Green Valley Special Utility District Wastewater Treatment Capacity Summary Most Downstream Drainage Basin Location		
Design Flow	**1 EDU/Acre**	**3 EDU/Acre**
	Capacity (MGD)	**Capacity (MGD)**
Drainage Basin A	2.3	6.8
Drainage Basin B	1.1	3.4
Drainage Basin C	1.4	4.1
Drainage Basin D	1.6	4.9
Drainage Basin E	8.7	26.2
Drainage Basin F	1.6	4.8
Drainage Basin G	1.8	5.5

The above table shows the wastewater capacity per 1 and 3 EDU/Acre development densities at the most downstream location in each drainage basin.

The exhibits in the attachments show theoretical wastewater treatment plants distributed along major trunk lines in each drainage basin. As the plants locate further downstream, there is a need for larger wastewater treatment plants. This shall be useful as a working guide to quickly estimate wastewater treatment capacity and costs at any pointy in the GVSUD wastewater collection system.

(see **Attachment 1,** Exhibit 5 - GVSUD Proposed Wastewater Treatment Capacity and Cost vs. Downstream Locations)
(see **Attachment 2**, Exhibit 4 – Wastewater Treatment Plant Capacity and Costs)

6.0 Capital Improvement Projects (CIP)

Presently, there are no GVSUD CIP projects to discuss. Each major trunk line along with the associated costs can be considered a preliminary list of CIP. As further communication with the development a community transpires, GVSUD shall develop list of CIP.

The adoption of the Harvest Hills Wastewater Treatment Plant could be considered an initial GVSUD Wastewater CIP.

7.0 Discharge Options and Permits

There are three basic types of effluent discharge permits. There is land application type, or zero discharge, where the effluent is discharged onto the surface of the land for evaporation or further filtration through the soil. This application is the easier permit to obtain from the TCEQ. However, this permit requires a great deal of land space that cannot be used for residential purpose.

The second type of permit is an effluent discharge permit. This type of permit allows wastewater effluent to be discharged into surface waters. This type of permit does not require as much land to support, but takes a great deal of time and is not a simple process to obtain a permit with TCEQ.

The third type of effluent discharge would be an opportunity for reuse or possibly sell the effluent. These options have revenue merit as well as benefit to society merit. There could be a great deal of costs associated with this type of discharge if there is not a reuse facility conveniently located nearby. The opportunity for wastewater effluent reuse would require additional study on a per project basis. As wastewater opportunities begin to surface, GVSUD should always explore wastewater effluent reuse opportunities from both customer service and potential additional revenue stream.

8.0 Estimated Costs

8.1 Wastewater Main Collection System Costs

For the purpose of determining long range feasibility and probable impact fees, a cost estimate was prepared for the wastewater collection system for Drainage Areas A through G. The estimates include costs associated with construction, basic engineering, easement acquisition, and survey. The cost estimates are shown in the below tables represent estimated cost for the proposed main wastewater collection system. The table identifies the costs of wastewater collection system per 1 and 3 EDU/Acre development densities.

Green Valley Special Utility District
Summary Costs
Proposed Main Wastewater Collection System
Engineer's Opinion of Probable Costs

Basin	Total Costs 1 (EDU/acre)	Total Costs 3 (EDU/acre)	Variance
A	$ 11,212,950.00	$ 13,229,734.00	$ 2,016,784.00
B	$ 3,379,449.00	$ 3,848,841.00	$ 469,392.00
C	$ 4,151,280.00	$ 4,773,440.00	$ 622,160.00
D	$ 3,072,068.00	$ 4,188,876.00	$ 1,116,808.00
E	$ 34,601,813.00	$ 43,682,177.00	$ 9,080,364.00
F	$ 5,230,109.00	$ 6,739,925.00	$ 1,509,816.00
G	$ 3,963,086.00	$ 4,673,334.00	$ 710,248.00
Total	**$ 65,610,755.00**	**$ 81,136,327.00**	$ 15,525,572.00

This cost estimate is based on River City Engineering's experience and qualifications, and represents River City Engineering's best judgment. This cost estimate was prepared for feasibility analysis purposes only. River City Engineering does not guarantee that the actual construction cost will not vary from this estimate. Unit prices were used from SAWS average unit price list revised October 2005. Units prices will not remain constraint and will vary due to market variations such as inflation.

(see **Attachment 2**, Exhibit 3 Wastewater Collection System Costs for unit prices)

8.2 Wastewater Treatment Plant Costs

For the purpose of determining long range feasibility and probable impact fees, a cost estimate was prepared for the wastewater treatment plant facilities. The wastewater treatment plant facilities were located at several locations along the downstream path of the main trunk line through each watershed or drainage basin. The estimates include the capacity of the plant if the plant was to be located at the location shown on the trunk line. These plant locations are not intended to represent actual recommended locations for wastewater treatment plants, but do represent what capacity and associated costs would exist periodically down the stream of the trunk line. The costs estimates includes construction, basic engineering, easement acquisition, and survey. The cost estimates shown (Attachment 1 Exhibit 5 GVSUD proposed wastewater treatment capacity and costs vs. downstream locations) represent theoretical wastewater treatment plant locations, required capacity at the assumed location, and costs of proposed wastewater treatment facilities. This method allows GVSUD to estimate wastewater treatment capacity and costs anywhere along the collection system.

The following table represents wastewater treatment costs at the most downstream location within each drainage basin.

Green Valley Special Utility District
Wastewater Treatment Costs Summary
Most Downstream Drainage Basin Location

Design Flow	1 EDU/Acre	3 EDU/Acre
	Costs ($)	Costs ($)
Drainage Basin A	$ 7,898,433	$ 20,310,255
Drainage Basin B	$ 4,021,675	$ 12,065,025
Drainage Basin C	$ 4,832,870	$ 14,498,610
Drainage Basin D	$ 5,734,103	$ 17,202,308
Drainage Basin E	$ 26,179,965	$ 39,269,948
Drainage Basin F	$ 5,586,613	$ 16,759,838
Drainage Basin G	$ 6,440,683	$ 16,561,755

(see **Attachment 2**, Exhibit 4, Wastewater Treatment Plant Capacity and Costs for unit prices (Costs/GPD)

From the above table the required cost to provide wastewater treatment is substantially different between 1 EDU/Acre and 3 EDU/Acre development densities. The actual wastewater capacity and costs will be somewhere between these two EDU densities.

9.0 Proposed Financing Opportunities

GVSUD has several financing options when determining projects. The projects can be funded through equity, debt, or arrangements with the development community. For the debt arrangement, GVSUD could utilize the existing revenue streams from the water service to raise funds for wastewater. However, due to the political disagreement with water users who do not get wastewater services, this would probably not help GVSUD.

Through legislation, GVSUD could also designate portions of the GVSUD wastewater CCN service area as a taxing entity. This could also cause political disagreement with water service customers who do not get wastewater service.

9.1 Community Development Block Grant, Rural Development – U. S. Department of Agriculture

The U. S. Department of Agriculture provides loans and grants for water and sanitary sewer projects through its Rural Development Program. First time water and sanitary sewer service projects usually receive favorable consideration.

The Rural Development Program has a Colonias grant program for which the entire amount of the requested funds is allowed. To be eligible for this program, the community has to be a declared or listed "Colonia". Further study is required to determine if any areas within the GVSUD wastewater CCN service area qualifies.

The typical grant program for this agency requires a match from the applicant. The match amount may vary from between 25 and 40 percent of the amount of the grant. We note that should the District receive funds from other programs, these funds could be used to meet the amount required for local participation. The Rural Development Program also has a low interest loan program for applicants to use to meet their match.

The Rural Development programs require that funds not be released to the applicant until a construction contract is entered into. Although engineering fees are eligible for grant funds, interim payments from the grant funds are not allowed. These fees would include the cost of a preliminary engineering report required for the program as well as the basic design fees. Design drawings and specifications must be accepted by Rural Development prior to bid. The bid package must incorporate standard forms and terminology required by the program. Typically, the process of applying for and receiving a grant from the Department of Agriculture, Rural Development, takes a long time requiring between 24 and 30 months from submittal to approval for bid.

These grants are favorable for improvement of low income area infrastructure. New high density development would not be favored for these types of grants.

9.2 Economic Development Administration

The Economic Development Administration is part of the U. S. Department of Commerce. The purpose of this organization is to promote business growth and thus provide jobs for a service area. Grants for this program require written commitments from potential employers that will move to a service area if services are provided or statements from existing employers that they will move out if the services are not provided. The number of new jobs which can be attributed to the completion of the project is an important consideration for grants from this agency. Grants for this program typically require a 20 to 30 percent match from the applicant.

Processing time for the Economic Development Administration grant is typically between 12 and 18 months from submittal to approval for bid. Interim costs prior to construction will be paid as part of the process.

This approach could be utilized as commercial development increases along the IH-10 corridor.

9.3 Impact Fees from Prospective Developers

Special Utility Districts may develop and institute an impact fee program to share the costs of providing infrastructure improvements to their service area. The operation of such a program is governed by state laws and must be adopted by the Texas Commission on Environmental Quality.

In this approach, a master plan for infrastructure improvements for a projected population at some time in the future and the associated costs for these improvements is developed. These costs are prorated to the total projected number of services, and per service costs assigned to each new service. As construction on lots for new developments begin, the impact fees for that lot are paid. Existing developments are not required to pay these impact fees.

The establishment of an impact fee program allows GVSUD to have the costs of infrastructure improvements to be partially borne by new development. Funds collected from new development are assigned to an audited account and then used to construct the proposed improvements, as they are required. GVSUD shall establish a wastewater impact fee subcommittee to manage the program.

It is extremely important that GVSUD establish a wastewater impact fee for new development. The GVSUD strategy to develop wastewater service through new development requires GVSUD to have Impact Fee policy in-place.

9.4 Municipal Bonds

The District may issue revenue bonds for the financing of the proposed improvements based on the collection of future income from the project. The bonds would be issued based on the estimated costs of the proposed improvements in addition to associated issuance costs. Bonds are typically sold to Government agencies Federal – Rural Development Assistance (RDA), State of Texas Water Development Board (TWDB) and Private Bond Market. Interest rates and terms vary based on associated risk, taxable or tax-exempt issuance and lender. Bonds typically are 20-30 years in duration with a "call" period, minimum finance period of 10 years. Rates are typically 1 to 4 points over-prime lending rates. Presently these rates are 5-7%.

The bonds could be established through three different mechanisms. First, GVSUD could sell bonds based on the income from the water service revenues. This could be a political issue due to some water rate payers would not be benefiting from wastewater services, but are charged the rate of the bonds on their water bill. Second, GVSUD could establish its wastewater service area as a special taxing unit. This approach would require passed legislation for the special taxing entity. Again with this approach, the political turmoil would exist from some tax payers not benefiting from wastewater services.

Third, GVSUD would establish itself in the wastewater business by first taking ownership and operation of the Harvest Hills wastewater treatment plant. This would start revenues flowing into GVSUD. As additional developments come on line, increased revenues could assist GVSUD to sell bonds for the capital required to install wastewater infrastructure to connect the new developed areas. The infrastructure increase would grow at the same pace as development and would slowly lead itself to more desirable regional wastewater collection systems and treatment facilities.

9.5 USDA Rural Development, TWDB, or Co Bank

As GVSUD develops a wastewater customer base, further opportunities for the third-party debt financing option will materialize. A USDA Rural Development loan for wastewater infrastructure under 7 USCA §1926 will provide GVSUD with CCN protection from competing wastewater providers.

10.0 Proposed Impact Fees

Communities as well as utility districts may develop and institute an impact fee program. The impact fee allows developers to share the costs of providing infrastructure improvements to their area. Wastewater impact fees and rates for local wastewater service providers are presented below.

New Braunfels Utilities charges a wastewater impact fee and a sewer tap fee. The wastewater impact fee is $1,160 per connection and the sewer connection fee is $655 per tap.

The City of Seguin also charges a sewer impact fee and a sewer tap fee. The sewer impact fee is $500 and the sewer tap fee is $470.

Cibolo Creek Municipal Authority (CCMA), who offers wholesale wastewater treatment to areas in the Green Valley SUD, charges a sewer impact fee of $985 per EDU (equivalent dwelling unit). The cost of treatment is $1.60 per 1,000 gallons.

GBRA charges a monthly service fee as well as a connection fee for the wastewater service it provides. The connection fee is $1,000 per EDU and the monthly service fee is $32.

Green Valley Special Utility District
Wastewater impact Fees and Rates
Neighboring Utilities

Neighboring Utility	Wastewater Impact Fee	Wastewater Connection Fee	Cost of Treatment ($/1000 gal)	Monthly Service Fee
New Braunfels Utilities	$1,160	$655		
City of Seguin	$500	$470		
CCMA	$985		$1.60	
GBRA		$1,000		$32

The surrounding wastewater providers approach impact fees differently. These rates for the surrounding entities are considered normal for area developers. GVSUD should establish an impact fee rate schedule that benefits GVSUD and remains within the range of the surrounding wastewater providers. Further, GVSUD should consult with an accountant to establish the required rate necessary for GVSUD to recover the proper amount of capital.

To evaluate feasibility and determine probable impact fees, the total project cost of each drainage area was divided by the expected number of EDU's in each respective drainage area. It should be noted that these costs do not include any costs associated with operation and maintenance of the wastewater treatment facilities or service lines from customers to the collection system.

Green Valley Special Utility District Wastewater Impact Fees Main Wastewater Collection System (Trunk Lines)						
Drainage Basin	Total LUE 1 (EDU/acre)	Total LUE 3 (EDU/acre)	Dev Density of 1 EDU/acre		Dev Density of 3 EDU/acre	
			Total Costs	Potential Impact Fee	Total Costs	Potential Impact Fee
Drainage Basin A	9,211	27,633	$11,212,950	$1,217	$13,229,734	$479
Drainage Basin B	4,690	14,070	$3,379,449	$721	$3,848,841	$274
Drainage Basin C	5,636	16,908	$4,151,280	$737	$4,773,440	$282
Drainage Basin D	6,688	20,064	$3,072,068	$459	$4,188,876	$209
Drainage Basin E	35,618	106,854	$34,601,813	$971	$43,682,177	$409
Drainage Basin F	6,515	19,545	$5,230,109	$803	$6,739,925	$345
Drainage Basin G	7,511	22,533	$3,963,086	$528	$4,673,334	$207
Total	**75,869**	**227,607**	**$65,610,755**	**$865**	**$81,136,327**	**$356**

Green Valley Special Utility District Wastewater Impact Fees Wastewater Treatment Facility						
Drainage Basin	Total LUE 1 (EDU/acre)	Total LUE 3 (EDU/acre)	Dev Density of 1 EDU/acre		Dev Density of 3 EDU/acre	
			Total Costs	Potential Impact Fee	Total Costs	Potential Impact Fee
Drainage Basin A	9,211	27,633	$7,898,433	$858	$20,310,255	$735
Drainage Basin B	4,690	14,070	$4,021,675	$858	$12,065,025	$858
Drainage Basin C	5,636	16,908	$4,832,870	$858	$14,498,610	$858
Drainage Basin D	6,688	20,064	$5,734,103	$857	$17,202,308	$857
Drainage Basin E	35,618	106,854	$26,179,965	$735	$39,269,948	$368
Drainage Basin F	6,515	19,545	$5,586,613	$858	$16,759,838	$858
Drainage Basin G	7,511	22,533	$6,440,683	$858	$16,561,755	$735
Total	**75,869**	**227,607**	**$60,694,342**	**$800**	**$136,667,739**	**$600**

The above two tables estimate the impact fee range that GVSUD may need to require for new wastewater development. The top table represents potential impact fees associated with the main wastewater collection system, the bottom table shows potential impact fees associated with construction of wastewater treatment facilities.

The following table is a summary of the above two tables combined.

Green Valley Special Utility District Wastewater Impact Fee Summary Wastewater Collection and Treatment Combined						
	Dev Density of 1 EDU/acre			Dev Density of 3 EDU/acre		
Drainage Basin	Wastewater Collection Impact fee	Wastewater Treatment Impact fee	Total Impact Fee	Wastewater Collection Impact fee	Wastewater Treatment Impact fee	Total Impact Fee
Drainage Basin A	$1,217	$858	$ 2,075	$479	$735	$1,214
Drainage Basin B	$721	$858	$ 1,578	$274	$858	$1,131
Drainage Basin C	$737	$858	$ 1,594	$282	$858	$1,140
Drainage Basin D	$459	$857	$ 1,317	$209	$857	$1,066
Drainage Basin E	$971	$735	$ 1,706	$409	$368	$776
Drainage Basin F	$803	$858	$ 1,660	$345	$858	$1,202
Drainage Basin G	$528	$858	$ 1,385	$207	$735	$942

From the above impact fee summary, GVSUD may need to charge a wastewater impact fee of approximately $2000 per EDU.

11.0 Recommendations

As previously developed, the cost of facilities to provide centralized wastewater service is less than or comparable to that provided by individual private on-site septic disposal systems. The benefits of public health and safety, water quality, both surface and groundwater protections are clearly evident.
The attached list of items are action items for consideration and implementation by the GVSUD Board of Directors.

1. Assume ownership and operation of Harvest Hills Property wastewater treatment plant.
2. Explore partnership opportunities with the City of Marion.
3. Aggressively pursue potential wastewater collection and treatment projects.
4. Limit Indendently Owner Utility (IOU) systems.
5. Adopt design criteria standards.
6. Adopt Impact Fees.
7. Identify develop density to stay consistent across entire GVSUD wastewater CCN.
8. GVSUD Attorney Mr. Mark Zeppa has recommended amending GVSUD by-laws to clearly delineate its ability to provide wastewater service to its customers. Mr. Zeppa has suggested draft rules changes for adoption.
9. Establish wastewater management team as shown in the below hierarchy diagram.
10. Establish GVSUD wastewater subcommittee.
11. Establish and adopt official GVSUD wastewater policies, tariffs, and by-laws.

12. Establish contract with Harvest Hills as wastewater owner and operator. GVSUD shall develop a service plan to provide wastewater service to this tract and possibly adjacent tracts.
13. Revise service applications (standard and non-standard) and easement applications forms to reflect not only water but wastewater as well.
14. Establish sales and marketing strategy for wastewater services.
15. GVSUD should meet with City of Santa Clara officials to discuss wastewater service plans. The above No. 5 Harvest Hills tract is in Santa Clara's political limits. To prevent future wastewater utilities from entering GVSUD wastewater CCN service area, a development plan to resolve these issues should be explored.
16. The City of Marion has expressed a desire to provide wastewater service outside its city limits. Discussions should be held to formalize a service plan between GVSUD and the City of Marion to insure infrastructure for wastewater service.
17. Discussion with GBRA on further regional long range wastewater facilities of much larger scale. Future wastewater needs for the GBRA CCN located to the Northeast of GVSUD's CCN will exceed current site capacity and a new larger site will be required.
18. New developments will fund wastewater systems with new construction. GVSUD should look for possible grants and innovative funding options to provide centralized service to existing subdivisions and developments. This would allow retrofitting and abandonment of their onsite systems for conversion to a centralized system. This can occur as service plans are developed.
19. Discuss with the residents of Treasure Island area the necessity to do away with existing individual below grade septic systems that could be potentially contaminating the Guadalupe River (Lake McQueeney). Propose GVSUD options to provide quality wastewater service to this area.
20. Adopt a formal development density to stay consistent throughout the GVSUD wastewater CCN service area.
21. Consider USDA Rural Development Assistance or TWDB type loans for CCN protection from competing wastewater providers who may attempt to take portions of GVSUD wastewater CCN service area.
22. Establish GVSUD wastewater design criteria standards.
23. Further study to implement wastewater impact fees.
24. Promote and advertise public meeting with development community.
25. Hire wastewater operator

River City Engineering, Ltd. is prepared to assist GVSUD with this long-term planning and assessment to implement this much needed utility service. Mutual cooperation with area utility systems and regulator authority will insure proper service and development.

12.0 Management Plan

GVSUD Board of Directors, General Manager, and Staff

For GVSUD to aggressively enter into the wastewater business there must be a wastewater team established. Due to the start-up nature of GVSUD involvement with wastewater, GVSUD needs internal motivation and aggressive wastewater board of directors, general manager, and staff. Included with duties of GVSUD should be the development of vision and mission statement to clearly define to its customers the long term wastewater goals.

GVSUD wastewater manager should continuously search for wastewater business opportunities to gain the competitive advantage with potential competition in the GVSUD wastewater CCN service area. GVSUD should organize wastewater subcommittee who can spend the time required to properly manage and get wastewater action items completed.

Engineering Consultant

GVSUD has hired River City Engineering, Ltd. (RCE) to develop this overall wastewater master plan. RCE is prepared to provide GVSUD technical direction beyond the adoption of this master plan and assist GVSUD into the wastewater business.

Legal Consultant

Mark Zeppa has been hired to represent GVSUD to establish formal policies and tariff rates. Also, Mr. Zeppa provides advice with general legal approach for GVSUD policy, rate structure and tariffs, rules and regulations, by-laws, and the eventual implementation of development impact fees.

Financial Consultant

GVSUD has several options to consider for funding of wastewater projects. GVSUD needs to establish a capital budgeting procedure. The procedure should at a minimum define the process of project identification, evaluation, selection, and verification.

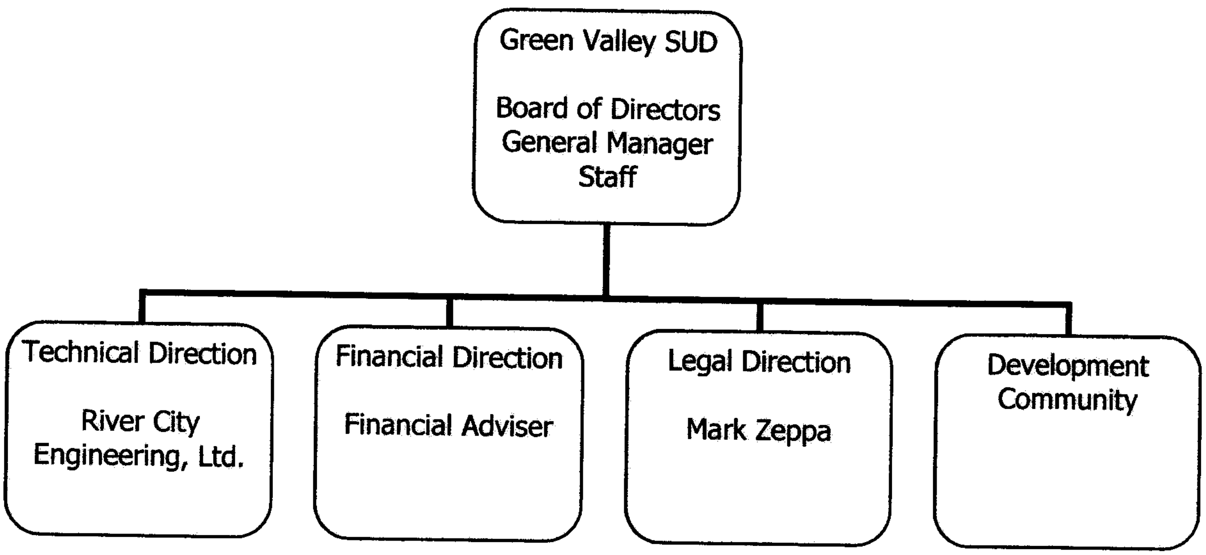
GVSUD should hire a financial adviser to assist with bond opportunities. The financial adviser shall assist GVSUD with capital through equity versus capital through debt, financial consultation and direction, and bond management.

GVSUD should also be aware of available grants and loans.

Development Community

The development community shall provide direction and assistance with initial wastewater start-ups dealing with new development. The area is prime for growth and the development community can assist bringing wastewater customers to GVSUD. There is a great deal of negotiation and dialog between GVSUD and the development community dealing with subjects like project phasing and cost assistance.

The Green Valley Special Utility District
Wastewater Business Team

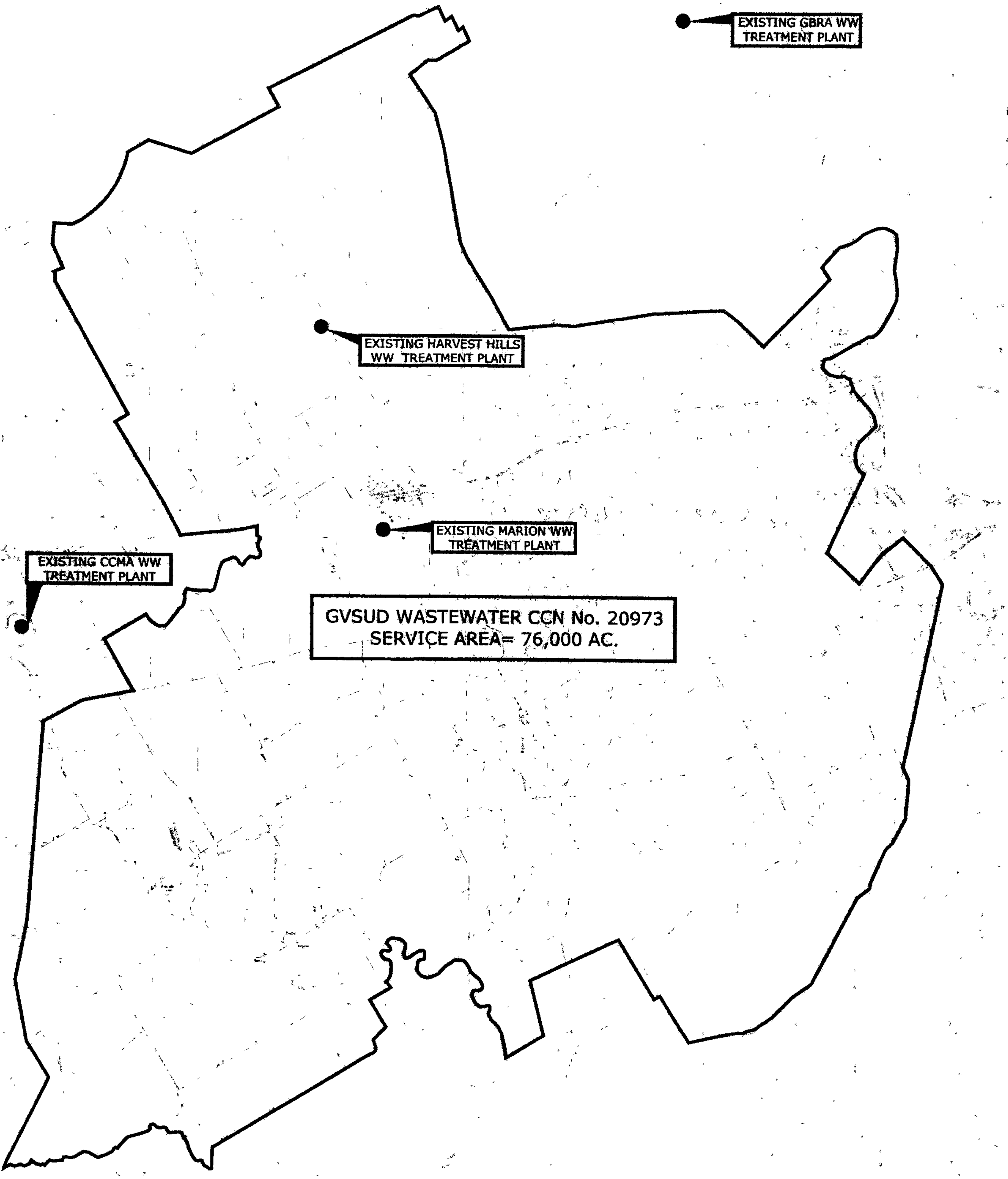


13.0 Conclusion

RCE looks forward to working with GVSUD with the wastewater venture in the future. The GVSUD wastewater CCN service area is prime for development and RCE recognizes GVSUD for the leadership and vision required to bring wastewater services to their customers. With continued support from the above wastewater team, GVSUD should prove itself to be the leader for quality wastewater service in the region.

Attachment 1
Exhibit Drawings

- Exhibit 1 GVSUD Existing Wastewater CCN No. 20973 Boundary
- Exhibit 2 GVSUD Drainage Basins
- Exhibit 3 GVSUD Area Calculations and Collection Points
- Exhibit 4 GVSUD Proposed Wastewater Main Collection System
- Exhibit 5 GVSUD Theoretical Locations of Wastewater Treatment Capacity and Costs vs. Downstream Locations
- Exhibit 6 GVSUD Proposed Growth and Development



LEGEND

MARION SEWER CCN
CIBOLO CITY LIMITS AND ETJ CCN
SPRINGS HILL WSC CCN
GBRA SEWER CCN
EAST CENTRAL CCN
NEW BRAUNFELS CCN
SCHERTZ SEWER CCN
SCHERTZ WATER CCN
GREEN VALLEY WATER/SEWER CCN

SCALE 1" 2000

EXHIBIT-1
EXISTING GVSUD WASTEWATER CCN BOUNDARY

DESIGNED SH	PROJECT NO. 6096-07	DATE: 11/2006	SHEET NO. 1 OF 6

RIVER CITY ENGINEERING, LTD.
CONSULTING CIVIL ENGINEERS

3801 SOUTH 1st STREET
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FAX-(512) 442-6622

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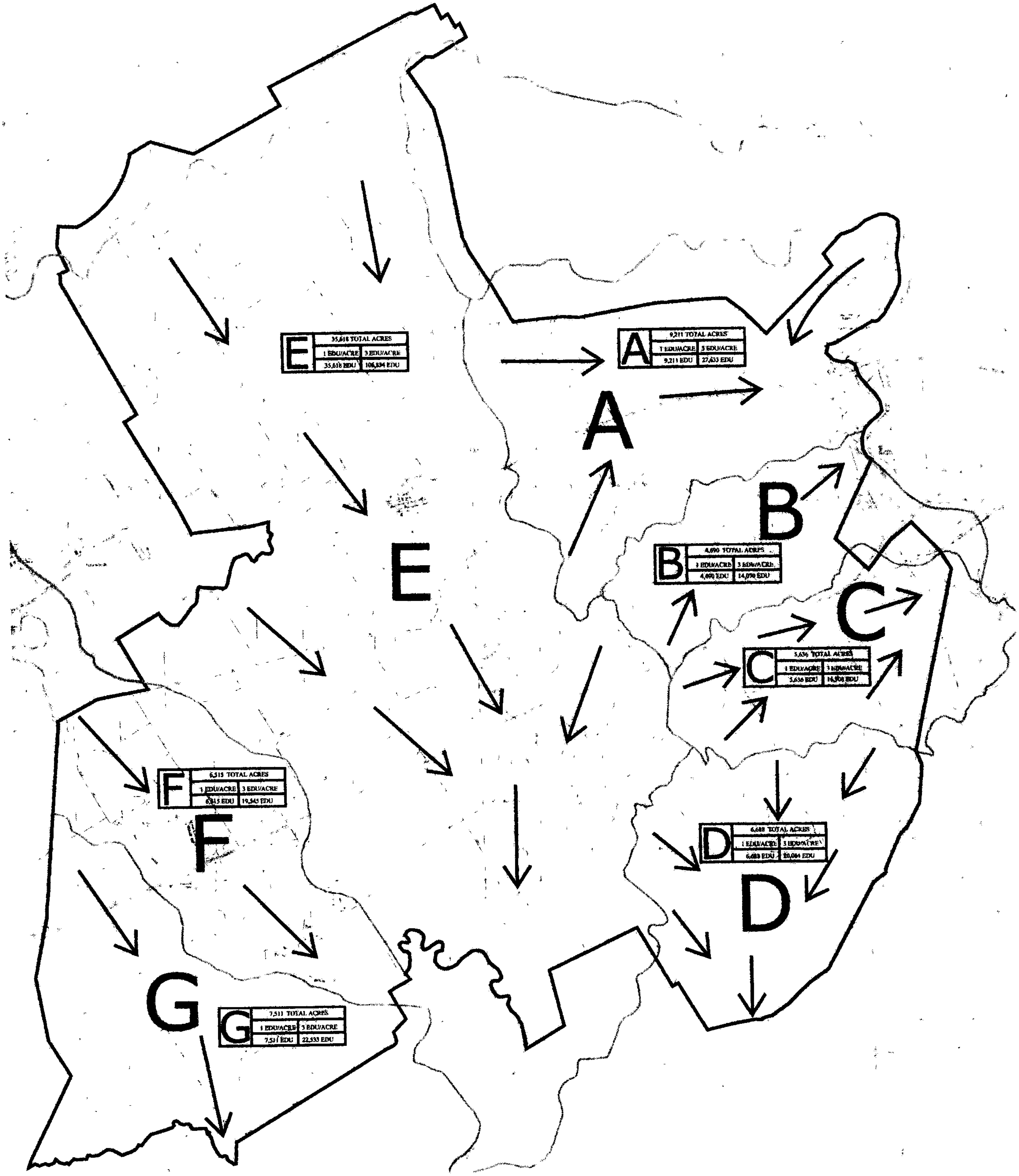
FAX-(830)-626-3601



LEGEND

MARION SEWER CCN

CIBOLO CITY LIMITS AND ETJ CCN

SPRINGS HILL WSC CCN

CRWA SEWER CCN

EAST CENTRAL CCN

NEW BRAUNFELS CCN

SCHERTZ SEWER CCN

SCHERTZ WATER CCN

MAJOR BASINS

GREEN VALLEY WATER/SEWER CCN

DRAINAGE FLOW DIRECTIONS

EXHIBIT-2 GVSUD DRAINAGE BASINS			
DESIGNED: SH	PROJECT NO. 6096-07	DATE. 11/2006	SHEET NO. 2 OF 6

RIVER CITY ENGINEERING, LTD.
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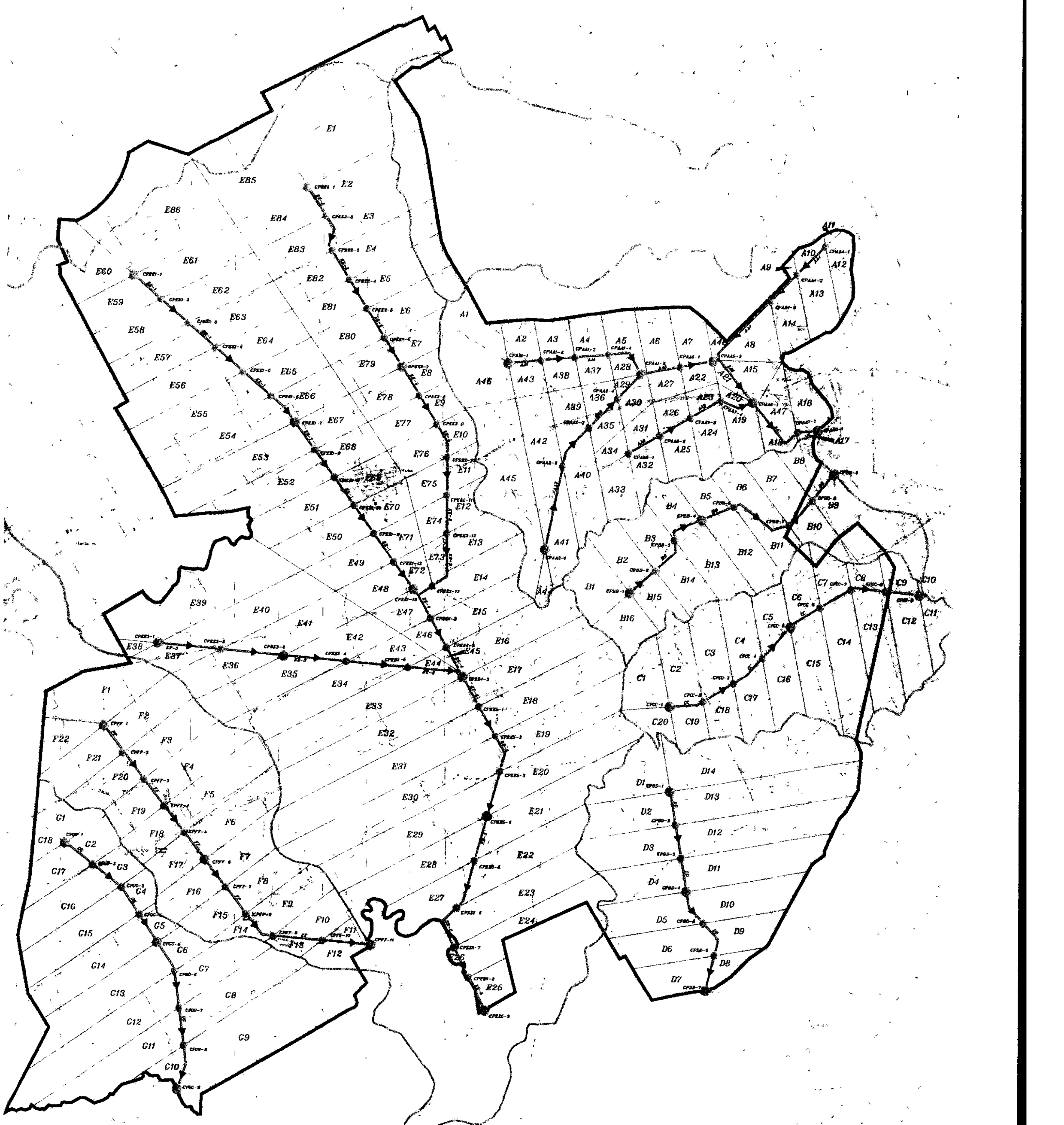

SCALE 1" = 2000'

LEGEND

- MARION SEWER CCN [illegible]
- CIBOLO CITY LIMITS AND ETJ CCN [illegible]
- SPRINGS HILL WSC CCN [illegible]
- GBRA SEWER CCN
- EAST CENTRAL CCN [illegible]
- NEW BRAUNFELS CCN
- SCHERTZ SEWER CCN [illegible]
- SCHERTZ WATER CCN [illegible]
- GREEN VALLEY WATER/SEWER CCN
- MAJOR BASINS
- DRAIN TRUNKS
- SUB BASINS
- COLLECTION POINTS
- E19 AREA IDENTIFICATION
- CPEE5-1 COLLECTION POINT ID
- EE 5 MAIN TRUNK ID

EXHIBIT-3
GVSUD AREA CALCULATIONS AND COLLECTION POINTS

DESIGNED. SH	PROJECT NO. 6096-07	DATE. 11/2006	SHEET NO. 3 OF 6

RIVER CITY ENGINEERING, LTD.
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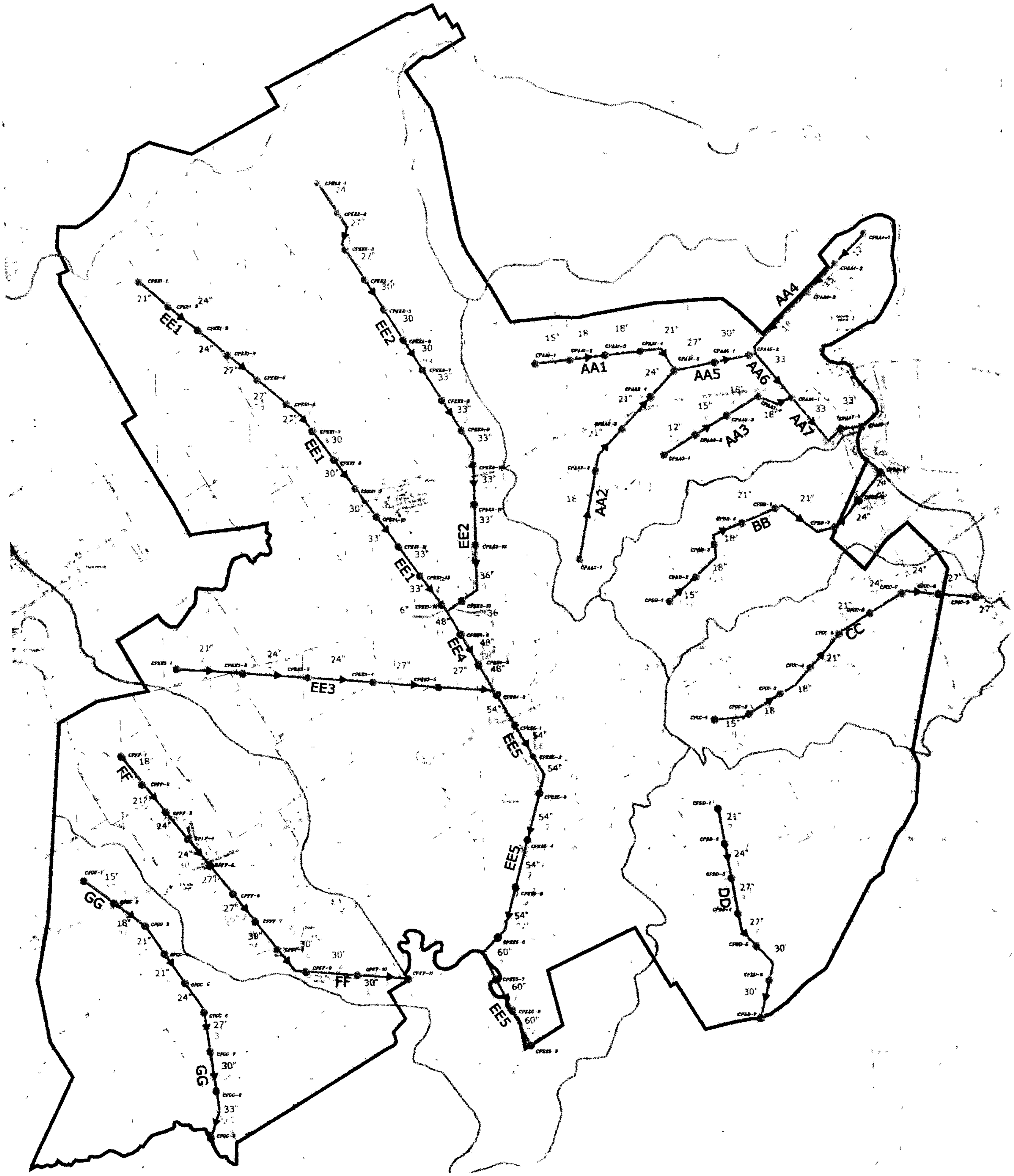

LEGEND

- MARION SEWER CCN [illegible]
- CIBOLO CITY LIMITS AND ECI CCN [illegible]
- SPRINGS HILL WSC CCN [illegible]
- GBRA SEWER CCN
- EAST CENTRAL CCN [illegible]
- NEW BRAUNFELS CCN
- SCHERTZ SEWER CCN [illegible]
- SCHERTZ WATER CCN [illegible]
- GREEN VALLEY WATER/SEWER CCN
- MAJOR BASINS
- DRAIN TRUNKS
- 30" PIPE DIAMETER PER 1 EDU/ACRE DEVELOPMENT DENSITY
- PIPE DIAMETER PER 3 EDU/ACRE DEVELOPMENT DENSITY
- COLLECTION POINTS
- CPEE5 1 COLLECTION POINT ID

EXHIBIT-4
GVSUD PROPOSED WASTEWATER MAIN COLLECTION SYSTEM

DESIGNED: SH	PROJECT NO. 6096-07	DATE: 11/2006	SHEET NO. 4 OF 6

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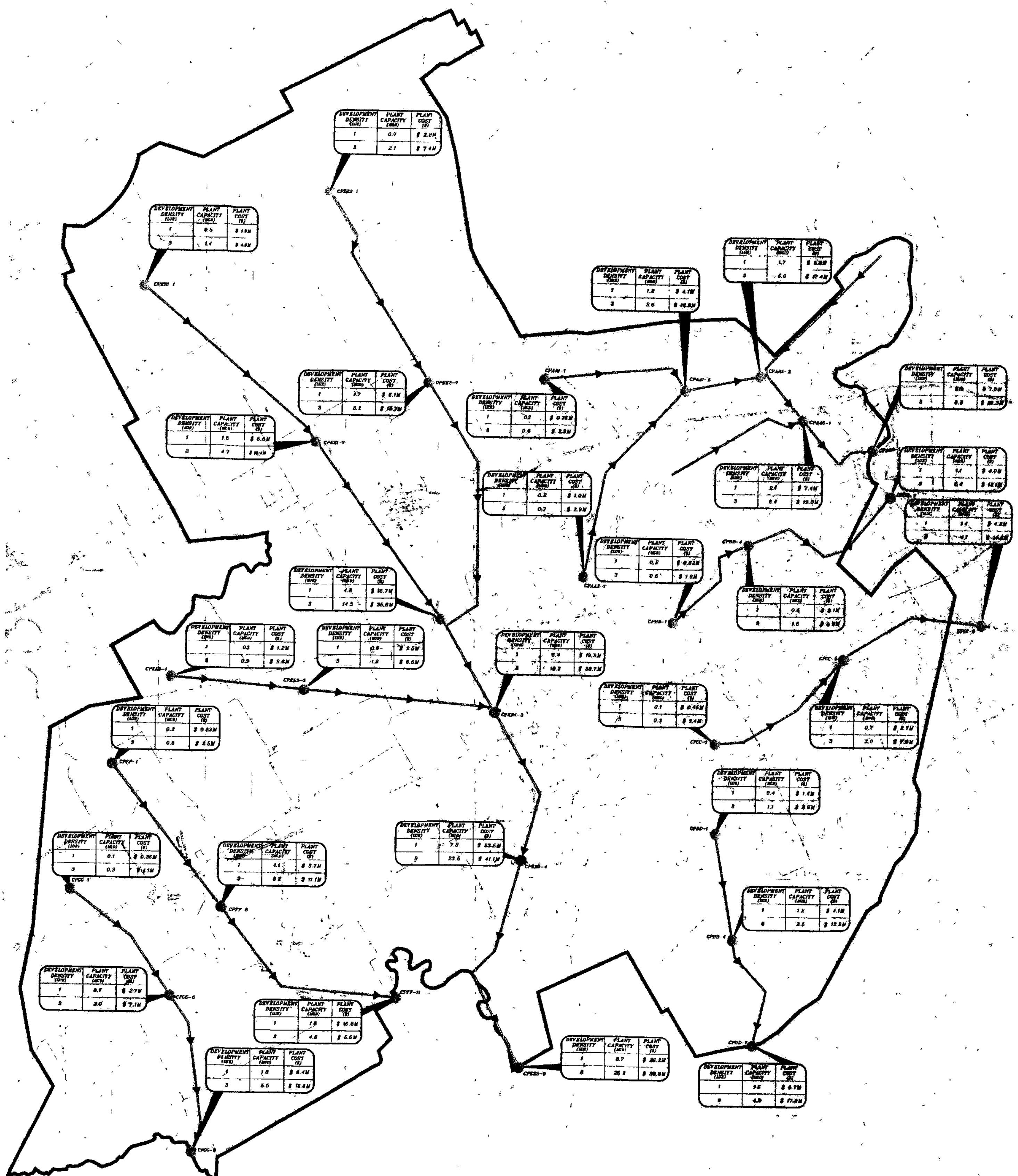
PHONE-(830)-626-3588
FAX-(830)-626-3601



LEGEND

- MARION SEWER CCN
- CIBOLO CITY LIMITS AND ETJ CCN
- SPRINGS HILL WSC CCN
- CIBOLA SEWER CCN
- EAST CENTRAL CCN
- NEW BRAUNFELS CCN
- SCHERTZ SEWER CCN
- SCHERTZ WATER CCN
- GREEN VALLEY WATER/SEWER CCN
- DRAIN TRUNKS
- COLLECTION POINTS
- CPEE5-1 COLLECTION POINT ID

SCALE 1" 2000'

EXHIBIT-5
GVSUD THEORETICAL LOCATIONS OF WASTEWATER TREATMENT CAPACITY AND COST VS. DOWNSTREAM LOCATIONS

DESIGNED SH	PROJECT NO. 6096-07	DATE 11/2006	SHEET NO. 5 OF 6

RIVER CITY ENGINEERING, LTD.
CONSULTING CIVIL ENGINEERS

3801 SOUTH 1ST STREET
AUSTIN, TEXAS 78704-7047
PHONE-(512) 442-3008
FAX-(512) 442-6522

1011 W. COUNTY LINE ROAD, SUITE C
NEW BRAUNFELS, TEXAS 78130
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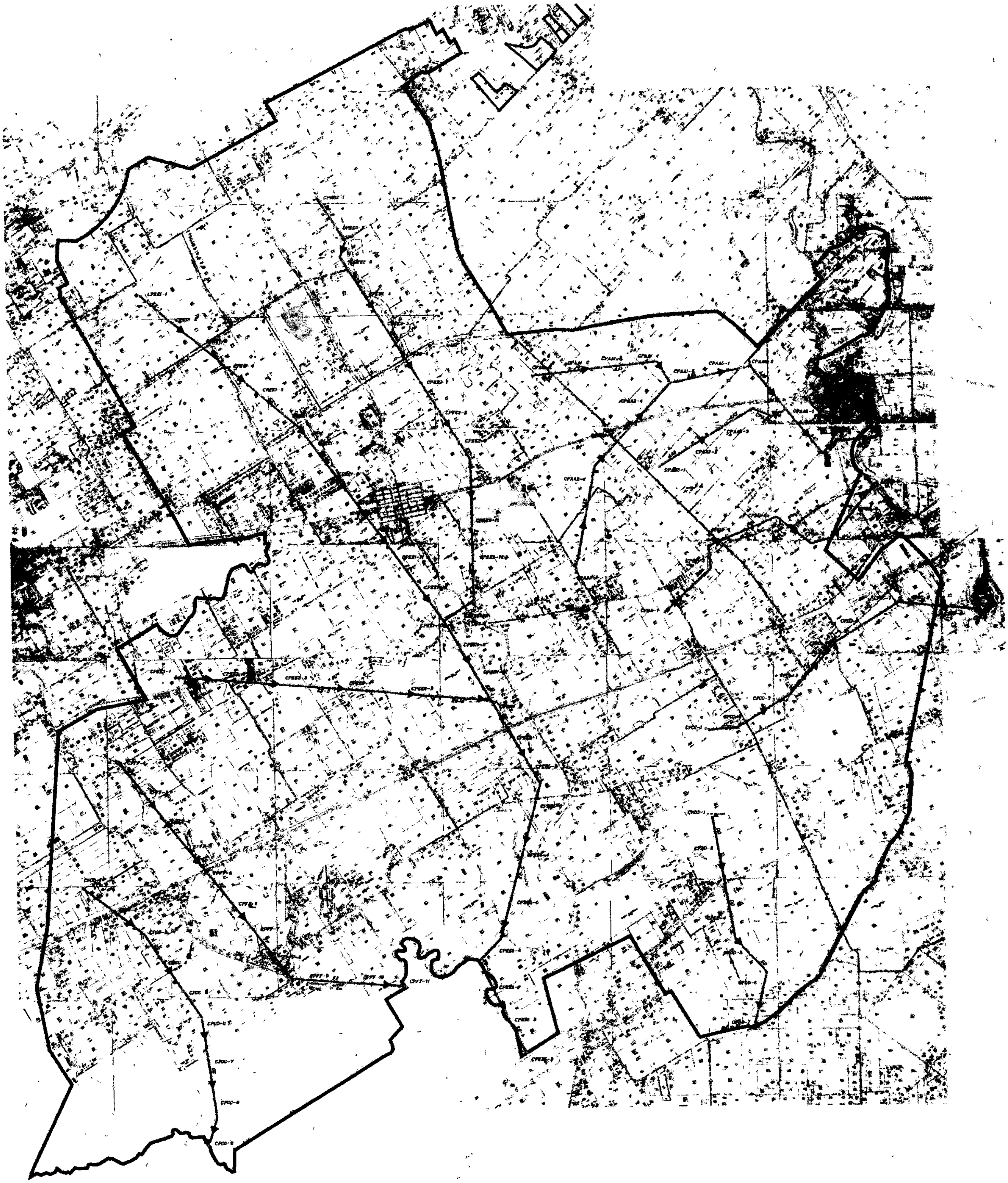

LEGEND

MARION SEWER CCN

CIBOLO CITY LIMITS AND ETJ CCN

SPRINGS HILL WSC CCN

CIBOLA SEWER CCN

EAST CENTRAL CCN

NEW BRAUNFELS CCN

SCHERTZ SEWER CCN

SCHERTZ WATER CCN

GREEN VALLEY WATER/SEWER CCN

DRAIN TRUNKS

COLLECTION POINTS

CPEE6-1 COLLECTION POINT ID

EE-5 MAIN TRUNK ID

SCALE 1" 2000'

EXHIBIT-6
GVSUD PROPOSED GROWTH AND DEVELOPMENT

DESIGNED: SH	PROJECT NO. 6096-07	DATE: 11/2006	SHEET NO. 6 OF 6

RIVER CITY ENGINEERING, LTD.
CONSULTING CIVIL ENGINEERS

3801 SOUTH 1st STREET
AUSTIN, TEXAS 78704 7047
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NEW BRAUNFELS, TEXAS 78130
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Attachment 2
Calculation Tables

- Exhibit 1 Total Equivalent Dwelling Unit (EDU) Calculations
- Exhibit 2 Wastewater Main Collection System Calculations
- Exhibit 3 Proposed Costs for Wastewater Main Collection System
- Exhibit 4 Wastewater Treatment Plant Capacity and Costs

Green Valley Special Utility District
EDU Calculation Summary
Total EDU Calculations

Drainage Basin ID	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU 1	Development Density (3 EDU/acre)	Total EDU 3
A	9,211	1	9,211	3	27,633
B	4,690	1	4,690	3	14,070
C	5,636	1	5,636	3	16,908
D	6,688	1	6,688	3	20,064
E	35,618	1	35,618	3	106,854
F	6,515	1	6,515	3	19,545
G	7,511	1	7,511	3	22,533
	75,869		**75,869**		**227,607**

Green Valley Special Utility District
Drainage Area A
Total EDU Calculations

A

Sub-Area Left ID	Sub-Area Right ID	Sub-Area Left (acres)	Sub-Area Right (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU	Development Density (3 EDU/acre)	Total EDU
Pipe AA1								
A1	A46	256	520	776	1	776	3	2,328
A2	A43	177	144	321	1	321	3	963
A3	A38	169	129	298	1	298	3	894
A4	A37	175	114	289	1	289	3	867
A5	A28	210	73	283	1	283	3	849
			Total Acres =	**1967**	**Total EDU =**	**1,967**	**Total EDU =**	**5,901**
Pipe AA 2								
A45	A44	931	71	1002	1	1,002	3	3,006
A42	A41	486	287	773	1	773	3	2,319
A39	A40	234	394	628	1	628	3	1,884
A36	A35	131	119	250	1	250	3	750
A29	A30	34	133	167	1	167	3	501
			Total Acres =	**2820**	**Total EDU =**	**2,820**	**Total EDU =**	**8,460**
Pipe AA3								
A34	A33	93	246	339	1	339	3	1,017
A31	A32	127	195	322	1	322	3	966
A26	A25	93	262	355	1	355	3	1,065
A23	A24	127	220	347	1	347	3	1,041
A20	A19	50	240	290	1	290	3	870
			Total Acres =	**1653**	**Total EDU =**	**1,653**	**Total EDU =**	**4,959**
Pipe AA4								
A12	A11	211	17	228	1	228	3	684
A13	A10	314	69	383	1	383	3	1,149
A14	A9	252	36	288	1	288	3	864
A8	A48	269	72	340	1	340	3	1,021
			Total Acres =	**1239**	**Total EDU =**	**1,239**	**Total EDU =**	**3,718**
Pipe AA5								
A6	A27	233	103	336	1	336	3	1,008
A7	A22	266	118	384	1	384	3	1,152
			Total Acres =	**720**	**Total EDU =**	**720**	**Total EDU =**	**2,160**
PipeAA6								
A15	A21	181	62	243	1	243	3	730
			Total Acres =	**243**	**Total EDU =**	**243**	**Total EDU =**	**730**
PipeAA7								
A47	A18	208	92	301	1	301	3	902
			Total Acres =	**301**	**Total EDU =**	**301**	**Total EDU =**	**902**
PipeAA8								
A16	A17	253	15	268	1	268	3	804
			Total Acres =	**268**	**Total EDU =**	**268**	**Total EDU =**	**804**
			Basin A (acres) =	**9,211**	**Basin A (EDU) =**	**9,211**	**Basin A (EDU) =**	**27,633**

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Green Valley Special Utility District
Drainage Area B
Total EDU Calculations

B

Sub-Area Left ID	Sub-Area Right ID	Sub-Area Left (acres)	Sub-Area Right (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU	Development Density (3 EDU/acre)	Total EDU
Pipe BB								
B1	B16	367	267	634	1	634	3	1,903
B2	B15	287	207	494	1	494	3	1,482
B3	B14	229	251	480	1	480	3	1,439
B4	B13	216	366	582	1	582	3	1,747
B5	B12	190	384	574	1	574	3	1,723
B6	B11	285	206	491	1	491	3	1,474
B7	B10	306	209	515	1	515	3	1,545
B8	B9	216	704	920	1	920	3	2,759
			Basin B (acres) =	**4690**	**Basin B (EDU) =**	**4,690**	**Basin B (EDU) =**	**14,071**

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Green Valley Special Utility District
Drainage Area C
Total EDU Calculations

C

Sub-Area Left ID	Sub-Area Right ID	Sub-Area Left (acres)	Sub-Area Right (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU	Development Density (3 EDU/acre)	Total EDU
Pipe CC								
C1	C20	314	150	464	1	464	3	1,391
C2	C19	365	173	537	1	537	3	1,612
C3	C18	373	192	565	1	565	3	1,694
C4	C17	331	271	602	1	602	3	1,807
C5	C16	233	332	565	1	565	3	1,696
C6	C15	259	457	716	1	716	3	2,149
C7	C14	203	584	788	1	788	3	2,363
C8	C13	119	520	639	1	639	3	1,916
C9	C12	152	405	557	1	557	3	1,670
C10	C11	9	194	203	1	203	3	610
			Basin C (acres) =	**5636**	**Basin C (EDU) =**	**5,636**	**Basin C (EDU) =**	**16,908**

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Green Valley Special Utility District
Drainage Area D
Total EDU Calculations

D

Sub-Area Left ID	Sub-Area Right ID	Sub-Area Left (acres)	Sub-Area Right (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU	Development Density (3 EDU/acre)	Total EDU
Pipe DD								
D14	D1	1068	401	1468	1	1,468	3	4,405
D13	D2	815	374	1189	1	1,189	3	3,567
D12	D3	725	411	1135	1	1,135	3	3,406
D11	D4	610	326	936	1	936	3	2,809
D10	D5	466	376	842	1	842	3	2,527
D9	D6	283	407	690	1	690	3	2,071
D8	D7	128	297	426	1	426	3	1,277
			Basin D (acres) =	**6688**	**Basin D (EDU) =**	**6,688**	**Basin D (EDU) =**	**20,063**

Green Valley Special Utility District
Drainage Area E
Total EDU Calculations

E

Sub-Area Left ID	Sub-Area Right ID	Sub-Area Left (acres)	Sub-Area Right (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU	Development Density (3 EDU/acre)	Total EDU
Pipe EE 1								
E86	E60	1455	442	1897	1	1,897	3	5,691
E61	E59	476	311	787	1	787	3	2,361
E62	E58	424	365	789	1	789	3	2,366
E63	E57	383	419	802	1	802	3	2,406
E64	E56	343	517	860	1	860	3	2,579
E65	E55	302	58	360	1	360	3	1,080
E66	E54	267	625	892	1	892	3	2,676
E67	E53	259	646	905	1	905	3	2,715
E68	E52	255	471	725	1	725	3	2,176
E69	E51	248	416	664	1	664	3	1,993
E70	E50	224	381	605	1	605	3	1,816
E71	E49	167	312	479	1	479	3	1,438
E72	E48	130	250	381	1	381	3	1,142
			Total Acres =	**10146**	**Total EDU =**	**10,146**	**Total EDU =**	**30,438**
Pipe EE 2								
E1	E85	2297	574	2871	1	2,871	3	8,612
E2	E84	519	347	866	1	866	3	2,598
E3	E83	484	322	806	1	806	3	2,417
E4	E82	464	279	743	1	743	3	2,230
E5	E81	419	273	692	1	692	3	2,076
E6	E80	406	266	673	1	673	3	2,018
E7	E79	229	260	489	1	489	3	1,466
E8	E78	151	253	404	1	404	3	1,213
E9	E77	135	247	382	1	382	3	1,146
E10	E76	142	232	374	1	374	3	1,122
E11	E75	161	183	345	1	345	3	1,034
E12	E74	151	140	291	1	291	3	874
E13	E73	291	110	401	1	401	3	1,204
			Total Acres =	**9337**	**Total EDU =**	**9,337**	**Total EDU =**	**28,011**
Pipe EE 3								
E39	E38	1168	50	1218	1	1,218	3	3,655
E40	E37	619	179	797	1	797	3	2,392
E41	E36	477	32	509	1	509	3	1,526
E42	E35	334	509	843	1	843	3	2,530
E43	E34	192	628	820	1	820	3	2,460
E44	E33	51	805	856	1	856	3	2,568
			Total Acres =	**5044**	**Total EDU =**	**5,044**	**Total EDU =**	**15,132**
Pipe EE 4								
E14	E47	466	184	649	1	649	3	1,948
E15	E46	414	106	520	1	520	3	1,560
E16	E45	578	28	606	1	606	3	1,817
			Total Acres =	**1775**	**Total EDU =**	**1,775**	**Total EDU =**	**5,325**
Pipe EE 5								
E17	E32	607	925	1532	1	1,532	3	4,596
E18	E31	644	1036	1679	1	1,679	3	5,038
E19	E30	585	1003	1588	1	1,588	3	4,764
E20	E29	67	801	868	1	868	3	2,603
E21	E28	621	650	1271	1	1,271	3	3,813
E22	E27	567	375	942	1	942	3	2,825
E23	E26	665	17	682	1	682	3	2,045
E24		564		564	1	564	3	1,692
E25		191		191	1	191	3	574
			Total Acres =	**9317**	**Total EDU =**	**9,317**	**Total EDU =**	**27,950**
			Basin E (acres) =	**35,618**	**Basin E (EDU) =**	**35,618**	**Basin E (EDU) =**	**106,855**

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Green Valley Special Utility District
Drainage Area F
Total EDU Calculations

F

Sub-Area Left ID	Sub-Area Right ID	Sub-Area Left (acres)	Sub-Area Right (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU	Development Density (3 EDU/acre)	Total EDU
Pipe FF								
F1	F22	614	233	847	1	847	3	2,542
F2	F21	379	343	722	1	722	3	2,166
F3	F20	389	291	680	1	680	3	2,040
F4	F19	451	229	680	1	680	3	2,041
F5	F18	500	239	739	1	739	3	2,216
F6	F17	452	229	681	1	681	3	2,042
F7	F16	313	284	597	1	597	3	1,791
F8	F15	295	233	528	1	528	3	1,585
F9	F14	363	89	451	1	451	3	1,354
F10	F13	250	86	337	1	337	3	1,010
F11	F12	82	171	253	1	253	3	758
			Basin F (acres) =	**6515**	**Basin F (EDU) =**	**6,515**	**Basin F (EDU) =**	**19,544**

Green Valley Special Utility District
Drainage Area G
Total EDU Calculations

G

Sub-Area Left ID	Sub-Area Right ID	Sub-Area Left (acres)	Sub-Area Right (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU	Development Density (3 EDU/acre)	Total EDU
Pipe GG								
G1	G18	267	96	363	1	363	3	1,088
G2	G17	187	268	455	1	455	3	1,365
G3	G16	144	452	596	1	596	3	1,789
G4	G15	129	552	681	1	681	3	2,043
G5	G14	90	594	685	1	685	3	2,054
G6	G13	160	661	821	1	821	3	2,463
G7	G12	387	838	1225	1	1,225	3	3,674
G8	G11	563	600	1163	1	1,163	3	3,488
G9	G10	1410	113	1523	1	1,523	3	4,569
			Basin G (acres) =	**7511**	**Basin G (EDU) =**	**7,511**	**Basin G (EDU) =**	**22,534**

Green Valley Special Utility District Design Flow Summary		
Design Flow	Development Density	
	1 EDU/Acre	3 EDU/Acre
Average Dry Weather Flow	245 GPD/EDU	245 GPD/EDU
Maximum Dry Weatherh Flow	735 GPD/EDU	735 GPD/EDU
Maximum Wet Weather Flow	1485 GPD/EDU	985 GPD/EDU

Green Valley Special Utility District
Wastewater Design Flows
Three Design Flow Conditions

Drainage Basin	Total Area (acres)	Total EDU 1 (EDU/acre)	Total EDU 3 (EDU/acre)	Development Density of 1 EDU/acre			Development Density of 3 EDU/acre		
				Average Dry Weather Flow (GPD)	Maximum Dry Weather Flow (GPD)	Maximum Wet Weather Flow (GPD)	Average Dry Weather Flow (GPD)	Maximum Dry Weather Flow (GPD)	Maximum Wet Weather Flow (GPD)
Drainage Basin A	9,211	9,211	27,633	2,256,695	6,770,085	13,678,335	6,770,085	20,310,255	27,218,505
Drainage Basin B	4,690	4,690	14,070	1,149,050	3,447,150	6,964,650	3,447,150	10,341,450	13,858,950
Drainage Basin C	5,636	5,636	16,908	1,380,820	4,142,460	8,369,460	4,142,460	12,427,380	16,654,380
Drainage Basin D	6,688	6,688	20,064	1,638,560	4,915,680	9,931,680	4,915,680	14,747,040	19,763,040
Drainage Basin E	35,618	35,618	106,854	8,726,410	26,179,230	52,892,730	26,179,230	78,537,690	105,251,190
Drainage Basin F	6,515	6,515	19,545	1,596,175	4,788,525	9,674,775	4,788,525	14,365,575	19,251,825
Drainage Basin G	7,511	7,511	22,533	1,840,195	5,520,585	11,153,835	5,520,585	16,561,755	22,195,005

Green Valley Special Utility District
1 EDU/acre
Pipe Diameter Design Summary

Pipe Diameter (in)	Basin A Pipe Length (ft)	Basin B Pipe Length (ft)	Basin C Pipe Length (ft)	Basin D Pipe Length (ft)	Basin E Pipe Length (ft)	Basin F Pipe Length (ft)	Basin G Pipe Length (ft)	Total Pipe Length (ft)
8								0
10								0
12	5,600							5,600
15	8,200	2,600	2,600				2,700	16,100
18	19,800	5,600	5,600			2,500	2,700	36,200
21	9,000	7,000	5,600	2,500	7,350	2,500	5,000	38,950
24	3,500	5,000	5,200	2,500	17,200	5,000	2,500	40,900
27	2,500		5,000	5,300	22,300	5,000	2,800	42,900
30	2,500			5,600	15,450	12,200	2,900	38,650
33	11,400				21,650		3,000	36,050
36					5,800			5,800
42								0
48					7,000			7,000
54					18,500			18,500
60					9,600			9,600
66								0
72								0
Total	62,500	20,200	24,000	15,900	124,850	27,200	21,600	296,250
							56	Miles

Green Valley Special Utility District
Drainage Area A - 1 EDU
Pipe Flow Design Calculations

1 EDU A

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe AA1	Upstream	CP AA1-1	256	520	776	1.0	776	190,120	190,120	1,152,360	800	1.78	1.78								
Pipe AA1	CP AA1-1	CP AA1-2	177	144	321	1.0	321	78,645	268,765	476,685	331	0.74	2.52	600	585	2,500	0.0060	11.60	14.50	**15**	4.09
Pipe AA1	CP AA1-2	CP AA1-3	169	129	298	1.0	298	73,010	341,775	442,530	307	0.68	3.21	585	570	2,500	0.0060	12.70	15.87	**18**	4.62
Pipe AA1	CP AA1-3	CP AA1-4	175	114	289	1.0	289	70,805	412,580	429,165	298	0.66	3.87	570	555	2,500	0.0060	13.62	17.03	**18**	4.62
Pipe AA1	CP AA1-4	CP AA1-5	210	73	283	1.0	283	69,335	481,915	420,255	292	0.65	4.52	555	540	3,500	0.0050	14.94	18.68	**21**	4.67
1	**Total**		**987**	**980**	**1967**		**1967**	**481,915**		**2,920,995**	**2,028**	**4.52**				**11,000**	**0.0058**				
Pipe AA2	Upstream	CP AA2-1	931	71	1002	1.0	1002	245,490	245,490	1,487,970	1033	2.30	2.30								
Pipe AA2	CP AA2-1	CP AA2-2	486	287	773	1.0	773	189,385	434,875	1,147,905	797	1.78	4.08	590	578	3,500	0.0050	14.38	17.97	**18**	4.21
Pipe AA2	CP AA2-2	CP AA2-3	234	394	628	1.0	628	153,860	588,735	932,580	648	1.44	5.52	578	565	3,000	0.0050	16.11	20.14	**21**	4.67
Pipe AA2	CP AA2-3	CP AA2-4	131	119	250	1.0	250	61,250	649,985	371,250	258	0.57	6.10	565	553	2,500	0.0050	16.72	20.90	**21**	4.67
Pipe AA2	CP AA2-4	CP AA1-5	34	133	167	1.0	167	40,915	690,900	247,995	172	0.38	6.48	553	540	3,500	0.0050	17.10	21.38	**24**	5.11
2	**Total**		**1816**	**1004**	**2820**		**2820**	**690,900**		**4,187,700**	**2,908**	**6.48**				**12,500**	**0.0050**				
Pipe AA3	Upstream	CP AA3-1	93	246	339	1.0	339	83,055	83,055	503,415	350	0.78	0.78								
Pipe AA3	CP AA3-1	CP AA3-2	127	195	322	1.0	322	78,890	161,945	478,170	332	0.74	1.52	600	581	2,600	0.0073	9.25	11.56	**12**	3.89
Pipe AA3	CP AA3-2	CP AA3-3	93	262	355	1.0	355	86,975	248,920	527,175	366	0.82	2.33	581	563	2,700	0.0067	11.05	13.81	**15**	4.31
Pipe AA3	CP AA3-3	CP AA3-4	127	220	347	1.0	347	85,015	333,935	515,295	358	0.80	3.13	563	545	2,800	0.0064	12.42	15.53	**18**	4.78
Pipe AA3	CP AA3-4	CP AA6-1	50	240	290	1.0	290	71,050	404,985	430,650	299	0.67	3.80	545	525	2,500	0.0080	12.82	16.02	**18**	5.33
3	**Total**		**490**	**1163**	**1653**		**1653**	**404,985**		**2,454,705**	**1,705**	**3.80**				**10,600**	**0.0071**				
Pipe AA4	Upstream	CP AA4-1	211	17	228	1.0	228	55,860	55,860	338,580	235	0.52	0.52								
Pipe AA4	CP AA4-1	CP AA4-2	314	69	383	1.0	383	93,835	149,695	568,755	395	0.88	1.40	550	543	3,000	0.0050	9.64	12.05	**12**	3.22
Pipe AA4	CP AA4-2	CP AA4-3	252	36	288	1.0	288	70,560	220,255	427,680	297	0.66	2.07	543	536	3,000	0.0050	11.14	13.93	**15**	3.73
Pipe AA4	CP AA4-3	CP AA5-2	269	72	341	1.0	341	83,545	303,800	506,385	352	0.78	2.85	536	530	6,000	0.0050	12.57	15.71	**18**	4.21
4	**Total**		**1046**	**194**	**1240**		**1240**	**303,800**		**1,841,400**	**1,279**	**2.85**				**12,000**	**0.0050**				
Pipe AA1	Upstream	CP AA1-5	987	980	1967	1.0	1967	481,915	481,915	2,920,995	2028	4.52	4.52								
Pipe AA2	Upstream	CP AA1-5	1816	1004	2820	1.0	2820	690,900	1,172,815	4,187,700	2908	6.48	11.00								
Pipe AA5	CP AA1-5	CP AA5-1	233	103	336	1.0	336	82,320	1,255,135	498,960	347	0.77	11.77	540	535	2,500	0.0050	21.40	26.75	**27**	5.52
Pipe AA5	CP AA5-1	CP AA5-2	266	118	384	1.0	384	94,080	1,349,215	570,240	396	0.88	12.65	535	530	2,500	0.0050	21.98	27.48	**30**	5.92
5	**Total**		**3302**	**2205**	**5507**		**5507**	**1,349,215**		**8,177,895**	**5,679**	**12.65**				**5,000**	**0.0050**				
Pipe AA4	Upstream	CP AA5-2	1046	194	1240	1.0	1240	303,800	303,800	1,841,400	1279	2.85	2.85								
Pipe AA5	CP AA1-5	CP AA5-2	3302	2205	5507	1.0	5507	1,349,215	1,653,015	8,177,895	5679	12.65	15.50								
Pipe AA6	CP AA5-2	CP AA6-1	181	62	243	1.0	243	59,535	1,712,550	360,855	251	0.56	16.06	530	525	4,500	0.0050	24.04	30.05	**33**	6.31
6	**Total**		**4529**	**2461**	**6990**		**6990**	**1,712,550**		**10,380,150**	**7,208**	**16.06**				**4,500**	**0.0050**				
Pipe AA3	Upstream	CP AA6-1	490	1163	1653	1.0	1653	404,985	404,985	2,454,705	1705	3.80	3.80								
Pipe AA6	CP AA5-2	CP AA6-1	4529	2461	6990	1.0	6990	1,712,550	2,117,535	10,380,150	7208	16.06	19.86								
Pipe AA7	CP AA6-1	CP AA7-1	208	92	300	1.0	300	73,500	2,191,035	445,500	309	0.69	20.55	525	510	4,900	0.0050	26.37	32.96	**33**	6.31
7	**Total**		**5227**	**3716**	**8943**		**8943**	**2,191,035**		**13,280,355**	**9,222**	**20.55**				**4,900**	**0.0050**				
Pipe AA7	CP AA6-1	CP AA7-1	5227	3716	8943	1.0	8943	2,191,035	2,191,035	13,280,355	9222	20.55	20.55								
Pipe AA8	CP AA7-1	CP AA8-1	253	15	268	1.0	268	65,660	2,256,695	397,980	276	0.62	21.16	510	495	2,000	0.0075	24.71	30.89	**33**	7.73
8	**Total**		**5480**	**3731**	**9211**		**9211**	**2,256,695**		**13,678,335**	**9,499**	**21.16**				**2,000**	**0.0075**				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	1	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	1485	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District

Drainage Area B - 1 EDU

Pipe Flow Design Calculations

1 EDU B

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe BB	Upstream	CP BB-1	267	367	634	1.0	634	155,330	155,330	941,490	654	1.46	1.46	600	580	2,600	0.0077	11.19	13.99	15	4.63
Pipe BB	CP BB-1	CP BB-2	207	287	494	1.0	494	121,030	276,360	733,590	509	1.14	2.59	580	560	2,800	0.0071	12.96	16.20	18	5.04
Pipe BB	CP BB-2	CP BB-3	251	229	480	1.0	480	117,600	393,960	712,800	495	1.10	3.69	560	540	2,800	0.0071	14.55	18.19	18	5.04
Pipe BB	CP BB-3	CP BB-4	366	216	582	1.0	582	142,590	536,550	864,270	600	1.34	5.03	540	520	2,600	0.0077	15.66	19.57	21	5.79
Pipe BB	CP BB-4	CP BB-5	384	190	574	1.0	574	140,630	677,180	852,390	592	1.32	6.35	520	490	4,400	0.0068	17.03	21.29	21	5.45
Pipe BB	CP BB-5	CP BB-6	206	285	491	1.0	491	120,295	797,475	729,135	506	1.13	7.48	490	470	2,500	0.0080	17.46	21.83	24	6.46
Pipe BB	CP BB-6	CP BB-7	209	306	515	1.0	515	126,175	923,650	764,775	531	1.18	8.66	470	450	2,500	0.0080	18.95	23.69	24	6.46
Pipe BB	CP BB-7	CP BB-8	704	216	920	1.0	920	225,400	1,149,050	1,366,200	949	2.11	10.78								
Total			2594	2896	4690		4690	1,149,050		6,964,650	4,837	10.78				20,200	0.0076				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	1	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	1485	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area C - 1 EDU
Pipe Flow Design Calculations

1 EDU C

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Actual (ft/sec)
Pipe CC	Upstream	CP CC-1	150	314	464	1.0	464	113,680	113,680	689,040	479	1.07	1.07								
Pipe CC	CP CC-1	CP CC-2	173	365	538	1.0	538	131,810	245,490	798,930	555	1.24	2.30	600	580	2,600	0.0077	10.70	13.38	**15**	4.63
Pipe CC	CP CC-2	CP CC-3	192	373	565	1.0	565	138,425	383,915	839,025	583	1.30	3.60	580	560	2,800	0.0071	12.83	16.04	**18**	5.04
Pipe CC	CP CC-3	CP CC-4	271	331	602	1.0	602	147,490	531,405	893,970	621	1.38	4.98	560	540	2,800	0.0071	14.50	18.12	**18**	5.04
Pipe CC	CP CC-4	CP CC-5	332	233	565	1.0	565	138,425	669,830	839,025	583	1.30	6.28	540	520	2,800	0.0071	15.81	19.77	**21**	5.58
Pipe CC	CP CC-5	CP CC-6	457	259	716	1.0	716	175,420	845,250	1,063,260	738	1.65	7.93	520	500	2,800	0.0071	17.25	21.57	**21**	5.58
Pipe CC	CP CC-6	CP CC-7	584	203	787	1.0	787	192,815	1,038,065	1,168,695	812	1.81	9.74	500	480	2,600	0.0077	18.38	22.97	**24**	6.33
Pipe CC	CP CC-7	CP CC-8	520	119	639	1.0	639	156,555	1,194,620	948,915	659	1.47	11.20	480	460	2,600	0.0077	19.37	24.22	**24**	6.33
Pipe CC	CP CC-8	CP CC-9	405	152	557	1.0	557	136,465	1,331,085	827,145	574	1.28	12.48	460	440	2,500	0.0080	20.03	25.03	**27**	6.99
Pipe CC	CP CC-9	CP CC-10	194	9	203	1.0	203	49,735	1,380,820	301,455	209	0.47	12.95	440	420	2,500	0.0080	20.31	25.38	**27**	6.99
Total			3278	2358	5636		5636	1,380,820		8,369,460	5,812	12.95				24,000	0.0075				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	1	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	1485	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area D - 1 EDU
Pipe Flow Design Calculations

1 EDU D

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Actual (ft/sec)
Pipe DD	Upstream	CP DD-1	401	1068	1469	1.0	1469	359,905	359,905	2,181,465	1515	3.38	3.38	570	562	2,500	0.0050	16.73	20.91	21	4.01
Pipe DD	CP DD-1	CP DD-2	374	815	1189	1.0	1189	291,305	651,210	1,765,665	1226	2.73	6.11	562	554	2,500	0.0050	19.12	23.90	24	4.39
Pipe DD	CP DD-2	CP DD-3	411	725	1136	1.0	1136	278,320	929,530	1,686,960	1172	2.61	8.72	554	546	2,500	0.0050	20.77	25.96	27	4.64
Pipe DD	CP DD-3	CP DD-4	326	610	936	1.0	936	229,320	1,158,850	1,389,960	965	2.15	10.87	546	538	2,800	0.0050	22.08	27.60	27	4.83
Pipe DD	CP DD-4	CP DD-5	376	466	842	1.0	842	206,290	1,365,140	1,250,370	868	1.93	12.80	538	530	3,000	0.0050	23.07	28.84	30	4.97
Pipe DD	CP DD-5	CP DD-6	407	283	690	1.0	690	169,050	1,534,190	1,024,650	712	1.59	14.39	530	522	2,600	0.0050	23.64	29.56	30	5.05
Pipe DD	CP DD-6	CP DD-7	297	128	425	1.0	425	104,125	1,638,315	631,125	438	0.98	15.37								
Total			2592	4095	6687		6687	1,638,315		9,930,195	6,896	15.37				15,900	0.0050				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	1	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	1485	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area E - 1 EDU
Pipe Flow Design Calculations

1 EDU E

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe EE1	Upstream	CP EE1-1	442	1455	1897	1.0	1897	464,765	464,765	2,817,045	1956	4.36	4.36								
Pipe EE1	CP EE1-1	CP EE1-2	311	476	787	1.0	787	192,815	657,580	1,168,695	812	1.81	6.17	830	811	2,750	0.0069	15.80	19.75	21	5.49
Pipe EE1	CP EE1-2	CP EE1-3	365	424	789	1.0	789	193,305	850,885	1,171,665	814	1.81	7.98	811	792	2,750	0.0069	17.41	21.76	24	6.00
Pipe EE1	CP EE1-3	CP EE1-4	419	383	802	1.0	802	196,490	1,047,375	1,190,970	827	1.84	9.82	792	773	2,750	0.0069	18.82	23.52	24	6.00
Pipe EE1	CP EE1-4	CP EE1-5	517	343	860	1.0	860	210,700	1,258,075	1,277,100	887	1.98	11.80	773	754	2,750	0.0069	20.16	25.19	27	6.49
Pipe EE1	CP EE1-5	CP EE1-6	58	302	360	1.0	360	88,200	1,346,275	534,600	371	0.83	12.63	754	735	2,750	0.0069	20.67	25.84	27	6.49
Pipe EE1	CP EE1-6	CP EE1-7	625	267	892	1.0	892	218,540	1,564,815	1,324,620	920	2.05	14.68	735	716	2,750	0.0069	21.87	27.34	27	6.49
Pipe EE1	CP EE1-7	CP EE1-8	646	259	905	1.0	905	221,725	1,786,540	1,343,925	933	2.08	16.76	716	697	2,600	0.0073	22.75	28.43	30	7.16
Pipe EE1	CP EE1-8	CP EE1-9	471	255	726	1.0	726	177,870	1,964,410	1,078,110	749	1.67	18.42	697	678	2,600	0.0073	23.57	29.46	30	7.16
Pipe EE1	CP EE1-9	CP EE1-10	416	248	664	1.0	664	162,680	2,127,090	986,040	685	1.53	19.95	678	659	2,600	0.0073	24.29	30.36	30	7.16
Pipe EE1	CP EE1-10	CP EE1-11	381	224	605	1.0	605	148,225	2,275,315	898,425	624	1.39	21.34	659	640	2,600	0.0073	24.91	31.13	33	7.63
Pipe EE1	CP EE1-11	CP EE1-12	312	167	479	1.0	479	117,355	2,392,670	711,315	494	1.10	22.44	640	621	2,600	0.0073	25.38	31.73	33	7.63
Pipe EE1	CP EE1-12	CP EE1-13	250	130	380	1.0	380	93,100	2,485,770	564,300	392	0.87	23.31	621	600	3,100	0.0068	26.12	32.64	33	7.35
	Total		5213	4933	10146		10146	2,485,770		#######	10,463	23.31				32,600	0.0071				
Pipe EE2	Upstream	CP EE2-1	574	2297	2871	1.0	2871	703,395	703,395	4,263,435	2961	6.60	6.60								
Pipe EE2	CP EE2-1	CP EE2-2	347	519	866	1.0	866	212,170	915,565	1,286,010	893	1.99	8.59	700	692	2,500	0.0050	19.01	23.76	24	5.11
Pipe EE2	CP EE2-2	CP EE2-3	322	484	806	1.0	806	197,470	1,113,035	1,196,910	831	1.85	10.44	692	684	2,900	0.0050	20.45	25.57	27	5.52
Pipe EE2	CP EE2-3	CP EE2-4	279	464	743	1.0	743	182,035	1,295,070	1,103,355	766	1.71	12.15	684	676	2,550	0.0050	21.65	27.06	27	5.52
Pipe EE2	CP EE2-4	CP EE2-5	273	419	692	1.0	692	169,540	1,464,610	1,027,620	714	1.59	13.74	676	668	2,550	0.0050	22.67	28.34	30	5.92
Pipe EE2	CP EE2-5	CP EE2-6	266	406	672	1.0	672	164,640	1,629,250	997,920	693	1.54	15.28	668	660	2,550	0.0050	23.60	29.49	30	5.92
Pipe EE2	CP EE2-6	CP EE2-7	260	229	489	1.0	489	119,805	1,749,055	726,165	504	1.12	16.40	660	652	2,550	0.0050	24.23	30.29	30	5.92
Pipe EE2	CP EE2-7	CP EE2-8	253	151	404	1.0	404	98,980	1,848,035	599,940	417	0.93	17.33	652	644	2,550	0.0050	24.74	30.92	33	6.31
Pipe EE2	CP EE2-8	CP EE2-9	247	135	382	1.0	382	93,590	1,941,625	567,270	394	0.88	18.21	644	636	2,500	0.0050	25.20	31.50	33	6.31
Pipe EE2	CP EE2-9	CP EE2-10	232	142	374	1.0	374	91,630	2,033,255	555,390	386	0.86	19.07	636	628	2,700	0.0050	25.64	32.05	33	6.31
Pipe EE2	CP EE2-10	CP EE2-11	183	161	344	1.0	344	84,280	2,117,535	510,840	355	0.79	19.86	628	620	2,800	0.0050	26.03	32.54	33	6.31
Pipe EE2	CP EE2-11	CP EE2-12	140	151	291	1.0	291	71,295	2,188,830	432,135	300	0.67	20.53	620	612	2,800	0.0050	26.36	32.95	33	6.31
Pipe EE2	CP EE2-12	CP EE2-13	110	291	401	1.0	401	98,245	2,287,075	595,485	414	0.92	21.45	612	604	4,400	0.0050	26.80	33.49	36	6.69
Pipe EE2	CP EE2-13	CP EE1-13	0	0	0	1.0	0	0	2,287,075	0	0	0.00	21.45	604	600	1,400	0.0050	26.80	33.49	36	6.69
	Total		3486	5849	9335		9335	2,287,075		#######	9,627	21.45				34,750	0.0050				
Pipe EE3	Upstream	CP EE3-1	1168	50	1218	1.0	1218	298,410	298,410	1,808,730	1256	2.80	2.80								
Pipe EE3	CP EE3-1	CP EE3-2	619	179	798	1.0	798	195,510	493,920	1,185,030	823	1.83	4.63	665	646	4,600	0.0050	15.08	18.85	21	4.67
Pipe EE3	CP EE3-2	CP EE3-3	477	32	509	1.0	509	124,705	618,625	755,865	525	1.17	5.80	646	627	4,600	0.0050	16.41	20.51	24	5.11
Pipe EE3	CP EE3-3	CP EE3-4	334	509	843	1.0	843	206,535	825,160	1,251,855	869	1.94	7.74	627	608	4,600	0.0050	18.28	22.85	24	5.11
Pipe EE3	CP EE3-4	CP EE3-5	192	628	820	1.0	820	200,900	1,026,060	1,217,700	846	1.88	9.62	608	589	4,600	0.0050	19.84	24.80	27	5.52
Pipe EE3	CP EE3-5	CP EE4-3	51	805	856	1.0	856	209,720	1,235,780	1,271,160	883	1.97	11.59	589	570	4,000	0.0050	21.27	26.59	27	5.52
	Total		2841	2203	5044		5044	1,235,780		7,490,340	5,202	11.59				22,400	0.0050				
Pipe EE1	Upstream	CP EE1-13	5213	4933	10146	1.0	10146	2,485,770	2,485,770	15,066,810	10463	23.31	23.31								
Pipe EE2	Upstream	CP EE1-13	3486	5849	9335	1.0	9335	2,287,075	4,772,845	13,862,475	9627	21.45	44.76								
Pipe EE4	CP EE1-13	CP EE4-1	184	466	650	1.0	650	159,250	4,932,095	965,250	670	1.49	46.26	600	590	2,000	0.0050	35.74	44.68	48	8.10
Pipe EE4	CP EE4-1	CP EE4-2	106	414	520	1.0	520	127,400	5,059,495	772,200	536	1.19	47.45	590	580	2,500	0.0050	36.09	45.11	48	8.10
Pipe EE4	CP EE4-2	CP EE4-3	28	578	606	1.0	606	148,470	5,207,965	899,910	625	1.39	48.84	580	570	2,500	0.0050	36.48	45.60	48	8.10
	Total		9017	12240	21257		21257	5,207,965		#######	21,921	48.84				7,000	0.0050				
Pipe EE3	Upstream	CP EE4-3	2841	2203	5044	1.0	5044	1,235,780	1,235,780	7,490,340	5202	11.59	11.59								
Pipe EE4	CP EE1-13	CP EE4-3	9017	12240	21257	1.0	21257	5,207,965	6,443,745	31,566,645	21921	48.84	60.43								
Pipe EE5	CP EE4-3	CP EE5-1	925	607	1532	1.0	1532	375,340	6,819,085	2,275,020	1580	3.52	63.95	570	566	2,500	0.0050	40.36	50.45	54	8.77
Pipe EE5	CP EE5-1	CP EE5-2	1036	644	1680	1.0	1680	411,600	7,230,685	2,494,800	1733	3.86	67.81	566	561	2,500	0.0050	41.26	51.57	54	8.77
Pipe EE5	CP EE5-2	CP EE5-3	1003	585	1588	1.0	1588	389,060	7,619,745	2,358,180	1638	3.65	71.46	561	556	3,000	0.0050	42.08	52.60	54	8.77
Pipe EE5	CP EE5-3	CP EE5-4	801	67	868	1.0	868	212,660	7,832,405	1,288,980	895	1.99	73.46	556	551	3,500	0.0050	42.51	53.14	54	8.77
Pipe EE5	CP EE5-4	CP EE5-5	650	621	1271	1.0	1271	311,395	8,143,800	1,887,435	1311	2.92	76.38	551	546	3,500	0.0050	43.14	53.93	54	8.77
Pipe EE5	CP EE5-5	CP EE5-6	375	567	942	1.0	942	230,790	8,374,590	1,398,870	971	2.16	78.54	546	541	3,500	0.0050	43.60	54.49	54	8.77
Pipe EE5	CP EE5-6	CP EE5-7	17	665	682	1.0	682	167,090	8,541,680	1,012,770	703	1.57	80.11	541	536	4,400	0.0050	43.92	54.90	60	9.40
Pipe EE5	CP EE5-7	CP EE5-8	0	564	564	1.0	564	138,180	8,679,860	837,540	582	1.30	81.41	536	531	2,500	0.0050	44.18	55.23	60	9.40
Pipe EE5	CP EE5-8	CP EE5-9	0	191	191	1.0	191	46,795	8,726,655	283,635	197	0.44	81.85	531	526	2,700	0.0050	44.27	55.34	60	9.40
	Total		16665	18954	35619		35619	8,726,655		#######	36,732	81.85				28,100	0.0050				

Design Parameters:

Residential Single Family Units (EDU) = 245 GPD
Population per EDU = 3.5 capita/EDU
Development Average Density = 1 EDU/acre
Wastewater Demand = 70 GPD/capita
Maximum Flow Peak Factor = 3
Inflow/Infiltration = 750 gallon/acres served

Average Dry Weather Flow = 245 GPD/EDU
Maximum Dry Weather Flow = 735 GPD/EDU
Maximum Wet Weather Flow = 1485 GPD/EDU

Manning's Roughness Coefficient = 0.013
Percent of Pipe Flowing Full = 80%

P:\Projects\6096 (Green Valley SUD)\07-Wastewater Master Plan\Report\Pipe Sizing\Pipe Size 1 EDU 112706\1 EDU Pipe Size Design Basis

Green Valley Special Utility District
Drainage Area F - 1 EDU
Pipe Flow Design Calculations

1 EDU F

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (1 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe FF	Upstream	CP FF 1	233	614	847	1.0	847	207,515	207,515	1,257,795	873	1.95	1.95	650	645	2,500	0.0050	13.73	17.16	18	4.21
Pipe FF	CP FF 1	CP FF 2	343	379	722	1.0	722	176,890	384,405	1,072,170	745	1.66	3.61	645	640	2,500	0.0050	15.71	19.64	21	4.67
Pipe FF	CP FF 2	CP FF 3	291	389	680	1.0	680	166,600	551,005	1,009,800	701	1.56	5.17	640	635	2,500	0.0050	17.35	21.69	24	5.11
Pipe FF	CP FF 3	CP FF 4	229	451	680	1.0	680	166,600	717,605	1,009,800	701	1.56	6.73	635	630	2,500	0.0050	18.88	23.60	24	5.11
Pipe FF	CP FF 4	CP FF 5	239	500	739	1.0	739	181,055	898,660	1,097,415	762	1.70	8.43	630	625	2,500	0.0050	20.12	25.15	27	5.52
Pipe FF	CP FF 5	CP FF 6	229	452	681	1.0	681	166,845	1,065,505	1,011,285	702	1.56	9.99	625	620	2,500	0.0050	21.12	26.39	27	5.52
Pipe FF	CP FF 6	CP FF 7	284	313	597	1.0	597	146,265	1,211,770	886,545	616	1.37	11.36	620	615	2,500	0.0050	21.93	27.42	30	5.92
Pipe FF	CP FF 7	CP FF 8	233	295	528	1.0	528	129,360	1,341,130	784,080	545	1.21	12.58	615	610	2,700	0.0050	22.60	28.25	30	5.92
Pipe FF	CP FF 8	CP FF 9	89	363	452	1.0	452	110,740	1,451,870	671,220	466	1.04	13.62	610	605	3,600	0.0050	23.07	28.84	30	5.92
Pipe FF	CP FF 9	CP FF 10	86	250	336	1.0	336	82,320	1,534,190	498,960	347	0.77	14.39	605	600	3,400	0.0050	23.41	29.27	30	5.92
Pipe FF	CP FF 10	CP FF 11	171	82	253	1.0	253	61,985	1,596,175	375,705	261	0.58	14.97								
Total			2427	4088	6515		6515	1,596,175		9,674,775	6,719	14.97				27,200	0.0050				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	1	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	1485	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area G - 1 EDU
Pipe Flow Design Calculations

1 EDU G

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Actual (ft/sec)
Pipe GG	Upstream	CP GG-1	96	267	363	1.0	363	88,935	88,935	539,055	374	0.83	0.83								
Pipe GG	CP GG-1	CP GG-2	268	187	455	1.0	455	111,475	200,410	675,675	469	1.05	1.88	640	629	2,700	0.0050	10.75	13.44	**15**	3.73
Pipe GG	CP GG-2	CP GG-3	452	144	596	1.0	596	146,020	346,430	885,060	615	1.37	3.25	629	618	2,700	0.0050	13.20	16.50	**18**	4.21
Pipe GG	CP GG-3	CP GG-4	552	129	681	1.0	681	166,845	513,275	1,011,285	702	1.56	4.81	618	607	2,500	0.0050	15.30	19.13	**21**	4.67
Pipe GG	CP GG-4	CP GG-5	594	90	684	1.0	684	167,580	680,855	1,015,740	705	1.57	6.39	607	596	2,500	0.0050	17.01	21.26	**21**	4.67
Pipe GG	CP GG-5	CP GG-6	661	160	821	1.0	821	201,145	882,000	1,219,185	847	1.89	8.27	596	585	2,500	0.0050	18.74	23.43	**24**	5.11
Pipe GG	CP GG-6	CP GG-7	838	387	1225	1.0	1225	300,125	1,182,125	1,819,125	1263	2.81	11.09	585	573	2,800	0.0050	20.92	26.15	**27**	5.52
Pipe GG	CP GG-7	CP GG-8	600	563	1163	1.0	1163	284,935	1,467,060	1,727,055	1199	2.67	13.76	573	563	2,900	0.0050	22.69	28.36	**30**	5.92
Pipe GG	CP GG-8	CP GG-9	113	1410	1523	1.0	1523	373,135	1,840,195	2,261,655	1571	3.50	17.26	563	550	3,000	0.0050	24.70	30.87	**33**	6.31
	Total		**4174**	**3337**	**7511**		**7511**	**1,840,195**		**11,153,835**	**7,746**	**17.26**				**21,600**	**0.0050**				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	1	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	1485	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
3 EDU/acre
Pipe Flow Design Summary

Pipe Diameter (in)	Basin A Pipe Length (ft)	Basin B Pipe Length (ft)	Basin C Pipe Length (ft)	Basin D Pipe Length (ft)	Basin E Pipe Length (ft)	Basin F Pipe Length (ft)	Basin G Pipe Length (ft)	Total Pipe Length (ft)
8								0
10								0
12								0
15	2,600							2,600
18	11,200	2,600	2,600				2,700	19,100
21	13,800	2,800	2,800				2,700	22,100
24	9,500	2,800	2,800		4,600	2,500	2,500	24,700
27	5,500	2,600	2,800	2,500	7,350	2,500	2,500	25,750
30	3,500	9,400	5,400		12,600	5,000	2,500	38,400
33			7,600	2,500	13,000	2,500	2,800	28,400
36	5,000			5,300	14,450	7,700	2,900	35,350
42	11,400			5,600	31,950	7,000	3,000	58,950
48					5,800			5,800
54								0
60					7,000			7,000
66					5,000			5,000
72					23,100			23,100
Total	62,500	20,200	24,000	15,900	124,850	27,200	21,600	296,250
							56	Miles

Green Valley Special Utility District
Drainage Area A - 3 EDU
Pipe Flow Design Calculations

3 EDU A

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (3 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe AA1	Upstream	CP AA1-1	256	520	776	3.0	2328	570,360	570,360	2,293,080	1592	3.55	3.55								
Pipe AA1	CP AA1-1	CP AA1-2	177	144	321	3.0	963	235,935	806,295	948,555	659	1.47	5.02	600	585	2,500	0.0060	15.02	18.77	**18**	4.62
Pipe AA1	CP AA1-2	CP AA1-3	169	129	298	3.0	894	219,030	1,025,325	880,590	612	1.36	6.38	585	570	2,500	0.0060	16.43	20.54	**21**	5.12
Pipe AA1	CP AA1-3	CP AA1-4	175	114	289	3.0	867	212,415	1,237,740	853,995	593	1.32	7.70	570	555	2,500	0.0060	17.63	22.04	**24**	5.59
Pipe AA1	CP AA1-4	CP AA1-5	210	73	283	3.0	849	208,005	1,445,745	836,265	581	1.29	8.99	555	540	3,500	0.0050	19.34	24.18	**24**	5.11
1	**Total**		**987**	**980**	**1967**		**5901**	**1,445,745**		**5,812,485**	**4,036**	**8.99**				**11,000**	**0.0058**				
Pipe AA2	Upstream	CP AA2-1	931	71	1002	3.0	3006	736,470	736,470	2,960,910	2056	4.58	4.58								
Pipe AA2	CP AA2-1	CP AA2-2	486	287	773	3.0	2319	568,155	1,304,625	2,284,215	1586	3.53	8.12	590	578	3,500	0.0050	18.61	23.26	**24**	5.11
Pipe AA2	CP AA2-2	CP AA2-3	234	394	628	3.0	1884	461,580	1,766,205	1,855,740	1289	2.87	10.99	578	565	3,000	0.0050	20.85	26.06	**27**	5.52
Pipe AA2	CP AA2-3	CP AA2-4	131	119	250	3.0	750	183,750	1,949,955	738,750	513	1.14	12.13	565	553	2,500	0.0050	21.64	27.05	**27**	5.52
Pipe AA2	CP AA2-4	CP AA1-5	34	133	167	3.0	501	122,745	2,072,700	493,485	343	0.76	12.89	553	540	3,500	0.0050	22.14	27.67	**30**	5.92
2	**Total**		**1816**	**1004**	**2820**		**8460**	**2,072,700**		**8,333,100**	**5,787**	**12.89**				**12,500**	**0.0050**				
Pipe AA3	Upstream	CP AA3-1	93	246	339	3.0	1017	249,165	249,165	1,001,745	696	1.55	1.55								
Pipe AA3	CP AA3-1	CP AA3-2	127	195	322	3.0	966	236,670	485,835	951,510	661	1.47	3.02	600	581	2,600	0.0073	11.97	14.96	**15**	4.51
Pipe AA3	CP AA3-2	CP AA3-3	93	262	355	3.0	1065	260,925	746,760	1,049,025	728	1.62	4.65	581	563	2,700	0.0067	14.30	17.88	**18**	4.87
Pipe AA3	CP AA3-3	CP AA3-4	127	220	347	3.0	1041	255,045	1,001,805	1,025,385	712	1.59	6.23	563	545	2,800	0.0064	16.08	20.10	**21**	5.30
Pipe AA3	CP AA3-4	CP AA6-1	50	240	290	3.0	870	213,150	1,214,955	856,950	595	1.33	7.56	545	525	2,500	0.0080	16.59	20.74	**21**	5.91
3	**Total**		**490**	**1163**	**1653**		**4959**	**1,214,955**		**4,884,615**	**3,392**	**7.56**				**10,600**	**0.0071**				
Pipe AA4	Upstream	CP AA4-1	211	17	228	3.0	684	167,580	167,580	673,740	468	1.04	1.04								
Pipe AA4	CP AA4-1	CP AA4-2	314	69	383	3.0	1149	281,505	449,085	1,131,765	786	1.75	2.79	550	543	3,000	0.0050	12.48	15.60	**18**	4.21
Pipe AA4	CP AA4-2	CP AA4-3	252	36	288	3.0	864	211,680	660,765	851,040	591	1.32	4.11	543	536	3,000	0.0050	14.42	18.03	**18**	4.21
Pipe AA4	CP AA4-3	CP AA5-2	269	72	341	3.0	1023	250,635	911,400	1,007,655	700	1.56	5.67	536	530	6,000	0.0050	16.27	20.34	**21**	4.67
4	**Total**		**1046**	**194**	**1240**		**3720**	**911,400**		**3,664,200**	**2,545**	**5.67**				**12,000**	**0.0050**				
Pipe AA1	Upstream	CP AA1-5	987	980	1967	3.0	5901	1,445,745	1,445,745	5,812,485	4036	8.99	8.99								
Pipe AA2	Upstream	CP AA1-5	1816	1004	2820	3.0	8460	2,072,700	3,518,445	8,333,100	5787	12.89	21.89								
Pipe AA5	CP AA1-5	CP AA5-1	233	103	336	3.0	1008	246,960	3,765,405	992,880	690	1.54	23.42	540	535	2,500	0.0050	27.69	34.62	**36**	6.69
Pipe AA5	CP AA5-1	CP AA5-2	266	118	384	3.0	1152	282,240	4,047,645	1,134,720	788	1.76	25.18	535	530	2,500	0.0050	28.46	35.57	**36**	6.69
5	**Total**		**3302**	**2205**	**5507**		**16521**	**4,047,645**		**16,273,185**	**11,301**	**25.18**				**5,000**	**0.0050**				
Pipe AA4	Upstream	CP AA5-2	1046	194	1240	3.0	3720	911,400	911,400	3,664,200	2545	5.67	5.67								
Pipe AA5	CP AA1-5	CP AA5-2	3302	2205	5507	3.0	16521	4,047,645	4,959,045	16,273,185	11301	25.18	30.85								
Pipe AA6	CP AA5-2	CP AA6-1	181	62	243	3.0	729	178,605	5,137,650	718,065	499	1.11	31.96	530	525	4,500	0.0050	31.12	38.90	**42**	7.41
6	**Total**		**4529**	**2461**	**6990**		**20970**	**5,137,650**		**20,655,450**	**14,344**	**31.96**				**4,500**	**0.0050**				
Pipe AA3	Upstream	CP AA6-1	490	1163	1653	3.0	4959	1,214,955	1,214,955	4,884,615	3392	7.56	7.56								
Pipe AA6	CP AA5-2	CP AA6-1	4529	2461	6990	3.0	20970	5,137,650	6,352,605	20,655,450	14344	31.96	39.52								
Pipe AA7	CP AA6-1	CP AA7-1	208	92	300	3.0	900	220,500	6,573,105	886,500	616	1.37	40.89	525	510	4,900	0.0050	34.13	42.66	**42**	7.41
7	**Total**		**5227**	**3716**	**8943**		**26829**	**6,573,105**		**26,426,565**	**18,352**	**40.89**				**4,900**	**0.0050**				
Pipe AA7	CP AA6-1	CP AA7-1	5227	3716	8943	3.0	26829	6,573,105	6,573,105	26,426,565	18352	40.89	40.89								
Pipe AA8	CP AA7-1	CP AA8-1	253	15	268	3.0	804	196,980	6,770,085	791,940	550	1.23	42.12	510	495	2,000	0.0075	31.98	39.98	**42**	9.08
8	**Total**		**5480**	**3731**	**9211**		**27633**	**6,770,085**		**27,218,505**	**18,902**	**42.12**				**2,000**	**0.0075**				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	3	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	985	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area B - 3 EDU
Pipe Flow Design Calculations

3 EDU B

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (3 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe BB	Upstream	CP BB-1	267	367	634	3.0	1902	465,990	465,990	1,873,470	1301	2.90	2.90	600	580	2,600	0.0077	14.48	18.10	18	5.23
Pipe BB	CP BB-1	CP BB-2	207	287	494	3.0	1482	363,090	829,080	1,459,770	1014	2.26	5.16	580	560	2,800	0.0071	16.77	20.97	21	5.58
Pipe BB	CP BB-2	CP BB-3	251	229	480	3.0	1440	352,800	1,181,880	1,418,400	985	2.19	7.35	560	540	2,800	0.0071	18.83	23.54	24	6.10
Pipe BB	CP BB-3	CP BB-4	366	216	582	3.0	1746	427,770	1,609,650	1,719,810	1194	2.66	10.01	540	520	2,600	0.0077	20.27	25.34	27	6.85
Pipe BB	CP BB-4	CP BB-5	384	190	574	3.0	1722	421,890	2,031,540	1,696,170	1178	2.62	12.64	520	490	4,400	0.0068	22.04	27.55	30	6.92
Pipe BB	CP BB-5	CP BB-6	206	285	491	3.0	1473	360,885	2,392,425	1,450,905	1008	2.25	14.88	490	470	2,500	0.0080	22.60	28.25	30	7.49
Pipe BB	CP BB-6	CP BB-7	209	306	515	3.0	1545	378,525	2,770,950	1,521,825	1057	2.35	17.24	470	450	2,500	0.0080	24.53	30.67	30	7.49
Pipe BB	CP BB-7	CP BB-8	704	216	920	3.0	2760	676,200	3,447,150	2,718,600	1888	4.21	21.44								
Total			2594	2096	4690		14070	3,447,150		13,858,950	9,624	21.44				20,200	0.0076				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	3	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	985	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area C - 3 EDU
Pipe Flow Design Calculations

3 EDU C

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe CC	Upstream	CP CC-1	150	314	464	3.0	1392	341,040	341,040	1,371,120	952	2.12	2.12								
Pipe CC	CP CC-1	CP CC-2	173	365	538	3.0	1614	395,430	736,470	1,589,790	1104	2.46	4.58	600	580	2,600	0.0077	13.85	17.32	**18**	5.23
Pipe CC	CP CC-2	CP CC-3	192	373	565	3.0	1695	415,275	1,151,745	1,669,575	1159	2.58	7.16	580	560	2,800	0.0071	16.61	20.77	**21**	5.58
Pipe CC	CP CC-3	CP CC-4	271	331	602	3.0	1806	442,470	1,594,215	1,778,910	1235	2.75	9.92	560	540	2,800	0.0071	18.77	23.46	**24**	6.10
Pipe CC	CP CC-4	CP CC-5	332	233	565	3.0	1695	415,275	2,009,490	1,669,575	1159	2.58	12.50	540	520	2,800	0.0071	20.47	25.59	**27**	6.60
Pipe CC	CP CC-5	CP CC-6	457	259	716	3.0	2148	526,260	2,535,750	2,115,780	1469	3.27	15.77	520	500	2,800	0.0071	22.33	27.92	**30**	7.08
Pipe CC	CP CC-6	CP CC-7	584	203	787	3.0	2361	578,445	3,114,195	2,325,585	1615	3.60	19.37	500	480	2,600	0.0077	23.79	29.74	**30**	7.35
Pipe CC	CP CC-7	CP CC-8	520	119	639	3.0	1917	469,665	3,583,860	1,888,245	1311	2.92	22.29	480	460	2,600	0.0077	25.08	31.35	**33**	7.83
Pipe CC	CP CC-8	CP CC-9	405	152	557	3.0	1671	409,395	3,993,255	1,645,935	1143	2.55	24.84	460	440	2,500	0.0080	25.92	32.40	**33**	7.99
Pipe CC	CP CC-9	CP CC-10	194	9	203	3.0	609	149,205	4,142,460	599,865	417	0.93	25.77	440	420	2,500	0.0080	26.28	32.85	**33**	7.99
Total			**3278**	**2358**	**5636**		**16908**	**4,142,460**		**16,654,380**	**11,566**	**25.77**				**24,000**	**0.0075**				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	3	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	985	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area D - 3 EDU
Pipe Flow Design Calculations

3 EDU D

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (3 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe DD	Upstream	CP DD-1	401	1068	1469	3.0	4407	1,079,715	1,079,715	4,340,895	3015	6.72	6.72								
Pipe DD	CP DD-1	CP DD-2	374	815	1189	3.0	3567	873,915	1,953,630	3,513,495	2440	5.44	12.15	570	562	2,500	0.0050	21.65	27.07	27	5.52
Pipe DD	CP DD-2	CP DD-3	411	725	1136	3.0	3408	834,960	2,788,590	3,356,880	2331	5.19	17.35	562	554	2,500	0.0050	24.75	30.93	33	6.31
Pipe DD	CP DD-3	CP DD-4	326	610	936	3.0	2808	687,960	3,476,550	2,765,880	1921	4.28	21.63	554	546	2,500	0.0050	26.88	33.60	36	6.69
Pipe DD	CP DD-4	CP DD-5	376	466	842	3.0	2526	618,870	4,095,420	2,488,110	1728	3.85	25.48	546	538	2,800	0.0050	28.58	35.73	36	6.69
Pipe DD	CP DD-5	CP DD-6	407	283	690	3.0	2070	507,150	4,602,570	2,038,950	1416	3.15	28.63	538	530	3,000	0.0050	29.86	37.33	42	7.41
Pipe DD	CP DD-6	CP DD-7	297	128	425	3.0	1275	312,375	4,914,945	1,255,875	872	1.94	30.58	530	522	2,600	0.0050	30.60	38.26	42	7.41
Total			2592	4095	6687		20061	4,914,945		19,760,085	13,722	30.58				15,900	0.0050				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	3	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	985	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area E - 3 EDU
Pipe Flow Design Calculations

3 EDU E

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (3 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe EE1	Upstream	CP EE1-1	442	1455	1897	3.0	5691	1,394,295	1,394,295	5,605,635	3893	8.67	8.67								
Pipe EE1	CP EE1-1	CP EE1-2	311	476	787	3.0	2361	578,445	1,972,740	2,325,585	1615	3.60	12.27	830	811	2,750	0.0069	20.45	25.57	27	6.49
Pipe EE1	CP EE1-2	CP EE1-3	365	424	789	3.0	2367	579,915	2,552,655	2,331,495	1619	3.61	15.88	811	792	2,750	0.0069	22.53	28.16	30	6.96
Pipe EE1	CP EE1-3	CP EE1-4	419	383	802	3.0	2406	589,470	3,142,125	2,369,910	1646	3.67	19.55	792	773	2,750	0.0069	24.36	30.44	30	6.96
Pipe EE1	CP EE1-4	CP EE1-5	517	343	860	3.0	2580	632,100	3,774,225	2,541,300	1765	3.93	23.48	773	754	2,750	0.0069	26.09	32.61	33	7.42
Pipe EE1	CP EE1-5	CP EE1-6	58	302	360	3.0	1080	264,600	4,038,825	1,063,800	739	1.65	25.13	754	735	2,750	0.0069	26.76	33.45	33	7.42
Pipe EE1	CP EE1-6	CP EE1-7	625	267	892	3.0	2676	655,620	4,694,445	2,635,860	1830	4.08	29.20	735	716	2,750	0.0069	28.31	35.39	36	7.86
Pipe EE1	CP EE1-7	CP EE1-8	646	259	905	3.0	2715	665,175	5,359,620	2,674,275	1857	4.14	33.34	716	697	2,600	0.0073	29.44	36.80	36	8.09
Pipe EE1	CP EE1-8	CP EE1-9	471	255	726	3.0	2178	533,610	5,893,230	2,145,330	1490	3.32	36.66	697	678	2,600	0.0073	30.51	38.14	42	8.96
Pipe EE1	CP EE1-9	CP EE1-10	416	248	664	3.0	1992	488,040	6,381,270	1,962,120	1363	3.04	39.70	678	659	2,600	0.0073	31.43	39.29	42	8.96
Pipe EE1	CP EE1-10	CP EE1-11	381	224	605	3.0	1815	444,675	6,825,945	1,787,775	1242	2.77	42.46	659	640	2,600	0.0073	32.24	40.30	42	8.96
Pipe EE1	CP EE1-11	CP EE1-12	312	167	479	3.0	1437	352,065	7,178,010	1,415,445	983	2.19	44.65	640	621	2,600	0.0073	32.85	41.07	42	8.96
Pipe EE1	CP EE1-12	CP EE1-13	250	130	380	3.0	1140	279,300	7,457,310	1,122,900	780	1.74	46.39	621	600	3,100	0.0068	33.80	42.25	42	8.63
Total			5213	4933	10146		30438	7,457,310		29,981,430	20,820	46.39				32,600	0.0071				
Pipe EE2	Upstream	CP EE2-1	574	2297	2871	3.0	8613	2,110,185	2,110,185	8,483,805	5892	13.13	13.13								
Pipe EE2	CP EE2-1	CP EE2-2	347	519	866	3.0	2598	636,510	2,746,695	2,559,030	1777	3.96	17.09	700	692	2,500	0.0050	24.60	30.76	30	5.92
Pipe EE2	CP EE2-2	CP EE2-3	322	484	806	3.0	2418	592,410	3,339,105	2,381,730	1654	3.69	20.77	692	684	2,900	0.0050	26.47	33.09	33	6.31
Pipe EE2	CP EE2-3	CP EE2-4	279	464	743	3.0	2229	546,105	3,885,210	2,195,565	1525	3.40	24.17	684	676	2,550	0.0050	28.02	35.03	36	6.69
Pipe EE2	CP EE2-4	CP EE2-5	273	419	692	3.0	2076	508,620	4,393,830	2,044,860	1420	3.16	27.33	676	668	2,550	0.0050	29.35	36.68	36	6.69
Pipe EE2	CP EE2-5	CP EE2-6	266	406	672	3.0	2016	493,920	4,887,750	1,985,760	1379	3.07	30.41	668	660	2,550	0.0050	30.54	38.18	42	7.41
Pipe EE2	CP EE2-6	CP EE2-7	260	229	489	3.0	1467	359,415	5,247,165	1,444,995	1003	2.24	32.64	660	652	2,550	0.0050	31.36	39.21	42	7.41
Pipe EE2	CP EE2-7	CP EE2-8	253	151	404	3.0	1212	296,940	5,544,105	1,193,820	829	1.85	34.49	652	644	2,550	0.0050	32.02	40.02	42	7.41
Pipe EE2	CP EE2-8	CP EE2-9	247	135	382	3.0	1146	280,770	5,824,875	1,128,810	784	1.75	36.24	644	636	2,500	0.0050	32.62	40.77	42	7.41
Pipe EE2	CP EE2-9	CP EE2-10	232	142	374	3.0	1122	274,890	6,099,765	1,105,170	767	1.71	37.95	636	628	2,700	0.0050	33.19	41.48	42	7.41
Pipe EE2	CP EE2-10	CP EE2-11	183	161	344	3.0	1032	252,840	6,352,605	1,016,520	706	1.57	39.52	628	620	2,800	0.0050	33.70	42.12	42	7.41
Pipe EE2	CP EE2-11	CP EE2-12	140	151	291	3.0	873	213,885	6,566,490	859,905	597	1.33	40.85	620	612	2,800	0.0050	34.12	42.65	42	7.41
Pipe EE2	CP EE2-12	CP EE2-13	110	291	401	3.0	1203	294,735	6,861,225	1,184,955	823	1.83	42.68	612	604	4,400	0.0050	34.68	43.35	48	8.10
Pipe EE2	CP EE2-13	CP EE1-13	0	0	0	3.0	0	0	6,861,225	0	0	0.00	42.68	604	600	1,400	0.0050	34.68	43.35	48	8.10
Total			3486	5849	9335		28005	6,861,225		27,584,925	19,156	42.68				34,750	0.0050				
Pipe EE3	Upstream	CP EE3-1	1168	50	1218	3.0	3654	895,230	895,230	3,599,190	2499	5.57	5.57								
Pipe EE3	CP EE3-1	CP EE3-2	619	179	798	3.0	2394	586,530	1,481,760	2,358,090	1638	3.65	9.22	665	646	4,600	0.0050	19.52	24.40	24	5.11
Pipe EE3	CP EE3-2	CP EE3-3	477	32	509	3.0	1527	374,115	1,855,875	1,504,095	1045	2.33	11.55	646	627	4,600	0.0050	21.24	26.55	27	5.52
Pipe EE3	CP EE3-3	CP EE3-4	334	509	843	3.0	2529	619,605	2,475,480	2,491,065	1730	3.85	15.40	627	608	4,600	0.0050	23.66	29.58	30	5.92
Pipe EE3	CP EE3-4	CP EE3-5	192	628	820	3.0	2460	602,700	3,078,180	2,423,100	1683	3.75	19.15	608	589	4,600	0.0050	25.68	32.10	33	6.31
Pipe EE3	CP EE3-5	CP EE4-3	51	805	856	3.0	2568	629,160	3,707,340	2,529,480	1757	3.91	23.06	589	570	4,000	0.0050	27.53	34.42	36	6.69
Total			2841	2203	5044		15132	3,707,340		14,905,020	10,351	23.06				22,400	0.0050				
Pipe EE1	Upstream	CP EE1-13	5213	4933	10146	3.0	30438	7,457,310	7,457,310	29,981,430	20820	46.39	46.39								
Pipe EE2	Upstream	CP EE1-13	3486	5849	9335	3.0	28005	6,861,225	14,318,535	27,584,925	19156	42.68	89.07								
Pipe EE4	CP EE1-13	CP EE4-1	184	466	650	3.0	1950	477,750	14,796,285	1,920,750	1334	2.97	92.05	600	590	2,000	0.0050	46.27	57.83	60	9.40
Pipe EE4	CP EE4-1	CP EE4-2	106	414	520	3.0	1560	382,200	15,178,485	1,536,600	1067	2.38	94.42	590	580	2,500	0.0050	46.71	58.39	60	9.40
Pipe EE4	CP EE4-2	CP EE4-3	28	578	606	3.0	1818	445,410	15,623,895	1,790,730	1244	2.77	97.20	580	570	2,500	0.0050	47.22	59.03	60	9.40
Total			9017	12240	21257		63771	15,623,895		62,814,435	43,621	97.20				7,000	0.0050				
Pipe EE3	Upstream	CP EE4-3	2841	2203	5044	3.0	15132	3,707,340	3,707,340	14,905,020	10351	23.06	23.06								
Pipe EE4	CP EE1-13	CP EE4-3	9017	12240	21257	3.0	63771	15,623,895	19,331,235	62,814,435	43621	97.20	120.26								
Pipe EE5	CP EE4-3	CP EE5-1	925	607	1532	3.0	4596	1,126,020	20,457,255	4,527,060	3144	7.00	127.26	570	566	2,500	0.0050	52.24	65.31	66	10.02
Pipe EE5	CP EE5-1	CP EE5-2	1036	644	1680	3.0	5040	1,234,800	21,692,055	4,964,400	3448	7.68	134.94	566	561	2,500	0.0050	53.40	66.76	66	10.02
Pipe EE5	CP EE5-2	CP EE5-3	1003	585	1588	3.0	4764	1,167,180	22,859,235	4,692,540	3259	7.26	142.21	561	556	3,000	0.0050	54.46	68.08	72	10.62
Pipe EE5	CP EE5-3	CP EE5-4	801	67	868	3.0	2604	637,980	23,497,215	2,564,940	1781	3.97	146.17	556	551	3,500	0.0050	55.03	68.79	72	10.62
Pipe EE5	CP EE5-4	CP EE5-5	650	621	1271	3.0	3813	934,185	24,431,400	3,755,805	2608	5.81	151.99	551	546	3,500	0.0050	55.84	69.80	72	10.62
Pipe EE5	CP EE5-5	CP EE5-6	375	567	942	3.0	2826	692,370	25,123,770	2,783,610	1933	4.31	156.29	546	541	3,500	0.0050	56.43	70.54	72	10.62
Pipe EE5	CP EE5-6	CP EE5-7	17	665	682	3.0	2046	501,270	25,625,040	2,015,310	1400	3.12	159.41	541	536	4,400	0.0050	56.85	71.06	72	10.62
Pipe EE5	CP EE5-7	CP EE5-8	0	564	564	3.0	1692	414,540	26,039,580	1,666,620	1157	2.58	161.99	536	531	2,500	0.0050	57.19	71.49	72	10.62
Pipe EE5	CP EE5-8	CP EE5-9	0	191	191	3.0	573	140,385	26,179,965	564,405	392	0.87	162.86	531	526	2,700	0.0050	57.31	71.63	72	10.62
Total			16665	18954	35619		106857	26,179,965		#######	73,093	162.86				28,100	0.0050				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	3	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	985	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area F - 3 EDU
Pipe Flow Design Calculations

3 EDU F

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (3 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe FF	Upstream	CP FF 1	233	614	847	3.0	2541	622,545	622,545	2,502,885	1738	3.87	3.87	650	645	2,500	0.0050	17.77	22.21	24	5.11
Pipe FF	CP FF 1	CP FF 2	343	379	722	3.0	2166	530,670	1,153,215	2,133,510	1482	3.30	7.17	645	640	2,500	0.0050	20.34	25.42	27	5.52
Pipe FF	CP FF 2	CP FF 3	291	389	680	3.0	2040	499,800	1,653,015	2,009,400	1395	3.11	10.28	640	635	2,500	0.0050	22.46	28.07	30	5.92
Pipe FF	CP FF 3	CP FF 4	229	451	680	3.0	2040	499,800	2,152,815	2,009,400	1395	3.11	13.39	635	630	2,500	0.0050	24.43	30.54	30	5.92
Pipe FF	CP FF 4	CP FF 5	239	500	739	3.0	2217	543,165	2,695,980	2,183,745	1516	3.38	16.77	630	625	2,500	0.0050	26.04	32.56	33	6.31
Pipe FF	CP FF 5	CP FF 6	229	452	681	3.0	2043	500,535	3,196,515	2,012,355	1397	3.11	19.89	625	620	2,500	0.0050	27.33	34.17	36	6.69
Pipe FF	CP FF 6	CP FF 7	284	313	597	3.0	1791	438,795	3,635,310	1,764,135	1225	2.73	22.61	620	615	2,500	0.0050	28.39	35.49	36	6.69
Pipe FF	CP FF 7	CP FF 8	233	295	528	3.0	1584	388,080	4,023,390	1,560,240	1084	2.41	25.03	615	610	2,700	0.0050	29.25	36.56	36	6.69
Pipe FF	CP FF 8	CP FF 9	89	363	452	3.0	1356	332,220	4,355,610	1,335,660	928	2.07	27.10	610	605	3,600	0.0050	29.86	37.33	42	7.41
Pipe FF	CP FF 9	CP FF 10	86	250	336	3.0	1008	246,960	4,602,570	992,880	690	1.54	28.63	605	600	3,400	0.0050	30.31	37.88	42	7.41
Pipe FF	CP FF 10	CP FF 11	171	82	253	3.0	759	185,955	4,788,525	747,615	519	1.16	29.79								
Total			2427	4088	6515		19545	4,788,525		19,251,825	13,369	29.79				27,200	0.0050				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	3	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	985	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Drainage Area G - 3 EDU
Pipe Flow Design Calculations

3 EDU G

Sewer Main Location			Contributing Area			Population		Average Dry Weather Flow		Maximum Wet Weather				Pipe Design							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pipe ID	Up Stream Collection Point	Down Stream Collection Point	Left Side Area (acres)	Right Side Area (acres)	Total Area (acres)	Development Density (3 EDU/acre)	Total EDU (EDU)	Dry Weather Flow (GPD)	Cumulative Dry Weather Flow (GPD)	Wet Weather Flow (GPD)	Wet Weather Flow (gpm)	Wet Weather Flow (cfs)	Cumulative Wet Weather Flow (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Pipe Length (ft)	Pipe Slope (ft)	Pipe Diameter Actual (inches)	Pipe Diameter 80% Full (inches)	Pipe Diameter Nominal (inches)	Pipe Velocity Nominal (ft/sec)
Pipe GG	Upstream	CP GG-1	96	267	363	3.0	1089	266,805	266,805	1,072,665	745	1.66	1.66								
Pipe GG	CP GG-1	CP GG-2	268	187	455	3.0	1365	334,425	601,230	1,344,525	934	2.08	3.74	640	629	2,700	0.0050	13.92	17.40	**18**	4.21
Pipe GG	CP GG-2	CP GG-3	452	144	596	3.0	1788	438,060	1,039,290	1,761,180	1223	2.73	6.47	629	618	2,700	0.0050	17.09	21.36	**21**	4.67
Pipe GG	CP GG-3	CP GG-4	552	129	681	3.0	2043	500,535	1,539,825	2,012,355	1397	3.11	9.58	618	607	2,500	0.0050	19.80	24.76	**24**	5.11
Pipe GG	CP GG-4	CP GG-5	594	90	684	3.0	2052	502,740	2,042,565	2,021,220	1404	3.13	12.71	607	596	2,500	0.0050	22.02	27.52	**27**	5.52
Pipe GG	CP GG-5	CP GG-6	661	160	821	3.0	2463	603,435	2,646,000	2,426,055	1685	3.75	16.46	596	585	2,500	0.0050	24.26	30.33	**30**	5.92
Pipe GG	CP GG-6	CP GG-7	838	387	1225	3.0	3675	900,375	3,546,375	3,619,875	2514	5.60	22.06	585	573	2,800	0.0050	27.08	33.85	**33**	6.31
Pipe GG	CP GG-7	CP GG-8	600	563	1163	3.0	3489	854,805	4,401,180	3,436,665	2387	5.32	27.38	573	563	2,900	0.0050	29.36	36.70	**36**	6.69
Pipe GG	CP GG-8	CP GG-9	113	1410	1523	3.0	4569	1,119,405	5,520,585	4,500,465	3125	6.96	34.34	563	550	3,000	0.0050	31.97	39.96	**42**	7.41
Total			**4174**	**3337**	**7511**		**22533**	**5,520,585**		**22,195,005**	**15,413**	**34.34**				**21,600**	**0.0050**				

Design Parameters:

Residential Single Family Units (EDU) =	245	GPD
Population per EDU =	3.5	capita/EDU
Development Average Density =	3	EDU/acre
Wastewater Demand =	70	GPD/capita
Maximum Flow Peak Factor =	3	
Inflow/Infiltration =	750	gallon/acres served

Average Dry Weather Flow =	245	GPD/EDU
Maximum Dry Weather Flow =	735	GPD/EDU
Maximum Wet Weather Flow =	985	GPD/EDU

Manning's Roughness Coefficient =	0.013
Percent of Pipe Flowing Full =	80%

Green Valley Special Utility District
Summary Costs
Proposed Main Wastewater Collection System
Engineer's Opinion of Probable Costs

Basin	Total Costs 1 (EDU/acre)	Total Costs 3 (EDU/acre)	Variance
A	$ 11,212,950.00	$ 13,229,734.00	$ 2,016,784.00
B	$ 3,379,449.00	$ 3,848,841.00	$ 469,392.00
C	$ 4,151,280.00	$ 4,773,440.00	$ 622,160.00
D	$ 3,072,068.00	$ 4,188,876.00	$ 1,116,808.00
E	$ 34,601,813.00	$ 43,682,177.00	$ 9,080,364.00
F	$ 5,230,109.00	$ 6,739,925.00	$ 1,509,816.00
G	$ 3,963,086.00	$ 4,673,334.00	$ 710,248.00
Total	**$ 65,610,755.00**	**$ 81,136,327.00**	$ 15,525,572.00

This cost estimate is based on River City Engineering's experience and qualifications, and represents River City Engineering's best judgment. This cost estimate was prepared for feasibility analysis purposes only. River City Engineering does not guarantee that the actual construction cost will not vary from this estimate. Unit prices were used from SAWS average unit price list revised October 2005. Units prices will not remain constraint and will vary due to market variations such as inflation.

Green Valley Special Utility District
Summary Drainage Basin A
Engineer's Opinion of Probable Costs

A

Item	Description	Total Costs 1 (EDU/acre)	Total Costs 3 (EDU/acre)
1	12" SDR 35, PVC (0'-6' cut)	$ 336,000.00	$ -
2	15" SDR 35, PVC (0'-6' cut)	$ 533,000.00	$ 169,000.00
3	18" SDR 35, PVC (0'-6' cut)	$ 1,386,000.00	$ 784,000.00
4	21" SDR 35, PVC (0'-6' cut)	$ 720,000.00	$ 1,104,000.00
5	24" SDR 35, PVC (0'-6' cut)	$ 315,000.00	$ 855,000.00
6	27" SDR 35, PVC (0'-6' cut)	$ 250,000.00	$ 550,000.00
7	30" SDR 35, PVC (0'-6' cut)	$ 275,000.00	$ 385,000.00
8	33" SDR 35, PVC (0'-6' cut)	$ 1,425,000.00	$ -
9	36" SDR 35, PVC (0'-6' cut)	$ -	$ 750,000.00
10	42", PVC (0'-6' cut)	$ -	$ 2,280,000.00
11	48", PVC (0'-6' cut)	$ -	$ -
12	54", PVC (0'-6' cut)	$ -	$ -
13	60", PVC (0'-6' cut)	$ -	$ -
14	66", PVC (0'-6' cut)	$ -	$ -
15	72", PVC (0'-6' cut)	$ -	$ -
16	48" dia. M.H. W.T. & Bolted (0'-6' cut)	$ 625,000.00	$ 625,000.00
17	Bore and Case Roadways	$ 406,250.00	$ 406,250.00
18	Bore and Case Creek Crossings	$ 250,000.00	$ 250,000.00
19	Trench Safety	$ 125,000.00	$ 125,000.00
20	Sewer Main Television Inspection	$ 1,625,000.00	$ 1,625,000.00
21	Erosion Control Devices	$ 62,500.00	$ 62,500.00
22	Sewer Junction Structure	$ 35,000.00	$ 35,000.00
23	Lift Station	$ 200,000.00	$ 200,000.00
	Total Construction	**$ 8,568,750.00**	**$ 10,205,750.00**
	Contingencies	$ 856,875.00	$ 1,020,575.00
	Total	**$ 9,425,625.00**	**$ 11,226,325.00**
	Easements	$ 312,500.00	$ 312,500.00
	Easements and Surveys and Acquisition Costs	$ 125,000.00	$ 125,000.00
	Environmental Investigation	$ 93,750.00	$ 93,750.00
	Total Easement Costs	**$ 531,250.00**	**$ 531,250.00**
	Basic Engineering	$ 942,562.50	$ 1,122,632.50
	Survey	$ 125,000.00	$ 125,000.00
	Construction Phase Services	$ 188,512.50	$ 224,526.50
	Total Engineering Costs	**$ 1,256,075.00**	**$ 1,472,159.00**
	Total Project Costs	**$ 11,212,950.00**	**$ 13,229,734.00**

This cost estimate is based on River City Engineering's experience and qualifications, and represents River City Engineering's best judgment. This cost estimate was prepared for feasibility analysis purposes only. River City Engineering does not guarantee that the actual construction cost will not vary from this estimate. Unit prices were used from SAWS average unit price list revised October 2005. Units prices will not remain constraint and will vary due to market variations such as inflation.

P:\Projects\6096 (Green Valley SUD)\07-Wastewater Master Plan\Report\Pipe Cost\112706\Cost Estimate Basin A 112706.xls

Green Valley Special Utility District
Drainage Basin A - 1 EDU/acre
Engineer's Opinion of Probable Costs

A

Item	Description	Unit	Quantity	Unit Price	Total Costs
1	12" SDR 35, PVC (0'-6' cut)	LF	5,600	$ 60.00	$ 336,000.00
2	15" SDR 35, PVC (0'-6' cut)	LF	8,200	$ 65.00	$ 533,000.00
3	18" SDR 35, PVC (0'-6' cut)	LF	19,800	$ 70.00	$ 1,386,000.00
4	21" SDR 35, PVC (0'-6' cut)	LF	9,000	$ 80.00	$ 720,000.00
5	24" SDR 35, PVC (0'-6' cut)	LF	3,500	$ 90.00	$ 315,000.00
6	27" SDR 35, PVC (0'-6' cut)	LF	2,500	$ 100.00	$ 250,000.00
7	30" SDR 35, PVC (0'-6' cut)	LF	2,500	$ 110.00	$ 275,000.00
8	33" SDR 35, PVC (0'-6' cut)	LF	11,400	$ 125.00	$ 1,425,000.00
9	36" SDR 35, PVC (0'-6' cut)	LF	0	$ 150.00	$ -
10	42" SDR 35, PVC (0'-6' cut)	LF	0	$ 200.00	$ -
11	48" SDR 35, PVC (0'-6' cut)	LF	0	$ 250.00	$ -
12	54" SDR 35, PVC (0'-6' cut)	LF	0	$ 300.00	$ -
13	60" SDR 35, PVC (0'-6' cut)	LF	0	$ 350.00	$ -
14	66" SDR 35, PVC (0'-6' cut)	LF	0	$ 400.00	$ -
15	72" SDR 35, PVC (0'-6' cut)	LF	0	$ 450.00	$ -
	Total Length	**LF**	**62,500**		
16	48" dia. M.H. W.T. & Bolted (0'-6' cut)	EA	125	$ 5,000.00	$ 625,000.00
17	Bore and Case Roadways	LF	3125	$ 130.00	$ 406,250.00
18	Bore and Case Creek Crossings	LF	2,500	$ 100.00	$ 250,000.00
19	Trench Safety	LF	62,500	$ 2.00	$ 125,000.00
20	Sewer Main Television Inspection	LF	62,500	$ 26.00	$ 1,625,000.00
21	Erosion Control Devices	LF	62,500	$ 1.00	$ 62,500.00
22	Sewer Junction Structure	EA	1	$ 35,000.00	$ 35,000.00
23	Lift Station	EA	1	$ 200,000.00	$ 200,000.00
	Total Construction				**$ 8,568,750.00**
	Contingencies	10%			$ 856,875.00
	Total				**$ 9,425,625.00**
	Easements	LF	62,500	$ 5.00	$ 312,500.00
	Easements and Surveys and Acquisition Costs	LF	62,500	$ 2.00	$ 125,000.00
	Environmental Investigation	LF	62,500	$ 1.50	$ 93,750.00
	Total Easement Costs				**$ 531,250.00**
	Basic Engineering	10%			$ 942,562.50
	Survey	LF	62,500	$ 2.00	$ 125,000.00
	Construction Phase Services	2%			$ 188,512.50
	Total Engineering Costs				**$ 1,256,075.00**
	Total Project Costs				**$11,212,950.00**

This cost estimate is based on River City Engineering's experience and qualifications, and represents River City Engineering's best judgment. This cost estimate was prepared for feasibility analysis purposes only. River City Engineering does not guarantee that the actual construction cost will not vary from this estimate. Unit prices were used from SAWS average unit price list revised October 2005. Units prices will not remain constraint and will vary due to market variations such as inflation.

Green Valley Special Utility District
Drainage Basin A - 3 EDU/acre
Engineer's Opinion of Probable Costs

A

Item	Description	Unit	Quantity	Unit Price	Total Costs
1	12" SDR 35, PVC (0'-6' cut)	LF	0	$ 60.00	$ -
2	15" SDR 35, PVC (0'-6' cut)	LF	2,600	$ 65.00	$ 169,000.00
3	18" SDR 35, PVC (0'-6' cut)	LF	11,200	$ 70.00	$ 784,000.00
4	21" SDR 35, PVC (0'-6' cut)	LF	13,800	$ 80.00	$ 1,104,000.00
5	24" SDR 35, PVC (0'-6' cut)	LF	9,500	$ 90.00	$ 855,000.00
6	27" SDR 35, PVC (0'-6' cut)	LF	5,500	$ 100.00	$ 550,000.00
7	30" SDR 35, PVC (0'-6' cut)	LF	3,500	$ 110.00	$ 385,000.00
8	33" SDR 35, PVC (0'-6' cut)	LF	0	$ 125.00	$ -
9	36" SDR 35, PVC (0'-6' cut)	LF	5,000	$ 150.00	$ 750,000.00
10	42" SDR 35, PVC (0'-6' cut)	LF	11,400	$ 200.00	$ 2,280,000.00
11	48" SDR 35, PVC (0'-6' cut)	LF	0	$ 250.00	$ -
12	54" SDR 35, PVC (0'-6' cut)	LF	0	$ 300.00	$ -
13	60" SDR 35, PVC (0'-6' cut)	LF	0	$ 350.00	$ -
14	66" SDR 35, PVC (0'-6' cut)	LF	0	$ 400.00	$ -
15	72" SDR 35, PVC (0'-6' cut)	LF	0	$ 450.00	$ -
	Total Length	**LF**	**62,500**		
16	48" dia. M.H. W.T. & Bolted (0'-6' cut)	EA	125	$ 5,000.00	$ 625,000.00
17	Bore and Case Roadways	LF	3125	$ 130.00	$ 406,250.00
18	Bore and Case Creek Crossings	LF	2,500	$ 100.00	$ 250,000.00
19	Trench Safety	LF	62,500	$ 2.00	$ 125,000.00
20	Sewer Main Television Inspection	LF	62,500	$ 26.00	$ 1,625,000.00
21	Erosion Control Devices	LF	62,500	$ 1.00	$ 62,500.00
22	Sewer Junction Structure	EA	1	$ 35,000.00	$ 35,000.00
23	Lift Station	EA	1	$ 200,000.00	$ 200,000.00
	Total Construction				**$10,205,750.00**
	Contingencies	10%			$ 1,020,575.00
	Total				**$11,226,325.00**
	Easements	LF	62,500	$ 5.00	$ 312,500.00
	Easements and Surveys and Acquisition Costs	LF	62,500	$ 2.00	$ 125,000.00
	Environmental Investigation	LF	62,500	$ 1.50	$ 93,750.00
	Total Easement Costs				**$ 531,250.00**
	Basic Engineering	10%			$ 1,122,632.50
	Survey	LF	62,500	$ 2.00	$ 125,000.00
	Construction Phase Services	2%			$ 224,526.50
	Total Engineering Costs				**$ 1,472,159.00**
	Total Project Costs				**$13,229,734.00**

This cost estimate is based on River City Engineering's experience and qualifications, and represents River City Engineering's best judgment. This cost estimate was prepared for feasibility analysis purposes only. River City Engineering does not guarantee that the actual construction cost will not vary from this estimate. Unit prices were used from SAWS average unit price list revised October 2005. Units prices will not remain constraint and will vary due to market variations such as inflation.

Green Valley Special Utility District
Summary Drainage Basin B
Engineer's Opinion of Probable Costs

B

Item	Description	Total Costs 1 (EDU/acre)	Total Costs 3 (EDU/acre)
1	12" SDR 35, PVC (0'-6' cut)	$ -	$ -
2	15" SDR 35, PVC (0'-6' cut)	$ 169,000.00	$ -
3	18" SDR 35, PVC (0'-6' cut)	$ 392,000.00	$ 182,000.00
4	21" SDR 35, PVC (0'-6' cut)	$ 560,000.00	$ 224,000.00
5	24" SDR 35, PVC (0'-6' cut)	$ 450,000.00	$ 252,000.00
6	27" SDR 35, PVC (0'-6' cut)	$ -	$ 260,000.00
7	30" SDR 35, PVC (0'-6' cut)	$ -	$ 1,034,000.00
8	33" SDR 35, PVC (0'-6' cut)	$ -	$ -
9	36" SDR 35, PVC (0'-6' cut)	$ -	$ -
10	42", PVC (0'-6' cut)	$ -	$ -
11	48", PVC (0'-6' cut)	$ -	$ -
12	54", PVC (0'-6' cut)	$ -	$ -
13	60", PVC (0'-6' cut)	$ -	$ -
14	66", PVC (0'-6' cut)	$ -	$ -
15	72", PVC (0'-6' cut)	$ -	$ -
16	48" dia. M.H. W.T. & Bolted (0'-6' cut)	$ 202,000.00	$ 202,000.00
17	Bore and Case Roadways	$ 131,300.00	$ 131,300.00
18	Bore and Case Creek Crossings	$ 80,800.00	$ 80,800.00
19	Trench Safety	$ 40,400.00	$ 40,400.00
20	Sewer Main Television Inspection	$ 525,200.00	$ 525,200.00
21	Erosion Control Devices	$ 20,200.00	$ 20,200.00
22	Sewer Junction Structure	$ -	$ -
23	Lift Station	$ -	$ -
	Total Construction	**$ 2,570,900.00**	**$ 2,951,900.00**
	Contingencies	$ 257,090.00	$ 295,190.00
	Total	**$ 2,827,990.00**	**$ 3,247,090.00**
	Easements	$ 101,000.00	$ 101,000.00
	Easements and Surveys and Acquisition Costs	$ 40,400.00	$ 40,400.00
	Environmental Investigation	$ 30,300.00	$ 30,300.00
	Total Easement Costs	**$ 171,700.00**	**$ 171,700.00**
	Basic Engineering	$ 282,799.00	$ 324,709.00
	Survey	$ 40,400.00	$ 40,400.00
	Construction Phase Services	$ 56,559.80	$ 64,941.80
	Total Engineering Costs	**$ 379,758.80**	**$ 430,050.80**
	Total Project Costs	**$ 3,379,448.80**	**$ 3,848,840.80**

This cost estimate is based on River City Engineering's experience and qualifications, and represents River City Engineering's best judgment. This cost estimate was prepared for feasibility analysis purposes only. River City Engineering does not guarantee that the actual construction cost will not vary from this estimate. Unit prices were used from SAWS average unit price list revised October 2005. Units prices will not remain constraint and will vary due to market variations such as inflation.

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