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City of Edgewood

Meridian Ave. Sewer Project

LID No. 1

Evaluation of Oversizing

August 13, 2014

Overview

Oversizing Costs that were Evaluated

- Project Development
- Design/Easement/Permitting
- Construction
- LID Formation and Assessment Process
- Financing

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What We Found

- Smaller pipe could have been used for 11,905 ft out of the 24,735 ft of gravity sewer installed
- Pump Stations 1 and 2 could have been built with 6” & 8” force mains v. 6” & 12” force mains
- Pump Station 3 could have been built with one 6” force main v. 6” & 8” force mains
- Pump Station 3 could have been sized for two pumps rather than three.

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Summary of Oversizing Costs

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

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Summary of Construction Costs

Table 9 Construction Oversizing Cost Summary	
Gravity Sewers	$195,968
Force Main	$308,505
Pump Stations	$74,550
Subtotal	**$579,023**
Sales Tax @ 9.5%	*$55,007*
Construction Administration	*$0*
Construction Oversizing Costs	**$634,030**

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Construction Oversizing Costs

- Oversizing associated with:
  - Design Flows
  - Gravity Sewers
  - Force Mains
  - Pump Stations

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Design Flows

- Consistent with Department of Ecology Standards (DOE)*
  - 100 gpcd per Table G2-2 in DOE Standards used for residential flows
  - Peaking factors per Figure C1-1 in DOE Standards
    - Higher population associated with Edgewood service area results in lower peak flows
    - Conservative to benefit of LID
- Consistent with General Sewer Plan

*https://fortress.wa.gov/ecy/publications/summarypages/9837.html

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Design Flows

- Zoning
  - Based on zoning in effect at time of design
  - Later zoning as discussed in the court decision provided for greater population densities that would have resulted in higher LID1 costs. The higher densities were not factored into the reports analysis of oversizing costs.
  - Conservative to Benefit of LID

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Design Flows

Table 2 Design Flows						
	Edgewood Service Area			LID1 Service Area		
	Design Flow		ERU	Design Flow		ERU
	MGD	GPM	Served	MGD	GPM	Served
Pump Station 1	3.684	2,558	2,548	1.934	1,343	848
Pump Station 2	3.296	2,258	2,500	1.578	1,096	824
Pump Station 3	1.713	1,190	1,378	0.745	517	420

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Gravity Sewers

- Oversizing associated with:
  - Diameter of gravity sewers
  - Depth of gravity sewers
  - Alignment of gravity sewers unchanged

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Gravity Sewers

- 8-inch minimum diameter per DOE standards
- Pipe capacity at full flow must exceed the design flow
- Depth of pipe changed when a reduction in the diameter required an increase in the slope to avoid violating the DOE Standards for minimum pipe slopes

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Gravity Sewers

- Additional construction costs associated with 2,995 feet of deeper trenches ignored
  - Conservative to benefit of LID1
- 11,905 out of 24,735 feet of gravity sewer was oversized
- Oversizing Costs
  - Pipe material
  - Bedding material
  - Backfill material

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Gravity Sewers

Table 6 Gravity Sewer Oversizing Costs	
Pipe Material	$142,011
Bedding	$14,917
Imported Backfill	$39,040
Subtotal	**$195,968**
Sales Tax @ 9.5%	*$18,617*
Total	**$214,585**

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Force Mains

- Oversizing associated with:
  - Diameter of force mains
  - Number of force mains
  - Alignment of pipe unchanged

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Force Mains

- DOE Standards required mitigation of odor and corrosion issues
  - Minimum 2.0 feet per second velocities and maximum 8.0 feet per second velocities per DOE standards
  - Design targeted 4 to 6 feet per second velocities

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Force Mains

- Design had to address planned flows for LID1
- Dual force mains
  - Provide Odor and corrosion control during the low initial flows
  - Reduce energy consumption during the larger fully developed flows
  - Provide operational flexibility for cleaning and repairs

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Force Mains

- Pump Station 1 & Pump Station 2 Force Mains
  - Dual force mains still required
  - 6” and 8” diameter versus 6” and 12” diameter
  - Oversizing Costs
    - Pipe and fitting material
    - Bedding material
    - Backfill material

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Force Mains

- Pump Station 3 Force Main
  - Single 6” diameter versus 6” & 8” diameter
  - Oversizing Costs
    - Pipe and fitting material
    - Bedding material
    - Backfill material
    - Trench work

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Force Mains

Table 7 Force Main Oversizing Costs	
Pipe Material (Pump Stations 1, 2, & 3 FM)	$124,392
Fittings (Pump Stations 1, 2, & 3 FM)	$31,110
Bedding (Pump Stations 1 & 2 FM)	$15,036
Imported Backfill (Pump Stations 1 & 2 FM)	$13,305
Trench Work (Pump Station 3 FM)	$72,928
Imported Backfill (Pump Station 3 FM)	$51,734
Subtotal	**$308,505**
Sales Tax @ 9.5%	*$29,308*
Total	**$337,813**

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Pump Stations

- Oversizing at Pump Stations 1 & 2
  - Diameter of pipe
  - Diameter of fittings
  - Size of flow meters
- Oversizing at Pump Stations 3
  - Connecting to a single force main versus dual force main
  - Decreased wet well diameter
  - Duplex station versus triplex station
  - Smaller valve vault and meter vault

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Pump Stations

Table 8 Pump Station Oversizing Costs	
Pump Station 1	$15,449
Pump Stations 2	$13,334
Pump Stations 3	$45,767
Subtotal	**$74,550**
Sales Tax @ 9.5%	*$7,082*
Total	**$81,632**

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Construction Administration

- Construction Administration Costs
  - Managing project during the construction phase
  - Administering the construction contracts
  - Observing the contractors' work for compliance with the construction contracts
  - Preparing construction record drawings
  - City staffing costs during construction
- These costs are not impacted by oversizing

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Construction Costs

Table 9 Construction Oversizing Cost Summary	
Gravity Sewers	$195,968
Force Main	$308,505
Pump Stations	$74,550
Subtotal	**$579,023**
Sales Tax @ 9.5%	*$55,007*
Construction Administration	*$0*
Construction Oversizing Costs	**$634,030**

- Construction oversizing costs are 5.9% of the $10,820,334 construction costs

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Summary of Oversizing Costs

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Project Development

- Project development costs include:
  - Preparation of the General Sewer Plan (GSP)
  - Applying for grants and loans to finance the design and construction of the project
  - City labor costs to administer the project

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Project Development

- GSP defined:
  - The sewer service area
  - Development densities
  - How to serve the area
  - How to develop the design flows
  - Where to convey the sewage for treatment

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Project Development

- City spent $103,524 preparing the 2004 GSP and the 2007 Amended GSP
- LID1 was a significant reason for preparing these documents
- City prorated the costs for preparing these documents resulting in $29,264 being included in assessments

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Project Development

- Oversizing Costs
  - Costs for developing the GSP is unrelated to the size and extent of facilities constructed under LID1
    - No credits are due for oversizing
  - Costs associated with applying for grants and loans to finance the project are unaffected by the size and extent of the facilities
    - No credits are due for oversizing

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Design/Easement/Permitting

- Efforts Prior to Construction included:
  - Preliminary design
  - Final Design
  - Geotechnical and environmental investigations
  - Obtaining the project permits
  - Obtaining the project easements

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Design/Easement/Permitting

- Efforts Impacted by Oversizing:
  - Preliminary design
    - Design flow calculations
    - Routing of flows
  - Final Design
    - Design flow calculations
    - Routing of flows
- These efforts are a small portion of the overall design efforts
- Oversizing costs were not tracked separately

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Design/Easement/Permitting

Table 9 Design Oversizing Costs	
Preliminary Design	$88,582
Design	$1.304.845
Total Design Costs	**$1,393,427**
Oversizing Construction Cost as Percent of Total Construction Cost	**5.9%**
Oversizing Costs*	**$81,650**

- *5.9% x $1,393,427 = $81,650

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LID Formation and Assessment Process

- Efforts associated with forming the LID, developing the assessments, and levying the assessments in accordance with the LID statutes are independent of the size of the facilities being constructed under the LID
- No oversizing costs are associated with LID formation and assessment process

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Financing

- Oversizing associated with the size and resultant interest costs of:
  - Bond Anticipation Note (BAN) financing during the design and construction phases
  - Interfund Loan and Public Works Trust Fund loan interest
  - Permanent financing setup and interest
  - LID guaranty fund

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Financing

- Financing oversizing cost ratio computed as:
  - Oversizing costs for design and construction divided by the total project costs (excluding finance costs) multiplied by the total financing costs
  - Oversizing costs for design & construction = $751,680
    - $81,650 + $634,030 = $751,680
  - Project costs excluding financing costs = $18,865,644
    - $21,238,268 - $2,372,624 = $18,865,644
  - Financing Oversizing Costs = $90,007
    - $751,680 / $18,865,644 = 3.8%
    - 3.8% x $2,372,624 = $90,007

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Questions

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