

Proposed Project for Application to the Kansas Department of Commerce for a grant and to the Kansas Department of Health and Environment for the Kansas Water Pollution Control Revolving Loan Fund.

Applicant: City of Westmoreland
Sanitary Sewer Collection & Wastewater Treatment System Improvements

Contact Person: Donna J. Crawford

Address: Governmental Assistance Services
905 Joseph Dr.
Lawrence, KS 66049

Sent to the Kansas Geological Survey for environmental review.

Agency Review Comments:

The long-term benefits of the improvements to the sanitary sewer collection system, including decreasing seepage of wastewater from old sewer lines, and to the wastewater treatment system, including meeting effluent quality limitations, should offset any short-term adverse environmental impacts during construction.

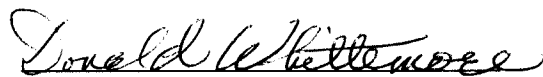
Recommended Action:

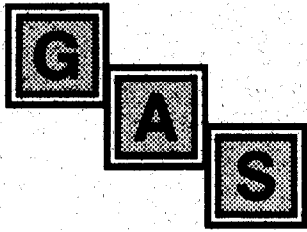
- ☒ Clearance of project should be granted
- ☐ Clearance of project should not be granted
- ☐ Clearance of project should be delayed until the issues or questions have been clarified
- ☐ Clearance of project should not be delayed, but the applicant (in the application) should address or clarify the questions or concerns indicated above

Donald Whittemore
Reviewer's Name

Geohydrology Section, Kansas Geological Survey
Division/Agency

8/15/05
Date


Reviewer's Signature



Governmental Assistance Services

905 Joseph Drive

Lawrence, Kansas 66049

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Toll Free 888-832-3335

e-mail: gasdonnaa@aol.com

July 19, 2005

Dr. William Harrison
Kansas Geological Survey
University of Kansas
1930 Constant Ave.-Campus West
Lawrence, KS 66047

RE: Environmental Review – Westmoreland, KS – Sanitary Sewer Collection & Treatment System Improvements

Dear Dr. Harrison:

The City of Westmoreland, Kansas is applying for funding to upgrade the city's sanitary sewer collection and treatment system. The Kansas Department of Commerce grant request is for \$400,000 with matching funds of \$597,805 through a KDHE state revolving loan for a total project cost of \$997,805.

Improvements will occur in Section 4, Range 9, Township 8. Please see attached engineering information and maps for the proposed project. Also, the new primary lagoon is controlled by the surrounding 100-year floodplain. Please note Flood Insurance Map attached. The lagoon system is located within Zone X which has been determined to be outside the 500-year floodplain. Please note Page 9 with the entire explanation of the floodplain area.

Please submit all comments to Governmental Assistance Services, 905 Joseph Dr., Lawrence, KS 66049.

Questions in reference to the project should be directed to Stacey Lamer, P.E., Bartlett & West Engineers at 785-272-2252.

Sincerely,

Donna J. Crawford
Project Coordinator

Enc/ Eng. Report Info
Project Maps

3.0 EXISTING SYSTEM

3.1 Lagoon Facility

The City currently operates a two-cell discharging waste stabilization pond (lagoon) that was constructed in the early 1960's. The lagoons are located approximately one-half mile south of town just west of Highway 99. The lagoons discharge into a small stream near the facility. Each cell has an approximate area of three acres and, with a design operating depth of five foot, the total combined volume is over nine million gallons.

3.2 Collection System

The sanitary sewer collection system is comprised primarily of 8-inch vitrified clay pipe, most of which was installed in the 1960's at minimum slopes of 0.4%. With the exception of one small pump station located in the northwest portion of the City, the collection system flows by gravity. The majority of the manholes in the system were constructed of brick. Any manholes that have been added after the original construction are concrete. In general, the collection system appears to being fairly "tight" given the age of the system. There are a few areas in town where problems have been experienced with the collection system. Most of these problems are a result of tree roots, faulty taps, or broken pipe. Over the years, City maintenance has been able to make most of the minor repairs to the collection system. Any major repairs or repairs that required deep excavation have been subcontracted.

3.3 Current Operating Budget

The 2005 budget is included in the Appendix. The wastewater specific budget items are not separated from the overall City budget therefore the revenues and expenditures are unknown and it is difficult to determine whether the wastewater accounting is currently balanced.

3.4 Sewer Rates

The City has a current monthly sewer use charge of \$10.00 per connection (Addendix). A monthly sewer use charge of \$10.00 is applied to other premises for usage less than 5,000 gallons. Usage above that volume is charged at \$1.00 per 1000 gallons.

4.0 NEED FOR PROJECT

4.1 Lagoon Facility

The Kansas Department of Health and Environment (KDHE) applies a 100 gallon per day per capita usage rate to the original design estimate of 675 Westmoreland residents which estimated the wastewater system will receive 67,500 gallons per day. Based on these criteria and the reduced lagoon volume discussed below the two-cell lagoon system has a 122 day detention time, less than the required 150 day detention time. The lagoon system is estimated to receive a normal daily flow between 50,000 and 67,500 gallons per day but the impact of commercial, inflow, and infiltration flows have not been evaluated. The lagoon system must be able to buffer the impacts of these unaccounted-for flows and provide adequate detention time to sufficiently treat the influent wastewater.

The City of Westmoreland currently uses approximately 47,000 gallons of water per day (2004 winter weather water usage). With the current population of 631 (2000 Census) the average per capita use is 75 gallons of water per day. The volume of the existing lagoon system is 8.26 million gallons. This volume is based on the 2003 KRWA Sludge Profile (Appendix) which indicated a 13.83% and 9.13% capacity reduction for Cells 1 and 2 respectively (referred to as Cells 3 and 2 respectively in the remainder of the report). Assuming the wastewater system receives 47,000 gallons per day, the detention time in the lagoon is approximately 170 days. Though this meets the 150 day detention time, the waste is not being adequately treated such that it meets the NPDES permit limits. There is no apparent evidence that short circuiting is occurring in either of the two cells that would minimize wastewater detention time.

The City has experienced three total suspended solids (TSS) and nine biochemical oxygen demand (BOD) wastewater effluent violations since 2000 (Table 2 on following page). Though the quarterly sample collection makes it difficult to detect a seasonal pattern of lagoon operation, most of the BOD violations occurred in the warmer months whereas the TSS violations occurred in the cooler months (Figure B on following page).

Table 2: Wastewater Lagoon System Testing Results

DATE	Effluent				
	BOD	TSS	pH	NH3	FECAL
	(mg/L)	(mg/L)		(mg/L)	(Col/100ml)
Permit Limits	45/30*	120/80*	6-9	---	---
Apr-00	34	34	8.70		
May-00			No Discharge		
Jul-00			No Discharge		
Dec-00	27	36	7.60		
Apr-01	31	66	7.40		
May-01	27	36	7.60		
Aug-01	46	36	7.70	9.5	98000
Dec-01	77	50	7.47		
Dec-02**	24	52	8.80		
Mar-03	39	80	8.73		
Oct-03	30	108	8.61		
Nov-03	43	52	8.50	0.3	230
Dec-03	24	52	8.80		
Mar-04	45	56	8.37		
May-04	86	43	8.33		
Sep-04	29	79	8.52	2.2	140
Dec-04	30	110	8.67		
Mar-05	31	41	8.86		

* Weekly Average/Monthly Average

** Only 2002 data provided by the City.

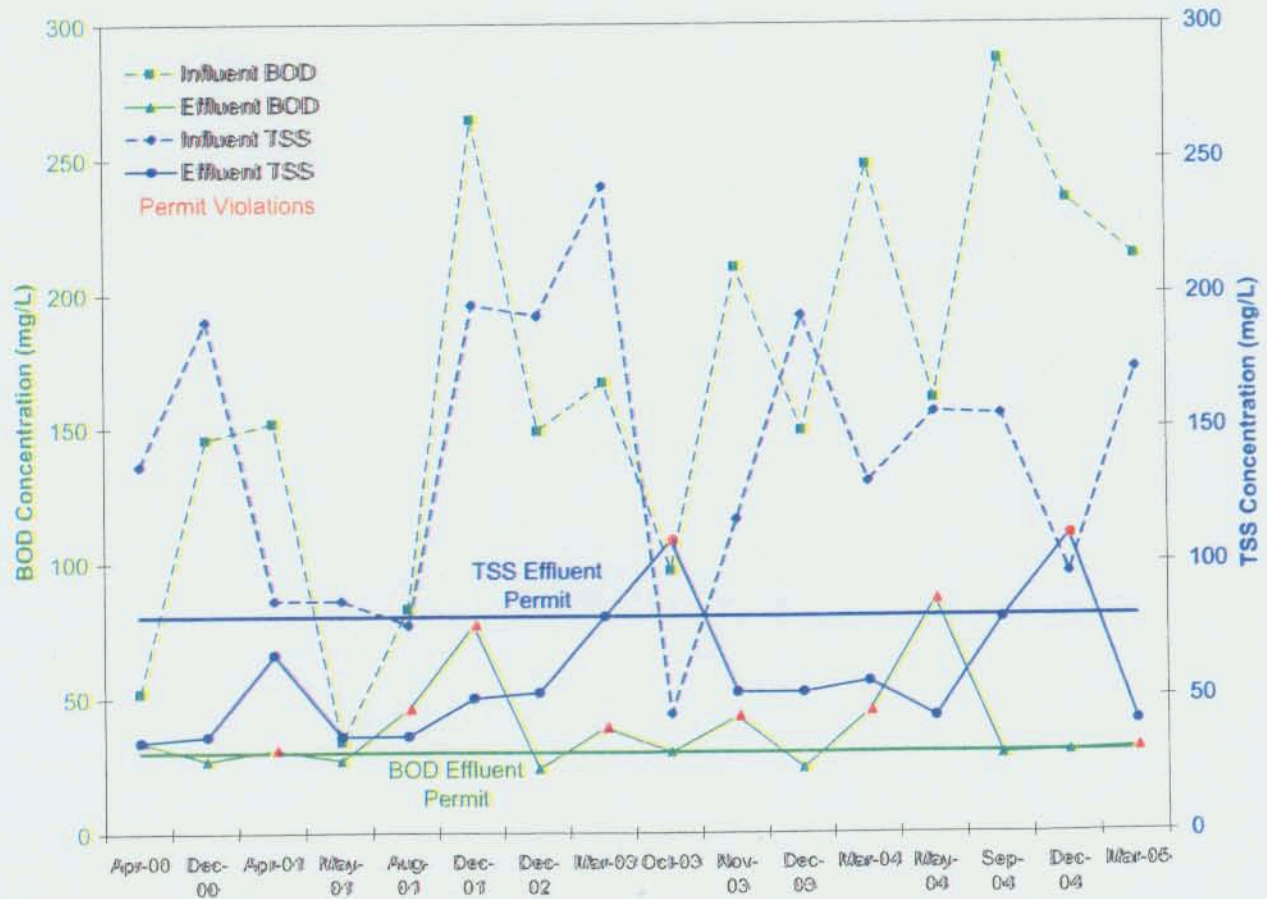
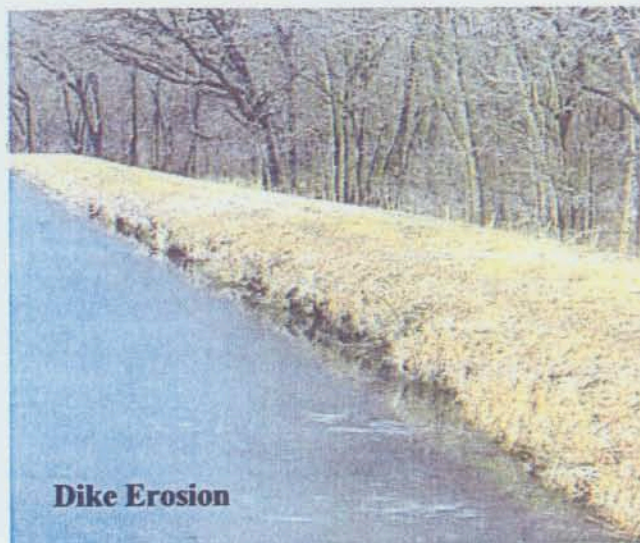


Figure B: Wastewater Lagoon System Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) Testing Results 2000-2004

The City has modified the discharge piping to allow the system to hold an additional 1 foot in water depth. This has increased the detention time in the lagoon but may have accelerated the already eroded dikes (adjacent photo). It is important that further bank erosion is prevented and that the existing damage is repaired. This bank stabilization can be accomplished by the placement of rock rip-rap.



Dike Erosion

To best manage the growth of the City and wastewater treatment requirements several alternatives were investigated; (1) new mechanical plant construction, (2) existing lagoon system rehabilitation, and (3) existing lagoon system expansion. Based on the significant capital, operation, and maintenance costs associated with a new mechanical plant installation and the limited capacity that would be gained by rehabilitating the existing two-cell system, it is recommended that the existing lagoon system be upgraded. Figure 1 (Appendix) shows an aerial of the existing lagoon system. The conversion of the system to a three-cell operation is a viable option. The land to the east appears to be the most ideal location for the construction of a new primary cell (photo below). The nearest residence is over 800 feet from the proposed lagoon location.



Northeast of the Lagoon Dike

The State of Kansas Department of Health and Environment Minimum Standards of Design for Water Pollution Control Facilities recommends the first two cells are designed based on

34 pounds BOD per acre per day (at the five-foot level) with a 60%-40% split between the primary and secondary cells. The existing Cell 2 has a total volume of approximately 4.2 million gallons (Table 3 on next page). This volume accounts for the reduced volume. The application of a 60%-40% split between the new Cell 1 and Cell 2 requires that the new Cell 1 have a minimum volume of approximately 7.5 million gallons. The loading rate for the new five acre primary cell would be 27 pounds of BOD per acre based on an influent BOD concentration of 200 mg/L. A new inlet structure with manual screening is proposed and a new equalization structure will be required.

Table 3: New Wastewater Lagoon System Data

	Cell Area	Total Volume	
	ACRE	CF	GAL
New Cell 1	5	1,006,000	7,525,000
Existing Cell 2*	3	564,000	4,219,000
Existing Cell 3*	3	540,000	4,039,000
		Total	15,783,000
Future Capacity GPD			130,000

** Based on the September 2003 KRWA Sludge Profile the capacity losses for Cells 2 and 3 are 9.13% and 13.83% respectively.*

The shape of the new primary lagoon is controlled by the surrounding 100-year flood plain. Figure 3 (Appendix) illustrates the location of the 100-year flood plain with respect to the wastewater lagoon system. The lagoon system is located within Zone X which has been determined to be outside of the 500-year flood plain. The system is surrounded by Zone AE area which can be inundated by a 100-year flood. The 100-year flood elevations are determined and are indicated to range from 1135 feet to 1138 feet in elevation. The existing system elevations, shown in Figure 2, differ from these elevations due to different survey benchmarking from the May 1962 Waste Stabilization Pond and Outfall Sewer Drawings.

The new five acre primary lagoon cell provides over 7.5 million gallons of treatment volume. Based on the required 120 day detention time for a three cell lagoon system the future capacity will be increased to 130,000 gallons per day. The estimate accounts for the reduced existing cell volume due to the sludge accumulation. Removal of the sludge is not included in this project.

4.2 Collection System

The City of Westmoreland sanitary sewer collection system is constructed of mostly 8-inch vitrified clay pipe. At the minimum slope of 0.40% this system can convey a maximum flow of 360 gallons per minute. It is typical that a system is designed based on two-thirds of full pipe flow which

results in a capacity of approximately 250 gallons per minute. Based on the future lagoon system capacity of 130,000 gallons per day, and with the application of a daily peaking factor of three, portions of the collection system that collect ultimate city flows will need to carry only slightly more than 250 gallons per minute. Though the collection system appears to have the capacity to carry nearly all the future flow, this evaluation does not include the flows produced by inflow and infiltration.

The City has conducted collection system evaluations with Utility Maintenance Contractors, LLC for several pipe sections within the City. The evaluations indicated tree root intrusion, joint offsets, and broken pipe issues (Appendix). Figure 4 (Appendix) illustrates the pipe sections that were identified by Utility Maintenance Contractors, LLC as problem areas. Figure 4 also contains areas where City maintenance crews have experienced problems. The City has already made some of these identified repairs. However, some segments are still in need of repair/replacement.

The sewer issues for each pipe section are indicated in the legend of Figure 4. For the purpose of this Preliminary Engineering Report, the complete replacement of each of these pipe sections was considered for budget purposes. This is likely to be the best corrective alternative for the reported sewer issues but other alternatives can include pipe lining, pipe bursting, and sewer bypass installation. These alternatives can be more effectively evaluated after performing a televised collection system evaluation.

5.0 PROPOSED PROJECT COST

5.1 Cost Estimates

The estimated construction cost for the lagoon facility is \$611,105 (Table 4 next page). This cost includes the construction of a new five acre cell and the associated structures as well as the bank stabilization of the existing lagoon cells and rehabilitation of the effluent discharge structures. The required grant administration, geological, engineering, legal, land acquisition, and construction observation work is equates to approximately 25 percent of the total construction cost. This results in a total project cost of \$740,305.

The estimated construction cost for collection system improvements is \$210,000 (Table 5 on page 13). This includes the replacement of approximately 4,000 linear feet of 8-inch pipe. This also includes the new sewer line and manholes needed for the industrial park. The installation includes excavation, bedding, backfill, and site restoration. The site restoration relating to Sites 2, 3, 4, 5, and 8 may require pavement restoration. It is recommended that a manhole be installed at Site 10. The total project cost is \$257,500 including administration and construction contingencies.

The total project cost for the combined lagoon facility and collection system improvements is \$997,805 (Table 6 on page 14).

Table 4. Preliminary Cost Estimate
Lagoon Improvements
City of Westmoreland, KS

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Excavation, Backfill, & Compaction	47,500	CY	5.50	261,250
2	Soil Liner	225,000	SF	0.17	37,125
3	8-inch Pipe	350	LF	44.00	15,400
4	Equalization Structure	1	LS	4,400	4,400
5	4-foot Manhole	1	EA	2,750	2,750
6	8-inch Slide Gate	1	EA	2,750	2,750
7	Inlet Structure w/Screening	1	EA	8,800	8,800
8	Discharge Structure Rehabilitation	1	LS	2,200	2,200
9	New Cell Rip-Rap	1,700	CY	55.00	93,500
10	Existing Cell Rip-Rap	2,300	CY	55.00	126,500
11	Site Work	3	ACRE	6,600	16,500
12	Seeding	9,000	SY	0.22	1,980
13	Fencing	3,500	LF	7.70	26,950
14	Mobilization	1	LS	5,500	5,500
15	Soil Sterilization	1	LS	5,500	5,500
TOTAL CONSTRUCTION COST					\$ 611,105.00
	Engineering and Construction Administration				47,200
	Design and Property Surveying				6,500
	Legal				3,000
	Land Acquisition				-
	Geological Investigation				6,000
	Grant Administration				15,000
	SRF Administration				8,500
	O & M Manual				3,000
	Construction Observation				40,000
TOTAL PROJECT COST					\$ 740,305.00

PROJECT FINANCING	
KPWSRF Loan	\$ 370,153
CDBG Grant	\$ 370,153
Annual Debt Payment, 20 years @ 3.0%	\$ 24,880
Monthly Debt Payment	\$ 2,073
Monthly Debt Payment/Customer (330 customers)	\$ 6.28

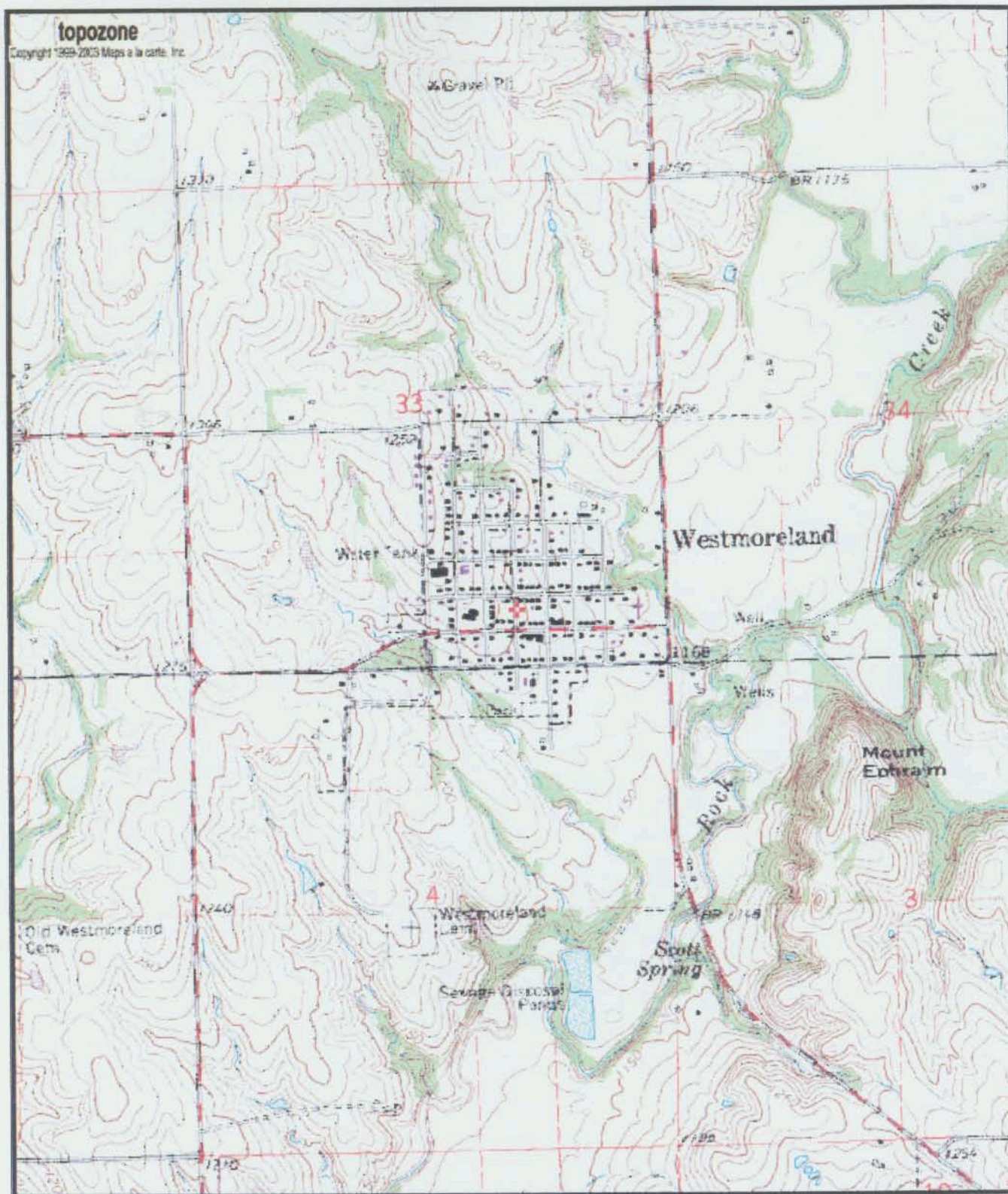
Table 5. Preliminary Cost Estimate
Collection System Improvements
City of Westmoreland, KS

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	8-inch Pipe - Pavement Disruption (<i>includes TV inspection</i>)	820	LF	88.00	72,160
2	8-inch Pipe (<i>includes TV inspection</i>)	3,000	LF	44.00	132,000
3	4-foot Manhole	3	EA	2,750	8,250
TOTAL CONSTRUCTION COST					\$210,000.00
	Engineering and Construction Administration				18,000
	Design and Property Surveying				3,500
	Legal				1,000
	Land Acquisition				-
	Geological Investigation				1,000
	Grant Administration				5,000
	SRF Administration				3,000
	O & M Manual				-
	Construction Observation				16,000
TOTAL PROJECT COST					\$257,500.00

PROJECT FINANCING	
KPWSLF Loan	\$ 257,500
CDBG Grant	\$ -
Annual Debt Payment, 20 years @ 3.0%	\$ 17,308
Monthly Debt Payment	\$ 1,442
Monthly Debt Payment/Customer (330 customers)	\$ 4.37

Table 6: Preliminary Cost Estimate
Combined Wastewater and Collection System Improvements
City of Westmoreland, KS

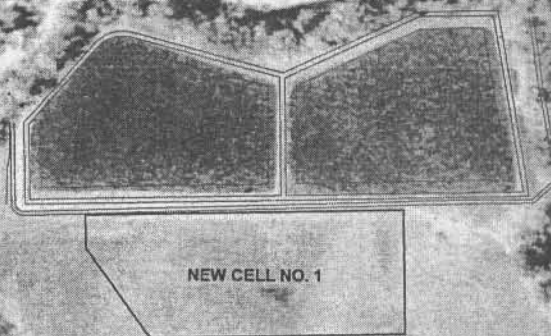
Item No.	Description	Quantity	Unit	Unit Price	Extension
Wastewater System					
1	Excavation, Backfill, & Compaction	47,500	CY	5.50	261,250.00
2	Liner	225,000	SF	0.17	37,125.00
3	8-inch Pipe	350	LF	44.00	15,400.00
4	Equalization Structure	1	LS	4,400	4,400.00
5	4-foot Manhole	1	EA	2,750	2,750.00
6	8-inch Slide Gate	1	EA	2,750	2,750.00
7	Inlet Structure w/Screening	1	EA	8,800	8,800.00
8	Discharge Structure Rehabilitation	1	LS	2,200	2,200.00
9	New Cell Rip-Rap	1,700	CY	55.00	93,500.00
10	Existing Cell Rip-Rap	2,300	CY	55.00	126,500.00
11	Site Work	3	ACRE	6,600	16,500.00
12	Seeding	9,000	SY	0.22	1,980.00
13	Fencing	3,500	LF	7.70	26,950.00
14	Mobilization	1	LS	5,500	5,500.00
15	Soil Sterilization	1	LS	5,500	5,500.00
				<i>Subtotal</i>	611,105
Collection System					
1	8-inch Pipe - Pavement Disruption (<i>includes TV inspection</i>)	820	LF	88.00	72,160
2	8-inch Pipe (<i>includes TV inspection</i>)	3,000	LF	44.00	132,000
3	4-foot Manhole	3	EA	2,750	8,250
				<i>Subtotal</i>	210,000
TOTAL CONSTRUCTION COST					\$ 821,105.00
Wastewater System					
	Engineering and Construction Administration				47,200
	Design and Property Surveying				6,500
	Legal				3,000
	Land Acquisition				-
	Geological Investigation				6,000
	Grant Administration				15,000
	SRF Administration				8,500
	O & M Manual				3,000
	Construction Observation				40,000
				<i>Subtotal</i>	129,200
Collection System					
	Engineering and Construction Administration				18,000
	Design and Property Surveying				3,500
	Legal				1,000
	Land Acquisition				-
	Geological Investigation				1,000
	Grant Administration				5,000
	SRF Administration				3,000
	O & M Manual				-
	Construction Observation				16,000
				<i>Subtotal</i>	47,500
TOTAL PROJECT COST					\$ 997,805.00
PROJECT FINANCING					
	KPWSRF Loan			\$	597,805
	CDBG Grant			\$	400,000
	Annual Debt Payment, 20 years @ 3.0%			\$	40,182
	Monthly Debt Payment			\$	3,348
	Monthly Debt Payment/Customer (330 customers)			\$	10.15



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Last edit on: Apr 08, 2005

PRELIMINARY



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BARTLETT & WEST

ENGINEERS
1800 HW EXECUTIVE DRIVE - TOPEKA KS 66610-3850
PHONE 785.573.2555 - FAX 785.573.5755
WWW.BARTWEST.CO

PHASE I: PROPOSED WASTEWATER LAGOON IMPROVEMENTS - AERIAL

CITY OF WESTMORELAND, KANSAS

DESIGNED BY:	SLL
DRAWN BY:	DOJ
APPROVED BY:	LRB
DESIGN PROJ:	13770.001
CONST PROJ:	---
SCALE:	AS LISTED
DATE:	APR. 2005
DRAWING NO:	FIGURE 1
SHEET NO:	

FIGURE 1

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Last edit on: Apr 08, 2005

PRELIMINARY

PLUG AND ABANDON
IN PLACE DISCHARGE
STRUCTURE

DRAIN HDWL
EL. 962.0

64 L.F. 6" CIP

18 L.F. 6" CIP
DRAIN HDWL W/18
L.F. 6" CIP EL. 967.0

15 L.F. 6" CIP OUTLET
FL. EL. 968.79

EXISTING CELL 2 - 3.02
ACRES BOT. EL. 967.0

8" DIP EQUALIZATION
STRUCTURE W/2 DRAIN
HEADWALLS FL. 970.00

RAISE TOP OF EXISTING
DIKE TO EL. 975.5

TOP OF DIKE EL. 975.0

STABILIZE BANK
TYP. ALL CELLS

REMOVE E

NEW CELL 1 - 5
BOT. EL. 967.5

974

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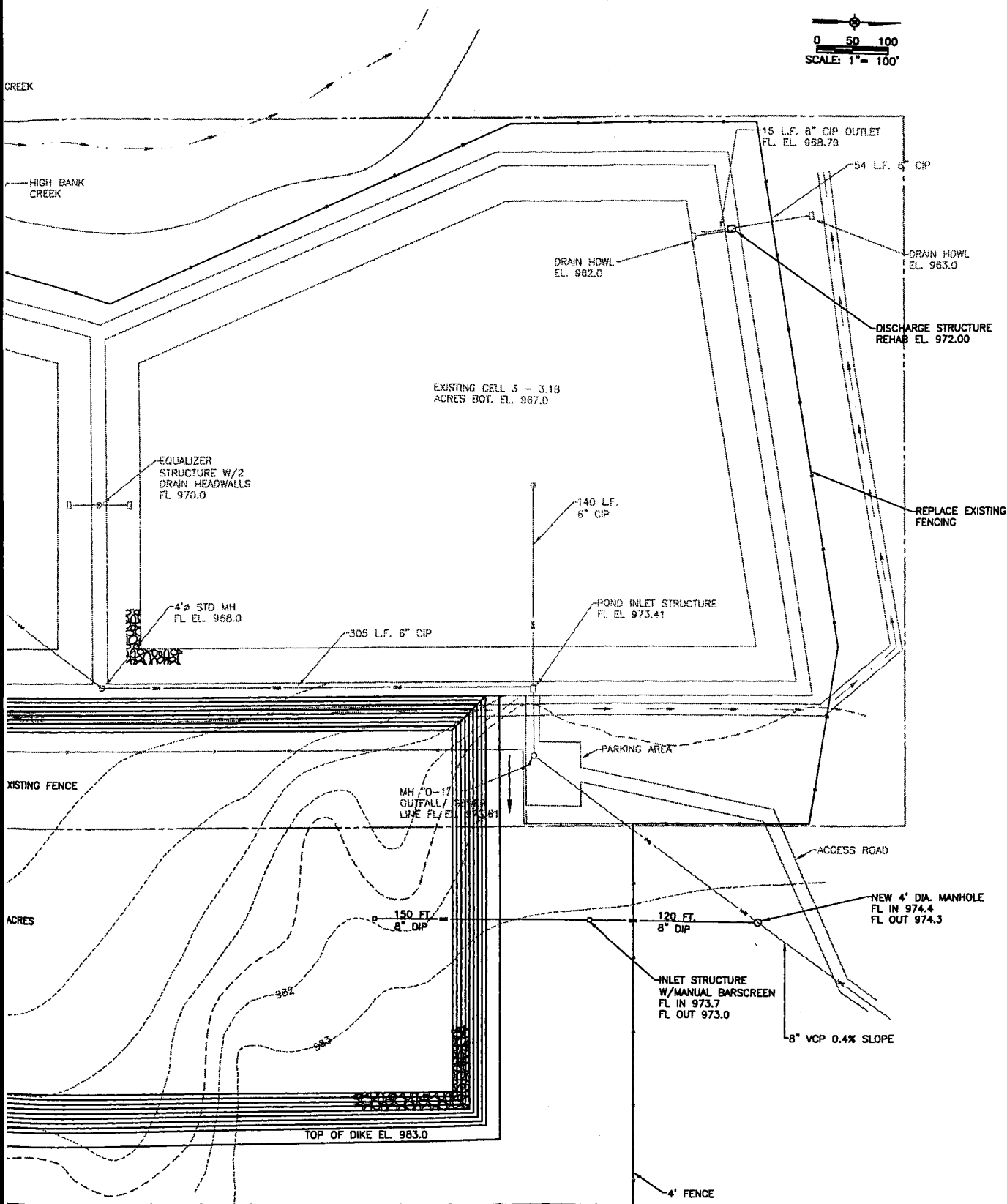
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BARTLETT & WEST
ENGINEERS

PHASE I: PROPOSED WASTEWATER LAGOON IMPROVEMENTS - SITE PLAN

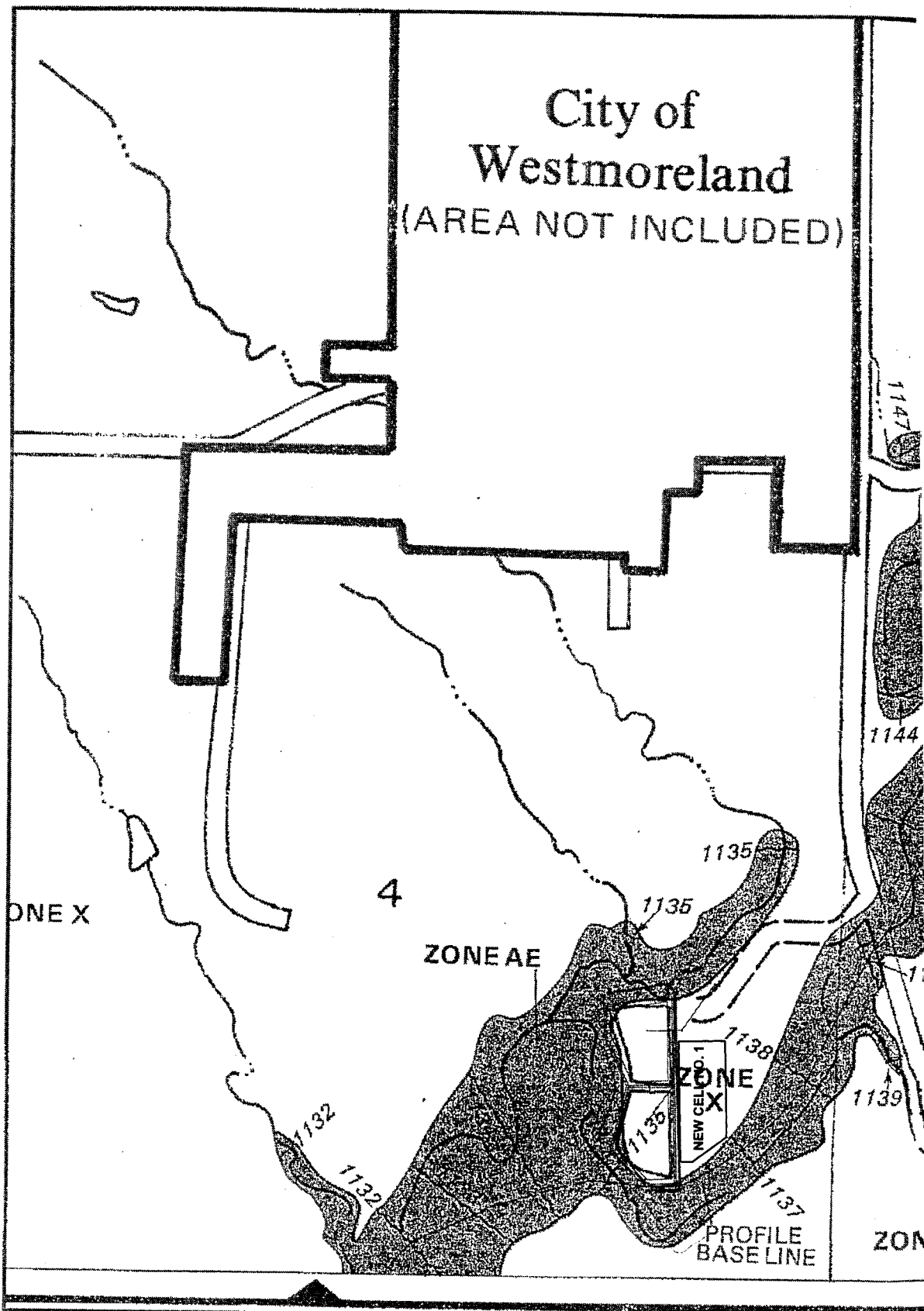
CITY OF WESTMORELAND, KANSAS

DESIGNED BY:	SLI
DRAWN BY:	DOJ
APPROVED BY:	LRB
DESIGN PROJ:	13770.001
CONST PROJ:	---
SCALE:	AS LISTED
DATE:	APR. 2005
DRAWING NO:	FIGURE 2
SHEET NO:	

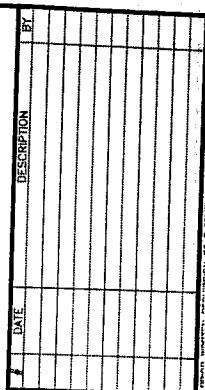
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Last edit on: Apr 08, 2005



PRELIMINARY



ENGINEERS

CITY OF WESTMORELAND, KANSAS

FIGURE 3

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Large Plate
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