	0.31	8	0.5	2.54	3.14	314	386	699	0.002	49
30	0420032090	MR-M	13,646	0.31	8	0.5	2.54	3.18	318	392	710	0.002	49
31	0420032051	MR-M	49,211	1.13	8	0.5	2.54	11.48	1,148	1,412	2,560	0.009	49
32	0420032046	MR-M	27,378	0.63	8	0.5	2.54	6.39	639	786	1,424	0.005	49
33	0420036011	MR-M	13,227	0.30	8	0.5	2.54	3.09	309	380	688	0.002	49
34	0420036010	MR-M	13,507	0.31	8	0.5	2.54	3.15	315	388	703	0.002	49
35	0420036009	MR-M	13,068	0.30	8	0.5	2.54	3.05	305	375	680	0.002	49
36	0420032061	MR-M	11,913	0.27	8	0.5	2.54	2.78	278	342	620	0.002	49
37	0420032045	MR-M	8,947	0.21	8	0.5	2.54	2.09	209	257	465	0.002	49
38	0420032064	MR-M	11,017	0.25	8	0.5	2.54	2.57	257	316	573	0.002	49
39	0420032107	MR-M	2,189	0.05	8	0.5	2.54	0.51	51	63	114	0.000	49
40	0420032069	MR-M	13,132	0.30	8	0.5	2.54	3.06	306	377	683	0.002	49
41	0420032062	MR-M	13,567	0.31	8	0.5	2.54	3.16	316	389	706	0.002	49
42	0420032063	MR-M	13,691	0.31	8	0.5	2.54	3.19	319	393	712	0.002	49
43	0420032035	MR-M	10,986	0.25	8	0.5	2.54	2.56	256	315	571	0.002	49
46	0420032120	C	44,231	1.02	8	0.5	2.54	10.32	1,032	1,523	2,555	0.009	49
46	0420032120	MR-M	17,655	0.41	8	0.5	2.54	4.12	412	507	918	0.003	49
47	0420036008	MR-M	34,604	0.79	8	0.5	2.54	8.07	807	993	1,800	0.006	49
48	0420036007	MR-M	27,262	0.63	8	0.5	2.54	6.36	636	782	1,418	0.005	49
49	0420032096	MR-M	13,541	0.31	8	0.5	2.54	3.16	316	389	704	0.002	49
50	0420036006	MR-M	18,104	0.42	8	0.5	2.54	4.22	422	520	942	0.003	49
51	0420032135	MR-M	13,455	0.31	8	0.5	2.54	3.14	314	386	700	0.002	49
52	0420032137	MR-M	70,478	1.62	8	0.5	2.54	16.44	1,644	2,022	3,666	0.013	49
53	0420036005	MR-M	19,302	0.44	8	0.5	2.54	4.50	450	554	1,004	0.004	49
54	0420032131	MR-M	9,655	0.22	8	0.5	2.54	2.25	225	277	502	0.002	49
55	0420032036	MR-M	12,408	0.28	8	0.5	2.54	2.89	289	356	645	0.002	49
56	0420032076	MR-M	9,611	0.22	8	0.5	2.54	2.24	224	276	500	0.002	49
57	0420032052	MR-M	9,488	0.22	8	0.5	2.54	2.21	221	272	494	0.002	49
62	6575000051	C	9,889	0.23	8	0.5	2.54	2.31	231	341	571	0.002	49
63	6021240070	MR-M	18,637	0.43	8	0.5	2.54	4.35	435	535	970	0.003	49
64	6021240060	MR-M	19,600	0.45	8	0.5	2.54	4.57	457	562	1,020	0.004	49
65	6021240050	MR-M	20,272	0.47	8	0.5	2.54	4.73	473	582	1,055	0.004	49
66	6575000102	MR-M	21,131	0.49	8	0.5	2.54	4.93	493	606	1,099	0.004	49
67	0420033037	MR-M	60,305	1.38	8	0.5	2.54	14.07	1,407	1,731	3,137	0.011	49
68	0420033001	MR-M	25,600	0.59	8	0.5	2.54	5.97	597	735	1,332	0.005	49
70	6021240010	C	13,839	0.32	8	0.5	2.54	3.23	323	477	799	0.003	49
71	6021240020	MR-M	12,735	0.29	8	0.5	2.54	2.97	297	365	662	0.002	49
72	6021240030	MR-M	16,963	0.39	8	0.5	2.54	3.96	396	487	882	0.003	49
73	6021240040	MR-M	17,507	0.40	8	0.5	2.54	4.08	408	502	911	0.003	49
74	6575000101	MR-M	8,962	0.21	8	0.5	2.54	2.09	209	257	466	0.002	49
76	0420033137	MR-M	186,781	4.29	8	0.5	2.54	43.57	4,357	5,360	9,716	0.034	49
76	0420033137	SF-M	171,316	3.93	3	1.0	2.54	29.97	2,997	0	2,997	0.010	49
115	0420106016	TC	19,473	0.45	10	0.5	2.54	5.68	568	671	1,238	0.004	29B
116	0420106017	TC	19,511	0.45	10	0.5	2.54	5.69	569	672	1,241	0.004	29B
132	3625000371	P	12,392	0.28	0	0.0	3.54	0.00	0	0	0	0.000	13
149	0420152065	MUR	24,004	0.55	6	0.5	2.54	4.20	420	689	1,109	0.004	3
150	0420152073	MUR	49,002	1.12	6	0.5	2.54	8.57	857	1,406	2,263	0.008	3
150	0420152073	SF-M	52,561	1.21	3	1.0	2.54	9.19	919	0	919	0.003	3
151	0420152005	MUR	52,379	1.20	6	0.5	2.54	9.16	916	1,503	2,419	0.008	4
151	0420152005	SF-M	41,994	0.96	3	1.0	2.54	7.35	735	0	735	0.003	4
152	0420152006	P	442,095	10.15	0	0.0	2.54	0.00	0	0	0	0.000	5
153	0420152127	MUR	17,621	0.40	6	0.5	2.54	3.08	308	506	814	0.003	6
154	0420152146	MUR	37,672	0.86	6	0.5	2.54	6.59	659	1,081	1,740	0.006	6
155	0420152124	MUR	16,739	0.38	6	0.5	2.54	2.93	293	480	773	0.003	6
156	0420152046	MUR	7,635	0.18	6	0.5	2.54	1.34	134	219	353	0.001	6
157	0420152036	MUR	14,174	0.33	6	0.5	2.54	2.48	248	407	655	0.002	6
158	0420152149	MUR	24,555	0.56	6	0.5	2.54	4.30	430	705	1,134	0.004	6
189	0420091133	P	66,268	1.52	0	0.0	2.54	0.00	0	0	0	0.000	32A
192	0420091103	SF-H	102,548	2.35	5	1.0	2.54	29.90	2,990	0	2,990	0.010	23
193	0420091103	SF-M	169,771	3.90	3	1.0	2.54	29.70	2,970	0	2,970	0.010	23
193	0420091135	SF-H	24,074	0.55	5	1.0	2.54	7.02	702	0	702	0.002	23
194	0420091136	SF-H	125,712	2.89	5	1.0	2.54	36.65	3,665	0	3,665	0.013	23
195	0420091091	SF-H	14,518	0.33	5	1.0	2.54	4.23	423	0	423	0.001	23
196	0420091132	SF-H	14,535	0.33	5	1.0	2.54	4.24	424	0	424	0.001	23
197	0420091131	SF-H	30,023	0.69	5	1.0	2.54	8.75	875	0	875	0.003	23
198	0420091116	SF-H	20,107	0.46	5	1.0	2.54	5.86	586	0	586	0.002	23
199	0420091117	SF-H	19,134	0.44	5	1.0	2.54	5.58	558	0	558	0.002	23
200	0420095024	SF-H	18,096	0.42	5	1.0	2.54	5.28	528	0	528	0.002	23
200	0420095024	SF-M	86,857	1.99	3	1.0	2.54	15.19	1,519	0	1,519	0.005	23
201	0420091101	SF-H	13,403	0.31	5	1.0	2.54	3.91	391	0	391	0.001	23

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Phase 1 Non-LID Area Flow Calculations
May 14, 2014

Residential Flow Rate = 100 gpcpd
Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
202	0420091130	SF-H	40,561	0.93	5	1.0	2.54	11.83	1,183	0	1,183	0.004	23
203	0420091118	SF-H	19,735	0.45	5	1.0	2.54	5.75	575	0	575	0.002	23
204	0420095023	SF-H	58,281	1.34	5	1.0	2.54	16.99	1,699	0	1,699	0.006	34
204	0420095023	SF-M	45,424	1.04	3	1.0	2.54	7.95	795	0	795	0.003	34
205	0420091106	SF-H	69,184	1.59	5	1.0	2.54	20.17	2,017	0	2,017	0.007	23
206	0420091104	SF-H	14,623	0.34	5	1.0	2.54	4.26	426	0	426	0.001	23
207	0420091105	SF-H	36,984	0.85	5	1.0	2.54	10.78	1,078	0	1,078	0.004	23
207	0420091105	SF-M	47,878	1.10	3	1.0	2.54	8.38	838	0	838	0.003	34
208	0420091061	SF-H	15,198	0.35	5	1.0	2.54	4.43	443	0	443	0.002	23
209	0420091066	SF-H	44,165	1.01	5	1.0	2.54	12.88	1,288	0	1,288	0.005	23
210	0420091107	SF-H	60,457	1.39	5	1.0	2.54	17.63	1,763	0	1,763	0.006	23
210	0420091107	SF-M	132,229	3.04	3	1.0	2.54	23.13	2,313	0	2,313	0.008	34
212	0420098001	SF-H	12,849	0.29	5	1.0	2.54	3.75	375	0	375	0.001	24
213	0420094112	SF-H	17,785	0.41	5	1.0	2.54	5.19	519	0	519	0.002	24
214	0420098002	SF-H	13,542	0.31	5	1.0	2.54	3.95	395	0	395	0.001	24
215	0420098003	SF-H	14,020	0.32	5	1.0	2.54	4.09	409	0	409	0.001	24
216	0420098029	SF-H	20,043	0.46	5	1.0	2.54	5.84	584	0	584	0.002	24
220	0420098052	SF-H	50,719	1.16	5	1.0	2.54	14.79	1,479	0	1,479	0.005	24
222	0420094003	SF-H	23,092	0.53	5	1.0	2.54	6.73	673	0	673	0.002	24
223	0420094050	SF-H	75,862	1.74	5	1.0	2.54	22.12	2,212	0	2,212	0.008	24
224	0420094051	SF-H	17,476	0.40	5	1.0	2.54	5.10	510	0	510	0.002	24
227	0420098057	SF-H	68,848	1.58	5	1.0	2.54	20.07	2,007	0	2,007	0.007	27
228	0420098058	SF-H	6,655	0.15	5	1.0	2.54	1.94	194	0	194	0.001	27
230	0420098040	TC	97,666	2.24	10	0.5	2.54	28.47	2,847	3,363	6,211	0.022	18
231	0420098041	TC	73,012	1.68	10	0.5	2.54	21.29	2,129	2,514	4,643	0.016	18
253	0420161018	MUR	43,249	0.99	6	0.5	2.54	7.57	757	1,241	1,998	0.007	3
254	0420161082	MUR	48,538	1.11	6	0.5	2.54	8.49	849	1,393	2,242	0.008	3
254	0420161082	SF-M	32,902	0.76	3	1.0	2.54	5.76	576	0	576	0.002	3
255	0420161019	MUR	26,700	0.61	6	0.5	2.54	4.67	467	766	1,233	0.004	3
256	0420161138	MUR	35,622	0.82	6	0.5	2.54	6.23	623	1,022	1,645	0.006	4
257	0420161098	MUR	13,219	0.30	6	0.5	2.54	2.31	231	379	611	0.002	4
258	0420161097	MUR	11,417	0.26	6	0.5	2.54	2.00	200	328	527	0.002	4
259	0420161121	MUR	5,203	0.12	6	0.5	2.54	0.91	91	149	240	0.001	4
260	0420161092	MUR	44,583	1.02	6	0.5	2.54	7.80	780	1,279	2,059	0.007	4
261	0420161096	MUR	58,932	1.35	6	0.5	2.54	10.31	1,031	1,691	2,722	0.010	1
262	0420161095	MUR	15,585	0.36	6	0.5	2.54	2.73	273	447	720	0.003	5
263	0420161008	MUR	186,615	4.28	6	0.5	2.54	32.64	3,264	5,355	8,620	0.030	1
Totals			**4,512,054**	**103.58**				**904.12**	**90,412**	**62,641**	**153,053**	**0.536**	

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Phase 2 Area Flow Calculations
May 14, 2014

Residential Flow Rate = 100 gpcpd
Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1001	0420032019	SF-M	19,303	0.44	3	1.0	2.54	3.38	338	0	338	0.001	55
1002	0420036003	SF-M	9,163	0.21	3	1.0	2.54	1.60	160	0	160	0.001	55
1003	0420036018	SF-M	26,180	0.60	3	1.0	2.54	4.58	458	0	458	0.002	55
1004	0420036019	SF-M	26,164	0.60	3	1.0	2.54	4.58	458	0	458	0.002	55
1005	0420036020	SF-M	24,042	0.55	3	1.0	2.54	4.21	421	0	421	0.001	55
1006	0420036021	SF-M	33,797	0.78	3	1.0	2.54	5.91	591	0	591	0.002	55
1007	0420032104	SF-M	9,683	0.22	3	1.0	2.54	1.69	169	0	169	0.001	55
1008	0420036002	SF-M	7,399	0.17	3	1.0	2.54	1.29	129	0	129	0.000	55
1009	0420036001	SF-M	9,179	0.21	3	1.0	2.54	1.61	161	0	161	0.001	55
1010	0420032127	SF-M	6,313	0.14	3	1.0	2.54	1.10	110	0	110	0.000	55
1011	0420036054	SF-M	125	0.00	3	1.0	2.54	0.02	2	0	2	0.000	55
1012	0420036055	SF-M	1,760	0.04	3	1.0	2.54	0.31	31	0	31	0.000	55
1013	4992000010	SF-M	11,104	0.25	3	1.0	2.54	1.94	194	0	194	0.001	55
1014	4992000020	SF-M	10,247	0.24	3	1.0	2.54	1.79	179	0	179	0.001	55
1015	4992000030	SF-M	10,459	0.24	3	1.0	2.54	1.83	183	0	183	0.001	55
1016	4992000040	SF-M	12,551	0.29	3	1.0	2.54	2.20	220	0	220	0.001	55
1017	4992000050	SF-M	13,752	0.32	3	1.0	2.54	2.41	241	0	241	0.001	55
1018	4992000060	SF-M	14,710	0.34	3	1.0	2.54	2.57	257	0	257	0.001	55
1019	4992000070	SF-M	12,110	0.28	3	1.0	2.54	2.12	212	0	212	0.001	55
1020	4992000080	SF-M	9,548	0.22	3	1.0	2.54	1.67	167	0	167	0.001	55
1021	4992000090	SF-M	9,039	0.21	3	1.0	2.54	1.58	158	0	158	0.001	55
1022	0420036046	SF-M	19,668	0.45	3	1.0	2.54	3.44	344	0	344	0.001	49
1023	0420036047	SF-M	25,700	0.59	3	1.0	2.54	4.50	450	0	450	0.002	49
1024	0420032121	SF-M	12,592	0.29	3	1.0	2.54	2.20	220	0	220	0.001	49
1025	0420032038	SF-M	11,541	0.26	3	1.0	2.54	2.02	202	0	202	0.001	49
1026	0420036026	SF-M	10,848	0.25	3	1.0	2.54	1.90	190	0	190	0.001	49
1027	0420032067	SF-M	10,719	0.25	3	1.0	2.54	1.88	188	0	188	0.001	49
1028	0420036027	SF-M	15,699	0.36	3	1.0	2.54	2.75	275	0	275	0.001	49
1029	9142800030	SF-M	16,840	0.39	3	1.0	2.54	2.95	295	0	295	0.001	49
1030	9142800020	SF-M	19,598	0.45	3	1.0	2.54	3.43	343	0	343	0.001	49
1031	9142800010	SF-M	20,960	0.48	3	1.0	2.54	3.67	367	0	367	0.001	49
1032	0420036028	SF-M	16,885	0.39	3	1.0	2.54	2.95	295	0	295	0.001	49
1033	0420032054	SF-M	81,227	1.86	3	1.0	2.54	14.21	1,421	0	1,421	0.005	49
1034	6023170010	SF-M	26,460	0.61	3	1.0	2.54	4.63	463	0	463	0.002	49
1035	6023170020	SF-M	21,218	0.49	3	1.0	2.54	3.71	371	0	371	0.001	49
1036	6023170030	SF-M	25,802	0.59	3	1.0	2.54	4.51	451	0	451	0.002	49
1037	6023170120	SF-M	3,257	0.07	3	1.0	2.54	0.57	57	0	57	0.000	49
1038	6023170040	SF-M	18,557	0.43	3	1.0	2.54	3.25	325	0	325	0.001	49
1039	6023170050	SF-M	27,892	0.64	3	1.0	2.54	4.88	488	0	488	0.002	49
1040	6023170060	SF-M	26,570	0.61	3	1.0	2.54	4.65	465	0	465	0.002	49
1041	6023170070	SF-M	28,872	0.66	3	1.0	2.54	5.05	505	0	505	0.002	49
1042	6023170080	SF-M	13,745	0.32	3	1.0	2.54	2.40	240	0	240	0.001	49
1043	6023170090	SF-M	10,739	0.25	3	1.0	2.54	1.88	188	0	188	0.001	49
1044	6023170100	SF-M	10,794	0.25	3	1.0	2.54	1.89	189	0	189	0.001	49
1045	6023170110	SF-M	10,002	0.23	3	1.0	2.54	1.75	175	0	175	0.001	49
1046	0420032011	SF-M	98,628	2.26	3	1.0	2.54	17.25	1,725	0	1,725	0.006	49
1047	0420032030	SF-M	103,370	2.37	3	1.0	2.54	18.08	1,808	0	1,808	0.006	49
1048	0420031124	SF-M	63,023	1.45	3	1.0	2.54	11.02	1,102	0	1,102	0.004	49
1049	0420031125	SF-M	47,513	1.09	3	1.0	2.54	8.31	831	0	831	0.003	49
1050	0420031162	SF-M	42,489	0.98	3	1.0	2.54	7.43	743	0	743	0.003	49
1051	0420031161	SF-M	43,052	0.99	3	1.0	2.54	7.53	753	0	753	0.003	49
1052	0420031076	P	530,732	12.18	0	0.0	2.54	0.00	0	0	0	0.000	49
1053	0420031077	P	102,298	2.35	0	0.0	2.54	0.00	0	0	0	0.000	49
1054	0420037042	SF-M	19,009	0.44	3	1.0	2.54	3.33	333	0	333	0.001	49
1055	0420037043	SF-M	22,064	0.51	3	1.0	2.54	3.86	386	0	386	0.001	49
1056	0420037044	SF-M	17,084	0.39	3	1.0	2.54	2.99	299	0	299	0.001	49
1057	0420033124	SF-M	10,829	0.25	3	1.0	2.54	1.89	189	0	189	0.001	49
1058	0420037040	SF-M	22,472	0.52	3	1.0	2.54	3.93	393	0	393	0.001	49
1059	0420037041	SF-M	13,415	0.31	3	1.0	2.54	2.35	235	0	235	0.001	49
1060	0420033048	SF-M	30,940	0.71	3	1.0	2.54	5.41	541	0	541	0.002	49
1061	0420033078	SF-M	18,361	0.42	3	1.0	2.54	3.21	321	0	321	0.001	49
1062	0420033079	SF-M	28,250	0.65	3	1.0	2.54	4.94	494	0	494	0.002	49
1063	0420033105	SF-M	14,136	0.32	3	1.0	2.54	2.47	247	0	247	0.001	49
1064	0420033050	SF-M	13,901	0.32	3	1.0	2.54	2.43	243	0	243	0.001	49
1065	0420033127	SF-M	15,754	0.36	3	1.0	2.54	2.76	276	0	276	0.001	49
1066	0420033126	SF-M	18,582	0.43	3	1.0	2.54	3.25	325	0	325	0.001	49
1067	0420033123	SF-M	32,059	0.74	3	1.0	2.54	5.61	561	0	561	0.002	49
1068	0420033060	SF-M	16,367	0.38	3	1.0	2.54	2.86	286	0	286	0.001	49
1069	0420033121	SF-M	17,402	0.40	3	1.0	2.54	3.04	304	0	304	0.001	49
1070	0420033122	SF-M	18,000	0.41	3	1.0	2.54	3.15	315	0	315	0.001	49
1071	0420033042	SF-M	34,728	0.80	3	1.0	2.54	6.08	608	0	608	0.002	49
1072	0420033034	SF-M	32,611	0.75	3	1.0	2.54	5.70	570	0	570	0.002	49
1073	0420037007	SF-M	15,263	0.35	3	1.0	2.54	2.67	267	0	267	0.001	49
1074	0420037008	SF-M	15,003	0.34	3	1.0	2.54	2.62	262	0	262	0.001	49
1075	0420033117	SF-M	116,376	2.67	3	1.0	2.54	20.36	2,036	0	2,036	0.007	49
1076	0420037009	SF-M	23,953	0.55	3	1.0	2.54	4.19	419	0	419	0.001	49
1077	0420033080	SF-M	18,406	0.42	3	1.0	2.54	3.22	322	0	322	0.001	49
1078	0420038016	SF-M	129,307	2.97	3	1.0	2.54	22.62	2,262	0	2,262	0.008	49
1079	0420038013	SF-M	7,676	0.18	3	1.0	2.54	1.34	134	0	134	0.000	49
1080	0420038014	SF-M	27,031	0.62	3	1.0	2.54	4.73	473	0	473	0.002	49
1081	0420038015	SF-M	27,902	0.64	3	1.0	2.54	4.88	488	0	488	0.002	49

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May 14, 2014

Residential Flow Rate = 100 gpcpd
Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1082	0420034068	SF-M	141,851	3.26	3	1.0	2.54	24.81	2,481	0	2,481	0.009	49
1083	0420034077	SF-M	88,230	2.03	3	1.0	2.54	15.43	1,543	0	1,543	0.005	49
1084	0420034076	SF-M	31,336	0.72	3	1.0	2.54	5.48	548	0	548	0.002	49
1085	0420034094	SF-M	32,928	0.76	3	1.0	2.54	5.76	576	0	576	0.002	49
1086	0420034086	SF-M	33,641	0.77	3	1.0	2.54	5.88	588	0	588	0.002	49
1087	0420034095	SF-M	33,040	0.76	3	1.0	2.54	5.78	578	0	578	0.002	49
1088	0420038024	SF-M	32,099	0.74	3	1.0	2.54	5.62	562	0	562	0.002	49
1089	0420038025	SF-M	33,370	0.77	3	1.0	2.54	5.84	584	0	584	0.002	49
1090	0420038026	SF-M	54,340	1.25	3	1.0	2.54	9.51	951	0	951	0.003	49
1091	0420038027	SF-M	17,529	0.40	3	1.0	2.54	3.07	307	0	307	0.001	49
1092	0420034049	SF-M	13,719	0.31	3	1.0	2.54	2.40	240	0	240	0.001	49
1093	0420034045	SF-M	13,827	0.32	3	1.0	2.54	2.42	242	0	242	0.001	49
1094	0420034117	SF-M	27,025	0.62	3	1.0	2.54	4.73	473	0	473	0.002	49
1095	0420034111	SF-M	26,742	0.61	3	1.0	2.54	4.68	468	0	468	0.002	49
1096	5642000010	SF-M	9,046	0.21	3	1.0	2.54	1.58	158	0	158	0.001	49
1097	5642000020	SF-M	9,387	0.22	3	1.0	2.54	1.64	164	0	164	0.001	49
1098	5642000030	SF-M	9,053	0.21	3	1.0	2.54	1.58	158	0	158	0.001	49
1099	5642000040	SF-M	9,769	0.22	3	1.0	2.54	1.71	171	0	171	0.001	49
1100	5642000050	SF-M	8,996	0.21	3	1.0	2.54	1.57	157	0	157	0.001	49
1101	5642000060	SF-M	9,443	0.22	3	1.0	2.54	1.65	165	0	165	0.001	49
1102	5642000070	SF-M	9,237	0.21	3	1.0	2.54	1.62	162	0	162	0.001	49
1103	5642000080	SF-M	9,059	0.21	3	1.0	2.54	1.58	158	0	158	0.001	49
1104	5642000090	SF-M	8,472	0.19	3	1.0	2.54	1.48	148	0	148	0.001	49
1105	5642000100	SF-M	8,819	0.20	3	1.0	2.54	1.54	154	0	154	0.001	49
1106	5642000110	SF-M	8,356	0.19	3	1.0	2.54	1.46	146	0	146	0.001	49
1107	5642000120	SF-M	8,595	0.20	3	1.0	2.54	1.50	150	0	150	0.001	49
1108	5642000130	SF-M	9,125	0.21	3	1.0	2.54	1.60	160	0	160	0.001	49
1109	5642000140	SF-M	8,923	0.20	3	1.0	2.54	1.56	156	0	156	0.001	49
1110	5642000150	SF-M	9,120	0.21	3	1.0	2.54	1.60	160	0	160	0.001	49
1111	5642000160	SF-M	9,183	0.21	3	1.0	2.54	1.61	161	0	161	0.001	49
1112	5642000170	SF-M	10,010	0.23	3	1.0	2.54	1.75	175	0	175	0.001	49
1113	0420033039	SF-M	1,083	0.02	3	1.0	2.54	0.19	19	0	19	0.000	49
1115	0420034082	SF-M	46,494	1.07	3	1.0	2.54	8.13	813	0	813	0.003	49
1116	0420034103	SF-M	18,373	0.42	3	1.0	2.54	3.21	321	0	321	0.001	49
1117	0420034101	SF-M	28,028	0.64	3	1.0	2.54	4.90	490	0	490	0.002	49
1118	0420034100	SF-M	12,939	0.30	3	1.0	2.54	2.26	226	0	226	0.001	49
1119	0420034055	SF-M	13,498	0.31	3	1.0	2.54	2.36	236	0	236	0.001	49
1120	0420034083	SF-M	11,795	0.27	3	1.0	2.54	2.06	206	0	206	0.001	49
1121	0420034084	SF-M	2,150	0.05	3	1.0	2.54	0.38	38	0	38	0.000	49
1122	0420034056	SF-M	11,361	0.26	3	1.0	2.54	1.99	199	0	199	0.001	49
1123	0420034104	SF-M	18,795	0.43	3	1.0	2.54	3.29	329	0	329	0.001	49
1124	0420034080	SF-M	10,592	0.24	3	1.0	2.54	1.85	185	0	185	0.001	49
1125	0420034102	SF-M	17,700	0.41	3	1.0	2.54	3.10	310	0	310	0.001	49
1126	0420037030	SF-M	74,526	1.71	3	1.0	2.54	13.04	1,304	0	1,304	0.005	49
1127	0420037032	SF-M	8,485	0.19	3	1.0	2.54	1.48	148	0	148	0.001	49
1128	0420037031	SF-M	81,666	1.87	3	1.0	2.54	14.29	1,429	0	1,429	0.005	49
1129	0420037033	SF-M	16,074	0.37	3	1.0	2.54	2.81	281	0	281	0.001	49
1130	0420033017	SF-M	92,914	2.13	3	1.0	2.54	16.25	1,625	0	1,625	0.006	49
1131	0420037014	SF-M	9,519	0.22	3	1.0	2.54	1.67	167	0	167	0.001	49
1132	0420037015	SF-M	15,917	0.37	3	1.0	2.54	2.78	278	0	278	0.001	49
1133	0420033093	SF-M	16,473	0.38	3	1.0	2.54	2.88	288	0	288	0.001	49
1134	0420037017	SF-M	16,138	0.37	3	1.0	2.54	2.82	282	0	282	0.001	49
1135	0420037016	SF-M	48,466	1.11	3	1.0	2.54	8.48	848	0	848	0.003	49
1137	0420033128	SF-M	13,623	0.31	3	1.0	2.54	2.38	238	0	238	0.001	43
1138	0420033074	SF-M	7,022	0.16	3	1.0	2.54	1.23	123	0	123	0.000	43
1139	0420033073	SF-M	4,876	0.11	3	1.0	2.54	0.85	85	0	85	0.000	43
1140	0420033087	SF-M	4,508	0.10	3	1.0	2.54	0.79	79	0	79	0.000	43
1141	0420033086	SF-M	10,050	0.23	3	1.0	2.54	1.76	176	0	176	0.001	43
1142	0420033071	SF-M	13,095	0.30	3	1.0	2.54	2.29	229	0	229	0.001	43
1143	0420033061	SF-M	13,023	0.30	3	1.0	2.54	2.28	228	0	228	0.001	43
1144	0420033057	SF-M	12,919	0.30	3	1.0	2.54	2.26	226	0	226	0.001	43
1145	0420033108	SF-M	10,173	0.23	3	1.0	2.54	1.78	178	0	178	0.001	43
1146	0420033114	SF-M	15,721	0.36	3	1.0	2.54	2.75	275	0	275	0.001	43
1147	7420000030	SF-M	12,827	0.29	3	1.0	2.54	2.24	224	0	224	0.001	43
1148	7420000040	SF-M	12,745	0.29	3	1.0	2.54	2.23	223	0	223	0.001	43
1149	7420000050	SF-M	12,293	0.28	3	1.0	2.54	2.15	215	0	215	0.001	43
1150	7420000060	SF-M	10,364	0.24	3	1.0	2.54	1.81	181	0	181	0.001	43
1151	7420000070	SF-M	6,008	0.14	3	1.0	2.54	1.05	105	0	105	0.000	43
1152	7420000080	SF-M	5,210	0.12	3	1.0	2.54	0.91	91	0	91	0.000	43
1153	7420000090	SF-M	4,718	0.11	3	1.0	2.54	0.83	83	0	83	0.000	43
1154	7420000100	SF-M	12,179	0.28	3	1.0	2.54	2.13	213	0	213	0.001	43
1155	7420000110	SF-M	13,065	0.30	3	1.0	2.54	2.29	229	0	229	0.001	43
1156	0420033069	SF-M	12,601	0.29	3	1.0	2.54	2.20	220	0	220	0.001	43
1157	0420033068	SF-M	12,699	0.29	3	1.0	2.54	2.22	222	0	222	0.001	43
1158	0420033089	SF-M	13,649	0.31	3	1.0	2.54	2.39	239	0	239	0.001	43
1159	0420033090	SF-M	14,209	0.33	3	1.0	2.54	2.49	249	0	249	0.001	43
1160	0420037037	SF-M	56,915	1.31	3	1.0	2.54	9.96	996	0	996	0.003	43
1161	0420037034	SF-M	18,996	0.44	3	1.0	2.54	3.32	332	0	332	0.001	43
1162	0420037035	SF-M	20,340	0.47	3	1.0	2.54	3.56	356	0	356	0.001	43
1163	0420037036	SF-M	24,476	0.56	3	1.0	2.54	4.28	428	0	428	0.001	43
1164	0420033008	SF-M	12,982	0.30	3	1.0	2.54	2.27	227	0	227	0.001	36

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Residential Flow Rate = 100 gpcpd
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ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1165	0420033041	SF-M	7,674	0.18	3	1.0	2.54	1.34	134	0	134	0.000	36
1166	0420037054	SF-M	44,007	1.01	3	1.0	2.54	7.70	770	0	770	0.003	43
1167	0420037053	SF-M	22,333	0.51	3	1.0	2.54	3.91	391	0	391	0.001	43
1168	0420037052	SF-M	24,788	0.57	3	1.0	2.54	4.34	434	0	434	0.002	36
1169	0420037051	SF-M	25,312	0.58	3	1.0	2.54	4.43	443	0	443	0.002	36
1170	0420037026	SF-M	18,046	0.41	3	1.0	2.54	3.16	316	0	316	0.001	36
1171	0420033054	SF-M	7,617	0.17	3	1.0	2.54	1.33	133	0	133	0.000	36
1172	0420033131	SF-M	8,891	0.20	3	1.0	2.54	1.56	156	0	156	0.001	36
1173	0420037027	SF-M	17,550	0.40	3	1.0	2.54	3.07	307	0	307	0.001	36
1174	0420037028	SF-M	21,979	0.50	3	1.0	2.54	3.84	384	0	384	0.001	36
1175	0420037029	SF-M	47,611	1.09	3	1.0	2.54	8.33	833	0	833	0.003	36
1176	6020340040	SF-M	20,999	0.48	3	1.0	2.54	3.67	367	0	367	0.001	36
1177	6020340030	SF-M	20,250	0.46	3	1.0	2.54	3.54	354	0	354	0.001	36
1178	6020340020	SF-M	15,704	0.36	3	1.0	2.54	2.75	275	0	275	0.001	36
1179	6020340010	SF-M	14,971	0.34	3	1.0	2.54	2.62	262	0	262	0.001	36
1180	0420037013	SF-M	13,947	0.32	3	1.0	2.54	2.44	244	0	244	0.001	36
1181	0420037012	SF-M	13,317	0.31	3	1.0	2.54	2.33	233	0	233	0.001	36
1182	0420037011	SF-M	13,189	0.30	3	1.0	2.54	2.31	231	0	231	0.001	36
1183	0420037010	SF-M	11,468	0.26	3	1.0	2.54	2.01	201	0	201	0.001	36
1185	6020340190	SF-M	10,661	0.24	3	1.0	2.54	1.87	187	0	187	0.001	36
1186	6020340180	SF-M	9,043	0.21	3	1.0	2.54	1.58	158	0	158	0.001	36
1187	6020340170	SF-M	14,102	0.32	3	1.0	2.54	2.47	247	0	247	0.001	36
1188	6020340160	SF-M	18,934	0.43	3	1.0	2.54	3.31	331	0	331	0.001	36
1189	6020340150	SF-M	18,595	0.43	3	1.0	2.54	3.25	325	0	325	0.001	36
1190	6020340140	SF-M	15,830	0.36	3	1.0	2.54	2.77	277	0	277	0.001	36
1191	6020340130	SF-M	15,948	0.37	3	1.0	2.54	2.79	279	0	279	0.001	36
1192	6020340120	SF-M	16,004	0.37	3	1.0	2.54	2.80	280	0	280	0.001	36
1193	6020340110	SF-M	15,273	0.35	3	1.0	2.54	2.67	267	0	267	0.001	36
1194	6020340100	SF-M	16,439	0.38	3	1.0	2.54	2.88	288	0	288	0.001	36
1195	6020340090	SF-M	14,436	0.33	3	1.0	2.54	2.53	253	0	253	0.001	36
1196	6020340080	SF-M	18,242	0.42	3	1.0	2.54	3.19	319	0	319	0.001	36
1197	6020340070	SF-M	14,143	0.32	3	1.0	2.54	2.47	247	0	247	0.001	36
1198	6020340060	SF-M	14,650	0.34	3	1.0	2.54	2.56	256	0	256	0.001	36
1199	6020340050	SF-M	16,578	0.38	3	1.0	2.54	2.90	290	0	290	0.001	36
1200	0420044063	SF-M	21,540	0.49	3	1.0	2.54	3.77	377	0	377	0.001	47
1201	0420044094	SF-M	14,213	0.33	3	1.0	2.54	2.49	249	0	249	0.001	47
1202	0420044095	SF-M	862	0.02	3	1.0	2.54	0.15	15	0	15	0.000	47
1203	0420044038	SF-M	18,331	0.42	3	1.0	2.54	3.21	321	0	321	0.001	47
1204	0420091059	SF-M	18,517	0.43	3	1.0	2.54	3.24	324	0	324	0.001	47
1205	0420091127	SF-M	63,335	1.45	3	1.0	2.54	11.08	1,108	0	1,108	0.004	47
1206	0420091128	SF-M	59,197	1.36	3	1.0	2.54	10.36	1,036	0	1,036	0.004	47
1207	0420095007	SF-M	38,655	0.89	3	1.0	2.54	6.76	676	0	676	0.002	47
1208	0420095022	SF-M	20,759	0.48	3	1.0	2.54	3.63	363	0	363	0.001	47
1209	0420095021	SF-M	56,447	1.30	3	1.0	2.54	9.87	987	0	987	0.003	47
1210	0420091031	SF-M	123,394	2.83	3	1.0	2.54	21.59	2,159	0	2,159	0.008	47
1211	0420091002	SF-M	65,186	1.50	3	1.0	2.54	11.40	1,140	0	1,140	0.004	47
1212	0420095012	SF-M	22,659	0.52	3	1.0	2.54	3.96	396	0	396	0.001	47
1213	0420091049	SF-M	8,154	0.19	3	1.0	2.54	1.43	143	0	143	0.000	47
1213	0420095013	SF-M	23,433	0.54	3	1.0	2.54	4.10	410	0	410	0.001	47
1214	0420091044	SF-M	14,715	0.34	3	1.0	2.54	2.57	257	0	257	0.001	47
1215	0420091143	SF-M	19,281	0.44	3	1.0	2.54	3.37	337	0	337	0.001	47
1216	0420091144	SF-M	41,958	0.96	3	1.0	2.54	7.34	734	0	734	0.003	47
1217	0420091142	SF-M	53,192	1.22	3	1.0	2.54	9.30	930	0	930	0.003	47
1218	0420091141	SF-M	73,019	1.68	3	1.0	2.54	12.77	1,277	0	1,277	0.004	47
1219	0420091139	SF-M	59,475	1.37	3	1.0	2.54	10.40	1,040	0	1,040	0.004	47
1220	0420091140	SF-M	60,826	1.40	3	1.0	2.54	10.64	1,064	0	1,064	0.004	47
1221	3630200060	SF-M	12,007	0.28	3	1.0	2.54	2.10	210	0	210	0.001	34
1222	3630200050	SF-M	11,594	0.27	3	1.0	2.54	2.03	203	0	203	0.001	34
1223	3630200040	SF-M	11,597	0.27	3	1.0	2.54	2.03	203	0	203	0.001	34
1224	3630200030	SF-M	11,366	0.26	3	1.0	2.54	1.99	199	0	199	0.001	34
1225	3630200020	SF-M	11,598	0.27	3	1.0	2.54	2.03	203	0	203	0.001	34
1226	3630200010	SF-M	11,583	0.27	3	1.0	2.54	2.03	203	0	203	0.001	34
1227	3630000080	SF-M	12,054	0.28	3	1.0	2.54	2.11	211	0	211	0.001	34
1228	3630000070	SF-M	12,410	0.28	3	1.0	2.54	2.17	217	0	217	0.001	34
1229	3630000060	SF-M	12,317	0.28	3	1.0	2.54	2.15	215	0	215	0.001	34
1230	3630000050	SF-M	12,159	0.28	3	1.0	2.54	2.13	213	0	213	0.001	34
1231	3630000040	SF-M	12,212	0.28	3	1.0	2.54	2.14	214	0	214	0.001	34
1232	3630000030	SF-M	11,350	0.26	3	1.0	2.54	1.99	199	0	199	0.001	34
1233	3630000021	SF-M	13,682	0.31	3	1.0	2.54	2.39	239	0	239	0.001	34
1234	0420091078	SF-M	144,120	3.31	3	1.0	2.54	25.21	2,521	0	2,521	0.009	47
1235	0420091137	SF-M	86,586	1.99	3	1.0	2.54	15.15	1,515	0	1,515	0.005	47
1236	0420091068	SF-M	38,333	0.88	3	1.0	2.54	6.71	671	0	671	0.002	47
1237	0420091067	SF-M	38,119	0.88	3	1.0	2.54	6.67	667	0	667	0.002	47
1238	0420095027	SF-M	53,513	1.23	3	1.0	2.54	9.36	936	0	936	0.003	47
1239	0420095003	SF-M	15,885	0.36	3	1.0	2.54	2.78	278	0	278	0.001	47
1240	0420095002	SF-M	15,840	0.36	3	1.0	2.54	2.77	277	0	277	0.001	47
1241	0420095029	SF-M	63,538	1.46	3	1.0	2.54	11.11	1,111	0	1,111	0.004	47
1242	0420091081	SF-M	11,429	0.26	3	1.0	2.54	2.00	200	0	200	0.001	47
1243	0420091098	SF-M	18,015	0.41	3	1.0	2.54	3.15	315	0	315	0.001	47
1244	0420091138	SF-M	102,753	2.36	3	1.0	2.54	17.97	1,797	0	1,797	0.006	47
1245	3630200070	SF-M	11,678	0.27	3	1.0	2.54	2.04	204	0	204	0.001	34

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Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1246	3630200080	SF-M	11,393	0.26	3	1.0	2.54	1.99	199	0	199	0.001	34
1247	3630200090	SF-M	11,298	0.26	3	1.0	2.54	1.98	198	0	198	0.001	34
1248	3630200100	SF-M	11,015	0.25	3	1.0	2.54	1.93	193	0	193	0.001	34
1249	3630200110	SF-M	11,227	0.26	3	1.0	2.54	1.96	196	0	196	0.001	34
1250	3630200120	SF-M	11,150	0.26	3	1.0	2.54	1.95	195	0	195	0.001	34
1251	3630000160	SF-M	12,603	0.29	3	1.0	2.54	2.20	220	0	220	0.001	34
1252	3630000150	SF-M	11,781	0.27	3	1.0	2.54	2.06	206	0	206	0.001	34
1253	3630000140	SF-M	11,849	0.27	3	1.0	2.54	2.07	207	0	207	0.001	34
1254	3630000130	SF-M	11,758	0.27	3	1.0	2.54	2.06	206	0	206	0.001	34
1255	3630000120	SF-M	10,445	0.24	3	1.0	2.54	1.83	183	0	183	0.001	34
1256	3630000110	SF-M	10,276	0.24	3	1.0	2.54	1.80	180	0	180	0.001	34
1257	3630000100	SF-M	13,024	0.30	3	1.0	2.54	2.28	228	0	228	0.001	34
1258	0420106033	SF-M	41,615	0.96	3	1.0	2.54	7.28	728	0	728	0.003	36
1259	0420106032	SF-M	193,408	4.44	3	1.0	2.54	33.83	3,383	0	3,383	0.012	36
1260	0420102061	SF-M	23,311	0.54	3	1.0	2.54	4.08	408	0	408	0.001	36
1261	0420106026	SF-M	54,200	1.24	3	1.0	2.54	9.48	948	0	948	0.003	36
1262	0420106027	SF-M	35,424	0.81	3	1.0	2.54	6.20	620	0	620	0.002	36
1263	0420106028	SF-M	42,308	0.97	3	1.0	2.54	7.40	740	0	740	0.003	36
1264	0420106025	SF-M	25,779	0.59	3	1.0	2.54	4.51	451	0	451	0.002	36
1265	0420106024	SF-M	14,962	0.34	3	1.0	2.54	2.62	262	0	262	0.001	36
1266	0420106023	SF-M	14,967	0.34	3	1.0	2.54	2.62	262	0	262	0.001	36
1267	0420106022	SF-M	19,422	0.45	3	1.0	2.54	3.40	340	0	340	0.001	36
1268	3633000010	SF-M	20,278	0.47	3	1.0	2.54	3.55	355	0	355	0.001	36
1269	3633000020	SF-M	15,852	0.36	3	1.0	2.54	2.77	277	0	277	0.001	36
1270	3633000030	SF-M	15,512	0.36	3	1.0	2.54	2.71	271	0	271	0.001	36
1271	3633000040	SF-M	16,167	0.37	3	1.0	2.54	2.83	283	0	283	0.001	36
1272	3633000050	SF-M	15,725	0.36	3	1.0	2.54	2.75	275	0	275	0.001	36
1273	3633000060	SF-M	16,167	0.37	3	1.0	2.54	2.83	283	0	283	0.001	36
1274	3633000070	SF-M	27,794	0.64	3	1.0	2.54	4.86	486	0	486	0.002	36
1275	0420106012	SF-M	21,476	0.49	3	1.0	2.54	3.76	376	0	376	0.001	36
1276	0420106013	SF-M	22,052	0.51	3	1.0	2.54	3.86	386	0	386	0.001	36
1277	0420102067	SF-M	70,021	1.61	3	1.0	2.54	12.25	1,225	0	1,225	0.004	36
1278	0420106015	SF-M	7,979	0.18	3	1.0	2.54	1.40	140	0	140	0.000	36
1279	0420106014	SF-M	11,252	0.26	3	1.0	2.54	1.97	197	0	197	0.001	36
1280	3633000080	SF-M	20,317	0.47	3	1.0	2.54	3.55	355	0	355	0.001	36
1281	3633000094	SF-M	13,827	0.32	3	1.0	2.54	2.42	242	0	242	0.001	36
1282	3633000093	SF-M	13,728	0.32	3	1.0	2.54	2.40	240	0	240	0.001	36
1283	3633000096	SF-M	13,381	0.31	3	1.0	2.54	2.34	234	0	234	0.001	36
1284	3633000098	SF-M	23,308	0.54	3	1.0	2.54	4.08	408	0	408	0.001	36
1285	3633000097	SF-M	10,426	0.24	3	1.0	2.54	1.82	182	0	182	0.001	36
1286	0420102002	SF-M	1,033	0.02	3	1.0	2.54	0.18	18	0	18	0.000	36
1287	0420102045	SF-M	78,297	1.80	3	1.0	2.54	13.70	1,370	0	1,370	0.005	36
1288	0420102097	SF-M	4,338	0.10	3	1.0	2.54	0.76	76	0	76	0.000	36
1289	0420102047	SF-M	13,050	0.30	3	1.0	2.54	2.28	228	0	228	0.001	36
1290	0420102050	SF-M	12,380	0.28	3	1.0	2.54	2.17	217	0	217	0.001	36
1291	0420102053	SF-M	17,732	0.41	3	1.0	2.54	3.10	310	0	310	0.001	36
1292	0420102056	SF-M	15,321	0.35	3	1.0	2.54	2.68	268	0	268	0.001	36
1293	0420102057	SF-M	17,667	0.41	3	1.0	2.54	3.09	309	0	309	0.001	36
1294	0420106008	SF-M	15,166	0.35	3	1.0	2.54	2.65	265	0	265	0.001	36
1295	0420106009	SF-M	15,287	0.35	3	1.0	2.54	2.67	267	0	267	0.001	36
1296	0420102089	SF-M	15,387	0.35	3	1.0	2.54	2.69	269	0	269	0.001	36
1297	0420106010	SF-M	15,488	0.36	3	1.0	2.54	2.71	271	0	271	0.001	36
1298	0420102088	SF-M	15,588	0.36	3	1.0	2.54	2.73	273	0	273	0.001	36
1299	0420106011	SF-M	15,689	0.36	3	1.0	2.54	2.74	274	0	274	0.001	36
1300	0420102096	SF-M	18,542	0.43	3	1.0	2.54	3.24	324	0	324	0.001	36
1301	6023030180	SF-M	1	0.00	3	1.0	2.54	0.00	0	0	0	0.000	36
1302	6023030190	P	5,233	0.12	0	0.0	2.54	0.00	0	0	0	0.000	36
1303	6023030160	SF-M	14,948	0.34	3	1.0	2.54	2.61	261	0	261	0.001	36
1304	6023030150	SF-M	14,616	0.34	3	1.0	2.54	2.56	256	0	256	0.001	36
1305	6023030140	SF-M	12,555	0.29	3	1.0	2.54	2.20	220	0	220	0.001	36
1306	6023030130	SF-M	12,563	0.29	3	1.0	2.54	2.20	220	0	220	0.001	36
1307	6023030120	SF-M	12,572	0.29	3	1.0	2.54	2.20	220	0	220	0.001	36
1308	6023030110	SF-M	12,637	0.29	3	1.0	2.54	2.21	221	0	221	0.001	36
1309	6023030100	SF-M	13,696	0.31	3	1.0	2.54	2.40	240	0	240	0.001	36
1310	6023030090	SF-M	19,968	0.46	3	1.0	2.54	3.49	349	0	349	0.001	36
1311	6023030080	SF-M	21,106	0.48	3	1.0	2.54	3.69	369	0	369	0.001	36
1312	0420102071	SF-M	38,390	0.88	3	1.0	2.54	6.72	672	0	672	0.002	36
1313	0420106005	SF-M	14,164	0.33	3	1.0	2.54	2.48	248	0	248	0.001	36
1314	0420106006	SF-M	14,192	0.33	3	1.0	2.54	2.48	248	0	248	0.001	36
1315	0420106007	SF-M	15,119	0.35	3	1.0	2.54	2.64	264	0	264	0.001	36
1316	6023030070	SF-M	31,982	0.73	3	1.0	2.54	5.59	559	0	559	0.002	36
1317	6023030060	SF-M	16,884	0.39	3	1.0	2.54	2.95	295	0	295	0.001	36
1318	6023030050	SF-M	15,412	0.35	3	1.0	2.54	2.70	270	0	270	0.001	36
1319	6023030040	SF-M	15,397	0.35	3	1.0	2.54	2.69	269	0	269	0.001	36
1320	6023030030	SF-M	15,379	0.35	3	1.0	2.54	2.69	269	0	269	0.001	36
1321	6023030020	SF-M	15,365	0.35	3	1.0	2.54	2.69	269	0	269	0.001	36
1322	6023030010	SF-M	14,555	0.33	3	1.0	2.54	2.55	255	0	255	0.001	36
1323	6023030170	P	3,005	0.07	0	0.0	2.54	0.00	0	0	0	0.000	36
1003	0420036018	SF-M	26,180	0.60	3	1.0	2.54	4.58	458	0	458	0.002	55
1004	0420036019	SF-M	26,164	0.60	3	1.0	2.54	4.58	458	0	458	0.002	55
1005	0420036020	SF-M	24,042	0.55	3	1.0	2.54	4.21	421	0	421	0.001	55

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ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1327	9770000250	SF-M	210,053	4.82	3	1.0	2.54	36.74	3,674	0	3,674	0.013	36
1328	9770000233	SF-M	12,721	0.29	3	1.0	2.54	2.23	223	0	223	0.001	36
1329	9770000239	SF-M	12,537	0.29	3	1.0	2.54	2.19	219	0	219	0.001	36
1330	9770000235	SF-M	14,315	0.33	3	1.0	2.54	2.50	250	0	250	0.001	36
1331	9770000241	SF-M	13,734	0.32	3	1.0	2.54	2.40	240	0	240	0.001	36
1332	9770000246	SF-M	27,766	0.64	3	1.0	2.54	4.86	486	0	486	0.002	36
1333	9770000245	SF-M	30,874	0.71	3	1.0	2.54	5.40	540	0	540	0.002	36
1334	9770000225	SF-M	22,505	0.52	3	1.0	2.54	3.94	394	0	394	0.001	36
1335	9770000240	SF-M	13,703	0.31	3	1.0	2.54	2.40	240	0	240	0.001	36
1336	9770000242	SF-M	13,322	0.31	3	1.0	2.54	2.33	233	0	233	0.001	36
1337	9770000226	SF-M	13,924	0.32	3	1.0	2.54	2.44	244	0	244	0.001	36
1338	0420091093	SF-M	42,627	0.98	3	1.0	2.54	7.46	746	0	746	0.003	47
1339	0420095005	SF-M	42,273	0.97	3	1.0	2.54	7.39	739	0	739	0.003	47
1340	0420106019	SF-M	67,656	1.55	3	1.0	2.54	11.84	1,184	0	1,184	0.004	29B
1341	0420106018	SF-M	28,398	0.65	3	1.0	2.54	4.97	497	0	497	0.002	29B
1342	0420102086	SF-M	25,918	0.60	3	1.0	2.54	4.53	453	0	453	0.002	29B
1343	0420102107	SF-M	42,407	0.97	3	1.0	2.54	7.42	742	0	742	0.003	36
1344	0420102076	SF-M	11,018	0.25	3	1.0	2.54	1.93	193	0	193	0.001	29B
1345	0420102078	SF-M	19,022	0.44	3	1.0	2.54	3.33	333	0	333	0.001	29B
1346	0420102077	SF-M	48,484	1.11	3	1.0	2.54	8.48	848	0	848	0.003	29B
1347	0420102037	P	394,671	9.06	0	0.0	2.54	0.00	0	0	0	0.000	36
1348	9770000219	SF-M	13,482	0.31	3	1.0	2.54	2.36	236	0	236	0.001	36
1349	9770000223	SF-M	13,366	0.31	3	1.0	2.54	2.34	234	0	234	0.001	36
1350	9770000222	SF-M	12,701	0.29	3	1.0	2.54	2.22	222	0	222	0.001	36
1351	3632500060	SF-M	12,814	0.29	3	1.0	2.54	2.24	224	0	224	0.001	36
1352	3632500070	SF-M	12,303	0.28	3	1.0	2.54	2.15	215	0	215	0.001	36
1353	3632500080	SF-M	13,343	0.31	3	1.0	2.54	2.33	233	0	233	0.001	36
1354	3632500030	SF-M	13,019	0.30	3	1.0	2.54	2.28	228	0	228	0.001	36
1355	3632500040	SF-M	10,960	0.25	3	1.0	2.54	1.92	192	0	192	0.001	36
1356	3632500050	SF-M	12,429	0.29	3	1.0	2.54	2.17	217	0	217	0.001	36
1357	3632500013	SF-M	16,505	0.38	3	1.0	2.54	2.89	289	0	289	0.001	36
1358	3632500012	SF-M	11,524	0.26	3	1.0	2.54	2.02	202	0	202	0.001	36
1359	3632500020	SF-M	14,266	0.33	3	1.0	2.54	2.50	250	0	250	0.001	36
1360	9770000211	SF-M	14,599	0.34	3	1.0	2.54	2.55	255	0	255	0.001	36
1361	9770000215	SF-M	14,528	0.33	3	1.0	2.54	2.54	254	0	254	0.001	36
1362	9770000213	SF-M	14,028	0.32	3	1.0	2.54	2.45	245	0	245	0.001	36
1363	9770000210	SF-M	14,582	0.33	3	1.0	2.54	2.55	255	0	255	0.001	36
1364	9770000212	SF-M	14,931	0.34	3	1.0	2.54	2.61	261	0	261	0.001	36
1365	9770000214	SF-M	13,684	0.31	3	1.0	2.54	2.39	239	0	239	0.001	36
1366	9770000206	SF-M	42,920	0.99	3	1.0	2.54	7.51	751	0	751	0.003	36
1367	9770000205	SF-M	11,769	0.27	3	1.0	2.54	2.06	206	0	206	0.001	36
1368	9770000204	SF-M	12,461	0.29	3	1.0	2.54	2.18	218	0	218	0.001	36
1369	9770000216	SF-M	12,139	0.28	3	1.0	2.54	2.12	212	0	212	0.001	36
1370	6020650080	SF-M	20,106	0.46	3	1.0	2.54	3.52	352	0	352	0.001	29B
1371	6020650070	SF-M	21,021	0.48	3	1.0	2.54	3.68	368	0	368	0.001	29B
1372	6020650060	SF-M	20,801	0.48	3	1.0	2.54	3.64	364	0	364	0.001	29B
1373	6020650050	SF-M	24,348	0.56	3	1.0	2.54	4.26	426	0	426	0.001	29B
1374	6020650040	SF-M	15,335	0.35	3	1.0	2.54	2.68	268	0	268	0.001	29B
1375	6020650030	SF-M	17,270	0.40	3	1.0	2.54	3.02	302	0	302	0.001	29B
1376	6020650020	SF-M	16,958	0.39	3	1.0	2.54	2.97	297	0	297	0.001	29B
1377	0420102042	SF-M	36,487	0.84	3	1.0	2.54	6.38	638	0	638	0.002	19
1378	6020650010	SF-M	23,723	0.54	3	1.0	2.54	4.15	415	0	415	0.001	29B
1379	6020650090	SF-M	19,223	0.44	3	1.0	2.54	3.36	336	0	336	0.001	29B
1380	6020650100	SF-M	26,005	0.60	3	1.0	2.54	4.55	455	0	455	0.002	29B
1381	6020650110	SF-M	30,529	0.70	3	1.0	2.54	5.34	534	0	534	0.002	29B
1382	6020650120	SF-M	20,542	0.47	3	1.0	2.54	3.59	359	0	359	0.001	29B
1383	6020650170	SF-M	13,442	0.31	3	1.0	2.54	2.35	235	0	235	0.001	29B
1384	6020650160	SF-M	15,500	0.36	3	1.0	2.54	2.71	271	0	271	0.001	29B
1385	6020650130	SF-M	21,527	0.49	3	1.0	2.54	3.77	377	0	377	0.001	29B
1386	6020650140	SF-M	19,841	0.46	3	1.0	2.54	3.47	347	0	347	0.001	29B
1387	6020650150	SF-M	15,996	0.37	3	1.0	2.54	2.80	280	0	280	0.001	29B
1388	6020650230	SF-M	1,176	0.03	3	1.0	2.54	0.21	21	0	21	0.000	29B
1389	6020650180	SF-M	2,178	0.05	3	1.0	2.54	0.38	38	0	38	0.000	29B
1390	0420102106	SF-M	48,724	1.12	3	1.0	2.54	8.52	852	0	852	0.003	29B
1391	6020650190	SF-M	27,749	0.64	3	1.0	2.54	4.85	485	0	485	0.002	29B
1392	6020650200	SF-M	27,040	0.62	3	1.0	2.54	4.73	473	0	473	0.002	29B
1393	6020650210	SF-M	23,436	0.54	3	1.0	2.54	4.10	410	0	410	0.001	29B
1394	6020650220	SF-M	28,217	0.65	3	1.0	2.54	4.94	494	0	494	0.002	29B
1395	0420102083	SF-M	29,594	0.68	3	1.0	2.54	5.18	518	0	518	0.002	29B
1396	0420102084	SF-M	40,219	0.92	3	1.0	2.54	7.04	704	0	704	0.002	29B
1397	0420102080	SF-M	25,493	0.59	3	1.0	2.54	4.46	446	0	446	0.002	29B
1398	0420102073	SF-M	16,126	0.37	3	1.0	2.54	2.82	282	0	282	0.001	29B
1399	0420102082	SF-M	28,530	0.65	3	1.0	2.54	4.99	499	0	499	0.002	29B
1400	0420102081	SF-M	9,190	0.21	3	1.0	2.54	1.61	161	0	161	0.001	29B
1401	0420102085	SF-M	37,488	0.86	3	1.0	2.54	6.56	656	0	656	0.002	29B
1402	0420102075	SF-M	14,377	0.33	3	1.0	2.54	2.51	251	0	251	0.001	29B
1403	0420102018	P	392,133	9.00	0	0.0	2.54	0.00	0	0	0	0.000	19
1404	9770000150	SF-M	14,745	0.34	3	1.0	2.54	2.58	258	0	258	0.001	36
1405	9770000160	SF-M	15,183	0.35	3	1.0	2.54	2.66	266	0	266	0.001	36
1406	9770000170	SF-M	17,667	0.41	3	1.0	2.54	3.09	309	0	309	0.001	36
1407	9770000140	SF-M	15,438	0.35	3	1.0	2.54	2.70	270	0	270	0.001	36

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Residential Flow Rate = 100 gpcpd
Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1408	4930000010	SF-M	10,655	0.24	3	1.0	2.54	1.86	186	0	186	0.001	36
1409	4930000020	SF-M	10,511	0.24	3	1.0	2.54	1.84	184	0	184	0.001	7
1410	4930000030	SF-M	18,202	0.42	3	1.0	2.54	3.18	318	0	318	0.001	7
1411	4930000040	SF-M	12,089	0.28	3	1.0	2.54	2.11	211	0	211	0.001	7
1412	4930000050	SF-M	12,082	0.28	3	1.0	2.54	2.11	211	0	211	0.001	7
1413	4930000060	SF-M	14,453	0.33	3	1.0	2.54	2.53	253	0	253	0.001	7
1414	4930000070	SF-M	17,386	0.40	3	1.0	2.54	3.04	304	0	304	0.001	7
1415	4930000080	SF-M	17,129	0.39	3	1.0	2.54	3.00	300	0	300	0.001	7
1416	4930000090	SF-M	16,987	0.39	3	1.0	2.54	2.97	297	0	297	0.001	7
1417	0420105006	SF-M	16,032	0.37	3	1.0	2.54	2.80	280	0	280	0.001	7
1418	0420105007	SF-M	24,226	0.56	3	1.0	2.54	4.24	424	0	424	0.001	7
1419	9770000180	SF-M	22,773	0.52	3	1.0	2.54	3.98	398	0	398	0.001	7
1420	4930000100	SF-M	7,928	0.18	3	1.0	2.54	1.39	139	0	139	0.000	7
1421	4930000120	SF-M	8,405	0.19	3	1.0	2.54	1.47	147	0	147	0.001	7
1422	4930000115	SF-M	10,994	0.25	3	1.0	2.54	1.92	192	0	192	0.001	7
1423	4930000116	SF-M	13,069	0.30	3	1.0	2.54	2.29	229	0	229	0.001	7
1424	9770000136	SF-M	16,187	0.37	3	1.0	2.54	2.83	283	0	283	0.001	7
1425	0420094021	SF-M	10,436	0.24	3	1.0	2.54	1.83	183	0	183	0.001	23
1426	4825000110	SF-M	17,056	0.39	3	1.0	2.54	2.98	298	0	298	0.001	23
1427	4825000100	SF-M	11,732	0.27	3	1.0	2.54	2.05	205	0	205	0.001	23
1428	4825000080	SF-M	11,233	0.26	3	1.0	2.54	1.97	197	0	197	0.001	23
1429	4825000070	SF-M	6,498	0.15	3	1.0	2.54	1.14	114	0	114	0.000	23
1430	4825000060	SF-M	1,327	0.03	3	1.0	2.54	0.23	23	0	23	0.000	23
1431	4825000050	SF-M	17,636	0.40	3	1.0	2.54	3.09	309	0	309	0.001	23
1432	4825000040	SF-M	13,968	0.32	3	1.0	2.54	2.44	244	0	244	0.001	23
1433	0420098019	SF-M	61,248	1.41	3	1.0	2.54	10.71	1,071	0	1,071	0.004	23
1434	0420098020	SF-M	47,333	1.09	3	1.0	2.54	8.28	828	0	828	0.003	24
1435	0420098059	SF-M	77,907	1.79	3	1.0	2.54	13.63	1,363	0	1,363	0.005	24
1436	0420094146	SF-M	41,623	0.96	3	1.0	2.54	7.28	728	0	728	0.003	23
1437	0420098038	SF-M	43,102	0.99	3	1.0	2.54	7.54	754	0	754	0.003	23
1438	0420098039	SF-M	60,673	1.39	3	1.0	2.54	10.61	1,061	0	1,061	0.004	24
1439	0420098047	SF-M	49,422	1.13	3	1.0	2.54	8.65	865	0	865	0.003	23
1440	0420098048	SF-M	21,467	0.49	3	1.0	2.54	3.76	376	0	376	0.001	24
1441	0420098034	SF-M	22,386	0.51	3	1.0	2.54	3.92	392	0	392	0.001	24
1442	0420094022	SF-M	42,600	0.98	3	1.0	2.54	7.45	745	0	745	0.003	23
1443	0420094054	SF-M	41,974	0.96	3	1.0	2.54	7.34	734	0	734	0.003	24
1445	0420107015	SF-M	17,236	0.40	3	1.0	2.54	3.02	302	0	302	0.001	29B
1446	0420107014	SF-M	21,717	0.50	3	1.0	2.54	3.80	380	0	380	0.001	29B
1447	0420107016	SF-M	6,664	0.15	3	1.0	2.54	1.17	117	0	117	0.000	29B
1448	0420103069	SF-M	5,242	0.12	3	1.0	2.54	0.92	92	0	92	0.000	29B
1449	0420103151	P	7,898	0.18	0	0.0	2.54	0.00	0	0	0	0.000	29B
1450	0420103129	SF-M	15,094	0.35	3	1.0	2.54	2.64	264	0	264	0.001	29B
1451	0420103144	SF-M	13,991	0.32	3	1.0	2.54	2.45	245	0	245	0.001	29B
1452	0420103143	SF-M	12,645	0.29	3	1.0	2.54	2.21	221	0	221	0.001	29B
1453	0420107025	SF-M	7,158	0.16	3	1.0	2.54	1.25	125	0	125	0.000	29B
1454	0420107022	SF-M	13,717	0.31	3	1.0	2.54	2.40	240	0	240	0.001	29B
1456	0420107024	SF-M	47,461	1.09	3	1.0	2.54	8.30	830	0	830	0.003	29B
1457	0420103105	SF-M	41,157	0.94	3	1.0	2.54	7.20	720	0	720	0.003	29B
1458	0420107008	SF-M	16,856	0.39	3	1.0	2.54	2.95	295	0	295	0.001	29B
1459	0420107009	SF-M	16,734	0.38	3	1.0	2.54	2.93	293	0	293	0.001	29B
1460	0420107010	SF-M	16,551	0.38	3	1.0	2.54	2.90	290	0	290	0.001	29B
1461	0420107045	SF-M	99,594	2.29	3	1.0	2.54	17.42	1,742	0	1,742	0.006	29B
1462	0420107055	SF-M	27,024	0.62	3	1.0	2.54	4.73	473	0	473	0.002	29B
1463	0420107036	SF-M	35,733	0.82	3	1.0	2.54	6.25	625	0	625	0.002	29B
1464	0420103019	SF-M	41,502	0.95	3	1.0	2.54	7.26	726	0	726	0.003	29B
1465	0420107033	SF-M	24,188	0.56	3	1.0	2.54	4.23	423	0	423	0.001	29B
1466	0420107047	SF-M	64,364	1.48	3	1.0	2.54	11.26	1,126	0	1,126	0.004	7
1467	0420103132	P	218,531	5.02	0	0.0	2.54	0.00	0	0	0	0.000	29B
1468	3850500011	SF-M	30,646	0.70	3	1.0	2.54	5.36	536	0	536	0.002	29B
1469	0420103181	SF-M	16,957	0.39	3	1.0	2.54	2.97	297	0	297	0.001	29B
1470	0420103184	SF-M	17,952	0.41	3	1.0	2.54	3.14	314	0	314	0.001	7
1471	3850500041	SF-M	13,790	0.32	3	1.0	2.54	2.41	241	0	241	0.001	7
1472	3850500051	SF-M	14,418	0.33	3	1.0	2.54	2.52	252	0	252	0.001	7
1473	3850500031	SF-M	17,648	0.41	3	1.0	2.54	3.09	309	0	309	0.001	7
1474	3850500021	SF-M	22,458	0.52	3	1.0	2.54	3.93	393	0	393	0.001	7
1475	3850500091	SF-M	21,923	0.50	3	1.0	2.54	3.83	383	0	383	0.001	7
1476	3850500081	SF-M	17,080	0.39	3	1.0	2.54	2.99	299	0	299	0.001	7
1477	3850500061	SF-M	14,570	0.33	3	1.0	2.54	2.55	255	0	255	0.001	7
1478	3850500071	SF-M	12,918	0.30	3	1.0	2.54	2.26	226	0	226	0.001	7
1479	0420104018	P	188,665	4.33	0	0.0	2.54	0.00	0	0	0	0.000	7
1480	0420104107	SF-M	48,841	1.12	3	1.0	2.54	8.54	854	0	854	0.003	7
1481	0420104136	SF-M	29,805	0.68	3	1.0	2.54	5.21	521	0	521	0.002	7
1482	0420104043	SF-M	24,687	0.57	3	1.0	2.54	4.32	432	0	432	0.002	7
1483	0420104040	SF-M	31,455	0.72	3	1.0	2.54	5.50	550	0	550	0.002	7
1484	0420104021	SF-M	31,187	0.72	3	1.0	2.54	5.46	546	0	546	0.002	7
1485	3625000093	SF-M	14,320	0.33	3	1.0	2.54	2.51	251	0	251	0.001	13
1486	3625000092	SF-M	11,915	0.27	3	1.0	2.54	2.08	208	0	208	0.001	13
1487	3625000091	SF-M	9,802	0.23	3	1.0	2.54	1.71	171	0	171	0.001	13
1488	3625000080	SF-M	8,965	0.21	3	1.0	2.54	1.57	157	0	157	0.001	13
1489	3625000070	SF-M	6,182	0.14	3	1.0	2.54	1.08	108	0	108	0.000	13
1490	3625000060	SF-M	3,880	0.09	3	1.0	2.54	0.68	68	0	68	0.000	13

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ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1491	3625000050	SF-M	5,712	0.13	3	1.0	2.54	1.00	100	0	100	0.000	13
1492	3625000100	SF-M	2,191	0.05	3	1.0	2.54	0.38	38	0	38	0.000	13
1493	3625000040	SF-M	31	0.00	3	1.0	2.54	0.01	1	0	1	0.000	13
1494	3625000021	SF-M	2	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1495	3625000010	SF-M	3	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1496	3625000360	SF-M	226	0.01	3	1.0	2.54	0.04	4	0	4	0.000	13
1497	3625000350	SF-M	172	0.00	3	1.0	2.54	0.03	3	0	3	0.000	13
1498	3625000340	SF-M	108	0.00	3	1.0	2.54	0.02	2	0	2	0.000	13
1499	3625000330	SF-M	89	0.00	3	1.0	2.54	0.02	2	0	2	0.000	13
1500	3625000311	SF-M	128	0.00	3	1.0	2.54	0.02	2	0	2	0.000	13
1501	3625000300	SF-M	42	0.00	3	1.0	2.54	0.01	1	0	1	0.000	13
1502	3625000290	SF-M	31	0.00	3	1.0	2.54	0.01	1	0	1	0.000	13
1503	3625000280	SF-M	9	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1504	3625000270	SF-M	2	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1505	3625000260	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1506	3625000250	SF-M	2	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1507	3625000240	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1508	3625000230	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1509	3625000220	SF-M	1,508	0.03	3	1.0	2.54	0.26	26	0	26	0.000	13
1510	3625000210	SF-M	1	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1511	3625000200	SF-M	1	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1512	3625000190	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1513	3625000130	SF-M	5,804	0.13	3	1.0	2.54	1.02	102	0	102	0.000	29B
1514	3625000111	SF-M	4,444	0.10	3	1.0	2.54	0.78	78	0	78	0.000	29B
1515	3625000140	SF-M	5,730	0.13	3	1.0	2.54	1.00	100	0	100	0.000	29B
1516	3625000150	SF-M	6,229	0.14	3	1.0	2.54	1.09	109	0	109	0.000	13
1517	3625000160	SF-M	4,085	0.09	3	1.0	2.54	0.71	71	0	71	0.000	13
1518	3625000180	SF-M	2,491	0.06	3	1.0	2.54	0.44	44	0	44	0.000	13
1519	3625000170	SF-M	7,989	0.18	3	1.0	2.54	1.40	140	0	140	0.000	13
1520	0420107043	SF-M	50,448	1.16	3	1.0	2.54	8.82	882	0	882	0.003	29B
1521	0420107044	SF-M	43,480	1.00	3	1.0	2.54	7.61	761	0	761	0.003	29B
1522	0420107056	SF-M	39,699	0.91	3	1.0	2.54	6.94	694	0	694	0.002	29B
1523	0420107037	SF-M	41,969	0.96	3	1.0	2.54	7.34	734	0	734	0.003	29B
1524	0420107050	SF-M	22,099	0.51	3	1.0	2.54	3.87	387	0	387	0.001	7
1525	0420107051	SF-M	22,106	0.51	3	1.0	2.54	3.87	387	0	387	0.001	7
1526	0420107040	SF-M	12,851	0.30	3	1.0	2.54	2.25	225	0	225	0.001	7
1527	0420107038	SF-M	41,516	0.95	3	1.0	2.54	7.26	726	0	726	0.003	29B
1528	0420107041	SF-M	41,260	0.95	3	1.0	2.54	7.22	722	0	722	0.003	7
1529	0420107042	SF-M	19,547	0.45	3	1.0	2.54	3.42	342	0	342	0.001	7
1530	0420103175	SF-M	33,113	0.76	3	1.0	2.54	5.79	579	0	579	0.002	7
1531	0420103180	SF-M	18,249	0.42	3	1.0	2.54	3.19	319	0	319	0.001	7
1532	0420103179	SF-M	368	0.01	3	1.0	2.54	0.06	6	0	6	0.000	7
1533	0420107052	SF-M	24,586	0.56	3	1.0	2.54	4.30	430	0	430	0.002	7
1534	0420107053	SF-M	19,118	0.44	3	1.0	2.54	3.34	334	0	334	0.001	7
1535	0420107054	SF-M	15,428	0.35	3	1.0	2.54	2.70	270	0	270	0.001	7
1536	0420103056	SF-M	30,179	0.69	3	1.0	2.54	5.28	528	0	528	0.002	7
1537	0420103036	SF-M	14,940	0.34	3	1.0	2.54	2.61	261	0	261	0.001	7
1538	0420103067	SF-M	21,596	0.50	3	1.0	2.54	3.78	378	0	378	0.001	7
1539	0420103037	SF-M	38,762	0.89	3	1.0	2.54	6.78	678	0	678	0.002	7
1540	0420104035	SF-M	14,559	0.33	3	1.0	2.54	2.55	255	0	255	0.001	7
1541	0420104086	SF-M	1,068	0.02	3	1.0	2.54	0.19	19	0	19	0.000	7
1542	0420104085	SF-M	15,527	0.36	3	1.0	2.54	2.72	272	0	272	0.001	7
1543	0420104038	SF-M	44,558	1.02	3	1.0	2.54	7.79	779	0	779	0.003	7
1544	0420104031	SF-M	25,734	0.59	3	1.0	2.54	4.50	450	0	450	0.002	7
1545	0420104102	SF-M	17,560	0.40	3	1.0	2.54	3.07	307	0	307	0.001	7
1546	0420108001	SF-M	14,017	0.32	3	1.0	2.54	2.45	245	0	245	0.001	7
1547	0420108002	SF-M	14,820	0.34	3	1.0	2.54	2.59	259	0	259	0.001	7
1548	0420104054	SF-M	20,111	0.46	3	1.0	2.54	3.52	352	0	352	0.001	7
1549	0420104048	SF-M	25,694	0.59	3	1.0	2.54	4.49	449	0	449	0.002	7
1550	0420104055	SF-M	23,194	0.53	3	1.0	2.54	4.06	406	0	406	0.001	7
1551	0420104098	SF-M	17,526	0.40	3	1.0	2.54	3.07	307	0	307	0.001	7
1552	0420104099	SF-M	18,075	0.41	3	1.0	2.54	3.16	316	0	316	0.001	7
1553	0420104141	SF-M	15,435	0.35	3	1.0	2.54	2.70	270	0	270	0.001	7
1554	0420104122	SF-M	11,140	0.26	3	1.0	2.54	1.95	195	0	195	0.001	7
1555	0420104140	SF-M	9,788	0.22	3	1.0	2.54	1.71	171	0	171	0.001	7
1556	0420104139	SF-M	17,391	0.40	3	1.0	2.54	3.04	304	0	304	0.001	7
1557	0420104103	SF-M	24,613	0.57	3	1.0	2.54	4.31	431	0	431	0.002	7
1558	0420104104	SF-M	15,547	0.36	3	1.0	2.54	2.72	272	0	272	0.001	7
1559	0420094059	SF-M	94,539	2.17	3	1.0	2.54	16.54	1,654	0	1,654	0.006	1
1560	0420094094	SF-M	39,346	0.90	3	1.0	2.54	6.88	688	0	688	0.002	1
1561	0420098009	SF-M	19,393	0.45	3	1.0	2.54	3.39	339	0	339	0.001	1
1562	0420098010	SF-M	20,159	0.46	3	1.0	2.54	3.53	353	0	353	0.001	1
1563	0420098027	SF-M	45,425	1.04	3	1.0	2.54	7.95	795	0	795	0.003	1
1564	0420098028	SF-M	44,782	1.03	3	1.0	2.54	7.83	783	0	783	0.003	1
1565	0420094081	SF-M	49,555	1.14	3	1.0	2.54	8.67	867	0	867	0.003	1
1566	0420094092	SF-M	39,449	0.91	3	1.0	2.54	6.90	690	0	690	0.002	1
1567	0420094103	SF-M	22,905	0.53	3	1.0	2.54	4.01	401	0	401	0.001	1
1568	0420094104	SF-M	16,952	0.39	3	1.0	2.54	2.97	297	0	297	0.001	1
1569	0420098044	SF-M	101,263	2.32	3	1.0	2.54	17.71	1,771	0	1,771	0.006	1
1570	0420098061	SF-M	76,662	1.76	3	1.0	2.54	13.41	1,341	0	1,341	0.005	1
1571	0420098062	SF-M	36,587	0.84	3	1.0	2.54	6.40	640	0	640	0.002	1

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Residential Flow Rate = 100 gpcpd
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ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1572	0420098063	SF-M	36,532	0.84	3	1.0	2.54	6.39	639	0	639	0.002	1
1573	0420098064	SF-M	36,477	0.84	3	1.0	2.54	6.38	638	0	638	0.002	1
1574	0420098014	SF-M	84,727	1.95	3	1.0	2.54	14.82	1,482	0	1,482	0.005	10A
1575	0420098056	SF-M	116,993	2.69	3	1.0	2.54	20.47	2,047	0	2,047	0.007	1
1576	0420098053	SF-M	21,903	0.50	3	1.0	2.54	3.83	383	0	383	0.001	1
1577	0420098055	SF-M	20,247	0.46	3	1.0	2.54	3.54	354	0	354	0.001	1
1578	0420098054	SF-M	19,900	0.46	3	1.0	2.54	3.48	348	0	348	0.001	1
1579	0420094105	SF-M	17,176	0.39	3	1.0	2.54	3.00	300	0	300	0.001	1
1580	0420094095	SF-M	11,719	0.27	3	1.0	2.54	2.05	205	0	205	0.001	1
1581	0420094106	SF-M	12,831	0.29	3	1.0	2.54	2.24	224	0	224	0.001	1
1582	0420094089	SF-M	13,035	0.30	3	1.0	2.54	2.28	228	0	228	0.001	1
1583	0420094086	SF-M	12,622	0.29	3	1.0	2.54	2.21	221	0	221	0.001	10A
1584	0420094090	SF-M	12,883	0.30	3	1.0	2.54	2.25	225	0	225	0.001	10A
1585	0420094107	SF-M	44,370	1.02	3	1.0	2.54	7.76	776	0	776	0.003	1
1586	0420094077	SF-M	13,161	0.30	3	1.0	2.54	2.30	230	0	230	0.001	1
1587	0420094043	SF-M	13,180	0.30	3	1.0	2.54	2.31	231	0	231	0.001	8
1588	0420094038	SF-M	13,313	0.31	3	1.0	2.54	2.33	233	0	233	0.001	8
1589	0420094084	SF-M	13,960	0.32	3	1.0	2.54	2.44	244	0	244	0.001	10A
1590	0420094102	SF-M	13,420	0.31	3	1.0	2.54	2.35	235	0	235	0.001	10A
1591	0420094101	SF-M	13,454	0.31	3	1.0	2.54	2.35	235	0	235	0.001	10A
1592	0420094039	SF-M	12,520	0.29	3	1.0	2.54	2.19	219	0	219	0.001	8
1593	0420094045	SF-M	12,639	0.29	3	1.0	2.54	2.21	221	0	221	0.001	8
1594	0420094042	SF-M	12,538	0.29	3	1.0	2.54	2.19	219	0	219	0.001	8
1595	0420103111	SF-M	3,556	0.08	3	1.0	2.54	0.62	62	0	62	0.000	13
1596	0420103107	SF-M	3	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1597	0420103141	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1598	0420103142	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	13
1599	0420103108	SF-M	1,317	0.03	3	1.0	2.54	0.23	23	0	23	0.000	13
1600	0420103109	SF-M	15,275	0.35	3	1.0	2.54	2.67	267	0	267	0.001	13
1601	0420103110	SF-M	15,122	0.35	3	1.0	2.54	2.65	265	0	265	0.001	13
1602	0420103092	SF-M	15,085	0.35	3	1.0	2.54	2.64	264	0	264	0.001	13
1603	0420103079	SF-M	8,858	0.20	3	1.0	2.54	1.55	155	0	155	0.001	13
1605	0420103046	SF-M	25,952	0.60	3	1.0	2.54	4.54	454	0	454	0.002	13
1606	0420103049	SF-M	44,438	1.02	3	1.0	2.54	7.77	777	0	777	0.003	13
1607	0420103116	SF-M	28,378	0.65	3	1.0	2.54	4.96	496	0	496	0.002	13
1608	0420103115	SF-M	17,137	0.39	3	1.0	2.54	3.00	300	0	300	0.001	13
1609	0420103113	SF-M	17,098	0.39	3	1.0	2.54	2.99	299	0	299	0.001	13
1611	0420103041	SF-M	28,055	0.64	3	1.0	2.54	4.91	491	0	491	0.002	6
1612	0420103035	SF-M	9,892	0.23	3	1.0	2.54	1.73	173	0	173	0.001	6
1613	0420107049	SF-M	49,528	1.14	3	1.0	2.54	8.66	866	0	866	0.003	13
1614	0420107048	SF-M	30,090	0.69	3	1.0	2.54	5.26	526	0	526	0.002	6
1615	0420103025	SF-M	36,622	0.84	3	1.0	2.54	6.41	641	0	641	0.002	13
1616	0420103064	SF-M	22,733	0.52	3	1.0	2.54	3.98	398	0	398	0.001	13
1617	0420103066	SF-M	19,842	0.46	3	1.0	2.54	3.47	347	0	347	0.001	6
1618	0420103071	SF-M	14,161	0.33	3	1.0	2.54	2.48	248	0	248	0.001	13
1619	0420103018	SF-M	22,189	0.51	3	1.0	2.54	3.88	388	0	388	0.001	6
1620	0420103123	SF-M	40,188	0.92	3	1.0	2.54	7.03	703	0	703	0.002	13
1621	0420107001	SF-M	45,905	1.05	3	1.0	2.54	8.03	803	0	803	0.003	13
1622	0420107002	SF-M	47,474	1.09	3	1.0	2.54	8.30	830	0	830	0.003	13
1623	0420107029	SF-M	59,930	1.38	3	1.0	2.54	10.48	1,048	0	1,048	0.004	7
1624	0420107028	SF-M	48,894	1.12	3	1.0	2.54	8.55	855	0	855	0.003	7
1625	0420107027	SF-M	49,593	1.14	3	1.0	2.54	8.68	868	0	868	0.003	7
1626	0420107026	SF-M	50,351	1.16	3	1.0	2.54	8.81	881	0	881	0.003	7
1627	0420103173	SF-M	22,231	0.51	3	1.0	2.54	3.89	389	0	389	0.001	7
1628	0420103174	SF-M	31,257	0.72	3	1.0	2.54	5.47	547	0	547	0.002	7
1629	0420103120	SF-M	4,236	0.10	3	1.0	2.54	0.74	74	0	74	0.000	7
1630	0420103060	SF-M	9,190	0.21	3	1.0	2.54	1.61	161	0	161	0.001	7
1631	0420103053	SF-M	9,367	0.22	3	1.0	2.54	1.64	164	0	164	0.001	7
1632	0420103122	SF-M	24,461	0.56	3	1.0	2.54	4.28	428	0	428	0.001	7
1633	0420107032	SF-M	79,958	1.84	3	1.0	2.54	13.99	1,399	0	1,399	0.005	13
1634	0420103134	SF-M	13,843	0.32	3	1.0	2.54	2.42	242	0	242	0.001	7
1635	0420103163	SF-M	21,415	0.49	3	1.0	2.54	3.75	375	0	375	0.001	7
1636	0420103171	SF-M	23,789	0.55	3	1.0	2.54	4.16	416	0	416	0.001	7
1637	0420103170	SF-M	14,503	0.33	3	1.0	2.54	2.54	254	0	254	0.001	7
1638	0420107004	SF-M	76,228	1.75	3	1.0	2.54	13.33	1,333	0	1,333	0.005	13
1639	0420103150	SF-M	37,905	0.87	3	1.0	2.54	6.63	663	0	663	0.002	7
1640	0420103054	SF-M	40,895	0.94	3	1.0	2.54	7.15	715	0	715	0.003	6
1641	0420107012	SF-M	36,152	0.83	3	1.0	2.54	6.32	632	0	632	0.002	6
1642	0420107013	SF-M	24,867	0.57	3	1.0	2.54	4.35	435	0	435	0.002	7
1643	0420103062	SF-M	2,032	0.05	3	1.0	2.54	0.36	36	0	36	0.000	7
1644	0420103021	SF-M	2,004	0.05	3	1.0	2.54	0.35	35	0	35	0.000	7
1645	0420103127	SF-M	11,884	0.27	3	1.0	2.54	2.08	208	0	208	0.001	7
1646	0420103128	SF-M	17,835	0.41	3	1.0	2.54	3.12	312	0	312	0.001	7
1647	0420103022	SF-M	25,488	0.59	3	1.0	2.54	4.46	446	0	446	0.002	7
1648	0420103061	SF-M	25,493	0.59	3	1.0	2.54	4.46	446	0	446	0.002	7
1649	0420103014	SF-M	52,435	1.20	3	1.0	2.54	9.17	917	0	917	0.003	7
1650	0420103055	SF-M	29,135	0.67	3	1.0	2.54	5.10	510	0	510	0.002	7
1651	0420107005	SF-M	13,118	0.30	3	1.0	2.54	2.29	229	0	229	0.001	7
1652	0420107006	SF-M	8,424	0.19	3	1.0	2.54	1.47	147	0	147	0.001	7
1653	0420107007	SF-M	8,039	0.18	3	1.0	2.54	1.41	141	0	141	0.000	7
1654	0420103076	SF-M	34,394	0.79	3	1.0	2.54	6.02	602	0	602	0.002	7

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1655	0420103080	SF-M	10,090	0.23	3	1.0	2.54	1.77	177	0	177	0.001	7
1656	0420103185	SF-M	14,479	0.33	3	1.0	2.54	2.53	253	0	253	0.001	7
1657	0420103168	SF-M	20,105	0.46	3	1.0	2.54	3.52	352	0	352	0.001	7
1658	0420103169	SF-M	30,451	0.70	3	1.0	2.54	5.33	533	0	533	0.002	7
1659	0420103058	SF-M	43,460	1.00	3	1.0	2.54	7.60	760	0	760	0.003	7
1660	0420103088	SF-M	29,171	0.67	3	1.0	2.54	5.10	510	0	510	0.002	7
1661	0420103059	SF-M	38,177	0.88	3	1.0	2.54	6.68	668	0	668	0.002	7
1662	0420103073	SF-M	33,638	0.77	3	1.0	2.54	5.88	588	0	588	0.002	7
1663	0420103068	SF-M	6,900	0.16	3	1.0	2.54	1.21	121	0	121	0.000	7
1664	0420107018	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	7
1665	0420107019	SF-M	11	0.00	3	1.0	2.54	0.00	0	0	0	0.000	7
1666	0420107020	SF-M	2,483	0.06	3	1.0	2.54	0.43	43	0	43	0.000	7
1667	0420107021	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	6
1668	0420103070	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	6
1669	0420104050	SF-M	17,385	0.40	3	1.0	2.54	3.04	304	0	304	0.001	6
1670	0420104052	SF-M	18,393	0.42	3	1.0	2.54	3.22	322	0	322	0.001	6
1671	0420104053	SF-M	18,413	0.42	3	1.0	2.54	3.22	322	0	322	0.001	6
1672	0420104057	SF-M	8,577	0.20	3	1.0	2.54	1.50	150	0	150	0.001	6
1673	0420104056	SF-M	292	0.01	3	1.0	2.54	0.05	5	0	5	0.000	6
1674	0420104058	SF-M	14,790	0.34	3	1.0	2.54	2.59	259	0	259	0.001	6
1675	0420104006	SF-M	41,914	0.96	3	1.0	2.54	7.33	733	0	733	0.003	6
1676	0420104076	SF-M	38,984	0.89	3	1.0	2.54	6.82	682	0	682	0.002	6
1677	0420104075	SF-M	40,230	0.92	3	1.0	2.54	7.04	704	0	704	0.002	6
1678	0420104016	SF-M	35,809	0.82	3	1.0	2.54	6.26	626	0	626	0.002	6
1679	0420104108	SF-M	90	0.00	3	1.0	2.54	0.02	2	0	2	0.000	6
1680	0420104109	SF-M	460	0.01	3	1.0	2.54	0.08	8	0	8	0.000	6
1681	0420104096	SF-M	62	0.00	3	1.0	2.54	0.01	1	0	1	0.000	6
1682	0420104127	SF-M	396	0.01	3	1.0	2.54	0.07	7	0	7	0.000	7
1683	0420104128	SF-M	927	0.02	3	1.0	2.54	0.16	16	0	16	0.000	7
1684	0420104078	SF-M	0	0.00	3	1.0	2.54	0.00	0	0	0	0.000	7
1685	6020210200	SF-M	476,660	10.94	3	1.0	2.54	83.38	8,338	0	8,338	0.029	1
1686	6020210090	SF-M	14,238	0.33	3	1.0	2.54	2.49	249	0	249	0.001	1
1687	6020210080	SF-M	14,335	0.33	3	1.0	2.54	2.51	251	0	251	0.001	1
1688	6020210070	SF-M	14,824	0.34	3	1.0	2.54	2.59	259	0	259	0.001	1
1689	6020210060	SF-M	13,922	0.32	3	1.0	2.54	2.44	244	0	244	0.001	1
1690	6020210050	SF-M	13,060	0.30	3	1.0	2.54	2.28	228	0	228	0.001	1
1691	6020210040	SF-M	13,474	0.31	3	1.0	2.54	2.36	236	0	236	0.001	1
1692	6020210030	SF-M	12,925	0.30	3	1.0	2.54	2.26	226	0	226	0.001	1
1693	6020210020	SF-M	13,014	0.30	3	1.0	2.54	2.28	228	0	228	0.001	1
1694	6020210010	SF-M	15,404	0.35	3	1.0	2.54	2.69	269	0	269	0.001	1
1695	6020210100	SF-M	13,537	0.31	3	1.0	2.54	2.37	237	0	237	0.001	1
1696	6020210110	SF-M	12,275	0.28	3	1.0	2.54	2.15	215	0	215	0.001	1
1697	6020210120	SF-M	12,077	0.28	3	1.0	2.54	2.11	211	0	211	0.001	1
1698	6020210130	SF-M	12,944	0.30	3	1.0	2.54	2.26	226	0	226	0.001	1
1699	6020210140	SF-M	14,059	0.32	3	1.0	2.54	2.46	246	0	246	0.001	1
1700	6020210150	SF-M	13,843	0.32	3	1.0	2.54	2.42	242	0	242	0.001	1
1701	6020210160	SF-M	13,763	0.32	3	1.0	2.54	2.41	241	0	241	0.001	1
1702	6020210170	SF-M	13,447	0.31	3	1.0	2.54	2.35	235	0	235	0.001	1
1703	6020210180	SF-M	17,686	0.41	3	1.0	2.54	3.09	309	0	309	0.001	1
1704	5002000080	SF-M	15,257	0.35	3	1.0	2.54	2.67	267	0	267	0.001	1
1705	5002000070	SF-M	11,333	0.26	3	1.0	2.54	1.98	198	0	198	0.001	1
1706	5002000060	SF-M	10,222	0.23	3	1.0	2.54	1.79	179	0	179	0.001	1
1707	5002000050	SF-M	9,790	0.22	3	1.0	2.54	1.71	171	0	171	0.001	1
1708	5002000040	SF-M	9,512	0.22	3	1.0	2.54	1.66	166	0	166	0.001	1
1709	5002000031	SF-M	16,432	0.38	3	1.0	2.54	2.87	287	0	287	0.001	1
1710	5002000011	SF-M	17,033	0.39	3	1.0	2.54	2.98	298	0	298	0.001	1
1711	6020210190	SF-M	13,003	0.30	3	1.0	2.54	2.27	227	0	227	0.001	1
1712	5002000090	SF-M	10,913	0.25	3	1.0	2.54	1.91	191	0	191	0.001	1
1713	5002000100	SF-M	11,603	0.27	3	1.0	2.54	2.03	203	0	203	0.001	1
1714	5002000110	SF-M	12,496	0.29	3	1.0	2.54	2.19	219	0	219	0.001	1
1715	5002000120	SF-M	12,663	0.29	3	1.0	2.54	2.22	222	0	222	0.001	1
1716	5002000130	SF-M	12,722	0.29	3	1.0	2.54	2.23	223	0	223	0.001	1
1717	0420161135	SF-M	685,839	15.74	3	1.0	2.54	119.97	11,997	0	11,997	0.042	1
1718	0420161040	SF-M	36,790	0.84	3	1.0	2.54	6.44	644	0	644	0.002	1
1719	0420165024	SF-M	18,682	0.43	3	1.0	2.54	3.27	327	0	327	0.001	1
1720	0420165023	SF-M	14,414	0.33	3	1.0	2.54	2.52	252	0	252	0.001	1
1721	0420161126	SF-M	142,101	3.26	3	1.0	2.54	24.86	2,486	0	2,486	0.009	1
1722	9811500010	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1723	9811500020	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1724	9811500030	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1725	9811500040	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1726	9811500050	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1727	9811500060	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1728	9811500070	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1729	9811500080	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1730	9811500090	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1731	9811500100	SF-M	78	0.00	3	1.0	2.54	0.01	1	0	1	0.000	1
1732	0420161045	SF-M	22,520	0.52	3	1.0	2.54	3.94	394	0	394	0.001	1
1733	0420161133	SF-M	32,958	0.76	3	1.0	2.54	5.77	577	0	577	0.002	1
1734	0420161134	SF-M	59,012	1.35	3	1.0	2.54	10.32	1,032	0	1,032	0.004	1
1735	0420161131	SF-M	15,914	0.37	3	1.0	2.54	2.78	278	0	278	0.001	1

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Phase 2 Area Flow Calculations
May 14, 2014

Residential Flow Rate = 100 gpcpd
Peaking Factor = 3.50

ID #	Tax Parcel	Zoning	Buildable Area (SF)	Buildable Area (acres)	Population Density	Flow Factor	HH Size	Population	Average Residential Flow (gal/day)	Average Commercial/ Industrial Flow (gal/day)	Total Average Flow (gal/day)	Peak Design Flow (mgd)	Pipe Segment
1736	0420161099	SF-M	14,189	0.33	3	1.0	2.54	2.48	248	0	248	0.001	1
1737	0420165022	SF-M	23,070	0.53	3	1.0	2.54	4.04	404	0	404	0.001	1
1738	0420165021	SF-M	21,697	0.50	3	1.0	2.54	3.80	380	0	380	0.001	1
1739	0420161027	SF-M	15,235	0.35	3	1.0	2.54	2.67	267	0	267	0.001	8
1740	0420165001	SF-M	9,707	0.22	3	1.0	2.54	1.70	170	0	170	0.001	8
1741	0420161124	SF-M	22,289	0.51	3	1.0	2.54	3.90	390	0	390	0.001	8
1742	0420161125	SF-M	2,976	0.07	3	1.0	2.54	0.52	52	0	52	0.000	8
1743	0420161091	SF-M	56,066	1.29	3	1.0	2.54	9.81	981	0	981	0.003	8
1744	0420161067	SF-M	21,456	0.49	3	1.0	2.54	3.75	375	0	375	0.001	8
1745	0420161073	SF-M	27,512	0.63	3	1.0	2.54	4.81	481	0	481	0.002	8
1746	0420161101	SF-M	3,013	0.07	3	1.0	2.54	0.53	53	0	53	0.000	8
1747	0420161053	SF-M	15,332	0.35	3	1.0	2.54	2.68	268	0	268	0.001	8
1748	0420161078	SF-M	12,377	0.28	3	1.0	2.54	2.17	217	0	217	0.001	8
1749	0420161079	SF-M	12,208	0.28	3	1.0	2.54	2.14	214	0	214	0.001	8
1750	0420161028	SF-M	21,210	0.49	3	1.0	2.54	3.71	371	0	371	0.001	8
1751	0420165010	SF-M	18,549	0.43	3	1.0	2.54	3.24	324	0	324	0.001	8
1752	0420165011	SF-M	17,359	0.40	3	1.0	2.54	3.04	304	0	304	0.001	8
1753	0420161102	SF-M	3,149	0.07	3	1.0	2.54	0.55	55	0	55	0.000	8
1754	0420161080	SF-M	10,402	0.24	3	1.0	2.54	1.82	182	0	182	0.001	8
1755	0420161000	SF-M	14,438	0.33	3	1.0	2.54	2.53	253	0	253	0.001	8
1756	0420161081	SF-M	10,896	0.25	3	1.0	2.54	1.91	191	0	191	0.001	8
1757	0420161062	SF-M	8,951	0.21	3	1.0	2.54	1.57	157	0	157	0.001	4
1758	0420161063	SF-M	9,344	0.21	3	1.0	2.54	1.63	163	0	163	0.001	4
1759	0420161064	SF-M	9,120	0.21	3	1.0	2.54	1.60	160	0	160	0.001	4
1760	0420161065	SF-M	13,343	0.31	3	1.0	2.54	2.33	233	0	233	0.001	4
1761	0420161121	SF-M	3,138	0.07	3	1.0	2.54	0.55	55	0	55	0.000	4
1762	0420165013	SF-M	173,612	3.99	3	1.0	2.54	30.37	3,037	0	3,037	0.011	1
1763	0420165014	SF-M	41,825	0.96	3	1.0	2.54	7.32	732	0	732	0.003	1
1764	0420165012	SF-M	93,497	2.15	3	1.0	2.54	16.36	1,636	0	1,636	0.006	1
1767	0420152049	SF-M	51,733	1.19	3	1.0	2.54	9.05	905	0	905	0.003	13
1768	0420152050	SF-M	58,593	1.35	3	1.0	2.54	10.25	1,025	0	1,025	0.004	13
1769	0420152058	SF-M	34,050	0.78	3	1.0	2.54	5.96	596	0	596	0.002	13
1770	0420152056	SF-M	30,352	0.70	3	1.0	2.54	5.31	531	0	531	0.002	13
1771	0420152115	SF-M	60,114	1.38	3	1.0	2.54	10.52	1,052	0	1,052	0.004	13
1772	0420152114	SF-M	50,332	1.16	3	1.0	2.54	8.80	880	0	880	0.003	13
1773	0420152070	SF-M	116,600	2.68	3	1.0	2.54	20.40	2,040	0	2,040	0.007	13
1774	0420152069	SF-M	63,185	1.45	3	1.0	2.54	11.05	1,105	0	1,105	0.004	13
1775	0420152077	SF-M	24,416	0.56	3	1.0	2.54	4.27	427	0	427	0.001	13
1776	0420156012	SF-M	49,017	1.13	3	1.0	2.54	8.57	857	0	857	0.003	13
1777	0420152072	SF-M	29,460	0.68	3	1.0	2.54	5.15	515	0	515	0.002	13
1778	0420156013	SF-M	66,229	1.52	3	1.0	2.54	11.59	1,159	0	1,159	0.004	13
1779	0420156014	SF-M	21,714	0.50	3	1.0	2.54	3.80	380	0	380	0.001	13
1780	0420156015	SF-M	21,405	0.49	3	1.0	2.54	3.74	374	0	374	0.001	13
1781	0420152143	SF-M	48,910	1.12	3	1.0	2.54	8.56	856	0	856	0.003	13
1782	0420156026	SF-M	20,231	0.46	3	1.0	2.54	3.54	354	0	354	0.001	13
1783	0420156025	SF-M	24,722	0.57	3	1.0	2.54	4.32	432	0	432	0.002	13
1784	0420152042	SF-M	86,348	1.98	3	1.0	2.54	15.10	1,510	0	1,510	0.005	13
1136A	0420033006	C	15,437	0.35	8	0.5	2.54	3.60	360	532	892	0.003	43
1136B	0420033006	SF-M	24,458	0.56	3	1.0	2.54	4.28	428	0	428	0.001	43
1444A	0420107031	TC	52,541	1.21	10	0.5	2.54	15.32	1,532	1,809	3,341	0.012	19
1444B	0420107032	SF-M	181,361	4.16	3	1.0	2.54	31.73	3,173	0	3,173	0.011	19
1604A	0420103040	MUR	5,791	0.13	6	0.5	2.54	1.01	101	166	267	0.001	13
1604B	0420103040	SF-M	13,884	0.32	3	1.0	2.54	2.43	243	0	243	0.001	13
1610A	0420103043	MUR	5,975	0.14	6	0.5	2.54	1.05	105	171	276	0.001	6
1610B	0420103043	SF-M	29,792	0.68	3	1.0	2.54	5.21	521	0	521	0.002	6
1765A	0420165008	MUR	55,316	1.27	6	0.5	2.54	9.68	968	1,587	2,555	0.009	4
1765B	0420165008	SF-M	20,612	0.47	3	1.0	2.54	3.61	361	0	361	0.001	4
1766A	0420165009	MUR	53,371	1.23	6	0.5	2.54	9.34	934	1,532	2,465	0.009	1
1766B	0420165009	SF-M	19,605	0.45	3	1.0	2.54	3.43	343	0	343	0.001	1
Totals			**21,322,783**	**489.50**				**3,414.62**	**341,462**	**5,797**	**347,259**	**1.215**	

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Summary Sheet
May 14, 2014

	Phase 1 LID	Phase 1 Non-LID	Phase 2	Total
Buildable Area (Acres)	247	104	490	840
Population	2,153	904	3,415	6,472
Average Flows				
Residential (gpd)	215,296	90,412	341,462	647,169
Commercial (gpd)	337,088	62,641	5,797	405,527
Total (gpd)	552,384	153,053	347,259	1,052,696
Peak Design Flow (mgd)	1.933	0.536	1.215	3.684

Phase 1 LID Buildable Area/Total Buildable Area	29.4%
Phase 1 LID Population/Total Population =	33.3%
Phase 1 LID Average Flows/Total Average Flows =	52.5%
Phase 1 LId Peak Flow/Total Peak Flow =	52.5%

Phase 1 Non-LID Buildable Area/Total Buildable Area =	12.3%
Phase 1 Non-LID Population/Total Population =	14.0%
Phase 1 Non-LID Average Flows/Total Average Flows =	14.5%
Phase 1 Non-LID Peak Flow/Total Peak Flow =	14.5%

Phase 2 Buildable Area/Total Buildable Area =	58.3%
Phase 2 Population/Total Population =	52.8%
Phase 2 Average Flows/Total Average Flows =	33.0%
Phase 2 Peak Flow/Total Peak Flow =	33.0%

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
May 14, 2014

Pipe Segment	Phase 1 LID1 Service Area				Phase 1 Non-LID1 Service Area				Phase 2 Service Area			
	Tributary Flow (mgd)	Upstream Flow (mgd)	Design Flow (mgd)	ERU	Tributary Flow (mgd)	Upstream Flow (mgd)	Design Flow (mgd)	ERU	Tributary Flow (mgd)	Upstream Flow (mgd)	Design Flow (mgd)	ERU
1	0.000	0.000	0.000	0.000	0.040	0.000	0.040	16.91	0.209	0.000	0.209	229.32
2	0.000	0.000	0.000	0.000	0.000	0.126	0.126	0.000	0.000	0.251	0.251	0.000
3	0.000	0.000	0.000	0.000	0.036	0.000	0.036	19.074	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.029	0.036	0.065	14.078	0.013	0.000	0.013	8.252
5	0.000	0.000	0.000	0.000	0.003	0.065	0.068	1.073	0.000	0.013	0.013	0.000
6	0.000	0.000	0.000	0.000	0.019	0.068	0.087	8.154	0.029	0.013	0.042	31.562
PS4 FM	(Flow from PS 4)		0.000	0.000	0.000		0.126	59.291			0.251	269.133
7	0.014	0.000	0.014	5.900	0.000	0.000	0.000	0.000	0.135	0.000	0.135	152.101
7A	0.002	0.000	0.002	0.752	0.000	0.126	0.126	0.000	0.000	0.251	0.251	0.000
8	0.011	0.000	0.011	4.551	0.000	0.000	0.000	0.000	0.022	0.000	0.022	24.681
9	0.008	0.026	0.034	3.417	0.000	0.126	0.126	0.000	0.000	0.408	0.408	0.000
10A	0.002	0.000	0.002	0.940	0.000	0.000	0.000	0.000	0.009	0.000	0.009	10.404
10	0.009	0.002	0.011	3.887	0.000	0.000	0.000	0.000	0.000	0.009	0.009	0.000
11	0.030	0.046	0.075	15.016	0.000	0.126	0.126	0.000	0.000	0.417	0.417	0.000
12	0.035	0.075	0.111	17.171	0.000	0.126	0.126	0.000	0.000	0.417	0.417	0.000
13	0.025	0.111	0.136	10.760	0.000	0.126	0.126	0.000	0.097	0.417	0.514	108.004
14	0.042	0.136	0.178	21.807	0.000	0.126	0.126	0.000	0.000	0.514	0.514	0.000
15	0.045	0.178	0.223	23.198	0.000	0.126	0.126	0.000	0.000	0.514	0.514	0.000
16	0.042	0.000	0.042	21.916	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	0.020	0.266	0.286	10.525	0.000	0.126	0.126	0.000	0.000	0.514	0.514	0.000
18	0.000	0.286	0.286	0.000	0.038	0.126	0.164	19.591	0.000	0.514	0.514	0.000
19	0.050	0.000	0.050	25.548	0.000	0.000	0.000	0.000	0.025	0.000	0.025	21.034
20	0.028	0.050	0.078	14.499	0.000	0.000	0.000	0.000	0.000	0.025	0.025	0.000
28	0.028	0.000	0.028	14.416	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	0.020	0.106	0.125	10.099	0.000	0.000	0.000	0.000	0.000	0.025	0.025	0.000
22	0.013	0.125	0.138	6.650	0.000	0.000	0.000	0.000	0.000	0.025	0.025	0.000
23	0.022	0.000	0.022	24.245	0.085	0.000	0.085	96.078	0.020	0.000	0.020	22.581
24	0.033	0.022	0.055	37.222	0.025	0.085	0.110	28.166	0.017	0.020	0.037	18.715
29A	0.066	0.000	0.066	33.647	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29B	0.051	0.000	0.051	26.045	0.009	0.000	0.009	4.475	0.102	0.000	0.102	114.542
29C	0.000	0.051	0.051	0.000	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
30A	0.000	0.116	0.116	0.000	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
30B	0.038	0.116	0.155	19.655	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
31	0.040	0.000	0.040	20.582	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31A	0.000	0.040	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32A	0.008	0.194	0.203	4.258	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
32B	0.000	0.203	0.203	0.000	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
32C	0.000	0.203	0.203	0.000	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
32D	0.000	0.203	0.203	0.000	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
32E	0.000	0.203	0.203	0.000	0.000	0.009	0.009	0.000	0.000	0.102	0.102	0.000
25	0.018	0.257	0.275	20.280	0.000	0.119	0.119	0.000	0.000	0.139	0.139	0.000
26	0.000	0.414	0.414	0.000	0.000	0.119	0.119	0.000	0.000	0.164	0.164	0.000
27	0.045	0.414	0.459	23.304	0.008	0.119	0.127	8.666	0.000	0.164	0.164	0.000
PS3 FM	(Flow from PS 3)		0.745	420.291	0.046		0.291	216.268			0.677	741.195
33A	0.000	0.745	0.745	0.000	0.000	0.291	0.291	0.000	0.000	0.677	0.677	0.000
33	0.261	0.745	1.005	133.458	0.000	0.291	0.291	0.000	0.000	0.677	0.677	0.000
34	0.123	1.005	1.128	61.393	0.020	0.291	0.311	22.222	0.019	0.677	0.696	21.035
34A	0.000	1.128	1.128	0.000	0.000	0.311	0.311	0.000	0.000	0.696	0.696	0.000
35	0.026	1.128	1.154	11.607	0.000	0.311	0.311	0.000	0.000	0.696	0.696	0.000
36	0.025	0.000	0.025	11.176	0.000	0.000	0.000	0.000	0.195	0.000	0.195	218.824
37	0.039	0.025	0.064	17.913	0.000	0.000	0.000	0.000	0.000	0.195	0.195	0.000
49	0.013	0.000	0.013	5.719	0.193	0.000	0.193	103.251	0.182	0.000	0.182	204.435
50	0.048	0.013	0.061	22.000	0.000	0.193	0.193	0.000	0.000	0.182	0.182	0.000
38A	0.000	0.061	0.061	0.000	0.000	0.193	0.193	0.000	0.000	0.182	0.182	0.000
38	0.003	0.061	0.064	1.142	0.018	0.193	0.211	9.165	0.000	0.182	0.182	0.000
39	0.030	0.064	0.093	13.714	0.000	0.211	0.211	0.000	0.000	0.182	0.182	0.000
40	0.090	0.093	0.183	42.703	0.000	0.211	0.211	0.000	0.000	0.182	0.182	0.000
41	0.093	0.183	0.276	44.977	0.000	0.211	0.211	0.000	0.000	0.182	0.182	0.000
42	0.019	0.276	0.295	8.561	0.000	0.211	0.211	0.000	0.000	0.182	0.182	0.000
43	0.009	0.000	0.009	3.902	0.000	0.000	0.000	0.000	0.031	0.000	0.031	33.036
44	0.000	0.304	0.304	0.000	0.000	0.211	0.211	0.000	0.000	0.213	0.213	0.000
45	0.044	0.304	0.348	19.978	0.000	0.211	0.211	0.000	0.000	0.213	0.213	0.000
46	0.000	0.348	0.348	0.000	0.000	0.211	0.211	0.000	0.000	0.213	0.213	0.000
47	0.012	1.501	1.513	5.500	0.000	0.522	0.522	0.000	0.095	0.909	1.004	106.762
48	0.000	1.577	1.577	0.000	0.000	0.522	0.522	0.000	0.000	1.198	1.198	0.000
PS2 FM	(Flow from PS 2)		1.577	824.036			0.522	350.906			1.198	1,325.286
51	0.000	1.577	1.577	0.000	0.000	0.522	0.522	0.000	0.000	1.198	1.198	0.000
52	0.000	1.577	1.577	0.000	0.000	0.522	0.522	0.000	0.000	1.198	1.198	0.000
53	0.012	1.577	1.589	5.243	0.011	0.522	0.533	4.917	0.000	1.198	1.198	0.000
54	0.012	1.589	1.601	5.391	0.000	0.533	0.533	0.128	0.000	1.198	1.198	0.000
55	0.017	1.601	1.617	7.582	0.000	0.533	0.533	0.000	0.017	1.198	1.215	19.052
56	0.046	1.617	1.664	1.268	0.000	0.533	0.533	0.000	0.000	1.215	1.215	0.000
57	0.081	1.664	1.745	4.101	0.000	0.533	0.533	0.000	0.000	1.215	1.215	0.000
58	0.000	1.745	1.745	0.000	0.000	0.533	0.533	0.000	0.000	1.215	1.215	0.000
59	0.078	1.745	1.822	0.000	0.000	0.533	0.533	0.000	0.000	1.215	1.215	0.000
60	0.000	1.822	1.822	0.000	0.000	0.533	0.533	0.000	0.000	1.215	1.215	0.000
61	0.111	1.822	1.933	0.000	0.002	0.533	0.536	0.000	0.000	1.215	1.215	0.000
PS1 FM	(Flow from PS 1)		1.933	847.621			0.536	355.951			1.215	1,344.338

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Pipe Segment	LID1 Service Area			Edgewood Service Area		
	Design Flow (mgd)	Flow (gpm)	ERU	Design Flow (mgd)	Flow (gpm)	ERU
1	0.000	0.0	0.0	0.040	27.6	246.230
2	0.000	0.0	0.0	0.377	261.9	0.000
3	0.000	0.0	0.0	0.036	25.1	19.074
4	0.000	0.0	0.0	0.065	45.2	22.331
5	0.000	0.0	0.0	0.080	55.9	1.073
6	0.000	0.0	0.0	0.100	69.1	39.716
PS4 FM	0.000	0.0	0.0	0.126	87.8	328.424
7	0.014	9.6	5.9	0.014	9.6	158.000
7A	0.002	1.2	0.8	0.379	263.1	0.752
8	0.011	7.4	4.6	0.011	7.4	29.232
9	0.034	23.8	3.4	0.569	394.9	3.417
10A	0.002	1.5	0.9	0.002	1.5	11.344
10	0.011	7.9	3.9	0.021	14.3	3.887
11	0.075	52.2	15.0	0.619	429.7	15.016
12	0.111	76.8	17.2	0.654	454.3	17.171
13	0.136	94.4	10.8	0.679	471.8	118.764
14	0.178	123.7	21.8	0.818	568.3	21.807
15	0.223	155.0	23.2	0.863	599.5	23.198
16	0.042	29.5	21.9	0.042	29.5	21.916
17	0.286	198.6	10.5	0.926	643.2	10.525
18	0.286	198.6	0.0	0.964	669.6	19.591
19	0.050	34.4	25.5	0.050	34.4	46.582
20	0.078	53.9	14.5	0.103	71.3	14.499
28	0.028	19.4	14.4	0.028	19.4	14.416
21	0.125	86.9	10.1	0.150	104.3	10.099
22	0.138	95.9	6.7	0.163	113.3	6.650
23	0.022	15.0	0.0 24.2	0.107	74.3	142.904
24	0.055	37.9	37.2	0.185	128.6	84.103
29A	0.066	45.8	33.6	0.066	45.8	33.647
29B	0.051	35.1	26.0	0.059	41.1	145.062
29C	0.051	35.1	0.0	0.161	111.8	0.000
30A	0.116	80.9	0.0	0.227	157.6	0.000
30B	0.155	107.4	19.7	0.265	184.1	19.655
31	0.040	27.7	20.6	0.040	27.7	20.582
31A	0.040	27.7	0.0	0.040	27.7	0.000
32A	0.203	140.8	4.3	0.313	217.5	4.258
32B	0.203	140.8	0.0	0.313	217.5	0.000
32C	0.203	140.8	0.0	0.313	217.5	0.000
32D	0.203	140.8	0.0	0.313	217.5	0.000
32E	0.203	140.8	0.0	0.313	217.5	0.000
25	0.275	191.3	20.3	0.533	370.2	20.280
26	0.414	287.2	0.0	0.696	483.5	0.000
27	0.459	318.5	23.3	0.749	520.2	31.971
PS3 FM	0.745	517.2	420.3	1.036	719.4	1,377.754
33A	0.745	517.2	0.0	1.713	1189.8	0.000
33	1.005	698.1	133.5	1.974	1370.7	133.458
34	1.128	783.4	61.4	2.116	1469.7	104.650
34A	1.128	783.4	0.0	2.135	1482.7	0.000
35	1.154	801.1	11.6	2.161	1500.4	11.607
36	0.025	17.1	11.2	0.025	17.1	230.000
37	0.064	44.5	17.9	0.259	179.6	17.913
49	0.013	8.7	5.7	0.206	142.9	313.405
50	0.061	42.4	22.0	0.436	302.7	22.000
38A	0.061	42.4	0.0	0.436	302.7	0.000
38	0.064	44.1	1.1	0.457	317.1	10.307
39	0.093	64.7	13.7	0.486	337.6	13.714
40	0.183	126.9	42.7	0.576	399.9	42.703
41	0.276	191.9	45.0	0.669	464.8	44.977
42	0.295	204.9	8.6	0.688	477.9	8.561
43	0.009	6.0	3.9	0.009	6.0	36.939
44	0.304	210.9	0.0	0.728	505.6	0.000
45	0.348	241.4	20.0	0.772	536.1	19.978
46	0.348	241.4	0.0	0.772	536.1	0.000
47	1.513	1050.9	5.5	2.945	2044.9	112.262
48	1.577	1095.4	0.0	3.298	2290.4	0.000
PS2 FM	1.577	1095.4	824.0	2.100	1458.1	2,500.228
51	1.577	1095.4	0.0	3.298	2290.4	0.000
52	1.577	1095.4	0.0	3.298	2290.4	0.000
53	1.589	1103.4	5.2	3.320	2305.8	10.160
54	1.601	1111.7	5.4	3.333	2314.3	5.519
55	1.617	1123.3	7.6	3.349	2325.8	26.633
56	1.664	1155.3	1.3	3.412	2369.7	1.268
57	1.745	1211.5	4.1	3.493	2425.9	4.101
58	1.745	1211.5	0.0	3.493	2425.9	0.000
59	1.822	1265.4	0.0	3.571	2479.8	0.000
60	1.822	1265.4	0.0	3.571	2479.8	0.000
61	1.933	1342.6	0.0	3.684	2558.6	0.000
PS1 FM	1.933	1342.6	847.6	2.469	1714.6	2,547.910

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Pipe Size Calculations
May 14, 2014

Pipe Segment	Design Flow (mgd)	Design Flow (gpm)	Length (ft)	Diameter (in)	Diameter (ft)	Upstream Ground (ft)	Upstream Invert (ft)	Upstream Depth (ft)	Downstream Ground (ft)	Downstream Invert (ft)	Downstream Depth (ft)	Ave. Depth (ft)	Design Slope (ft/ft)	Min. Slope (ft/ft)	Pipe Capacity (mgd)	Factor of Safety	Capacity Check	Slope Check
7	0.014	10	175	8	0.67	369.09	363.00	6.09	378.13	361.25	16.88	11.49	0.0100	0.0040	0.783	56.54	O.K	O.K
7A	0.002	1	180	8	0.67	378.10	363.05	15.05	378.13	361.25	16.88	15.97	0.0100	0.0040	0.783	443.40	O.K	O.K
8	0.011	7	354	8	0.67	391.26	383.00	8.26	378.13	361.25	16.88	12.57	0.0614	0.0040	1.940	181.63	O.K	O.K
9	0.034	24	332	8	0.67	378.13	361.15	16.98	379.88	359.83	20.05	18.52	0.0040	0.0040	0.495	14.43	O.K	O.K
10A	0.002	2	260	8	0.67	389.62	381.60	8.02	381.90	373.00	8.90	8.46	0.0331	0.0040	1.425	645.43	O.K	O.K
10	0.011	8	100	8	0.67	381.90	372.90	9.00	379.88	359.83	20.05	14.53	0.1307	0.0040	2.831	249.83	O.K	O.K
11	0.075	52	297	8	0.67	379.88	359.73	20.15	378.46	358.55	19.91	20.03	0.0040	0.0040	0.495	6.58	O.K	O.K
12	0.111	77	340	8	0.67	378.46	358.45	20.01	374.40	357.10	17.30	18.66	0.0040	0.0040	0.495	4.48	O.K	O.K
13	0.136	94	330	8	0.67	374.40	357.00	17.40	367.60	355.69	11.91	14.66	0.0040	0.0040	0.495	3.64	O.K	O.K
14	0.178	124	330	8	0.67	367.60	355.59	12.01	361.22	351.80	9.42	10.72	0.0115	0.0040	0.840	4.71	O.K	O.K
15	0.223	155	301	8	0.67	361.22	351.70	9.52	362.12	349.65	12.47	11.00	0.0068	0.0040	0.646	2.89	O.K	O.K
16	0.042	30	294	8	0.67	365.75	352.80	12.95	362.12	349.65	12.47	12.71	0.0107	0.0040	0.810	19.06	O.K	O.K
17	0.286	199	314	8	0.67	362.12	349.55	12.57	353.55	344.40	9.15	10.86	0.0164	0.0040	1.003	3.51	O.K	O.K
17A	0.926	643	32	8	0.67	353.55	344.30	9.25	352.27	343.50	8.77	9.01	0.0250	0.0040	1.238	1.34	O.K	O.K
18	0.286	199	324	8	0.67	352.27	343.40	8.87	342.92	334.30	8.62	8.75	0.0281	0.0040	1.313	4.59	O.K	O.K
19	0.050	34	175	8	0.67	391.80	378.80	13.00	383.09	370.00	13.09	13.05	0.0503	0.0040	1.756	35.45	O.K	O.K
20	0.078	54	345	8	0.67	383.09	369.90	13.19	373.65	357.45	16.20	14.70	0.0361	0.0040	1.488	19.16	O.K	O.K
28	0.028	19	400	8	0.67	378.73	361.45	17.28	373.65	357.45	16.20	16.74	0.0100	0.0040	0.783	28.01	O.K	O.K
21	0.125	87	400	8	0.67	373.65	357.35	16.30	364.16	351.00	13.16	14.73	0.0159	0.0040	0.987	7.89	O.K	O.K
22	0.138	96	259	8	0.67	364.16	350.90	13.26	357.67	338.10	19.57	16.42	0.0494	0.0040	1.740	12.60	O.K	O.K
23	0.022	15	293	8	0.67	365.86	352.90	12.96	355.00	343.30	11.70	12.33	0.0328	0.0040	1.418	65.80	O.K	O.K
23A	0.022	15	42	8	0.67	355.00	343.20	11.80	354.26	341.90	12.36	12.08	0.0310	0.0040	1.379	63.97	O.K	O.K
24	0.055	38	240	8	0.67	354.26	341.80	12.46	354.13	340.50	13.63	13.05	0.0054	0.0040	0.575	10.53	O.K	O.K
24A	0.055	38	233	8	0.67	354.13	340.40	13.73	355.89	339.20	16.69	15.21	0.0052	0.0040	0.565	10.33	O.K	O.K
29AA	0.066	46	90	8	0.67	385.10	366.39	18.71	380.43	365.49	14.94	16.83	0.0100	0.0040	0.783	11.87	O.K	O.K
29A	0.066	46	197	8	0.67	383.68	365.39	18.29	380.43	364.40	16.03	17.16	0.0050	0.0040	0.554	8.39	O.K	O.K
29B	0.051	35	47	8	0.67	377.80	371.50	6.30	379.52	369.50	10.02	8.16	0.0426	0.0040	1.616	32.00	O.K	O.K
29C	0.051	35	206	8	0.67	379.52	369.40	10.12	380.43	364.40	16.03	13.08	0.0243	0.0040	1.221	24.17	O.K	O.K
30A	0.116	81	339	8	0.67	380.43	364.30	16.13	369.55	357.00	12.55	14.34	0.0215	0.0040	1.148	9.86	O.K	O.K
30B	0.155	107	346	8	0.67	369.55	356.90	12.65	363.02	353.00	10.02	11.34	0.0113	0.0040	0.832	5.38	O.K	O.K
31	0.040	28	200	8	0.67	370.40	360.00	10.40	367.03	357.20	9.83	10.12	0.0140	0.0040	0.927	23.22	O.K	O.K

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Pipe Size Calculations
May 14, 2014

Pipe Segment	Design Flow (mgd)	Design Flow (gpm)	Length (ft)	Diameter (in)	Diameter (ft)	Upstream Ground (ft)	Upstream Invert (ft)	Upstream Depth (ft)	Downstream Ground (ft)	Downstream Invert (ft)	Downstream Depth (ft)	Ave. Depth (ft)	Design Slope (ft/ft)	Min. Slope (ft/ft)	Pipe Capacity (mgd)	Factor of Safety	Capacity Check	Slope Check
31A	0.040	28	268	8	0.67	367.03	357.10	9.93	363.02	353.00	10.02	9.97	0.0153	0.0040	0.969	24.27	O.K	O.K
32	0.203	141	77	8	0.67	363.02	352.90	10.12	364.09	352.45	11.64	10.88	0.0058	0.0040	0.596	2.94	O.K	O.K
32A	0.203	141	26	8	0.67	364.09	352.35	11.74	364.21	352.20	12.01	11.88	0.0058	0.0040	0.596	2.94	O.K	O.K
32B	0.203	141	283	8	0.67	364.21	352.10	12.11	360.56	350.50	10.06	11.09	0.0057	0.0040	0.591	2.92	O.K	O.K
32C	0.203	141	194	8	0.67	360.56	350.40	10.16	359.68	349.00	10.68	10.42	0.0072	0.0040	0.664	3.28	O.K	O.K
32D	0.203	141	246	8	0.67	359.68	348.90	10.78	356.51	347.00	9.51	10.15	0.0077	0.0040	0.687	3.39	O.K	O.K
32E	0.203	141	210	8	0.67	356.51	346.90	9.61	355.89	339.20	16.69	13.15	0.0367	0.0040	1.500	7.40	O.K	O.K
25	0.275	191	201	8	0.67	355.89	339.07	16.82	357.67	338.07	19.60	18.21	0.0050	0.0040	0.554	2.01	O.K	O.K
26	0.414	287	300	8	0.67	357.67	337.97	19.70	351.74	336.40	15.34	17.52	0.0052	0.0040	0.565	1.37	O.K	O.K
27	0.459	319	343	8	0.67	351.74	336.30	15.44	342.92	334.30	8.62	12.03	0.0058	0.0040	0.596	1.30	O.K	O.K
27A	0.745	517	50	8	0.67	342.92	334.27	8.65	341.70	333.80	7.90	8.27	0.0094	0.0040	0.759	1.02	O.K	O.K
PS3 FM	0.745	517	3098	6	0.50		Vel =	5.87	fps						1.015	1.36	O.K	
33A	0.745	517	111	8	0.67	385.70	380.00	5.70	384.56	367.60	16.96	11.33	0.1117	0.0040	2.617	3.51	O.K	O.K
33	1.005	698	370	8	0.67	384.56	367.50	17.06	377.78	361.40	16.38	16.72	0.0165	0.0040	1.006	1.00	O.K	O.K
34	1.128	783	264	8	0.67	377.78	361.30	16.48	365.90	351.70	14.20	15.34	0.0364	0.0040	1.494	1.32	O.K	O.K
34A	1.128	783	278	8	0.67	365.90	351.60	14.30	352.28	337.00	15.28	14.79	0.0525	0.0040	1.794	1.59	O.K	O.K
35	1.154	801	277	8	0.67	352.28	336.90	15.38	342.13	324.82	17.31	16.35	0.0436	0.0040	1.635	1.42	O.K	O.K
36	0.025	17	219	8	0.67	352.50	344.10	8.40	342.53	330.90	11.63	10.02	0.0603	0.0040	1.923	78.15	O.K	O.K
37	0.064	44	140	8	0.67	342.53	330.80	11.73	341.20	326.25	14.95	13.34	0.0325	0.0040	1.412	22.04	O.K	O.K
37A	0.064	44	109	8	0.67	341.20	326.15	15.05	341.28	322.40	18.88	16.96	0.0344	0.0040	1.452	22.68	O.K	O.K
49	0.013	9	143	8	0.67	371.52	357.90	13.62	370.00	356.90	13.10	13.36	0.0070	0.0040	0.655	52.03	O.K	O.K
50	0.061	42	396	8	0.67	370.00	356.80	13.20	357.85	349.40	8.45	10.83	0.0187	0.0040	1.071	17.55	O.K	O.K
38A	0.061	42	269	8	0.67	357.85	349.30	8.55	352.26	340.10	12.16	10.36	0.0342	0.0040	1.448	23.73	O.K	O.K
38	0.064	44	232	8	0.67	352.26	340.00	12.26	346.30	337.03	9.27	10.77	0.0128	0.0040	0.886	13.94	O.K	O.K
38B	0.064	44	158	8	0.67	346.30	336.93	9.37	342.74	335.00	7.74	8.56	0.0122	0.0040	0.865	13.61	O.K	O.K
39	0.093	65	340	8	0.67	342.74	334.90	7.84	341.45	332.65	8.80	8.32	0.0066	0.0040	0.636	6.83	O.K	O.K
40	0.183	127	160	8	0.67	341.45	332.57	8.88	341.40	331.93	9.47	9.18	0.0040	0.0040	0.495	2.71	O.K	O.K
41	0.276	192	304	8	0.67	341.40	331.83	9.57	341.48	330.62	10.86	10.22	0.0040	0.0040	0.495	1.79	O.K	O.K
42	0.295	205	372	8	0.67	341.48	330.52	10.96	341.50	328.97	12.53	11.75	0.0042	0.0040	0.507	1.72	O.K	O.K
43	0.009	6	235	8	0.67	343.11	329.90	13.21	341.50	328.97	12.53	12.87	0.0040	0.0040	0.495	57.64	O.K	O.K
44	0.304	211	294	8	0.67	341.50	328.87	12.63	341.45	327.70	13.75	13.19	0.0040	0.0040	0.495	1.63	O.K	O.K
45	0.348	241	280	8	0.67	341.45	327.60	13.85	341.37	326.25	15.12	14.49	0.0048	0.0040	0.543	1.56	O.K	O.K
46	0.348	241	265	8	0.67	341.37	326.15	15.22	342.25	324.80	17.45	16.34	0.0051	0.0040	0.559	1.61	O.K	O.K

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Flow Calculations
Pipe Size Calculations
May 14, 2014

Pipe Segment	Design Flow (mgd)	Design Flow (gpm)	Length (ft)	Diameter (in)	Diameter (ft)	Upstream Ground (ft)	Upstream Invert (ft)	Upstream Depth (ft)	Downstream Ground (ft)	Downstream Invert (ft)	Downstream Depth (ft)	Ave. Depth (ft)	Design Slope (ft/ft)	Min. Slope (ft/ft)	Pipe Capacity (mgd)	Factor of Safety	Capacity Check	Slope Check
47A	0.012	8	110	8	0.67	345.45	335.30	10.15	342.25	324.83	17.42	13.79	0.0952	0.0040	2.416	199.53	O.K	O.K
47	1.513	1,051	246	12	1.00	342.25	324.49	17.76	341.20	322.20	19.00	18.38	0.0093	0.0022	2.226	1.47	O.K	O.K
48	1.577	1,095	25	12	1.00	341.20	322.10	19.10	341.00	321.83	19.17	19.14	0.0108	0.0022	2.399	1.52	O.K	O.K
PS2 FM	1.577	1,095	3553	6 & 8		6" dia=	0.5	ft	8" dia=	0.67		Vel =	4.48	fps	2.820	1.79	O.K	
51	1.577	1,095	60	8	0.67	366.10	360.10	6.00	366.10	350.10	16.00	11.00	0.1667	0.0040	3.197	2.03	O.K	O.K
52	1.577	1,095	175	10	0.83	366.10	349.93	16.17	361.20	347.70	13.50	14.83	0.0128	0.0028	1.604	1.02	O.K	O.K
53	1.589	1,103	220	10	0.83	361.20	347.60	13.60	354.74	344.60	10.14	11.87	0.0136	0.0028	1.658	1.04	O.K	O.K
54	1.601	1,112	220	10	0.83	354.74	344.50	10.24	345.70	339.00	6.70	8.47	0.0250	0.0028	2.245	1.40	O.K	O.K
55	1.617	1,123	279	10	0.83	345.70	338.89	6.81	345.70	334.50	11.20	9.01	0.0157	0.0028	1.781	1.10	O.K	O.K
56	1.664	1,155	212	10	0.83	345.70	334.40	11.30	335.20	328.90	6.30	8.80	0.0259	0.0028	2.287	1.37	O.K	O.K
57	1.745	1,212	185	10	0.83	335.20	328.80	6.40	324.50	316.10	8.40	7.40	0.0686	0.0028	3.720	2.13	O.K	O.K
58	1.745	1,212	211	10	0.83	324.50	316.00	8.50	312.20	303.10	9.10	8.80	0.0611	0.0028	3.510	2.01	O.K	O.K
59	1.822	1,265	180	10	0.83	312.20	303.00	9.20	289.60	282.60	7.00	8.10	0.1133	0.0028	4.780	2.62	O.K	O.K
60	1.822	1,265	265	10	0.83	289.60	282.50	7.10	268.70	262.00	6.70	6.90	0.0774	0.0028	3.949	2.17	O.K	O.K
61	1.933	1,343	17	10	0.83	268.70	261.90	6.80	267.00	260.90	6.10	6.45	0.0588	0.0028	3.443	1.78	O.K	O.K
PS1 FM	1.933	1,343	4243	6 & 8		6" dia=	0.5	ft	8" dia=	0.67		Vel =	4.48	fps	2.820	1.46	O.K	
100	1.933	1,343	265	12	1.00	307.67	302.71	4.96	305.40	300.17	5.23	5.10	0.0096	0.0022	2.260	1.17	O.K	O.K
101	1.933	1,343	415	12	1.00	305.40	300.07	5.33	301.15	296.10	5.05	5.19	0.0096	0.0022	2.258	1.17	O.K	O.K
102	1.933	1,343	360	12	1.00	301.15	296.00	5.15	297.49	292.53	4.96	5.06	0.0096	0.0022	2.267	1.17	O.K	O.K
103	1.933	1,343	360	12	1.00	297.49	292.43	5.06	294.09	288.97	5.12	5.09	0.0096	0.0022	2.263	1.17	O.K	O.K
104	1.933	1,343	80	12	1.00	294.09	288.87	5.22	293.29	284.35	8.94	7.08	0.0565	0.0022	5.488	2.84	O.K	O.K
105	1.933	1,343	228	12	1.00	293.29	284.25	9.04	284.50	279.51	4.99	7.02	0.0208	0.0022	3.329	1.72	O.K	O.K
106	1.933	1,343	84	12	1.00	284.50	279.41	5.09	285.50	278.00	7.50	6.30	0.0168	0.0022	2.991	1.55	O.K	O.K
107	1.933	1,343	337	12	1.00	285.50	277.90	7.60	284.10	275.53	8.57	8.09	0.0070	0.0022	1.936	1.00	O.K	O.K
108	1.933	1,343	103	12	1.00	284.10	275.43	8.67	269.34	263.40	5.94	7.31	0.1168	0.0022	7.890	4.08	O.K	O.K
109	1.933	1,343	97	12	1.00	269.34	263.30	6.04	267.26	262.60	4.66	5.35	0.0072	0.0022	1.961	1.01	O.K	O.K
110	1.933	1,343	101	12	1.00	267.26	262.50	4.76	268.75	261.79	6.96	5.86	0.0070	0.0022	1.936	1.00	O.K	O.K
111	1.933	1,343	106	12	1.00	268.75	261.69	7.06	270.87	260.94	9.93	8.50	0.0071	0.0022	1.942	1.00	O.K	O.K
112	1.933	1,343	177	12	1.00	270.87	260.84	10.03	266.77	259.59	7.18	8.61	0.0071	0.0022	1.940	1.00	O.K	O.K
113	1.933	1,343	182	12	1.00	266.77	259.49	7.28	271.70	256.10	15.60	11.44	0.0186	0.0022	3.151	1.63	O.K	O.K
114	1.933	1,343	11	12	1.00	271.70	256.00	15.70	272.00	253.28	18.72	17.21	0.2473	0.0022	11.480	5.94	O.K	O.K

APPENDIX C.
COST ANALYSIS

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Cost Calculations
May 14, 2014

OVERSIZING COSTS SUMMARY

Gravity Sewer Over-sizing Costs	
Pipe Material	$142,011
Bedding	$14,917
Imported Backfill	$39,040
Total Oversizing Costs for Gravity Sewers	**$195,968**

Force Main Oversizing Costs	
Pipe Material (PS1 FM, PS2 FM, PS3 FM)	$124,392
Fittings (PS1 FM, PS2 FM, PS3 FM)	$31,110
Bedding (PS1 FM, PS2 FM)	$15,036
Imported Backfill (PS1 FM, PS2 FM)	$13,305
Trench Work (PS3 FM)	$72,928
Imported Backfill (PS3 FM)	$51,734
Total Oversizing Costs for Force Mains	**$308,505**

Pump Station Oversizing Costs	
Pump Station 1	$15,449
Pump Station 2	$13,334
Pump Station 3	$45,767
Total Oversizing Costs for Pump Stations	**$74,550**

Total Oversizing Costs	**$579,023**

Sales Tax @ 9.5%	**$55,007**

Total Oversizing Costs	**$634,030**

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Cost Calculations
Material Cost Information
May 14, 2014

ENR Material Cost Index	
Nov-2009	2,620
Apr-2014	2,969

Gravity Sewer Pipe	Diameter	Cost/LF*		Source
		Apr 2014	Nov 2009	
ASTM D3034 SDR 35	8	$5.58	$4.92	HD Fowler
ASTM D3034 SDR 35	10	$8.74	$7.71	HD Fowler
ASTM D3034 SDR 35	12	$12.55	$11.07	HD Fowler
ASTM D3034 SDR 35	15	$18.75	$16.54	HD Fowler
ASTM D3034 SDR 35	18	$29.08	$25.66	HD Fowler

Force Main Pipe	Diameter	Cost/LF*		Source
		4/1/2014*	11/1/2009*	
AWWA C900 DR 18	6	$6.89	$6.08	HD Fowler
AWWA C900 DR 18	8	$11.91	$10.51	HD Fowler
AWWA C900 DR 18	10	$17.89	$15.79	HD Fowler
AWWA C900 DR 18	12	$25.27	$22.30	HD Fowler
AWWA C905 DR 18	14	$42.55	$37.55	HD Fowler
AWWA C905 DR 18	16	$75.90	$66.98	HD Fowler

Force Main Fittings	Diameter	Cost/EA*		Source
		4/1/2014*	11/1/2009*	
DI 45 Degree Elbow	12	$234.60	$207.02	HD Fowler
DI 22.5 Degree Elbow	12	$299.00	$263.85	HD Fowler
DI 11.25 Degree Elbow	12	$280.60	$247.62	HD Fowler
Megalug Fittings	12	$228.85	$201.95	EBAA Iron Website List Price
EBAA Iron Series 1600 Pipe Restraints	12	$342.70	$302.42	EBAA Iron Website List Price
DI 45 Degree Elbow	8	$108.10	$95.39	HD Fowler
DI 22.5 Degree Elbow	8	$152.95	$134.97	HD Fowler
DI 11.25 Degree Elbow	8	$146.05	$128.88	HD Fowler
Megalug Fittings	8	$115.00	$101.48	EBAA Iron Website List Price
EBAA Iron Series 1600 Pipe Restraints	8	$179.40	$158.31	EBAA Iron Website List Price

Miscellaneous Items	Unit Cost*	Source
Bedding Material	$16.00 /Ton	Per Engineer's Estimate
Bank Run Gravel Backfill	$16.00 /Ton	Per Contractor's Bid
Tracer Wire (TW)	$2.00 /lf	Per Engineer's Estimate
Tracer Wire Station	$200.00 /ea	Per Engineer's Estimate

* Unit Costs include 15% markup for Contractor's Overhead and Profit

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Cost Calculations
Gravity Sewer Oversizing Costs
May 14, 2014

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Installed = As constructed parameters
Required = As needed to serve the LID area only parameters

Pipe Segment	Length	Diameter		Pipe Type	Pipe Material Cost		Unit Cost Difference	Oversizing Costs	Trench Width		Bedding Quantity		Bedding Material Cost		Oversizing Costs	Backfill (Oversizing)			Oversizing Costs
		Installed	Required		Installed	Required			Installed	Required	Installed	Required	Installed	Required		Width*	Depth**	Volume	
	(ft)	(in)	(in)		($/LF)	($/LF)	($/LF)	($)	(in)	(in)	(ton)	(ton)	($)	($)	($)	(in)	(ft)	(ton)	($)
7	175	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	50.96	50.96	$815.44	$815.44	$0.00	0	10.32	0.00	$0.00
7A	180	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	52.42	52.42	$838.73	$838.73	$0.00	0	14.80	0.00	$0.00
8	354	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	103.09	103.09	$1,649.51	$1,649.51	$0.00	0	11.40	0.00	$0.00
9	332	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$926.53	34	32	109.76	96.69	$1,756.13	$1,547.00	$209.14	2	17.35	68.28	$1,092.51
10A	260	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	75.72	75.72	$1,211.50	$1,211.50	$0.00	0	7.29	0.00	$0.00
10	100	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	29.12	29.12	$465.96	$465.96	$0.00	0	13.36	0.00	$0.00
11	297	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$828.85	34	32	98.19	86.49	$1,571.00	$1,383.91	$187.09	2	18.86	66.40	$1,062.38
12	340	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$948.86	34	32	112.40	99.02	$1,798.45	$1,584.27	$214.18	2	17.49	70.49	$1,127.87
13	330	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$920.95	34	32	109.10	96.10	$1,745.56	$1,537.68	$207.88	2	13.49	52.77	$844.38
14	330	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$920.95	34	32	109.10	96.10	$1,745.56	$1,537.68	$207.88	2	9.55	37.36	$597.83
15	301	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$840.02	34	32	99.51	87.66	$1,592.16	$1,402.55	$189.61	2	9.83	35.08	$561.27
16	294	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	85.62	85.62	$1,369.93	$1,369.93	$0.00	0	11.54	0.00	$0.00
17	314	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$876.30	34	32	103.81	91.45	$1,660.92	$1,463.12	$197.80	2	9.69	36.07	$577.18
17A	32	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$89.30	34	32	10.58	9.32	$169.27	$149.11	$20.16	2	7.84	2.97	$47.59
18	324	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$904.20	34	32	107.11	94.36	$1,713.82	$1,509.72	$204.10	2	7.58	29.12	$465.92
19	175	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	50.96	50.96	$815.44	$815.44	$0.00	0	11.88	0.00	$0.00
20	345	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	100.47	100.47	$1,607.57	$1,607.57	$0.00	0	13.53	0.00	$0.00
28	400	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	116.49	116.49	$1,863.85	$1,863.85	$0.00	0	15.57	0.00	$0.00
21	400	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	116.49	116.49	$1,863.85	$1,863.85	$0.00	0	13.56	0.00	$0.00
22	259	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	75.43	75.43	$1,206.84	$1,206.84	$0.00	0	15.25	0.00	$0.00
23	293	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	85.33	85.33	$1,365.27	$1,365.27	$0.00	0	11.16	0.00	$0.00
23A	42	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	12.23	12.23	$195.70	$195.70	$0.00	0	10.91	0.00	$0.00
24	240	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	69.89	69.89	$1,118.31	$1,118.31	$0.00	0	11.88	0.00	$0.00
24A	233	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	67.86	67.86	$1,085.69	$1,085.69	$0.00	0	14.04	0.00	$0.00
29AA	90	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	26.21	26.21	$419.37	$419.37	$0.00	0	15.66	0.00	$0.00
29A	197	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	57.37	57.37	$917.95	$917.95	$0.00	0	15.99	0.00	$0.00
29B	47	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	13.69	13.69	$219.00	$219.00	$0.00	0	6.99	0.00	$0.00
29C	206	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	59.99	59.99	$959.88	$959.88	$0.00	0	11.91	0.00	$0.00
30A	339	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	98.73	98.73	$1,579.61	$1,579.61	$0.00	0	13.17	0.00	$0.00
30B	346	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	100.76	100.76	$1,612.23	$1,612.23	$0.00	0	10.17	0.00	$0.00
31	200	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	58.25	58.25	$931.93	$931.93	$0.00	0	8.95	0.00	$0.00
31A	268	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	78.05	78.05	$1,248.78	$1,248.78	$0.00	0	8.80	0.00	$0.00
32	77	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	22.42	22.42	$358.79	$358.79	$0.00	0	9.71	0.00	$0.00
32A	26	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	7.57	7.57	$121.15	$121.15	$0.00	0	10.71	0.00	$0.00
32B	283	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	82.42	82.42	$1,318.68	$1,318.68	$0.00	0	9.92	0.00	$0.00
32C	194	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	56.50	56.50	$903.97	$903.97	$0.00	0	9.25	0.00	$0.00
32D	246	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	71.64	71.64	$1,146.27	$1,146.27	$0.00	0	8.98	0.00	$0.00
32E	210	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	61.16	61.16	$978.52	$978.52	$0.00	0	11.98	0.00	$0.00
25	201	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$560.94	34	32	66.45	58.54	$1,063.20	$936.59	$126.62	2	17.04	40.60	$649.62
26	300	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$837.23	34	32	99.18	87.37	$1,586.87	$1,397.89	$188.98	2	16.35	58.15	$930.32
27	343	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$957.23	34	32	113.39	99.89	$1,814.32	$1,598.25	$216.07	2	10.86	44.16	$706.58
27A	50	12	8	ASTM D3034 SDR 35	$11.07	$4.92	$6.15	$307.49	36	32	18.54	14.56	$296.65	$232.98	$63.67	4	7.10	8.42	$134.70
33A	111	12	8	ASTM D3034 SDR 35	$11.07	$4.92	$6.15	$682.63	36	32	41.16	32.33	$658.57	$517.22	$141.35	4	10.16	26.74	$427.85
33	370	12	8	ASTM D3034 SDR 35	$11.07	$4.92	$6.15	$2,275.43	36	32	137.20	107.75	$2,195.23	$1,724.06	$471.17	4	15.55	136.41	$2,182.54
34	264	12	8	ASTM D3034 SDR 35	$11.07	$4.92	$6.15	$1,623.55	36	32	97.90	76.88	$1,566.33	$1,230.14	$336.18	4	14.17	88.69	$1,419.10
34A	278	12	8	ASTM D3034 SDR 35	$11.07	$4.92	$6.15	$1,709.65	36	32	103.09	80.96	$1,649.39	$1,295.38	$354.01	4	13.62	89.77	$1,436.36
35	277	12	8	ASTM D3034 SDR 35	$11.07	$4.92	$6.15	$1,703.50	36	32	102.72	80.67	$1,643.46	$1,290.72	$352.74	4	15.18	99.69	$1,595.08
36	219	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	63.78	63.78	$1,020.46	$1,020.46	$0.00	0	8.85	0.00	$0.00
37	140	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	40.77	40.77	$652.35	$652.35	$0.00	0	12.17	0.00	$0.00
37A	109	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	31.74	31.74	$507.90	$507.90	$0.00	0	15.79	0.00	$0.00

City of Edgewood
Meridian Avenue Sewer Improvements
Oversizing Cost Calculations
Gravity Sewer Oversizing Costs
May 14, 2014

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Installed = As constructed parameters
Required = As needed to serve the LID area only parameters

Pipe Segment	Length	Diameter		Pipe Type	Pipe Material Cost		Unit Cost Difference	Oversizing Costs	Trench Width		Bedding Quantity		Bedding Material Cost		Oversizing Costs	Backfill (Oversizing)			Oversizing Costs
		Installed	Required		Installed	Required			Installed	Required	Installed	Required	Installed	Required		Width*	Depth**	Volume	
	(ft)	(in)	(in)		($/LF)	($/LF)	($/LF)	($)	(in)	(in)	(ton)	(ton)	($)	($)	($)	(in)	(ft)	(ton)	($)
49	143	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	41.65	41.65	$666.33	$666.33	$0.00	0	12.19	0.00	$0.00
50	396	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	115.33	115.33	$1,845.21	$1,845.21	$0.00	0	9.66	0.00	$0.00
38A	269	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	78.34	78.34	$1,253.44	$1,253.44	$0.00	0	9.19	0.00	$0.00
38	232	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	67.56	67.56	$1,081.03	$1,081.03	$0.00	0	9.60	0.00	$0.00
38B	158	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	46.01	46.01	$736.22	$736.22	$0.00	0	7.39	0.00	$0.00
39	340	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	99.02	99.02	$1,584.27	$1,584.27	$0.00	0	7.15	0.00	$0.00
40	160	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$446.52	34	32	52.90	46.60	$846.33	$745.54	$100.79	2	8.01	15.20	$243.13
41	304	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$848.39	34	32	100.50	88.53	$1,608.03	$1,416.53	$191.50	2	9.05	32.62	$521.90
42	372	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$1,038.16	34	32	122.98	108.34	$1,967.72	$1,733.38	$234.33	2	10.58	46.66	$746.57
43	235	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$655.83	34	32	77.69	68.44	$1,243.05	$1,095.01	$148.03	2	11.70	32.60	$521.54
44	294	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$820.48	34	32	97.20	85.62	$1,555.13	$1,369.93	$185.20	2	12.02	41.89	$670.31
45	280	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$781.41	34	32	92.57	81.54	$1,481.08	$1,304.70	$176.38	2	13.32	44.21	$707.42
46	265	10	8	ASTM D3034 SDR 35	$7.71	$4.92	$2.79	$739.55	34	32	87.61	77.18	$1,401.73	$1,234.80	$166.93	2	15.17	47.66	$762.49
47A	110	8	8	ASTM D3034 SDR 35	$4.92	$4.92	$0.00	$0.00	32	32	32.03	32.03	$512.56	$512.56	$0.00	0	12.62	0.00	$0.00
47	246	15	12	ASTM D3034 SDR 35	$16.54	$11.07	$5.47	$1,345.59	39	36	106.45	91.22	$1,703.24	$1,459.53	$243.71	3	16.88	73.82	$1,181.15
48	25	15	12	ASTM D3034 SDR 35	$16.54	$11.07	$5.47	$136.75	39	36	10.82	9.27	$173.09	$148.33	$24.77	3	17.64	7.84	$125.44
51	60	15	8	ASTM D3034 SDR 35	$16.54	$4.92	$11.62	$697.18	39	32	25.96	17.47	$415.42	$279.58	$135.85	7	9.83	24.47	$391.59
52	175	15	10	ASTM D3034 SDR 35	$16.54	$7.71	$8.83	$1,545.06	39	34	75.73	57.85	$1,211.65	$925.67	$285.98	5	13.50	69.98	$1,119.72
53	220	15	10	ASTM D3034 SDR 35	$16.54	$7.71	$8.83	$1,942.37	39	34	95.20	72.73	$1,523.22	$1,163.70	$359.52	5	10.54	68.68	$1,098.94
54	220	15	10	ASTM D3034 SDR 35	$16.54	$7.71	$8.83	$1,942.37	39	34	95.20	72.73	$1,523.22	$1,163.70	$359.52	5	7.14	46.52	$744.33
55	279	18	10	ASTM D3034 SDR 35	$25.66	$7.71	$17.95	$5,008.65	42	34	138.54	92.24	$2,216.64	$1,475.79	$740.85	8	7.68	101.54	$1,624.59
56	212	18	10	ASTM D3034 SDR 35	$25.66	$7.71	$17.95	$3,805.86	42	34	105.27	70.09	$1,684.33	$1,121.39	$562.94	8	7.47	75.04	$1,200.68
57	185	18	10	ASTM D3034 SDR 35	$25.66	$7.71	$17.95	$3,321.15	42	34	91.86	61.16	$1,469.81	$978.57	$491.24	8	6.07	53.21	$851.31
58	211	18	10	ASTM D3034 SDR 35	$25.66	$7.71	$17.95	$3,787.91	42	34	104.77	69.76	$1,676.38	$1,116.10	$560.28	8	7.47	74.69	$1,195.02
59	180	18	10	ASTM D3034 SDR 35	$25.66	$7.71	$17.95	$3,231.39	42	34	89.38	59.51	$1,430.09	$952.12	$477.97	8	6.77	57.74	$923.88
60	265	18	10	ASTM D3034 SDR 35	$25.66	$7.71	$17.95	$4,757.32	42	34	131.59	87.61	$2,105.41	$1,401.73	$703.67	8	5.57	69.93	$1,118.94
61	17	18	10	ASTM D3034 SDR 35	$25.66	$7.71	$17.95	$305.19	42	34	8.44	5.62	$135.06	$89.92	$45.14	8	5.12	4.12	$65.98
100	265	16	12	AWWA C905 DR18	$66.98	$22.30	$44.68	$11,840.87	40	36	120.26	98.27	$1,924.10	$1,572.26	$351.84	4	3.60	22.61	$361.81
101	415	16	12	AWWA C905 DR18	$66.98	$22.30	$44.68	$18,543.24	40	36	188.33	153.89	$3,013.21	$2,462.22	$550.99	4	3.69	36.30	$580.78
102	360	16	12	AWWA C905 DR18	$66.98	$22.30	$44.68	$16,085.71	40	36	163.37	133.49	$2,613.87	$2,135.90	$477.97	4	3.56	30.38	$486.06
103	360	16	12	AWWA C905 DR18	$66.98	$22.30	$44.68	$16,085.71	40	36	163.37	133.49	$2,613.87	$2,135.90	$477.97	4	3.59	30.63	$490.15
104	80	16	12	AWWA C905 DR18	$66.98	$22.30	$44.68	$3,574.60	40	36	36.30	29.67	$580.86	$474.64	$106.21	4	5.58	10.58	$169.30
105	228	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$3,327.23	42	36	113.22	84.55	$1,811.45	$1,352.74	$458.71	6	5.52	44.75	$715.98
106	84	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$1,225.82	42	36	41.71	31.15	$667.37	$498.38	$169.00	6	4.80	14.34	$229.38
107	337	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$4,917.88	42	36	167.34	124.97	$2,677.44	$1,999.44	$678.00	6	6.59	78.96	$1,263.41
108	103	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$1,503.09	42	36	51.15	38.19	$818.33	$611.10	$207.22	6	5.81	21.28	$340.44
109	97	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$1,415.53	42	36	48.17	35.97	$770.66	$575.51	$195.15	6	3.85	13.28	$212.45
110	101	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$1,473.90	42	36	50.15	37.45	$802.44	$599.24	$203.20	6	4.36	15.66	$250.52
111	106	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$1,546.87	42	36	52.64	39.31	$842.16	$628.90	$213.26	6	7.00	26.38	$422.12
112	177	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$2,582.98	42	36	87.89	65.63	$1,406.25	$1,050.15	$356.10	6	7.11	44.75	$715.93
113	182	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$2,655.95	42	36	90.37	67.49	$1,445.98	$1,079.82	$366.16	6	9.94	64.32	$1,029.17
114	11	18	12	ASTM D3034 SDR 35	$25.66	$11.07	$14.59	$160.52	42	36	5.46	4.08	$87.39	$65.26	$22.13	6	15.71	6.14	$98.31

Oversizing Pipe Costs	**$142,010.62**
Oversizing Pipe Bedding Costs	**$14,917.13**
Oversizing Imported Backfill Costs	**$39,039.81**

* Values represent the difference between the installed width of the trench and the required width of the trench to serve the LID area only.

** Depth is the average distance from the ground surface to the top of the bedding.

City of Edgewood
Meridian Avenue Sewer Improvements
Force Main Oversizing Cost Calculations
May 14, 2014

Installed = As constructed parameters
Required = As needed to serve the LID area only parameters

OVERSIZING COSTS FOR PS1 FORCE MAIN AND PS2 FORCE MAIN

PIPE COSTS

Pipe Segment	Length (ft)	Diameter Installed (in)	Diameter Required (in)	Pipe Type	Material Cost Installed ($/LF)	Material Cost Required ($/LF)	Unit Cost Difference ($/LF)	Oversizing Costs
PS1 FM	4,243	12	8	AWWA C900 DR 18	$22.30	$10.51	$11.78	$49,991.27
PS2 FM	3,553	12	8	AWWA C900 DR 18	$22.30	$10.51	$11.78	$41,861.65
PS3 FM	3,095	8	N/A	AWWA C900 DR 18	$10.51	$0.00	$10.51	$32,539.39
Total	**7,796**							**$124,392.31**

FITTING COSTS

Force Main	Quantity (ea)	Diameter Installed (in)	Diameter Required (in)	Fitting Description	Material Cost Installed ($/EA)	Material Cost Required ($/EA)	Unit Cost Difference ($/EA)	Oversizing Costs
PS1 FM	3	12	8	DI 45 Degree Elbow	$207.02	$95.39	$111.63	$334.89
PS1 FM	9	12	8	DI 22.5 Degree Elbow	$263.85	$134.97	$128.88	$1,159.94
PS1 FM	2	12	8	DI 11.25 Degree Elbow	$247.62	$128.88	$118.73	$237.47
PS1 FM	28	12	8	Megalug Fittings	$201.95	$101.48	$100.47	$2,813.08
PS1 FM	35	12	8	EBAA Iron Series 1600	$302.42	$158.31	$144.10	$5,043.65
PS2 FM	10	12	8	DI 45 Degree Elbow	$207.02	$95.39	$111.63	$1,116.30
PS2 FM	1	12	8	DI 22.5 Degree Elbow	$263.85	$134.97	$128.88	$128.88
PS2 FM	1	12	8	DI 11.25 Degree Elbow	$247.62	$128.88	$118.73	$118.73
PS2 FM	24	12	8	Megalug Fittings	$201.95	$101.48	$100.47	$2,411.21
PS2 FM	32	12	8	EBAA Iron Series 1600	$302.42	$101.48	$200.93	$6,429.90
PS3 FM	10	8	N/A	DI 45 Degree Elbow	$95.39	$0.00	$95.39	$953.93
PS3 FM	4	8	N/A	DI 22.5 Degree Elbow	$134.97	$0.00	$134.97	$539.88
PS3 FM	1	8	N/A	DI 11.25 Degree Elbow	$128.88	$0.00	$128.88	$128.88
PS3 FM	30	8	N/A	Megalug Fittings	$101.48	$0.00	$101.48	$3,044.46
PS3 FM	42	8	N/A	EBAA Iron Series 1600	$158.31	$0.00	$158.31	$6,649.10
Total								**$31,110.32**

BEDDING COSTS

Pipe Segment	Length (ft)	Diameter Installed	Diameter Required	Trench Width* Installed (in)	Trench Width* Required (in)	Bedding Quantity Installed (ton)	Bedding Quantity Required (ton)	Material Cost Installed ($)	Material Cost Required ($)	Bedding Oversizing Costs ($)	Backfill Width** (in)	Backfill Depth (ft)	Backfill Volume (ton)	Backfill Oversizing Costs ($)
PS1 FM	4,243	6" & 12"	6" & 8"	54	50	2419.30	1930.74	$38,708.84	$30,891.90	$7,816.95	4	4.5	452.59	$7,241.39
PS2 FM	3,553	6" & 12"	6" & 8"	60	56	2278.53	1827.31	$36,456.51	$29,237.00	$7,219.50	4	4.5	378.99	$6,063.79
Total	**7,796**									**$15,036.45**				**$13,305.17**

* The maximum width allowed per the Contract Documents was used for these calculations.

** Values represent the difference between the installed width of the trench and the required width of the trench to serve the LID area only.

PS1, PS2, and PS3 Pipe Material Over-Sizing Costs =	**$124,392**
PS1 and PS2 Force Main Fitting Over-Sizing Costs =	**$31,110**
PS1 and PS2 Force Main Bedding Over-Sizing Costs =	**$15,036**
PS1 and PS2 Force Main Backfill Over-Sizing Costs =	**$13,305**
Total =	**$183,844**

City of Edgewood
Meridian Avenue Sewer Improvements
Force Main Oversizing Cost Calculations
May 14, 2014

Installed = As constructed parameters
Required = As needed to serve the LID area only parameters

OVERSIZING COSTS FOR PS3 FORCE MAIN

PUMP STATION 3 FORCE MAIN TRENCH VOLUMES

Pipe Segment	Length	Trench Type	Installed							Required							Trench Volume Ratio
			Gravity Sewer Trench			Force Main Trench			Total Trench Volume	Gravity Sewer Trench			Force Main Trench			Total Trench Volume	
	(ft)		Width* (in)	Depth (ft)	Volume (cf)	Width* (in)	Depth (ft)	Volume (cf)	(cf)	Width* (in)	Depth (ft)	Volume (cf)	Width* (in)	Depth (ft)	Volume (cf)	(cf)	
27A	47	11	36	7.10	1001.57	74	6.50	1883.92	2885.49	32	7.10	890.28	30	6.00	705.00	1595.28	0.553
27	343	11	34	10.86	10557.35	74	6.50	13748.58	24305.93	32	10.86	9936.33	30	6.00	5145.00	15081.33	0.620
26	280	11	34	16.35	12973.64	74	6.50	11223.33	24196.98	32	16.35	12210.49	30	6.00	4200.00	16410.49	0.678
26	20	7	34	16.35	926.69	56	6.50	606.67	1533.36	32	16.35	872.18	30	6.00	300.00	1172.18	0.764
25	201	7	34	17.04	9706.18	56	6.50	6097.00	15803.18	32	17.04	9135.23	30	6.00	3015.00	12150.23	0.769
32E	210	11	32	11.98	6710.67	74	6.50	8417.50	15128.17	32	11.98	6710.67	30	6.00	3150.00	9860.67	0.652
32D	246	11	32	8.98	5893.07	74	6.50	9860.50	15753.57	32	8.98	5893.07	30	6.00	3690.00	9583.07	0.608
32C	194	11	32	9.25	4787.06	74	6.50	7776.17	12563.22	32	9.25	4787.06	30	6.00	2910.00	7697.06	0.613
32B	283	11	32	9.92	7488.81	74	6.50	11343.58	18832.39	32	9.92	7488.81	30	6.00	4245.00	11733.81	0.623
32A	26	11	32	10.71	742.79	74	6.50	1042.17	1784.96	32	10.71	742.79	30	6.00	390.00	1132.79	0.635
32	77	11	32	9.71	1994.47	74	6.50	3086.42	5080.89	32	9.71	1994.47	30	6.00	1155.00	3149.47	0.620
30B	346	11	32	10.17	9386.60	74	6.50	13868.83	23255.43	32	10.17	9386.60	30	6.00	5190.00	14576.60	0.627
30A	60	7	32	13.17	2107.73	56	6.50	1820.00	3927.73	32	13.17	2107.73	30	6.00	900.00	3007.73	0.766
30A	279	11	32	13.17	9800.96	74	6.50	11183.25	20984.21	32	13.17	9800.96	30	6.00	4185.00	13985.96	0.666
29A	197	7	32	15.99	8401.83	56	6.50	5975.67	14377.50	32	15.99	8401.83	30	6.00	2955.00	11356.83	0.790
29AA	90	7	32	15.66	3759.20	56	6.50	2730.00	6489.20	32	15.66	3759.20	30	6.00	1350.00	5109.20	0.787
FM ONLY	196	6	0	0.00	0.00	50	6.50	5308.33	5308.33	30	0.00	0.00	30	6.00	2940.00	2940.00	0.554

* The maximum width allowed per the Contract Documents was used for these calculations.

City of Edgewood
Meridian Avenue Sewer Improvements
Force Main Oversizing Cost Calculations
May 14, 2014

Installed = As constructed parameters
Required = As needed to serve the LID area only parameters

OVERSIZING COSTS FOR PS3 FORCE MAIN

PUMP STATION 3 FORCE MAIN OVER-SIZE COSTS

Pipe Segment	Length	Installed Costs for Trench Work						Trench Volume Ratio	Required Costs for Trench Work					Trench Work Oversize Costs		Imported Backfill			Backfill Oversizing Costs
		Unit Bid Price*	Unit Price Pipe	Unit Price TW**	Unit Price TWS Quantity	Unit Price TWS Total	Trench Work Unit Price		Revised Trench Work Unit Price***	Unit Price TW****	Unit Price TWS Quantity	Unit Price TWS Total	Revised Force Main Unit Price	Unit Cost Difference	Force Main Total Cost	Width**	Depth	Volume	
	(ft)	($/LF)	($/LF)	($/LF)	(EA)	($/LF)	($/LF)		($/LF)	($/LF)	(EA)	($/LF)	($/LF)	($/LF)	($)	(in)	(ft)	(ton)	($)
27A	47	$122.00	$27.66	$4.00	2	$8.51	$81.83	0.553	$45.24	$2.00	1	$4.26	$51.49	$30.33	$1,425.59	44	4.5	55.15	$882.35
27	343	$96.00	$24.30	$4.00	2	$1.17	$66.53	0.620	$41.28	$2.00	1	$0.58	$43.86	$25.25	$8,660.44	44	4.5	402.45	$6,439.25
26	280	$96.00	$24.30	$4.00	0	$0.00	$67.70	0.678	$45.91	$2.00	0	$0.00	$47.91	$21.78	$6,099.52	44	4.5	328.53	$5,256.53
26	20	$91.00	$24.30	$4.00	2	$20.00	$42.70	0.764	$32.64	$2.00	1	$10.00	$44.64	$10.06	$201.13	26	4.5	13.87	$221.87
25	201	$91.00	$24.30	$4.00	2	$1.99	$60.71	0.769	$46.67	$2.00	1	$1.00	$49.67	$14.03	$2,820.46	26	4.5	139.36	$2,229.76
32E	210	$99.00	$21.51	$4.00	2	$1.90	$71.58	0.652	$46.66	$2.00	1	$0.95	$49.61	$24.92	$5,234.02	44	4.5	246.40	$3,942.40
32D	246	$99.00	$21.51	$4.00	2	$1.63	$71.86	0.608	$43.71	$2.00	1	$0.81	$46.53	$28.15	$6,924.09	44	4.5	288.64	$4,618.24
32C	194	$99.00	$21.51	$4.00	2	$2.06	$71.42	0.613	$43.76	$2.00	1	$1.03	$46.79	$27.66	$5,367.00	44	4.5	227.63	$3,642.03
32B	283	$99.00	$21.51	$4.00	4	$2.83	$70.66	0.623	$44.03	$2.00	2	$1.41	$47.44	$26.63	$7,537.37	44	4.5	332.05	$5,312.85
32A	26	$99.00	$21.51	$4.00	2	$15.38	$58.10	0.635	$36.87	$2.00	1	$7.69	$46.57	$21.23	$551.94	44	4.5	30.51	$488.11
32	77	$99.00	$21.51	$4.00	0	$0.00	$73.49	0.620	$45.55	$2.00	0	$0.00	$47.55	$27.93	$2,150.95	44	4.5	90.35	$1,445.55
30B	346	$99.00	$21.51	$4.00	0	$0.00	$73.49	0.627	$46.06	$2.00	0	$0.00	$48.06	$27.42	$9,488.92	44	4.5	405.97	$6,495.57
30A	60	$102.00	$21.51	$4.00	0	$0.00	$76.49	0.766	$58.57	$2.00	0	$0.00	$60.57	$17.92	$1,074.92	26	4.5	41.60	$665.60
30A	279	$99.00	$21.51	$4.00	2	$1.43	$72.05	0.666	$48.02	$2.00	1	$0.72	$50.74	$24.03	$6,704.21	44	4.5	327.36	$5,237.76
29A	197	$102.00	$21.51	$4.00	2	$2.03	$74.46	0.790	$58.81	$2.00	1	$1.02	$61.83	$15.64	$3,081.64	26	4.5	136.59	$2,185.39
29AA	90	$102.00	$21.51	$4.00	0	$0.00	$76.49	0.787	$60.22	$2.00	0	$0.00	$62.22	$16.27	$1,463.90	26	4.5	62.40	$998.40
FM ONLY	196	$70.00	$16.59	$4.00	2	$2.04	$47.37	0.554	$26.23	$2.00	1	$1.02	$29.25	$21.13	$4,142.05	20	4.5	104.53	$1,672.53
Total	**3,095**														**$72,928.16**				**$51,734.19**

* Unit prices per the Contractor's bid for each pipe configuration and trench type.

** Tracer wire and tracer wire stations were installed on both force mains.

*** Trench Work Unit Price multiplied by the Trench Volume Ratio

**** Tracer wire and tracer wire stations would only be required on the single force main.

PS3 FM Trench Work Oversizing Costs =	**$72,928**
PS3 FM Imported Backfill Oversizing Costs =	**$51,734**
Total =	**$124,662**

City of Edgewood
Meridian Avenue Sewer Improvements
Pump Station Oversizing Cost Calculations
May 14, 2014

Pump Station 1 - Downsize from 6" & 12" FM's to 6" & 8" FM's	units	12" Quantity	12" Unit cost	12" Total Cost	8" Quantity	8" Unit cost	8" Total Cost	Apr 2014 difference	Nov 2009 difference	Source
Vault piping (downsize in flow meter vault; valve vault unchanged)										
2nd Force main pipe	lf	8	$71	$572	same as 12"	$51	$408	($164)	($144)	H D Fowler
Megaflange	ea	1	$549	$549	same as 12"	$453	$453	($96)	($85)	H D Fowler
Megaflange coupling adapter	ea	1	$575	$575	same as 12"	$475	$475	($100)	($89)	2014 USA Blue Book
				$1,696			$1,336	($360)	($317)	
Buried piping on site (downsize 2nd FM up to 1st 45 elbow at road)										
2nd Force main pipe	lf	104	$71	$7,434	same as 12"	$51	$5,308	($2,126)	($1,877)	H D Fowler
Emergency Inlet pipe	lf	15	$71	$1,072	same as 12"	$51	$766	($307)	($271)	H D Fowler
tees & wyes	ea	2	$1,204	$2,409	same as 12"	$570	$1,141	($1,268)	($1,119)	H D Fowler
cross for emergency Inlet	ea	1	$1,112	$1,112	same as 12"	$518	$518	($595)	($525)	H D Fowler
90 elbow for emergency inlet	ea	1	$792	$792	same as 12"	$382	$382	($410)	($362)	H D Fowler
45 elbows	ea	2	$668	$1,336	same as 12"	$322	$644	($692)	($611)	H D Fowler
reducers	ea	3	$506	$1,519	same as 12"	$262	$787	($732)	($646)	H D Fowler
Sleeve couplings	ea	4	$315	$1,260	same as 12"	$196	$782	($478)	($422)	H D Fowler
plug valves	ea	3	$4,969	$14,907	same as 12"	$3,000	$9,001	($5,906)	($5,212)	H D Fowler
flange ss bolt kits	ea	16	$302	$4,838	same as 12"	$149	$2,391	($2,447)	($2,160)	2014 USA Blue Book
				$36,681			$21,719	($14,962)	($13,203)	
Instrumentation - downsize from 12" to 8" flow meter										
mag flow meter	ea	1	$6,900	$6,900	same as 12"	$4,715	$4,715	($2,185)	($1,928)	2014 USA Blue Book
SUBTOTAL PUMP STATION 1 OVERSIZING COST									**($15,449)**	

Pump Station 2 - Downsize from 6" & 12" FM's to 6" & 8" FM's	units	12" Quantity	12" Unit cost	12" Total Cost	8" Quantity	8" Unit cost	8" Total Cost	Apr 2014 difference	Nov 2009 difference	Source
Vault piping (downsize FM in flow meter vault; valve vault unchanged)										
2nd Force main pipe	lf	8	$71	$572	same as 12"	$51	$408	($164)	($144)	
Megaflange	ea	1	$549	$549	same as 12"	$453	$453	($96)	($85)	H D Fowler
Megaflange coupling adapter	ea	1	$750	$750	same as 12"	$619	$619	($131)	($116)	2014 USA Blue Book
				$1,871			$1,481	($390)	($344)	
Buried piping on site (downsize FM to north property line)										
2nd Force main pipe	lf	30	$71	$2,145	same as 12"	$51	$1,531	($613)	($541)	H D Fowler
Emergency Inlet pipe	lf	10	$71	$715	same as 12"	$51	$510	($204)	($180)	H D Fowler
tees & wyes	ea	2	$1,204	$2,409	same as 12"	$570	$1,141	($1,268)	($1,119)	H D Fowler
cross for emergency Inlet	ea	1	$1,112	$1,112	same as 12"	$518	$518	($595)	($525)	H D Fowler
90 elbow for emergency inlet	ea	1	$792	$792	same as 12"	$382	$382	($410)	($362)	H D Fowler
reducers	ea	3	$506	$1,519	same as 12"	$262	$787	($732)	($646)	H D Fowler
Sleeve couplings	ea	3	$315	$945	same as 12"	$196	$587	($359)	($317)	H D Fowler
plug valves	ea	3	$4,969	$14,907	same as 12"	$3,000	$9,001	($5,906)	($5,212)	H D Fowler
flange ss bolt kits		16	$302	$4,838	same as 12"	$149	$2,391	($2,447)	($2,160)	2014 USA Blue Book
				$29,382			$16,847	($12,535)	($11,061)	
Instrumentation - downsize from 12" to 8" flow meter										
mag flow meter	ea	1	$6,900	$6,900	same as 12"	$4,715	$4,715	($2,185)	($1,928)	2014 USA Blue Book
SUBTOTAL PUMP STATION 2 OVERSIZING COST									**($13,334)**	

City of Edgewood
Meridian Avenue Sewer Improvements
Pump Station Oversizing Cost Calculations
May 14, 2014

Pump Station 3 - Downsize from 6" & 8" FM's to Single 6" FM	units	8" Quantity	8" Unit cost	8" Total Cost	6" Quantity	6" Unit cost	6" Total Cost	Apr 2014 difference	Nov 2009 difference	Source
144" Wet Well Structure (downsize to 96" dia for 2 pumps)										
Reduce cost in proportion to wet well diameter				$75,000	(8'/12')=	67%	$50,000		($25,000)	
Wet Well Pumps and Piping (upsize from 340 to 517 gpm)										
Pumps	ea	2	$19,000	$38,000	2	$24,000	$48,000		$10,000	Cornell Pump Co. list prices
Riser pipes (4" orig., 6" LID1)	lf	20	$20	$400	20	$34	$680		$280	2014 Means 3311-13.15
Reducer (installed cost)	ea	2	$393	$787	0	na	na		($787)	H D Fowler
				$39,187			$48,680		$9,493	
Precast Vaults (downsize from 8'+11' to 8'+8' vaults)										
Reduce cost in proportion to total vault length				$20,000	(16'/19')=	84%	$16,842		($3,158)	
Vault piping (delete 8" fm at flow meter vault; valve vault unchanged)										
2nd Force main pipe (installed cost)	lf	8	$77	$612	0	na	$ -	($612)	($540)	H D Fowler
Megaflange (installed cost)	ea	1	$680	$680	0	na	$ -	($680)	($600)	H D Fowler
Flanged coupling adapter (installed cost)	ea	1	$929	$929	0	na	$ -	($929)	($820)	2014 USA Blue Book
				$2,221			$ -	($2,221)	($1,960)	
Buried piping on site (delete 8" FM to east property line & downsize emergency inlet)										
2nd Force main pipe (installed cost)	lf	10	$115	$1,148	0	na	$0	($1,148)	($1,013)	H D Fowler
Emergency Inlet pipe (installed cost)	lf	11	$115	$1,263	11	$61	$668	($595)	($525)	H D Fowler
tees & wyes (installed cost)	ea	3	$856	$2,567	2	$574	$1,149	($1,418)	($1,252)	H D Fowler
cross for emergency Inlet (installed cost)	ea	1	$776	$776	1	$607	$607	($169)	($149)	H D Fowler
90 elbow for emergency inlet (installed cost)	ea	1	$573	$1,000	2	$422	$615	($385)	($340)	H D Fowler
reducers (installed cost)	ea	3	$393	$1,180	2	$283	$566	($614)	($542)	H D Fowler
Sleeve couplings (installed cost)	ea	2	$293	$587	0	na	$0	($587)	($518)	H D Fowler
6" plug valves (installed cost)	ea	2	$3,000	$6,000	1	$3,000	$3,000	($3,000)	($2,647)	H D Fowler
8" plug valves (installed cost)	ea	3	$4,501	$13,502	0	na	$0	($13,502)	($11,915)	H D Fowler
flange ss bolt kits (installed cost)	ea	16	$224	$3,587	5	$205	$3,283	($304)	($268)	2014 USA Blue Book
				$31,609			$9,887	($21,722)	($18,901)	
Instrumentation - delete 8" flow meter										
mag flow meter	ea	1	$7,073	$7,073	$ -	na	$0	($7,073)	($6,241)	2014 USA Blue Book
SUBTOTAL PUMP STATION 3 OVERSIZING COST									**($45,767)**	

TOTAL PUMP STATION OVERSIZING COST	**($74,549)**