

**WASTEWATER SYSTEM
ENGINEERING APPRAISAL**

For

**TANSI SEWER UTILITY DISTRICT OF
CUMBERLAND COUNTY, TENNESSEE**

November 2012

**GRW ENGINEERS, INC.
404 BNA DRIVE, SUITE 201
NASHVILLE, TN 37217**

EXECUTIVE SUMMARY

This engineering appraisal has been prepared with; cost information provided when the projects were bid for construction, actual construction pay requests, purchased equipment costs, and estimated project costs based on recommendations of the United States Department of Agriculture (USDA), Rural Development (RD) program. Information was provided by the TSUD staff, W&O Construction, and Southern Sales Company (Sales representative for GE).

Development costs for the various projects to create the TSUD system include engineering fees, legal fees and interest during construction. These costs are provided in the appendix and total \$271,900.00. Compilations of these costs are based on recommendations of the United States Department of Agriculture (USDA), Rural Development (RD) program, and from experience with similar projects.

The present worth estimate of the Tansi Sewer System was based on straight line depreciation as shown below. The estimated life expectancy is typical for the industry and generally recognized by funding agencies such as the United States Department of Agriculture (USDA), Rural Development (RD) program. These costs argumentatively, do not include the project development costs. The present worth as shown below is \$1,313,215.00.

	2009	Life Exp.	Annual	2012
2008 CONSTRUCTION AND EQUIPMENT COSTS	Value	Years	Depreciation	Value
Collection System Projects*	\$500,300.00	20	\$25,015.00	\$425,255.00
Treatment Plant Construction	\$483,200.00	40	\$12,080.00	\$446,960.00
Treatment Plant Equipment	<u>\$490,000.00</u>	30	\$16,333.33	<u>\$441,000.00</u>
TOTAL CONSTRUCTION AND EQUIPMENT COST	\$1,473,500.00			\$1,313,215.00
TOTAL PROJECT COSTS	\$271,900.00			

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- System Map

Collection System

- Summary & Cost Estimate of Collection System Projects
- Bid Tabulation for Amenity Wastewater Collection System

Treatment Plant

- W&O Construction Final Pay Request
- Bid Tabulation Sheet
- Email from Southern Sales (General Electric Sales Representative)

Project Cost

- Summary of Project And Development Costs
- Engineering Fee Calculations

Present Worth Estimate

- Present Worth Estimate

I. GENERAL INFORMATION

A. Location

The Tansi Sewer Utility District of Cumberland County, Tennessee (TSUD), serves customers on the northeast side of Lake Tansi in Crossville Tennessee.

B. Purpose of Report

The purpose of this report is to present the findings of an engineering appraisal completed at the request of the TSUD Commissioners. This appraisal considers the value of the system as constructed.

II. EXISTING FACILITIES

A. Wastewater Treatment Plant

The TSUD wastewater treatment plant building and structures were constructed in the summer of 2009 by W&O Construction. The equipment was installed separately by the TSUD. The treatment plant has an average design capacity of 50,000 gallons per day (GPD). At the time of this study the average flow to the plant was 20,000 GPD and the peak flows have been 30,000 GPD.

The treatment plant consists of; a flow equalization tank, contract screen, anoxic chamber, aeration bioreactor, membrane filtration, and ultra-violet (UV) disinfection. The plant discharges into Hiawatha Lake and has not had any reported violations. The NPDES discharge permit for the plant is TN00411, and the discharge limits are;

- Daily maximum 10 MG/L for BOD and SS.
- Monthly Average 20 MG/L for BOD and SS.

B. Sanitary Sewer Collection System

The TSUD sewer collection system consists of approximately 18,700 linear feet of 3 and 4 inch pressure sewers, 24 residential grinder pump stations, and one 100 GPM pump station. The majority of the collection sewers were installed in 2009 by W&O Construction Company. The TSUD was not aware of any collection system violations.

III. ENGINEERING APPRAISAL

A. General

This engineering appraisal has been prepared with; cost information provided when the projects were bid for construction, actual construction pay requests, purchased equipment costs, and estimated project costs based on recommendations of the United States Department of Agriculture (USDA), Rural Development (RD) program. Information was provided by the TSUD staff, W&O Construction, and Southern Sales Company (Sales representative for GE).

This report has not addressed any known or unknown problems in the collection or treatment facilities.

B. Collection System

The collection system quantities were obtained from the three (3) project drawings prepared by ECE, and the bid tabulations from the original project. The quantities were checked with the collection system map in the TSUD office. Pricing for construction of the collection system was obtained from the original project. We used the low bidders numbers (W&O Construction) for the total installed quantities.

The number and type of grinder pumps installed in the system was supplied by the TSUD employees.

The estimated value of the collection system as provided in the appendix is \$500,300.

C. Treatment Plant

Information used in estimating the value of the Wastewater Treatment Plant was; the bid tabulation from the project, the contractors (W&O Construction) final pay request, and the dollar amount of the equipment sold as provided by Southern Sales Inc. (GE Representative).

The estimated value of the treatment plant as provided in the appendix is broken down as follows;

- Final construction pay request by W&O for \$483,194.00
- Email of equipment cost from Southern Sales \$490,000.00

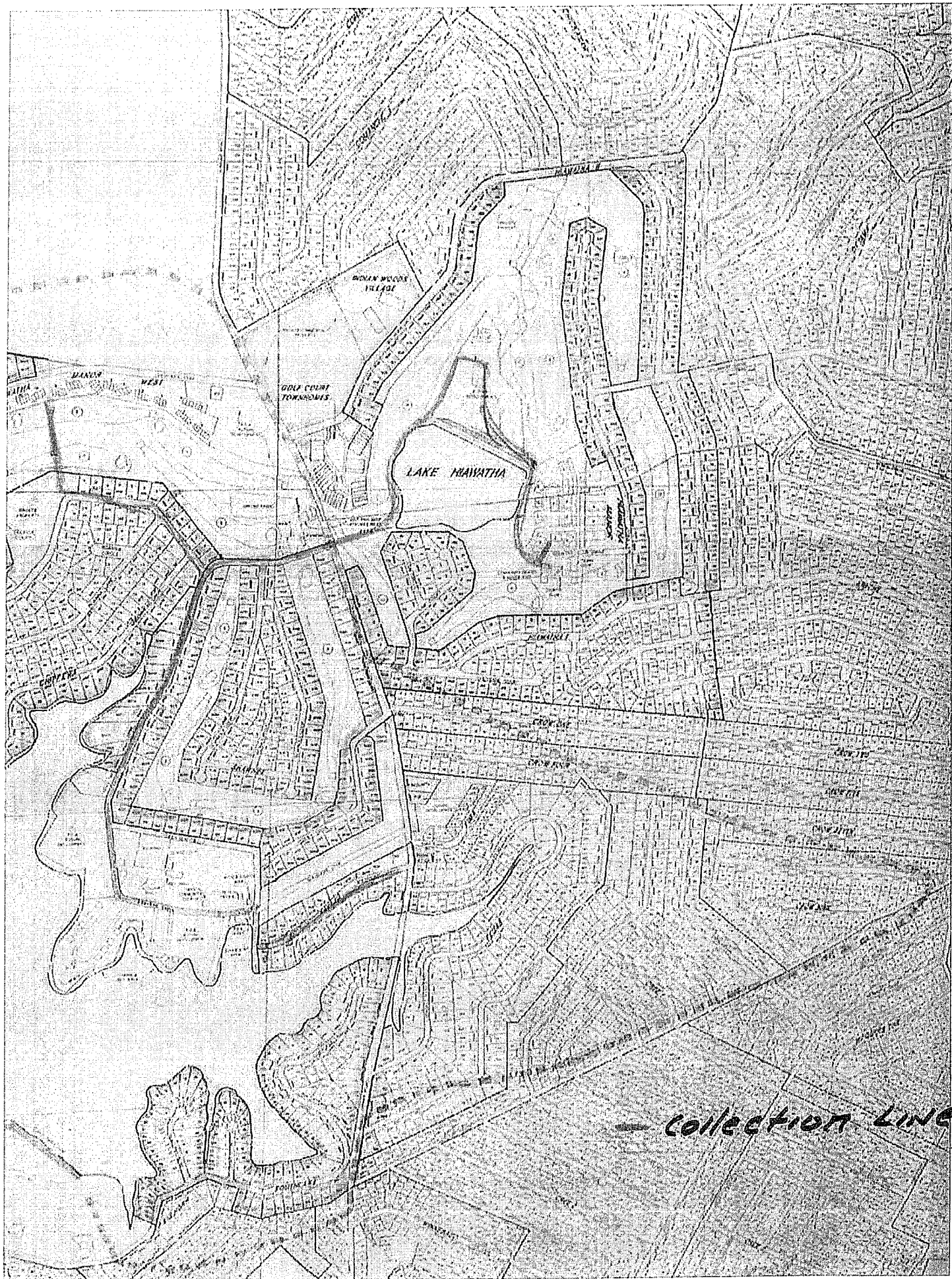
D. Development Costs

Development costs for the various projects to create the TSUD system include engineering fees, legal fees and interest during construction. These costs are provided in the appendix and total \$271,900.00. Compilations of these costs are based on recommendations of the United States Department of Agriculture (USDA), Rural Development (RD) program, and from experience with similar projects.

E. Present Worth Estimate

The present worth estimate of the Tansi Sewer System was based on straight line depreciation as shown in the table in the appendix. The estimated life expectancy is typical for the industry and generally recognized by funding agencies such as the United States Department of Agriculture (USDA), Rural Development (RD) program. These costs argumentatively, do not include the project development costs. The present worth as shown in the appendix is \$1,313,215.00.

APPENDIX



— Collection Lines

COLLECTION SYSTEM

Tansi Sewer System

Summary & Cost Estimate of Collection System Projects

Item	Description	Unit	2008	2010	2011	Add. Units	Totals	Unit Price	Total Price
			Quantity	Quantity	Quantity				
01011-001	Mobilization of Equipment Onto Site and Preparedness to Work	LS	1	1	1		3	\$2,500.00	\$7,500.00
01356-001	Stormwater Pollution Prevention Measures as Shown or as Directed By Engineer	LS		1	1		2	\$5,000.00	\$10,000.00
01356-010	Bailed Hay or Straw Erosion Checks	Bale	15				15	\$5.00	\$75.00
01356-011	Temporary Silt Fences	LF	100				100	\$6.00	\$600.00
02100-001	Clearing and Grubbing	Acre	0.2				0.2	\$5,000.00	\$1,000.00
02222-101	Undercutting of Unsuitable Materials	TON	40				40	\$15.00	\$600.00
02222-101	Crushed Stone for Shoulder Maintenance and Pavement Replacement	TN	120	60	73		253	\$15.00	\$3,795.00
02222-201	Stream Crossing In Rock	LF	130	70			200	\$35.00	\$7,000.00
02222-301	Gravel Crossing	LF	90				90	\$8.00	\$720.00
02222-301	Gravel Crossing, Road Replacement for Utility Crossing	LF		22			22	\$8.00	\$176.00
02222-303	Concrete Crossing, Road Replacement for Utility Crossing	LF	32	155			187	\$15.00	\$2,805.00
02222-304	Concrete Crossing (Pea Gravel)	LF	40				40	\$15.00	\$600.00
02222-311	Asphalt Crossing, Road Replacement for Utility Crossing	LF	900	20	185		1105	\$9.00	\$9,945.00
02601-008	10" Steel Casing for Sewer Line: Open Cut	LF		35			35	\$50.00	\$1,750.00
02601-009	8" Steel Casing for Sewer Line: Open Cut	LF	250		215		465	\$40.00	\$18,600.00
02601-303	4" PVC CL200 Casing; Open Cut	LF	40				40	\$9.00	\$360.00
02601-501	4" PVC CL200 Force Main Sewer Line Installation In Existing 10" Steel Casing, at Dunbar Road	LS	1				1	\$2,500.00	\$2,500.00

Item	Description	Unit	2008			2010			2011			Add. Units	Totals	Unit Price	Total Price
			Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity						
02730-014	Connection to Existing 4" Force Main Sewer Including All Valves, Specials and Fittings	EA		1	3							4	\$1,000.00	\$4,000.00	
02730-015	Connection to Existing 3" Force Main Sewer Line	EA		1								1	\$800.00	\$800.00	
02730-175	4" PVC Gravity Sewer Service Line	LF	75									75	\$9.00	\$675.00	
02730-176	3" PVC Gravity Sewer Service Line	LF	525									525	\$9.00	\$4,725.00	
02730-254	4" Resilient-Seat Sewer Gate Valve with Valve Box	EA	2									2	\$400.00	\$800.00	
02730-256	2" Resilient-Seat Sewer Gate Valve with Valve Box	EA	2									2	\$300.00	\$600.00	
02730-305	4" Cleanout, Termination Type, Force Main Sewer, Heavy Duty Assembly	EA	5	1	4							10	\$1,300.00	\$13,000.00	
02730-307	2" Cleanout, Termination Type, Force Main Sewer, Heavy Duty Assembly	EA	6									6	\$800.00	\$4,800.00	
02730-354	4" Cleanout, In-Line Type, Force Main Sewer, Heavy Duty Assembly	EA	5	1								6	\$1,400.00	\$8,400.00	
02730-356	2" Cleanout, In-Line Type, Force Main Sewer, Heavy Duty Assembly	EA	6									6	\$900.00	\$5,400.00	
02730-401	Sewer Line Air/Vacuum Release Valve Assembly	EA	2									2	\$2,500.00	\$5,000.00	
02730-501	Effluent Outfall Structure	LS	1									1	\$2,000.00	\$2,000.00	
02730-504	4" PVC CL200 Force Main Sewer Line Including All Valves, Specials, and Fittings	LF	10,900	1,221	2,445							14566	\$9.00	\$131,094.00	
02730-505	3" PVC CL200 Force main Sewer Line	LF		770								770	\$9.00	\$6,930.00	
02730-206	2" PVC CL200 Force Main Sewer Line	EA	3400									3400	\$7.00	\$23,800.00	
02730-601	Grease Trap Assembly	EA	1									1	\$3,000.00	\$3,000.00	
02740-101	Service Installation Grinder Pump Type I	EA	23									23	\$4,750.00	\$109,250.00	
02740-102	Service Installation Grinder Pump Type II	EA	1									1	\$5,500.00	\$5,500.00	

Item	Description	Unit	2008	2010	2011	Add. Units	Totals	Unit Price	Total Price
		Quantity	Quantity	Quantity	Quantity				
		EA	1				1	\$90,000.00	\$90,000.00
02740-104	100 GPM Grinder Pump Installation	EA	1				1	\$500.00	\$500.00
02740-201	Sewer Service Connection to Existing Grinder Pump Service	EA	25				25	\$500.00	\$12,500.00
02921-001	2" Service Junction Box	Unit	150	1	16		167	\$3.00	\$501.00
	Permanent Seeding, Liming, Fertilizing and Mulching								
	TOTAL ALL PRICES								\$501,301.00



Environmental & Civil Engineering Services

Engineering • Geotechnical • Testing

BID TABULATION

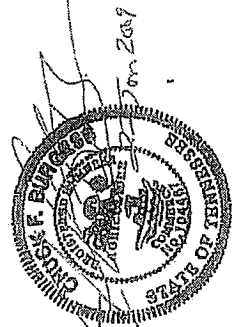
Tansi Waste Management, Inc.
Amenity Wastewater Collection System
 Date: Wednesday, January 21, 2009
 Time: 3:00 p.m. local time
 Location: Lake Tansi POA Office

ITEM #	ITEM DESCRIPTION	EST. QTY	UNIT	W & O Construction		Ironwood Construction & Engineering, LLC		Hopper Excavation, LLC		Green Brothers Construction	
				UNIT PRICE	TOTAL EST. ITEM COST	UNIT PRICE	TOTAL EST. ITEM COST	UNIT PRICE	TOTAL EST. ITEM COST	UNIT PRICE	TOTAL EST. ITEM COST
0101-001	Mobilization	1	LS	\$ 2,500.00	\$ 2,500.00	\$ 2,000.00	\$ 2,000.00	\$ 3,500.00	\$ 3,500.00	\$ -	\$ -
01356-010	Baled Hay	15	BALE	\$ 5.00	\$ 75.00	\$ 25.00	\$ 375.00	\$ 10.00	\$ 150.00	\$ 5.00	\$ 75.00
01356-011	Silt Fence	100	LF	\$ 6.00	\$ 600.00	\$ 3.00	\$ 300.00	\$ 3.50	\$ 350.00	\$ 6.00	\$ 600.00
02100-001	Cleaning and Grubbing	0.2	ACRE	\$ 5,000.00	\$ 1,000.00	\$ 5,000.00	\$ 1,000.00	\$ 2,500.00	\$ 500.00	\$ 2,200.00	\$ 440.00
02222-101	Undercutting	40	TON	\$ 15.00	\$ 600.00	\$ 15.00	\$ 600.00	\$ 20.00	\$ 800.00	\$ 18.00	\$ 720.00
02222-102	Crushed Stone for Shoulder Maintenance	120	TON	\$ 15.00	\$ 1,800.00	\$ 15.00	\$ 1,800.00	\$ 20.00	\$ 2,400.00	\$ 20.00	\$ 2,400.00
02222-201	Stream Crossing in Rock	130	LF	\$ 35.00	\$ 4,550.00	\$ 50.00	\$ 6,500.00	\$ 40.00	\$ 5,200.00	\$ 200.00	\$ 26,000.00
02222-301	Gravel Road Crossing	90	LF	\$ 8.00	\$ 720.00	\$ 15.00	\$ 1,350.00	\$ 10.00	\$ 900.00	\$ 20.00	\$ 1,800.00
02222-303	Concrete Road Crossing	32	LF	\$ 15.00	\$ 480.00	\$ 75.00	\$ 2,400.00	\$ 40.00	\$ 1,280.00	\$ 200.00	\$ 6,400.00
02222-304	Concrete Road Crossing, Pen Gravel	40	LF	\$ 15.00	\$ 600.00	\$ 100.00	\$ 4,000.00	\$ 50.00	\$ 2,000.00	\$ 200.00	\$ 8,000.00
02222-306	Hot Mix Road Crossing	900	LF	\$ 9.00	\$ 8,100.00	\$ 25.00	\$ 22,500.00	\$ 18.00	\$ 16,200.00	\$ 25.00	\$ 22,500.00
02601-107	8" Steel Casing, Open Cut	250	LF	\$ 40.00	\$ 10,000.00	\$ 30.00	\$ 7,500.00	\$ 40.00	\$ 10,000.00	\$ 60.00	\$ 15,000.00
02601-303	4" PVC Casing, Open Cut	40	LF	\$ 15.00	\$ 600.00	\$ 10.00	\$ 400.00	\$ 10.00	\$ 400.00	\$ 40.00	\$ 1,600.00
02601-501	Install in existing Casing at Dunbar	1	LS	\$ 2,500.00	\$ 2,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00
02730-175	4" Gravity Sewer Service	75	LF	\$ 9.00	\$ 675.00	\$ 10.00	\$ 750.00	\$ 30.00	\$ 2,250.00	\$ 25.00	\$ 1,875.00
02730-176	3" Gravity Sewer Service	595	LF	\$ 9.00	\$ 5,355.00	\$ 10.00	\$ 5,950.00	\$ 25.00	\$ 14,875.00	\$ 30.00	\$ 17,850.00
02730-204	4" PVC CL200 Force Main	10900	LF	\$ 9.00	\$ 98,100.00	\$ 11.25	\$ 122,625.00	\$ 21.00	\$ 228,900.00	\$ 20.00	\$ 218,000.00
02730-206	2" PVC CL200 Force Main	3400	LF	\$ 7.00	\$ 23,800.00	\$ 9.25	\$ 31,450.00	\$ 15.00	\$ 51,000.00	\$ 19.00	\$ 64,600.00
02730-254	4" Gate Valve	2	EA	\$ 400.00	\$ 800.00	\$ 750.00	\$ 1,500.00	\$ 600.00	\$ 1,200.00	\$ 500.00	\$ 1,000.00

ITEM #	ITEM DESCRIPTION	QTY	EST.	W & O Construction			Ironwood Construction & Engineering, LLC			Hopper Excavation, LLC			Green Brothers Construction		
				UNIT	PRICE	TOTAL EST.	UNIT	PRICE	TOTAL EST.	UNIT	PRICE	TOTAL EST.	UNIT	PRICE	TOTAL EST.
02730-256	3" Gate Valve	2	EA	\$ 300.00	\$ 600.00	\$ 500.00	\$ 1,000.00	\$ 500.00	\$ 1,000.00	\$ 500.00	\$ 1,000.00	\$ 500.00	\$ 1,000.00		
02730-305	4" Cleanout, Termination, HD	5	EA	\$ 1,300.00	\$ 6,500.00	\$ 1,500.00	\$ 7,500.00	\$ 1,500.00	\$ 7,500.00	\$ 1,500.00	\$ 7,500.00	\$ 1,500.00	\$ 7,500.00		
02730-307	2" Cleanout, Termination, HD	6	EA	\$ 800.00	\$ 4,800.00	\$ 1,200.00	\$ 7,200.00	\$ 1,300.00	\$ 7,800.00	\$ 1,300.00	\$ 7,800.00	\$ 1,300.00	\$ 7,800.00		
02730-354	4" Cleanout, In-line, HD	5	EA	\$ 1,400.00	\$ 7,000.00	\$ 1,800.00	\$ 9,000.00	\$ 1,700.00	\$ 8,500.00	\$ 1,700.00	\$ 8,500.00	\$ 1,700.00	\$ 8,500.00		
02730-355	2" Cleanout, In-line, HD	6	EA	\$ 900.00	\$ 5,400.00	\$ 1,700.00	\$ 10,200.00	\$ 1,400.00	\$ 8,400.00	\$ 1,400.00	\$ 8,400.00	\$ 1,400.00	\$ 8,400.00		
02730-401	Air / Vacuum Release Valve	2	EA	\$ 2,500.00	\$ 5,000.00	\$ 1,800.00	\$ 3,600.00	\$ 2,200.00	\$ 4,400.00	\$ 2,200.00	\$ 4,400.00	\$ 2,200.00	\$ 4,400.00		
02730-501	Effluent Outfall Structure	1	LS	\$ 2,000.00	\$ 2,000.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00		
02730-601	Grease Trap	1	EA	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00	\$ 3,000.00		
02740-101	Grinder Pump Installation, Type I	23	EA	\$ 4,750.00	\$ 109,250.00	\$ 3,500.00	\$ 80,500.00	\$ 6,000.00	\$ 138,000.00	\$ 6,000.00	\$ 138,000.00	\$ 6,000.00	\$ 138,000.00		
02740-102	Grinder Pump Installation, Type II	1	EA	\$ 5,500.00	\$ 5,500.00	\$ 3,700.00	\$ 3,700.00	\$ 3,700.00	\$ 3,700.00	\$ 3,700.00	\$ 3,700.00	\$ 3,700.00	\$ 3,700.00		
02740-104	Existing Grinder Pump Installation	1	EA	\$ 500.00	\$ 500.00	\$ 1,500.00	\$ 1,500.00	\$ 800.00	\$ 800.00	\$ 800.00	\$ 800.00	\$ 1,000.00	\$ 1,000.00		
02740-201	2" Service Junction Box	25	EA	\$ 500.00	\$ 12,500.00	\$ 500.00	\$ 12,500.00	\$ 1,000.00	\$ 25,000.00	\$ 1,000.00	\$ 25,000.00	\$ 400.00	\$ 10,000.00		
02921-001	Permanent Seeding	150	UNIT	\$ 3.00	\$ 450.00	\$ 100.00	\$ 15,000.00	\$ 35.00	\$ 5,250.00	\$ 35.00	\$ 5,250.00	\$ 300.00	\$ 45,000.00		
				TOTAL OF ALL ESTIMATED PRICES:			\$ 324,725.00			\$ 370,000.00			\$ 558,305.00		

Bid Alternates:

02730-205	3" PVC CL200 Force Main	3400	LF	\$ 9.00	\$ 30,600.00	\$ 10.25	\$ 34,850.00	\$ 18.00	\$ 61,200.00	\$ 20.00	\$ 68,000.00
02730-306	3" Cleanout, Termination, HD	6	EA	\$ 1,400.00	\$ 8,400.00	\$ 1,350.00	\$ 8,100.00	\$ 1,450.00	\$ 8,700.00	\$ 700.00	\$ 4,200.00
02730-353	3" Cleanout, In-line, HD	6	EA	\$ 1,400.00	\$ 8,400.00	\$ 1,750.00	\$ 10,500.00	\$ 1,600.00	\$ 9,600.00	\$ 800.00	\$ 4,800.00
02730-334	4" Cleanout, Termination, Light Duty	5	EA	\$ 1,200.00	\$ 6,000.00	\$ 1,300.00	\$ 6,500.00	\$ 1,300.00	\$ 6,500.00	\$ 700.00	\$ 3,500.00
02730-335	3" Cleanout, Termination, Light Duty	6	EA	\$ 1,200.00	\$ 7,200.00	\$ 1,100.00	\$ 6,600.00	\$ 1,200.00	\$ 7,200.00	\$ 700.00	\$ 4,900.00
02730-336	2" Cleanout, Termination, Light Duty	6	EA	\$ 800.00	\$ 4,800.00	\$ 900.00	\$ 5,400.00	\$ 900.00	\$ 5,400.00	\$ 400.00	\$ 2,400.00
02730-379	4" Cleanout, In-line, Light Duty	5	EA	\$ 1,200.00	\$ 6,000.00	\$ 2,500.00	\$ 12,500.00	\$ 1,350.00	\$ 6,750.00	\$ 800.00	\$ 4,000.00
02730-380	3" Cleanout, In-line, Light Duty	6	EA	\$ 1,200.00	\$ 7,200.00	\$ 1,800.00	\$ 10,800.00	\$ 1,100.00	\$ 6,600.00	\$ 800.00	\$ 4,800.00
02730-381	2" Cleanout, In-line, Light Duty	6	EA	\$ 800.00	\$ 4,800.00	\$ 1,500.00	\$ 9,000.00	\$ 900.00	\$ 5,400.00	\$ 300.00	\$ 1,800.00
02222-202	Stream Crossing in Soil	130	LF	\$ 20.00	\$ 2,600.00	\$ 40.00	\$ 5,200.00	\$ 40.00	\$ 5,200.00	\$ 175.00	\$ 22,750.00



I hereby certify that this is an accurate and correct tabulation of the bids received for the project. All bids have been reviewed and checked for mathematical errors.