

KANSAS GEOLOGICAL SURVEY

1930 Constant Ave., Campus West
The University of Kansas
Lawrence, Kansas 66047-3726
phone 785-864-3965
fax 785-864-5317

January 3, 2005

Ms. Donna J. Crawford
Governmental Assistance Services
905 Joseph Drive
Lawrence, Kansas 66049

RE: Environmental Review—Americus, Kansas—Sanitary Sewer Expansion

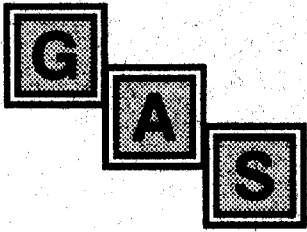
Dear Ms. Crawford:

I have received your request for comment by the Kansas Geological Survey on a grant application to the Kansas Department of Commerce and a Kansas Department of Health and Environment (KDHE) loan to upgrade the city's sanitary sewer treatment and collection system. The enlargement will be in the same area as the existing sewage lagoon system.

I reviewed the information provided along with data from the Plymouth 7½ minute quadrangle, a 2002 orthophoto, and a report on the geology of Lyon County (Kansas Geological Survey Volume #12). No detailed geologic site characterization was provided. The site is located on an alluvial terrace. Based on the above information and as long as the site meets the KDHE regulations, the Kansas Geological Survey has no knowledge of geologic factors that would adversely affect this project.

Sincerely,

Gregory Ohlmacher
Associate Scientist



Governmental Assistance Services

905 Joseph Drive

Lawrence, Kansas 66049

785-832-2141 • Fax 785-832-1111

Toll Free 888-832-3335

e-mail: gasdonnaa@aol.com

December 20, 2004

Greg Ohlmacher

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

RE: Environmental Review – Americus, KS – Sanitary Sewer Expansion

Dear Dr. Harrison:

The City of Americus, Kansas will be applying for a \$400,000 grant from the Kansas Department of Commerce and a KDHE loan of approximately \$1,612,843 to upgrade the city's sanitary sewer treatment and collection system. The enlargement will be in the same area as the existing 3-cell lagoon system. The grant request will be submitted October 15, 2005.

The facility is located SE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ and SW $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$, Section 12, Township 18S, Range 10E, Lyon County, Kansas.

I am attaching the Explanation of Alternatives, maps of line replacement and the lagoon construction area.

Please submit your response to Governmental Assistance Services, 905 Joseph Dr., Lawrence, KS 66049.

If you have questions please call me at 888-832-3335.

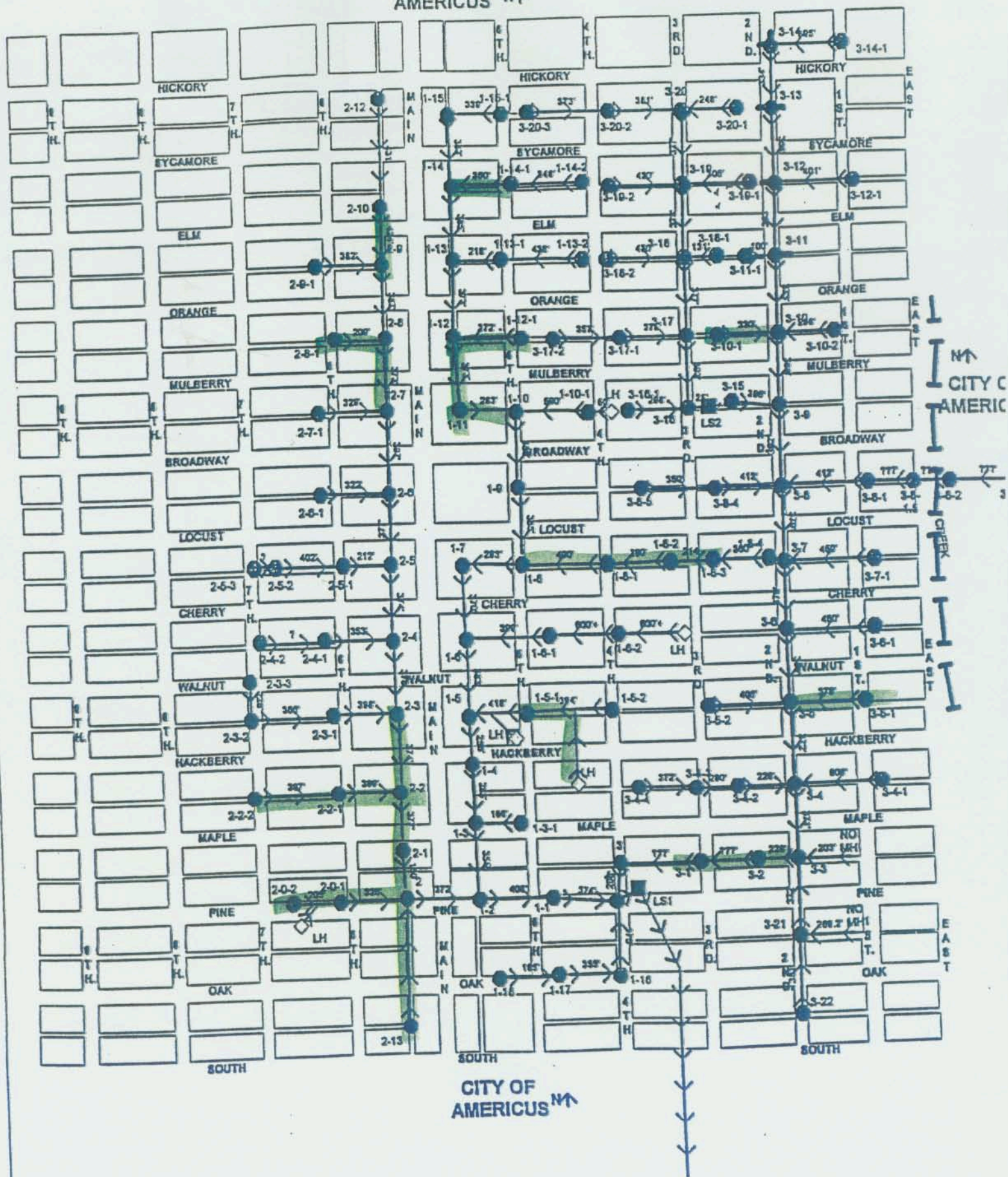
Sincerely,

Donna J. Crawford

Donna J. Crawford
Project Coordinator

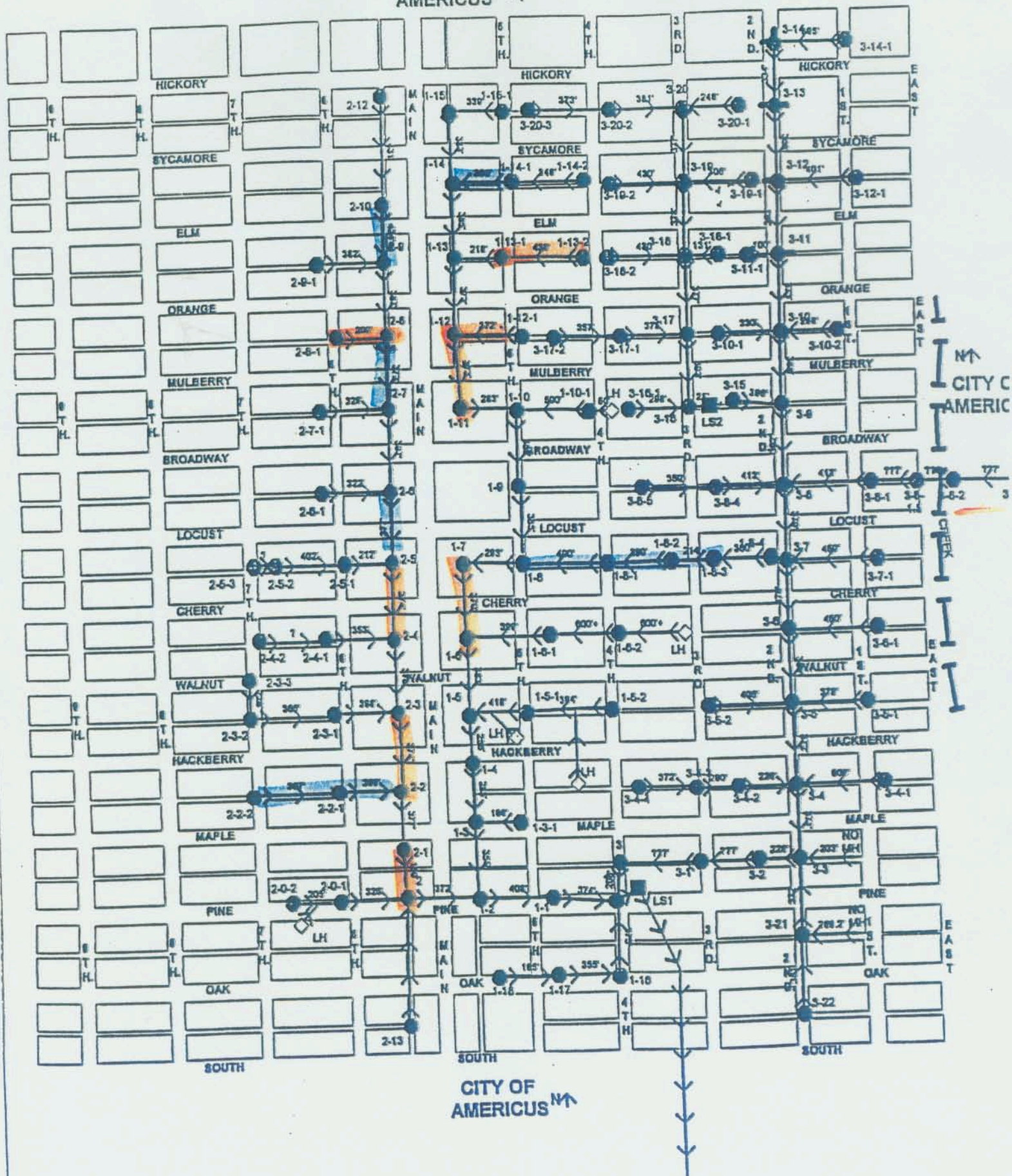
Enc/ Partial Engineering Report

11



Reprinted
In Site

CITY OF
AMERICUS $\uparrow$



The map displays a grid of streets and lots in the City of Americus, Georgia. The streets are labeled with names such as Hickory, Elm, Orange, Mulberry, Broadway, Locust, Cherry, Walnut, Hackberry, Maple, Pine, Oak, and South. The lots are numbered, and the map shows various street intersections and lot boundaries. The map is oriented with North at the top.

Section 5

ALTERNATIVE FOR UPDATING WASTEWATER TREATMENT FACILITIES

5.1 NO ACTION

The existing wastewater treatment facilities for the City of Americus, Kansas currently cannot continuously comply with state and federal permit regulations. During the last eighteen months only three months met permit limits for BOD5 and twelve months met permit limits for TSS. No action allows the problem to worsen and is not considered an option at this time. KDHE will not tolerate continuing of non-compliance with permit limits.

5.2 Aeration of Existing Lagoon

The lagoon system is currently aerating the primary treatment cell. This current treatment is obviously enhancing the treatment process, but reports have shown the effluent to be outside of the required specifications. Due to the existing size (surface area) and depth and the layout of the existing three cell lagoon system, aeration of the facility is not very cost effective. Electrical supply costs and future maintenance costs to operate the system will be excessive. The first cell would have to be split and a concrete wall installed to allow for super aeration. The current facility has four aerators installed at this time with all in operation. This type of aeration in a larger cell is not productive. For these reasons future aeration of the existing wastewater facilities will no longer be considered in this report.

5.3 Mechanical Plant with Existing lagoon

A Mechanical plant is usually more desirable to a larger community than the size of Americus. The initial cost of a mechanical plant and monthly operation is cost prohibitive to be considered. The permit limits set for a mechanical plant are stricter and will be very hard to meet.

5.4 Continuously Discharging 3-cell System, 120 days of Detention

The continuous discharge waste stabilization lagoon is designed on organic loading as previously discussed and hydraulic detention or storage. The minimum KSDHE requirement for wastewater detention is 120 days at average daily flow. The total volume and surface area needed to accommodate this requirement, based on the future design parameters is as follows.

a. Future Population Equivalent:

$$1231 \text{ P.E.} \quad \times \quad 100 \text{ gpcd} \quad = \quad 123,100 \text{ gpd}$$

b. Allowable Infiltration:

$$250 \text{ gpd/inch/mile} \times 8 \text{ inch} \times 7.7 \text{ mile} = 15,400 \text{ gpd}$$

c. Total average daily flow:

$$123,100 \text{ gpd} + 15,400 \text{ gpd} = 138,500 \text{ gpd}$$

d. 120 days, Detention Time:

$$138,500 \text{ gpd} \times 120 \text{ days} = 16,620,000 \text{ gallons}$$

e. Volume Required:

$$16,620,000 \text{ gallons} \div 7.48 \text{ gallons/cu. ft.} = 2,221,925 \text{ cu. ft.}$$

d. Surface Required at the 5' water level:

$$2,221,925 \text{ cu. ft.} \div 5 \text{ feet} = 444,385 \text{ Sq. Ft.}$$

g. Surface area required for the treatment facility:

$$444,385 \text{ Sq. Ft.} \div 43,560 \text{ Sq. Ft./Acre} = 10.20 \text{ acres}$$

$$\text{Existing Facility} - 7.7 \text{ acres} < 10.2 \text{ acres required}$$

h. BOD5 Loading:

$$\text{Loading} = .17 \text{ lb./cap./day}$$

$$\text{Rate} = 34 \text{ lbs./BOD5/acre/day}$$

$$1,231 \text{ P.E.} \times .17 \text{ lb./cap./day} = 209.3 \text{ lb./day BOD5 loading}$$

$$209.3 \text{ lb./day} \div 34 \text{ lb./acre/day} = 6.16 \text{ acres primary treatment}$$

$$\text{Existing Cell No. 1} - 2.0 \text{ acres} < 6.16 \text{ acres required}$$

i. Possible size of treatment facility:

Existing Lagoons:

Cell No. 1	2.00 acres
Cell No. 2	3.20 acres
Cell No. 3	<u>2.50 acres</u>
Total Surface Area	7.70 acres

Trial No. 1: Reverse Cells and piping and increase Cell 1	
Cell No. 1 (Increase Cell 3 by 4.0 ac.)	6.50 acres
Cell No. 2	3.20 acres
Cell No. 3	<u>2.00 acres</u>
Total Surface Area	11.70 acres

Trial No. 2: Increase Cell 1 and breach berm and add another Cell 3	
Cell No. 1 (add 1.0 ac. & Cell 2)	6.20 acres
Cell No. 2	2.50 acres
Cell No. 3 (New)	<u>1.50 acres</u>
Total Surface Area	10.20 acres

Trial No. 3: Combine Cell No. 1 & 2 and add finishing cell	
Cell No. 1 (1 & 2 combined)	5.2 acres
Cell No. 2	2.5 acres
Cell No. 3 (New)	<u>2.5 acres</u>
Total Surface Area	10.2 acres

5.5 Non-Discharging Lagoon

A non-discharging wastewater treatment facility is designed non-overflowing based upon a water balance, including average rainfall, soil permeability, evapotranspiration and wastewater inflow volumes. The eastern portion of the state of Kansas is very hard to design a non-discharging facility that will work according to the design. The average rainfall is higher than the western half of Kansas and the evapotranspiration is less.

Non-discharging design parameters for Americus, Kansas, Lyon County.

Lyon County Average Rainfall	+36.70 inches/year
Average Annual Evapotranspiration	-48.50 inches/year
Seepage (1/4 inch per day)	<u>-91.25 inches/year</u>
Average Yearly Water Loss	-103.05 inches/year -8.59 feet/year

Future Wastewater Flows:

$$138,500 \text{ gpd} \times 365 \text{ days} = 50,552,500 \text{ gallons/year}$$

$$50,552,500 \text{ gallons/year} \div 7.48 \text{ gallons/cu.ft.} = 6,758,356 \text{ cu.ft./year}$$

Surface Area at 1/4 inch/day seepage:

$$6,758,356 \text{ cu.ft./year} \div 8.59 \text{ feet/year} = 789,913 \text{ sq.ft.} \approx 18.1 \text{ acres}$$

Surface Area at 1/10 inch/day seepage:

$$6,758,356 \text{ cu.ft./year} \div 4.03 \text{ feet/year} = 1,677,011 \text{ sq.ft.} \approx 38.5 \text{ acres}$$

Surface Area at 0 inch/day seepage:

$$6,758,356 \text{ cu.ft./year} \div 0.98 \text{ feet/year} = 6,896,282 \text{ sq.ft.} \approx 158.3 \text{ acres}$$

Based on the future wastewater volumes and the above mentioned design parameters approximately 38.5 surface acres would be required to maintain the lagoon facility non-overflowing at 1/10 inch per day seepage. This is assuming that Americus has a normal rainfall and evapotranspiration year. If during construction the lagoon bottom is constructed with zero seepage the non-discharging facility will be overflowing. The location selected for this facility will required a large amount of land and will not be cost feasible to build. Therefore a non-discharging facility will not be a feasible option.

5.6 Irrigation

The intention of wastewater irrigation is to irrigate crops that are not produced for direct human consumption. Also, to provide total effluent discharge irrigation would required a large area of irrigation. The City should, although the feasibility of total effluent irrigation is not advisable, consider and discuss with the adjoining landowner the possibility of intermittent short-term irrigation around the facility, including the existing grassed dikes and waterways. During hot summer days the water level may be lowered by irrigation resulting in less of a discharge in the fall and spring.

The following management and monitoring requirements apply for treated wastewater from the treatment facility utilized for irrigation purpose at the dikes and waterways.

- Irrigation shall be limited in such a manner as to avoid runoff of effluent to adjacent landowners.
- Control tailwater to prevent runoff to surface waters of the State
- Draw water only from the final cell in the treatment process.
- Irrigation using treated wastewater shall occur only at times when public access to the irrigated area is restricted.
- No ponding of wastewater on the ground surface.
- All monitoring of the treated wastewater shall be conducted using EPA approved methods and KDHE certified laboratories.
- The results of the analyses shall be reported quarterly to the address shown on the standard discharge monitoring report.

5.7 Land Requirements for a new wastewater facility

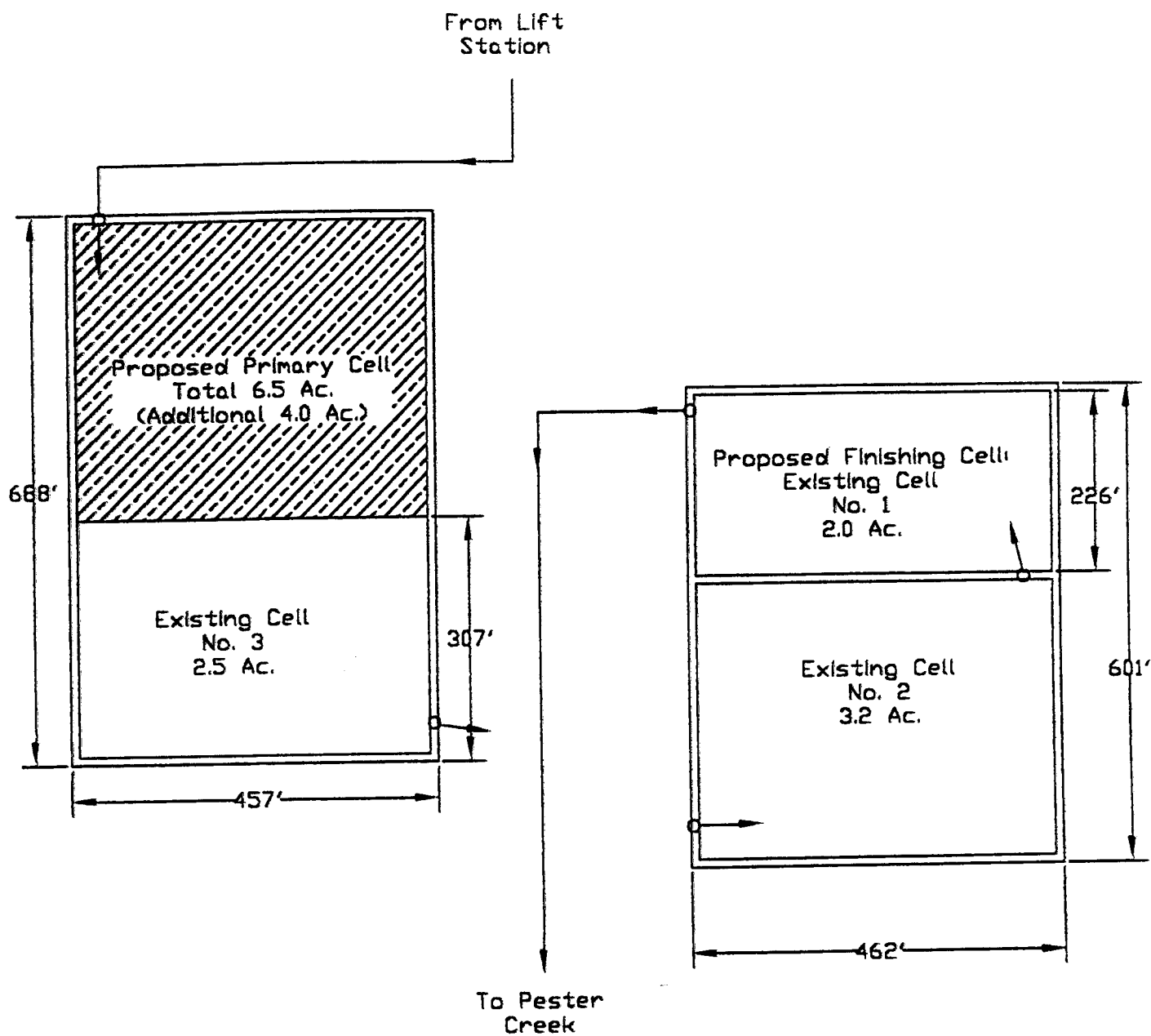
The minimum separation requirements for a facility of 100 P.E. or larger are as follows. This information is reproduced from the KDHE Minimum Design Standards, Section IV General Design Considerations for Sewage Treatment Works.

Plant Type	Existing Habitations	Proposed Development	Property Lines
#Activated Sludge	1000'*	350'	100'
Trickling Filter	1000'*	350'	100'
@Aerobic Lagoon	500'*	350'	100'
Anerobic Lagoon	1000'	1000'	100'
All other Facilities	1000'*	350'	100'

This is the type of mechanical treatment proposed in this report.

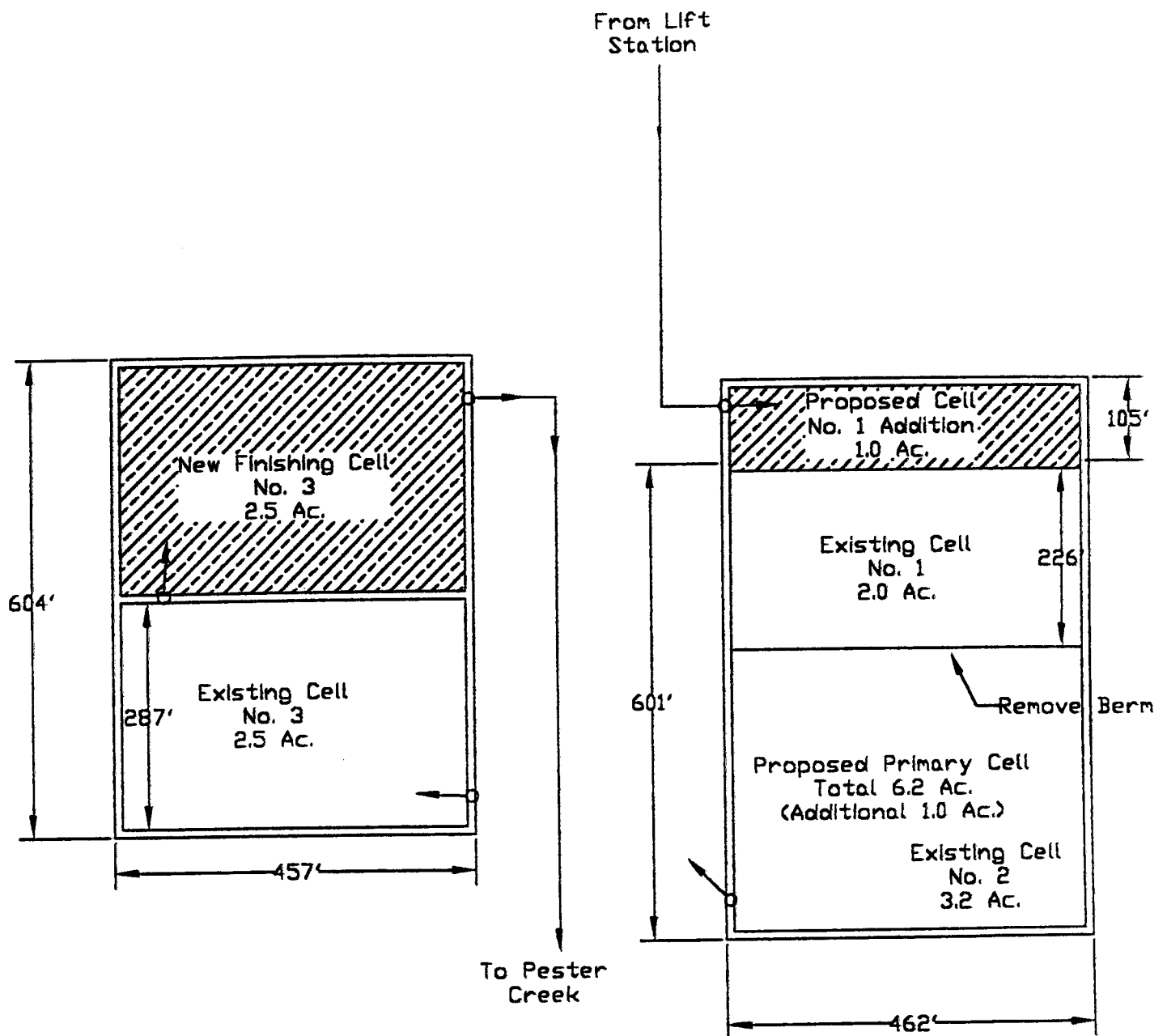
@ This is the same type of treatment facility that the City of Americus currently uses and is proposed in either a discharging or non-discharging lagoon.

- *This distance may be reduced to a minimum of 350 feet with the written permission of the affected property owner have a habitation less than 1000 feet from the proposed treatment works. The written permission must be a notarized statement from the affected property owner stating that there are no objections to the establishment and construction of the treatment facility. The statement shall not waive any future rights with respect to future action on lack of proper operation and maintenance. A copy of the notarized statement must be furnished to KDHE, the property owner and the owner of the treatment facility.
- The above distances are required minimums. Requests for further reductions or additions must be fully documented and will be reviewed by KDHE. However, further reductions/additions will not be approved on a routine basis.
- Where an existing treatment plant has been established on a site with fixed boundaries, modifications, and/or additions to the plant should only be concerned with the 100 foot separation from property lines.
- The separation distances may include roadway or railway right of way as long as a minimum of 100 feet from property lines is observed.

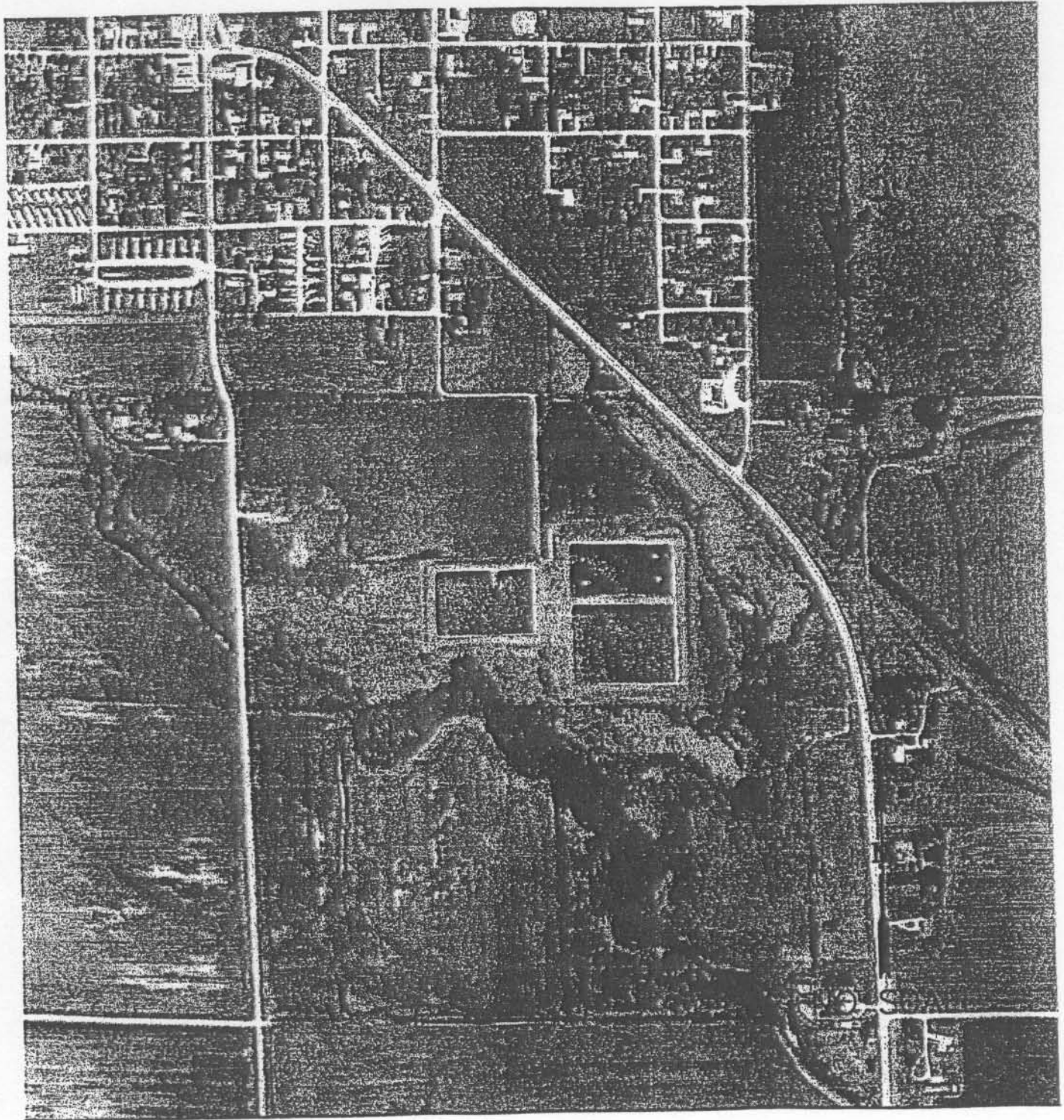


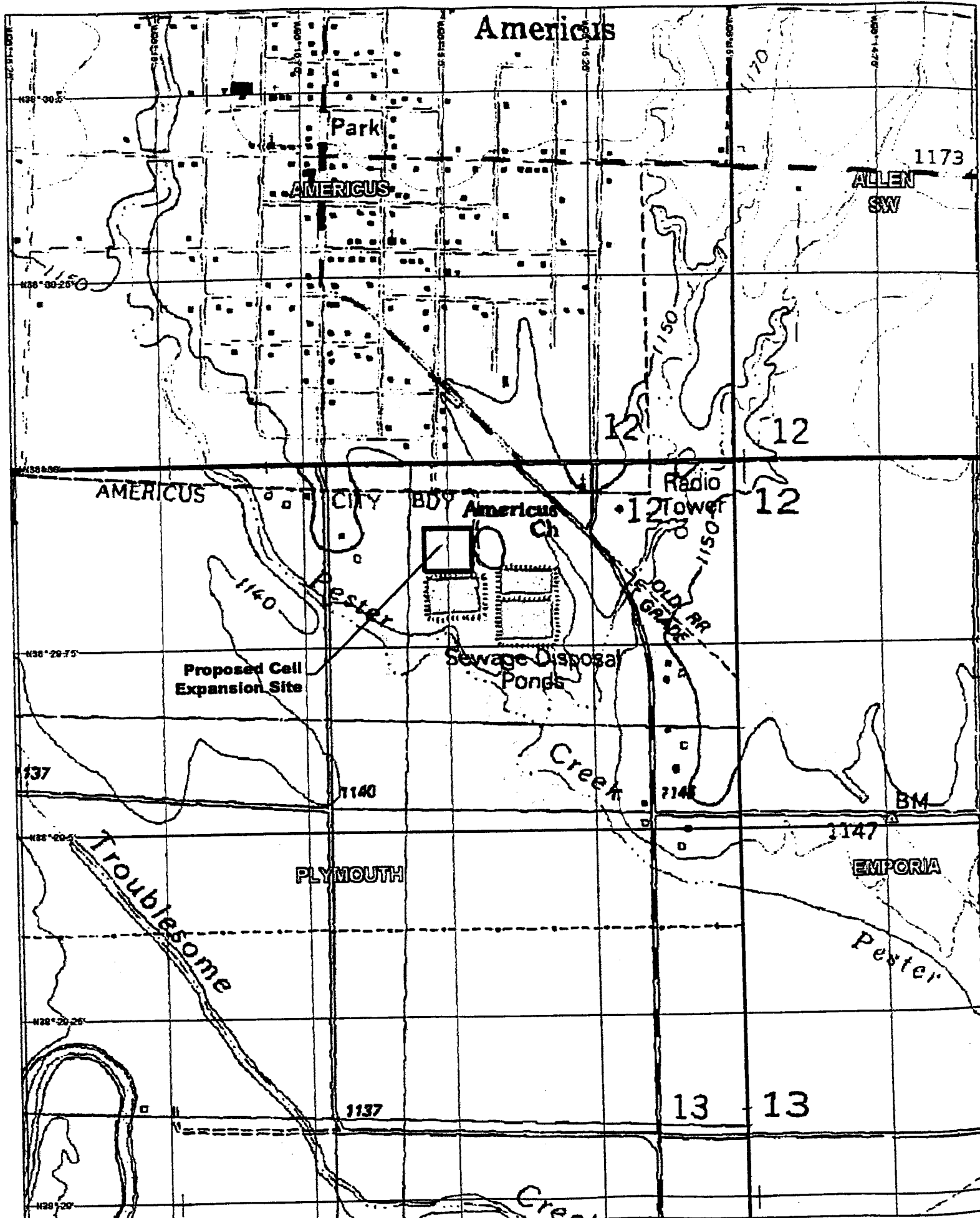
Trial 1:
3-Cell, 120 Days

NO SCALE



Trial 2:
3-Cell, 120 Days





RECOMMENDATIONS

6.1 FINAL RECOMMENDATION FOR UPDATING THE WASTEWATER TREATMENT FACILITY

Based upon the data contained within this report it is the recommendation that, Trial 1, a 3-cell treatment facility be constructed with a 120 days of detention. The exact cell location and conformity will be finalized after a site is obtained. This option was selected because of the possible new EPA and KDHE Regulations that will be requiring increased water quality standards and the project population increase. The receiving stream in the existing location will be dry for the majority of the year and is wastewater flow induced. A possible recommendation in the future by KDHE may be to make this facility a non-discharging facility by using wetlands for the discharge. A non-discharging facility using conventional lagoons is not the best option because of the surface acres of water required and land cost. The City should consider purchasing enough land for expansion in the future to add a wetland area, which could be the size of another cell. The land to be purchased should be reviewed for depth to rock, storm drainage and possible layout of the lagoon site.

The 3-cell lagoon facility implementing Trial 1, was chosen over the other options. The construction costs for the other options would be greater and Trial 1 increases the facility for future population growth while handling 100 percent of the BOD5 in the primary cell. It is our feeling the best option long term is the 3-cell facility utilizing the Trial 1 configuration.

Based upon the information obtained during the study it is recommended to replace the wet well and lift station along with replacement/rehabilitation of approximately 12,000 linear feet of sanitary sewer main. The proposed cost of all improvements is approximately \$2,000,000.

6.2 COMPLIANCE SCHEDULE FOR FACILITY IMPROVEMENTS

- | | |
|--|-----------------|
| a) Engineering Report Submitted to KDHE | August, 2004 |
| b) Plans and Specifications approved by KDHE | September, 2005 |
| c) Matching Funds for project secured for CDBG | September, 2005 |
| d) CDBG Submittal of Project | October, 2005 |
| e) Begin Project Construction | June, 2006 |
| f) Project Construction Completion | December, 2006 |

**Opinion of Probable Cost
City of Americus, Kansas
3-cell, 120 days of detention**

ITEM	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
Part A: Wastewater Treatment (Lagoon)			
1 Mobilization	Lump Sum	\$40,000.00	\$40,000.00
2 Clearing and Grubbing	Lump Sum	6,000.00	\$6,000.00
3 Dewatering Existing lagoon	Lump Sum	7,500.00	\$7,500.00
4 Removal of Sludge	Lump Sum	30,000.00	\$30,000.00
5 Lagoon Construction	Lump Sum	185,000.00	\$185,000.00
6 Pond Sterilization	11.7 AC.	500.00	5,850.00
7 Pond Sealant	7 AC.	2,000.00	14,000.00
8 Finish Grading	12 AC.	1,200.00	14,400.00
9 Distribution Box	2 EA	6,000.00	12,000.00
10 Flow Control Structures	3 EA	5,000.00	15,000.00
11 Outlet Manhole	1 EA	6,000.00	6,000.00
12 Transfer Piping	600 L.F.	35.00	21,000.00
13 Pond Piping	800 L.F.	50.00	40,000.00
14 Outfall Piping	600 L.F.	20.00	12,000.00
15 Splash Blocks	15 S.Y.	200.00	3,000.00
16 Concrete Backslope Lining	100 S.Y.	70.00	7,000.00
17 Level Indicator	3 EA	1,000.00	3,000.00
18 Rock Riprap (Primary Wind Direction Only)	750 C.Y.	45.00	33,750.00
19 Surfacing	500 S.Y.	6.00	3,000.00
20 Fence	2000 L.F.	6.00	12,000.00
21 12' Gate	2 EA	600.00	1,200.00
22 Concrete Headwall	1 EA	3,500.00	3,500.00
23 Seeding	Lump Sum	7,500.00	7,500.00
Subtotal			\$482,700.00
Part B: Pump Station and Force Main			
1 Pump Station	1 EA	75,000.00	75,000.00
2 Generator	1 EA	30,000.00	30,000.00
3 Wet Well	1 EA	12,000.00	12,000.00
4 Removal of Existing Well	1 EA	8,000.00	8,000.00
5 Seeding	Lump Sum	500.00	500.00
Subtotal			\$125,500.00
Part C: Collection System			
1 In Situ Form Sanitary Mains	8,000 LF	45.00	360,000.00
2 Replacement of Sanitary Mains	4,000 LF	50.00	200,000.00
3 Manhole - Rehabilitation	40 EA	2,000.00	80,000.00
4 Manhole - Replacement	11 EA	4,000.00	44,000.00
5 Connections	50 EA	750.00	37,500.00
6 Remove/Replace Paving	2,000 S.Y.	10.00	20,000.00
7 Televising the Entire Collection System	27,000 LF	1.20	32,400.00
8 Seeding	Lump Sum	8,000.00	8,000.00
Subtotal			\$781,900.00

Opinion of Probable Cost (Cont.)
City of Americus, Kansas
3-cell, 120 days of detention

Total Part A , B, & C	\$1,390,100.00
10% Construction Contingency	<u>\$139,010.00</u>
Total Construction Cost	\$1,529,110.00
30% Contingency, Design, Const. Adm.	
Legal, Financing, etc.	\$458,733.00
Land for Lagoon Site	<u>\$25,000.00</u>
*Opinion of Probable Cost	\$2,012,843.00

Total Part A & B	\$608,200.00
10% Construction Contingency	<u>\$60,820.00</u>
Total Construction Cost	\$669,020.00
30% Contingency, Design, Const. Adm.	
Legal, Financing, etc.	\$200,706.00
Land for Lagoon Site	<u>\$25,000.00</u>
*Opinion of Probable Cost	\$894,726.00

Total Part A, B, and Partial C(Rehab \$200k)	\$808,200.00
10% Construction Contingency	<u>\$80,820.00</u>
Total Construction Cost	\$889,020.00
30% Contingency, Design, Const. Adm.	
Legal, Financing, etc.	\$266,706.00
Land for Lagoon Site	<u>\$25,000.00</u>
*Opinion of Probable Cost	\$1,180,726.00

* This Opinion of Probable Cost assumes that the site contains no rock excavation