INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Michael R. Pence
Governor

Thomas W. Easterly
Commissioner

April 4, 2014

65-40 LN
Fall Creek RWD
PO Box 59
Pendeton, IN 46064

Dear Board of Trustees:

Re: Regional District Plan

Pursuant to Indiana Code (IC) 13-26, and as required in the Order forming the Regional District (District), a district plan (Plan) was required to be submitted by the District to the Indiana Department of Environmental Management (IDEM).

IDEM has received and reviewed the District Plan and determined the Plan to be complete. No further action regarding the Plan is required at this time. Please note that the District should send updates to the Plan to IDEM as they occur.

If you have any questions, please feel free to contact me at 800-451-6027, extension (3-0476) or at lnewlon@idem.in.gov.

Sincerely,

Lynne Newlon

Lynne Newlon
Regional District Coordinator
Indiana Department of Environmental Management

BOSE
McKINNEY
& EVANS LLP

ATTORNEYS AT LAW

Stephen C. Unger
Direct Dial: (317) 684-5465
Fax: (317) 223-0465
E-Mail: SUnger@boselaw.com

October 15, 2013

VIA HAND DELIVERY

Lynne Newlon
Indiana Department of Environmental Management
Office of Water Quality
100 North Senate Avenue, MC 65-40 IGCN 1255
Indianapolis, IN 46204-2251

RE: Fall Creek Regional Waste District
District Plan

Dear Lynne:

On behalf of Fall Creek Regional Waste District ("District") and pursuant to your request, enclosed please find a copy of the District's original *Facilities Plan for Wastewater Treatment* prepared by Beam Longest and Neff, Inc. Please copy me on your letter of acknowledgement to the District, and feel free to contact me should you have any questions.

Sincerely,

Stephen C. Unger

SCU/jan
Enc.
cc: Joe Rowlett, FCRWD, General Manager

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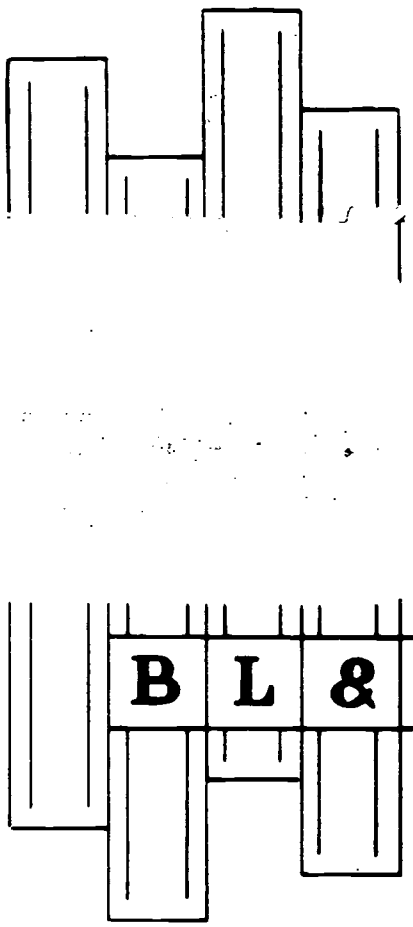


BEAM LONGEST AND NEFF, INC.

INDIANAPOLIS INDIANA

ADDENDUM I

FALL CREEK REGIONAL WASTE DISTRICT
FACILITIES PLAN

PREPARED BY

BEAM, LONGEST & NEFF, INC.
8136 Castleton Road
Indianapolis, Indiana 46250

ADDENDUM I

FALL CREEK REGIONAL WASTE DISTRICT

This Addendum is written in response to the comments made in the January 18, 1979 letter from the Indiana State Board of Health concerning the Fall Creek Regional Waste District Facilities Plan. A copy of this letter is included in the appendix of this addendum for reference. Each particular comment mentioned in the letter is addressed below.

(1) A land use map depicting existing and future land use characteristics is attached. The map was created by the Madison County Council of Governments in 1976 during an EDA-funded county-wide land use study.

(2,3) Two letters from the Department of Natural Resources are attached. The letters verify that no known historical, architectural, archaeological, wetland or floodplain sites or environmentally sensitive or endangered species will be disturbed by the project.

It is currently proposed that neither of the two treatment plants will be constructed within the 100 year flood elevations mentioned in the Department of Natural Resources correspondence. If, during Step 2 design, it is determined that construction within the flood boundaries will be required, appropriate Federal Flood Insurance Policies will be adhered to.

(4) Attached is a letter from the State of Indiana, Department of Administration with their recommended design flow from the State Reformatory at Pendleton. The letter gives a maximum inmate population of 2,000. The population of 2,500 listed in Table Nine on page 83 will be revised to the 2,000 figure suggested by the State Department of Administration. The revised design flow from the Reformatory is therefore 760,750 gallons/day.

(5) The Region VI population projections that are referred to in your letter have been published after the submittal of the Facilities Plan. An earlier Region VI population publication was used in the preparation of the Facilities Plan.

The projected population of the Town of Ingalls in the Facilities Plan is 1,325 persons. The revised Region IV projection is between 965 and 1050 persons. Recently, the Town has expanded its corporate limits to include a recently constructed subdivision. 100 lots are currently platted in the subdivision. At 3.38 persons/home the expected increase in population from this addition is 338 persons. For this reason the design population of 1325 will not be revised.

The change in the projected Green Township growth rate from 29% to 5.7% will change future projected population of the development northwest of Ingalls. The revised design flow is shown in the appendix of this addendum.

The format of determining the design flow from the subdivisions in the Fall Creek Developments and the South Anderson area has been revised and will not involve a township growth rate. The design flow will be determined by assuming that all lots in the subdivisions will be developed which will represent full growth. This number of homes times the Township average number of persons per home will yield the design flow. The revised design flow is shown in the response to comment #23 of this addendum.

(6, 7) The proposed project will have both primary and secondary environmental effects on the local area. The environmental effects and the proposed mitigating measures are discussed below:

PRIMARY IMPACTS:

Adverse impacts such as air pollution and noise caused by heavy construction machinery, water impacts of erosion at the ditch and stream crossings, destruction of local vegetational growth at the treatment plant site, and inconvenience caused by detours and traffic disruptions will affect all sections of the proposed project during construction. These

items are common to all construction projects and by reasonable measures and requirements they can be minimized.

Air pollution and noise pollution from the construction machinery will be temporary and therefore, minimal. Noise barriers or temporary relocation of residents is obviously impractical from the standpoint of sheer numbers. One possible solution to mitigate this temporary impact would consist of restricting work hours for operations that would generate high levels of noise. Construction equipment, if new, is manufactured with more efficient noise control devices. Older models can be upgraded with new mufflers, engine overhaul, or other measures to limit air pollution and minimize noise. Air pollution from dust is a construction impact that requires close monitoring. Specifications to control dust will be written and enforced. Continuous cleaning of traveled roadways by scraping and sweeping of loose materials will be required. Wetting of surfaces with a water or salt solution will contain dust. An oil application on road bases can be used to hold down dust during road repair phases of construction. Timely paving scheduling will minimize the possibility of dust from roadway areas. Blowing dust from disturbed grassy areas can be eliminated by grading, seeding and mulching as soon as climate and weather allow. The increase in costs to the project would be minimal if these restrictions are employed. Prior to letting the contract this project will again be reviewed concerning measures to minimize adverse construction impacts to the local communities. Construction inconveniences are generally accepted by the public since they know it is unavoidable and temporary in nature. Public meetings have been held in addition to special meetings with interested groups (Optimists' Club, Lions' Club, etc.) to discuss the project and inform people of planned construction in the area.

The Contractor shall submit for approval his plan of operations for accomplishing temporary and permanent erosion control work relating to grubbing, grading, paving and other work which might create erosion. When determined necessary for the prevention of pollution due to erosion, the Contractor shall construct temporary berms, dikes, ditching or sediment basins and maintain control features until permanent control features are placed. Permanent erosion control features will be incorporated into the project at the earliest practicable time as the construction progresses.

Currently the proposed Fall Creek Regional Treatment Plant site is located in an uncultivated area and the Markleville site is in an area used as pasture. The Fall Creek site will involve approximately 25 acres of land along Fall Creek, presently owned by the Indiana Department of Corrections. The Markleville site is along Lick Creek and immediately adjacent to the Adams Township cemetery. Approximate area required for the facility would be 3-4 acres of land in the northeast corner of a field. No relocation of people will be necessary at either site. The potential uses of these areas near streams or cemeteries would be

agricultural use. Only a small portion is tillable acreage. Neither site has any known geological or historical significance. Some small trees, shurbs and grassy areas will be removed during construction. However, both areas will be land-scaped after construction which will enhance the environs of the sites. Where economically and physically feasible, all measures possible will be taken to preserve the natural beauty of the area and eliminate the needless destruction of the landscape. Possible measures to mitigate harm would include right-of-way design, such as blending into the landscape and regulatory measures by the local government.

When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled both during and after completion of the work that erosion will be minimized and sediment will not enter streams or other bodies of water. Waste or disposal areas and construction roads shall be located and constructed in a manner that will keep sediment from entering streams.

Traffic disruption along state highways and major arterial roads will be kept at an absolute minimum. There will be traffic disruption and possibly short term detours (24-48 hour periods) along the streets and alleys within the communities being served. All state highway standards concerning traffic disruption will be adhered to by the Contractor.

Other primary impacts include environmental affects on aquatic biota, plant and animal life and surface and groundwater pollution. Currently, Fall Creek and Lick Creek are suffering pollution problems due to point discharge of pollutants from community storm sewers and individual malfunctioning septic systems. With the proposed system, these point discharges will be eliminated and the sewage will be collected and treated at the two sewage treatment plants. Pollution of groundwater will be abated by the introduction of collection lines used to transmit wastewaters to the treatment facilities. Thus, a positive impact on the local area's water quality is anticipated.

Disturbances to all areas and destruction of vegetation zones will be lessened by construction within road right-of-way and maximum allowable trench widths. All disturbed areas will be re-seeded, fertilized, conditioned and mulched. The seed mixture selection specified will be designed to provide a fast and complete cover crop.

No known endangered plants or animals are located at either plant site. Disruption of animal habitat at the site during construction will be limited to small animals such as rabbit, ground squirrel and various birds. These animals will readily relocate in available areas adjacent to the plant sites. Some of the animals, particularly birds, will return to the site following construction. The grassed

and landscaped areas around the plant particularly with respect to the tree species chosen for revegetation, will provide habitat for birds and some small animals.

All applicable regulations of fish and wildlife agencies and statutes relating to the preventions and abatement of pollution shall be complied with in the performance of the contract.

SECONDARY IMPACTS:

Secondary impacts associated with proposed regional sewerage systems may include changes in the intensity and distribution of population, and changes in the human use of the land.

The data presented in Table II of the Facilities Plan indicates that the population of the incorporated towns in the study area (and hence the county itself) has been increasing since 1940. Since the area outlying these towns is predominantly land utilized for agricultural resource extraction, development as a result of population pressure has involved the altering of such land for residential land use. Indeed, it is the development of such land for residential purposes, with improper and/or insufficient regard for adequate means of sewage and waste control, that has resulted in the present poor water quality situation, (see Section 4.2.4. of the Facilities Plan) and the need for a comprehensive, area-wide waste treatment plan and facilities.

The Madison County Council of Governments has done research on the future growth and needs of the County and on public opinion and feasibility of different types of growth patterns. Their conclusion is that growth centered around the existing developed areas is preferred by the public over uncontrolled development, strip development, or restriction of development to urbanized centers. Referring to the Pollution Source Map, in the Facilities Plan, the major incentive for the newer subdivisions is proximity to the metropolitan areas of Anderson and Pendleton. The existence of a well-defined network of highways allows for and promotes such development.

There are currently 3 major areas of growth in the planning area. One area is between Fortville and Ingalls on U.S. 36. The second area is around Pendleton and the area along S.R. 9. The third area is the area directly south of Anderson between Interstate 69 and U.S. 36. Although there is little growth from I-69 north to the City of Anderson, itself, most of the residents in the developed areas south of I-69 commute to Anderson for work. The point that needs to be made here is that these growth patterns have been firmly established and would be stimulated, but not drastically modified by the recommended alternative.

Within the study area, three institutionalities "oversee" development and land use. The Madison County Planning Commission has jurisdiction over all of the area with the exception of the incorporated and fringe areas of both Ingalls and Pendleton (the City of Anderson is not in the study area), which have their own individual plan commissions. None of these agencies has an adopted future land use or master plan. Development for the most part is theoretically controlled by zoning ordinances. A review of the zoning maps seems to indicate that very little is actually done to zone in anticipation of future growth. This is particularly true for residential development. For example, the latest zoning maps indicate that the area of the Fiddler's Green subdevelopment is still zoned for agricultural usage. This is also true for that part of the Rose Addition east of County Road 100 West (Madison Avenue). On the other hand, the entire area bounded roughly by Fall Creek on the south, I-69 on the north, Main Street on the west and S.R. 109 on the east is zoned as residential, yet only roughly one-half of this area has actually been developed. In conclusion, the existing zoning maps are of very little help in projecting future growth patterns. Fortunately, as previously described, the growth patterns are fairly-well established and recognizable through growth history and current development.

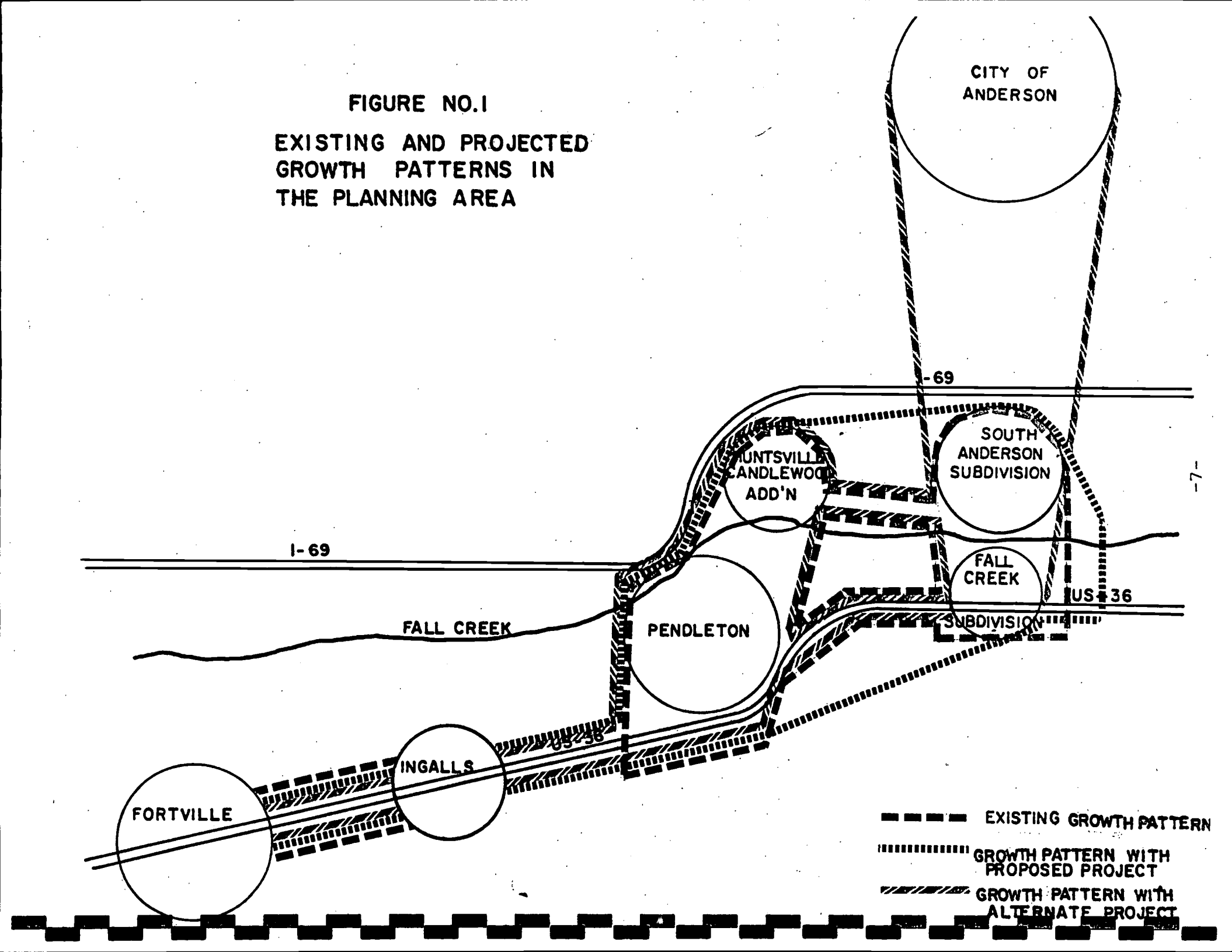
Recently, the zoning boards and particularly the County Health Department have instilled a "moratorium" on residential and other development until a waste treatment alternative is chosen and implemented. Thus, the sewer project's chief secondary impact would be to reopen the opportunity for development. Initially, the vacant lots in the existing subdivisions would be developed and hence, the immediate response would not be growth along an undefined pattern. This is further ensured by the fact that all of the existing subdividions would be connected together and thence to Pendleton by the use of force main interceptors. This would inhibit "spot" or "sprawl" development along the lines themselves. Future growth stimulated by this comprehensive sewer network would occur in district areas such as subdivisions, which could be more readily monitored by the appropriate zoning agencies. The local zoning agencies are fully cognizant of the proposed project and feel that growth could be more readily monitored and "shaped" given the existence of a comprehensive waste treatment network.

On a larger scale, the simplified diagram in Figure One of this addendum shows the existing proposed and an alternative form of growth pattern in the area. The alternative proposal would have the City of Anderson incorporate and provide sewer service to the developed area south of I-69.

As can be seen from the figure, the expected growth with the proposed sewer project is very similar to the present growth pattern. The differences are an expanded corridor

FIGURE NO.1

EXISTING AND PROJECTED GROWTH PATTERNS IN THE PLANNING AREA



between the Town of Pendelton and the subdivisions south of Anderson and along U.S. 36 and the creation of a new corridor between the Town of Ingalls and the Town of Pendleton.

The growth pattern shown for the alternative project has several advantages and disadvantages. One disadvantage is that this alternative was not cost effective when compared to the recommended alternative. Another disadvantage is that the City of Anderson has expressed a desire not to expand its facilities outside of Anderson Township at this time. There is currently little development between Anderson and the subdivisions south of I-69. The City desires to channel future growth north or northwest where utilities and school facilities are more available. The only advantage of this alternative is a more controlled growth pattern under the direct jurisdiction of two political entities (Anderson and Pendleton) compared to the relatively uncontrolled linear growth that the recommended alternative will allow for. With these conditions in mind, the recommended alternative with its ensuing growth pattern has been approved by the local planning agencies - the Madison County Planning Commission and the Town of Pendleton and the Town of Ingalls.

Other secondary impacts that may be expected as a result of the proposed sewer project are those associated with the transportation network, schools, air quality, open space and public services.

The ongoing residential development and the additional development promoted by the project will serve to increase traffic in the general area. As should be evident by this time, the existence of I-69, U.S. 36, and State Roads 9, 13, 67 and 109 provide a more than adequate arterial transportation system for the motoring public and would be able to handle the additional traffic associated with the additional residential subdevelopment. The county roads in the area may require repair or even upgrading commensurate with the increase in traffic. County funds would be sufficient for repair and some degree of upgrading. Federal aid funds (i.e., Federal Aid Secondary, Safer Off-System, Federal Aid Urban, etc.) would be available through the FHWA for major road improvement projects. Presently, the county roads which are extensively traveled are paved.

No adverse secondary impacts on schools are anticipated. A new middle school is currently under construction at the intersection of State Road 109 and U.S. 36. This is being built not only in response to the development that has ocurred to date, but also in anticipation of additional growth. It is scheduled to open in fall of 1979.

The proposed sewer project is not expected to adversely affect the air quality within the study area. Residential development is not typically associated with adversely affecting air quality and it cannot be assumed that industry would locate itself in the planning area, simply because a new waste treatment system is being built. The noxious odor problem plaguing certain subdivisions (as mentioned in the Facilities Plan, these odors are generally attributed to (1) septic fields having been built in nonconducive soils which often results in surface ponding of sewage and (2) direct introduction of sewage into drainageways) should be rectified.

Hydrologic characteristics of a watershed are altered in two ways by urbanization. First, an increasing percentage of the surface is rendered impervious to infiltration by construction of roofs, driveways, walks, pavements, and parking lots. It has been estimated that in residential areas, for a lot size of 15,000 sq.ft. (0.34 acre; 1400 sq. m) the impervious area amounts to about 25 percent, whereas for a lot size of 6000 sq.ft. it rises to about 80 percent. An increase in proportion of impervious surface reduces infiltration and increases overland flow generally from the urbanized area. In addition to increasing flood peaks during heavy storms, there is a reduction of recharge to the ground body beneath, and this reduction in turn decreases the base flow contribution to channels in the area. Thus the full range of stream discharges from low stages in dry periods to flood stages, is made greater by urbanization. A second change caused by urbanization is the introduction of storm sewers that allow storm runoff from paved areas to be taken directly to stream channels for discharge. Runoff travel time to channels is thus being shortened at the same time that the proportion of runoff is being increased by expansion in impervious surfaces. The two changes together conspire to reduce the lag time. Madison County is currently in the process of improving the county's drainage through upgrading and enhancement of their legal ditch system.

The use of the land for residential development should be closely controlled by the appropriate zoning entities so as to assure the preservation of some degree of open space.

Public services in the area may expect an escalating need for their services as new development occurs, particularly water, electric power and emergency services. The proposed project would not generate any problems of access for these services.

(8,9) The design summary will be revised to allow for an influent BOD concentration of 200 mg/L and phosphorus concentration of 5 mg/L. The revised summary is shown in the appendix of this addendum.

(10) The revised design summary shall also include a 12' depth for the final clarifiers.

(11) The aeration rotors mentioned in the design summary for the Markleville sewage treatment plant refer to the equipment required in the oxidation ditch, not the final effluent aeration process.

(12) A revised treatment plant schematic is attached. The schematic incorporates a common junction box both at the influent and the effluent of the two one-day ponds. This will allow for both series and parallel operation of the ponds.

(13) A review of the estimated operation and maintenance costs of the one-day terminal ponds advanced treatment alternative indicated that the costs were somewhat high. A conservative estimate of a once-a-week application of chemicals was used in determining these figures. The construction cost estimates were within 10% of the estimated values provided for one-day pond facilities in the U.S. E.P.A. publication 430/9-77-013. Despite the conservative O & M estimates this alternative still proved to be cost effective when compared to the other advanced treatment methods. The estimated chemical addition costs for the selected alternative have been revised and are shown in the appendix of this addendum.

(14, 17) The method of disposal of the digested sludge recommended in the Facilities Plan is liquid sludge application to land with sludge drying bed application as a back-up facility.

Recent studies have shown that land application of digested sludge is not feasible during a large part of the year. Therefore sludge storage facilities will be needed during these periods. The anaerobic digestors with floating covers allow for approximately 35 days of storage. However, a conservative spreading season, for sludge, will consist of only 30 days (10 in spring, 20 in fall) a year. Therefore, 265 days of sludge storage is required.

There are two feasible alternative methods of storing the sludge during the non-spreading seasons. Alternative one will consist of placing all the digested sludge that cannot be applied to land or stored in the digesters into sand drying beds. The dried sludge will then be hauled to the nearest sanitary landfill for disposal.

Alternative two will consist of a large sludge holding lagoon at the treatment plant. The sludge lagoon will hold all the digested sludge until land application is feasible.

It is estimated that approximately 8,360 gallons of liquid digested sludge will be produced per day by the digestors. This figure includes all primary, secondary and phosphorus removed sludge precipitant.

The nearest state approved sanitary landfill is the Caldwell Landfill in Shelby County some 30 miles south of the proposed treatment plant site. Currently the landfill charges four dollars a ton for sludge disposal. It is anticipated that the sludge can be land applied within 5 miles of the plant site on local farmland.

A present worth analysis of the two alternatives is shown below:

PRESENT WORTH ANALYSIS
SLUDGE HANDLING FACILITIES

ALTERNATIVE ONE

Construction Costs

ITEM	COST	
Sludge Drying Beds	$77,040	
Front End Loader	20,000	
Dump Truck	27,000	
Sludge Spreading Truck	35,000	
Sludge Hauler	20,000	
	179,040	$179,040

Replacement Costs

Replace vehicles in 10 yrs. (102,000)(.55)	56,290
TOTAL INITIAL COSTS	$235,330

Operation and Maintenance Costs

Rates @ Landfill	4,850	
Front End Loader	200	
Dump Truck & Travelling Exp.	2,550	
Big Wheels	130	
Tanker	270	
Present Worth (8000 X 11.35) =		$ 90,800

Salvage Value

$$(77040 - [77040 \times \frac{20}{50} \times])(6.304) = -(14,050)$$

TOTAL PRESENT WORTH $312,080

ALTERNATIVE TWO

Construction Costs

ITEM	COST	
Lagoon	$159,200	
Sludge Spreading Truck	35,000	
Tanker Tractor Trailer	50,000	
	$244,200	$244,200

Replacement Costs

Replace Vehicles in 10 years (85000)(.55)	46,910
TOTAL INITIAL COSTS	$291,110

Operation and Maintenance Costs

Big Wheels	660
Tanker	2,290
	2,950
Present Worth (2950)(11.25) =	33,480

Salvage Value

159200 X (.304) =	-(48,400)
TOTAL PRESENT WORTH	$276,190

The results of the cost effective analysis show that alternative 2 has the lower present worth value. As both alternatives have similar positive and adverse environmental effects, Alternative 2 is the selected alternative due to cost effectiveness.

The design summary and estimated project costs will be revised to include this method of sludge handling.

(15) The design summary will be revised to include floating gas covers on both digestor units.

In order to raise the solids valume of the waste sludge from the secondary clarifiers to a 4% level, an air floatation thickening device will be required. The increased quantity of solids will reduce the size of the sludge handling facilities. The air floatation thickener has been added to the revised design summary.

(16) A cost effective analysis of the anaerobic and aerobic sludge digestion alternatives is shown on page 115. The analysis was made for a 1.8 MGD sewage treatment plant. The construction cost estimate of the aerobic digestor unit has since been found to be too low. The revised cost for the aerobic digestor was taken from the E.P.A. publication 430/9-77-013 and is approximately $80,000 higher than previously estimated. This additional cost would make anaerobic even more cost effective for this size treatment plant. Therefore, the anaerobic sludge digestion alternative remains the recommended method of sludge handling.

(18, 19, 28) Plat maps of all the subdivisions east of Pendleton that are proposed to be sewered are included in the appendix of this addendum. County building inspection records were researched to determine the dates of construction of the homes in these areas. All homes that were in existence on or before 1972 are marked with an "X" on the plat maps. The following table summarizes the information provided on the plat maps.

SUBDIVISION	# Lots Platted	# Homes Existing 1979	# Homes Built 1972 or earlier
Pendle Hill	72	60	0
Fiddlers Green	60	42	17
Mara Meadows	25	20	10
Falconhurst	68	55	6
Fall Creek Heights	259	245	232
Paradise Village	110	97	87
Ballards	48	48	48
Stottlemyer	29	29	29
Norris Heights	53	46	37
Shocks Addition	32	30	29
Baby Farms	77	70	64
Village Colony	75	58	11
Rose Addition	55	54	20

The subdivision of Sherwood Forest will be discussed in the comments at the end of this addendum.

Maps of the proposed sanitary sewers in these subdivisions cannot be supplied during this stage of the project. However, for estimating purposes the x'd in areas of the plat maps are areas of eligible construction while other areas are not. A complete breakdown of the estimated eligible and non-eligible costs for the sanitary sewers for each of the subdivisions is included in the appendix of this addendum.

(20) The present Regency Mobile Home Park N.P.D.E.S. will expire in 1981. The Indiana State Board of Health should modify the conditions of the permit prior to renewal and require that the Regency Park wastewater be transmitted to the Fall Creek Regional Waste District interceptor system at no cost to the District.

(21) On April 18th, 1978, the superintendent of the Pentacostal Church Camp, Mr. J.H. Simonson, attended the Public Hearing for the sewage project at Ingalls, Indiana. His questions and their responses were recorded in the minutes that were submitted with the Facilities Plan. The camp minister, Mr. Israel Christine, has attended several Fall Creek Regional Waste District mettings. Also, the consulting engineer for the camp, Mr. John Hawkins of West Lafayette, Indiana, has been informed of the infiltration problems and the recommendations of the Facilities Plan.

The camp will only discharge to the Regional Treatment Facility 3-4 months/year. Their present treatment facility will act as a holding facility for the remainder of the year. At the time the treatment plant at the camp is abandoned the camp officials have expressed a desire to minimize their excessive infiltration for economic reasons.

(22) Since the submittal of the Fall Creek Regional Waste District Facilities Plan, the sewer system evaluation survey conducted for the Town of Pendleton has been revised, with the remaining expected Infiltration/Inflow rate being somewhat lower than initially estimated. This change will require a revision in the capacity of the proposed Flow Equalization Basin at Pendleton.

The flow equalization basin (F.E.B.) will be sized to retain excessive infiltration/inflow from the Pendleton collection system until that time when the proposed sewage treatment facility can hydraulically accept the remaining I/I. In sizing the F.E.B. there are essentially 3 steps. The first step is to determine a design storm for the area and to calculate the expected I/I into the collection system, assuming that the rehabilitation program recommended in the S.S.E.S. has been successfully implemented. The next step is to determine an average I/I rate throughout the design period. This rate will be added to the expected Pendleton domestic and industrial flow to determine the design flow from the Pendelton area. The final step is to determine the excessive I/I that will require storage by subtracting the design flow from the expected

I/I in the system.

The infiltration/inflow (I/I) expected to remain in the Pendleton collection system after the rehabilitation program has been completed is about 31.9 million gallons (mg) per year. The average annual precipitation at the nearby Anderson sewage treatment plant from the years 1974 through 1978 is 37.43 inches. The relationship between precipitation and I/I thus is about 31.9 mg/yr ÷ 37.43 inches/yr = 0.852 mg I/I/inch precipitation.

The existing rainfall records were reviewed to find the worst 7 day rainfall period in the past five years. From August 6th to August 13th, 4.84 inches of rainfall were recorded. This event will be used as the design storm for the sizing of the flow equalization basin.

It is estimated that after the initial rainfall, infiltration will continue to enter the system for a period of 4 more days. The I/I is assumed to diminish by 20% each day. The table below illustrates these expected values.

EXPECTED I/I

PENDLETON

DAY	RAINFALL (INCHES)	I/I FROM DAY 1 (MG)	I/I 2 (MG)	I/I 3 (MG)	I/I 4 (MG)	I/I 5 (MG)	I/I 6 (MG)	I/I 7 (MG)	I/I 8 (MG)	TOTAL I/I (MG)
1	1.3	.37	--	--	--	--	--	--	--	.37
2	0.36	.30	.10	--	--	--	--	--	--	.40
3	0.18	.22	.08	.05	--	--	--	--	--	.35
4	0	.15	.06	.04	--	--	--	--	--	.25
5	0.57	.07	.04	.03	--	.16	--	--	--	.30
6	2.1	--	.02	.02	--	.13	.60	--	--	.77
7	0	--	--	.01	--	.10	.48	--	--	.59
8	0.33	--	--	--	--	.06	.36	--	.09	.51
9	--	--	--	--	--	.03	.24	--	.07	.34
10	--	--	--	--	--	--	.12	--	.06	.18
11	--	--	--	--	--	--	--	--	.04	.04
12	--	--	--	--	--	--	--	--	.02	.02

The total expected I/I for the design period is 4.12 MG. The average peak I/I over the 8 day design storm period would equal 4.12 ÷ 8 = 0.52 MG. As this is the average peak flow, the average daily design flow will equal 1/2 of that amount or 0.26 MGD. The design flow from the Pendleton area will equal the projected domestic and industrial flow (0.43 MGD plus the average infiltration rate (0.26 MGD) which totals 0.69 MGD.

The treatment plant will be sized to handle 0.69 MGD from the Pendleton area. The flow equalization basin will store all other flow until periods of low flow. The required storage capacity of the F.E.B. is shown in the following table:

F.E.B. STORAGE REQUIREMENT

DAY	PENDLETON DESIGN FLOW (MG) (I/I ONLY)	EXPECTED I/I (MG)	STORAGE REQUIRED (MG)
1	.26	.37	.11
2	.26	.40	.25
3	.26	.35	.34
4	.26	.25	.33
5	.26	.30	.37
6	.26	.77	.88
7	.26	.59	1.21
8	.26	.51	1.46
9	.26	.34	1.54
10	.26	.18	1.46
11	.26	.04	1.24
12	.26	.02	1.00
13-16	1.04	--	--

The maximum stored amount is 1.54 MG. The revised dimensions of the F.E.B. are shown in the design summary included in the appendix of this addendum.

(23,
24) The revised design population projections and plant capacity is shown in the table below.

FALL CREEK REGIONAL WASTE DISTRICT

DESIGN DATA

SERVICE AREA	PRESENT FLOW	DESIGN FLOW
Town of Pendleton	242,000	278,000
Average Daily Infiltration	310,000	260,000
Arrowhead Estates	21,000	21,000
Pendleton Schools	70,750	70,750
Murcers Addition	3,910	3,910
Outlying Areas	43,400	56,420
Town of Ingalls	90,700	132,500
Development NW of Ingalls	6,400	6,900
Ingalls School	1,250	1,250
M.H.P., N.E. of Ingalls	6,000	8,000
Pentacostal Camp	100,000	100,000
State Reformatory	400,000	760,750
Lantern Meadows	8,500	11,400
South Anderson Subdivisions	---	---
Fall Creek Heights	83,060	87,800
Paradise Village	32,880	37,290
Ballards	16,270	16,270
Stottlemyer	9,830	9,830
Village Colony	19,660	25,430
Norris Heights	15,600	17,970
Shocks Addition and Main St.	14,580	15,260
Baby Farms	22,820	25,100
Rose Addition/Surrounding Area	18,310	26,440
Fall Creek Developments Subdivisions	---	---
Pendle Hill	20,340	24,410
Fiddler's Green	14,340	20,340
Mara Meadows	6,780	8,400
Falconhurst	18,640	23,050
Regency M.H.P.	11,500	11,500
TOTAL DESIGN FLOW	1,593,940 GPD	2,061,400 GPD

(25) The treatment plant costs for the different wastewater treatment alternatives are broken down for four plant sizes (0.07 MGD, 0.33 MGD, 1.8 MGD and 27. MGD) on pages 118 and 119 of the Facilities Plan.

(26, 29) The appendix to this addendum contains the complete revised construction and non-construction costs for the project. Also shown are the revised operation and maintenance costs and estimated user rates.

The costs have been revised upward due, basically, to inflation. The costs were estimated when the Facilities Plan was prepared in 1977. Although a 10% contingency cost was added at that time, construction costs have risen at an estimated 16% rate since that time. Also, some items such as power, concrete and land have inflated at substantionally higher rates than 16%. The estimated costs shown in the addendum were developed using bid prices from recently bid sewage treatment projects and also from the cost data supplied in the E.P.A. publication 430/9-77-013.

(27) The proposed labor budget of $32,000 per year was based upon an estimated 4-8 hour per day, 5 day per week plant operation. However, a recent survey of sewage treatment plants this size around the State has shown that a minimum of 7 days per week, 8 hour per day plant operation is required. For this reason, the estimated labor schedule must be revised.

The plant will be operated by a licensed Class III certified operator. Assisting the Chief Operator will be 2 full time assistant operators. The duties of the assistant operators will essentially be assisting the Chief Operator in all phases of the treatment plant operation. One full time laborer will be hired to work for the assistant operators during the weekends or other periods when the Chief Operator is not available. In addition to the operators, a full time chemist will be employed to run all laboratory tests required.

The maintenance of the collection and interceptor systems and some of the treatment plant maintenance will be conducted by a maintenance department consisting of a chief maintenance person, one full time assistant and one part time assistant. In addition to routine maintenance this department will also be responsible for sludge disposal.

The anticipated labor costs are shown on the proposed operation and maintenance costs in the appendix of this addendum.

(30) The table below lists the industries, their function, employment and method of sewage disposal for the planning area within Madison County. The industrial development in the Fortville area was covered extensively in the Facilities Plan.

INDUSTRY	LOCATION	FUNCTION	#PERSONS EMPLOYED	CURRENT METHOD OF SEWAGE DISPOSAL
1. Ex-Cell-O Corp.	Pendleton	Aircraft Parts	410	Discharges to Pendleton Sewage System
2. Umble Concrete	Pendleton	Manuf. Conc. Block & Tile	10-12	Discharges to Pendelton Sewage System
3. Anderson Masonry	North Pendleton on Anderson Pike Road	Masonry Products	21	Private System - suspected discharge to Prairie Creek
4. C & R Tool & Die Shop	Pendleton (E. Side)	Tool & Die Casting	20	Discharges to private septic syste
5. Pendleton Motel	Pendleton (E. Side)	Motel	7	Discharges to holdin tank with periodic pumping
6. Young's Boat Rental	North Pendleton on Anderson Pike Road	Boat Rental	5	Private system - suspected discharge to Prairie Creek
7. Macy's Grocery	Pendleton	Grocery	18	Discharges to Pendle ton sewage system
8. Ring Imple- ment Corp.	Pendleton	Rings	6	Discharges to Pendle ton sewage system
9. Pendelton Water Co.	Pendleton	Utility	8	Discharges to Pendle ton sewage system
10. Ingalls Auto Repair	Ingalls	Auto Repair	9	Suspected Direct dis charge to Ingalls storm sewer
11. MarkTool & Die	Markleville	Tool & Die	12-15	Suspected direct dis charge to Marklevill storm sewer
12. Vogle Tool	Markleville	Tool & Die	30	Suspected direct dis charge to Marklevill storm sewer
13. Markleville Lumber Yard	Markleville	Lumber	10-12	Private Septic syste
14. Fredricks, Inc.	Markleville	Const. of Pole Bldgs.	12	Suspected direct dis charge to Marklevill storm sewer

Once the recommendations of the Facilities Plan are implemented, all known industrial discharges will be collected in a public system in the planning area.

Of the industries listed, only one contributes a sizeable quantity of sewage to the public system - the Ex-Cell-O Corporation of Pendleton. Over the past 3 years, Ex-Cell-O Corporation has consumed an average of 16,500 gallons of water per day. From this figure, the estimated sewage production is 19,410 gallons per day. This figure is below the 25,000 gpd E.P.A. guidline for industrial cost recovery. It is the intent of the Fall Creek Regional Waste District to develop and implement a pretreatment policy for all industrial discharges prior to the proposed sewage system becoming operational.

(31) A letter from the Madison County Sanitarian relating several pollution and groundwater problems in the planning area is included in the appendix of this addendum.

A complete soils survey for Madison County written by the United States Department of Agriculture Soil Conservation Service was used extensively in the preparation of the Facilities Plan. A copy of this report is available upon request from this office.

OTHER COMMENTS

Recently, the City of Anderson, Indiana, has expanded their City boundaries to include all of Anderson Township. All items such as fire and police protection, road service, water service and sewage service for the recently incorporated areas are new under the jurisdication of the City of Anderson.

The subdivision of Sherwood Forest is included in this area. For this reason, implementation of the recommendations concerning this area in the Fall Creek Facilities Plan shall be conducted by the City of Anderson. The recommendations and all other information concerning Sherwood Forest shall be forwarded to the appropriate Anderson City officials by the Fall Creek Regional Waste District.

The Town of Fortville will be completing a facilities plan for Fortville and the surrounding area in Hancock County in the near future. The facilities plan for that area will be submitted in the form of an Addendum #2 to the Fall Creek Regional Waste District Facilities Plan.

APPENDIX

TO

ADDENDUM ONE

INDEX

1. Comment letter from Indiana State Board of Health
2. Revised Cost Estimates
3. Revised Design Summary
4. Revised Implementation Schedule
5. Land Use Map
6. Letter fron Indiana Department of Natural Resources
   - A. Historical, Architectural or Archaeological Effects
   - B. Flood Plain Information
   - C. Wetlands
   - D. Endangered Species
7. Letter fron Indiana Department of Administration Concerning Flows at Pendleton Reformatory
8. Plat Maps of Subdivisions East of Pendleton
9. Letter from Madison County Health Department

STATE of INDIANA

STATE BOARD OF HEALTH

AN EQUAL OPPORTUNITY EMPLOYER

INDIANAPOLIS

Address Reply to:
Indiana State Board of Health
1330 West Michigan Street
Indianapolis, IN 46206

January 18, 1979

Beam, Longest and Neff, Inc.
Attention: Mr. Mike R. Kline
8136 Castleton Road
Indianapolis, IN 46250

Gentlemen:

Re: Facilities Plan
C180872 01
Fall Creek Regional Waste District

A review of the Fall Creek Regional Waste District Facility Plan has been completed, and the following comments are offered:

1. A detailed land use map depicting existing and future land use characteristics should be provided for the entire planning area. "Pie" diagrams are to generalized.

2. The Department of Natural Resources should be consulted on the following:

   a. A letter must be obtained stating that the proposed construction will not affect any known Archaeological/Historical sites.

   b. The Department must verify that the proposed construction will not affect any environmentally sensitive or endangered species.

3. Will the proposed plant site be above the 100-year flood line? Will any flood plains or wetlands be affected by the proposed project?

4. What is the basis for the population projection of 2500 for the Indiana Reformatory?

5. The population projection for the Town of Ingalls and for the subdivisions in Fall Creek Township are much higher than the population projections developed and adopted by the Region VI Planning and Development Commission.

a. The population growth rate for Green Township, which includes the Town of Ingalls, is 5.7 percent. By the use of the "least squares" method of projecting the population for Ingalls, the population projection is between 965 and 1050. If the figure of 1325 is used, the figure must be justified.

b. The growth rate for Fall Creek Township is only 18.9 percent for the next 20 years; therefore, if higher population projections are used for the subdivisions in this area, they must be justified.

6. A complete summary of all environmental impacts with respect to primary and secondary effects must be addressed more thoroughly. Secondary impacts induce changes in land use, population density and effects on natural resources such as air and water. Will the secondary impacts created by the project be considered by the local planning agency?

7. Proposed mitigating measures should be listed and assessed for any adverse effects created by the project.

8. The report lists the raw BOD as 300 mg/l which is very high in view of the fact that the inflow includes 0.31 mgd of infiltration. Furthermore, this gives an aeration tank loading of 52.4 lbs/1000 cf per day which is above the accepted loading rate. If the strength of the BOD in the inflow is assumed to be 200 mg/l, the loading on the aeration tanks is 35 lbs/1000 cf per day which is acceptable.

9. Since the implementation of the phosphate detergent ban, the concentration of phosphorus in most influents is in the range of five or six mg/l instead of 15 mg/l as indicated on page 150. The inclusion of .310 mgd of infiltration should further lower the phosphate concentration.

10. The present design standards recommend minimum sidewall depth of 10 feet for final clarifiers; however, the forthcoming revisions recommend a minimum depth of 12 feet for final clarifiers. This change should be considered by the Engineer.

11. Page 155 of the report recommends both step cascades and rotors for aeration of the final effluent. Are both systems needed?

12. The two one-day lagoons should be designed to be operated either in series or in parallel with provisions for the addition of chemicals; therefore, condideration should be given to bringing the two effluent lines to a common junction box.

13. Lagoons generally require the addition of chemicals only a few days each year; therefore, the O&M costs shown on page 128 appear to be in error. The chart on page 128 does not agree with the statement made in the second paragraph on page 110. Since the addition of chemicals will be required only occasionally, we question if elaborate chemical feed equipment facilities are required.

14. An area of one square foot per capita is sufficient sludge drying bed area if the primary method of sludge disposal is liquid sludge application to the land. Will liquid sludge disposal facilities be provided?

15. Gas production is generally greatest in the first stages or primary digester and not in the secondary digester. It is preferable to have floating covers on both digesters instead of only the secondary digester. If it is necessary to thicken the waste activated sludge, it should be thickened in a separate open-top sludge thickener or in the primary clarifiers.

16. A cost study must be made to determine if an aerobic digestion might be a cost-effective method of treating the sludge for this facility.

17. What will be the ultimate disposal of the digested sludge? Will it be applied to farm land or hauled to a landfill? If the sludge is disposed of in a landfill, permission must be obtained from the Indiana State Board of Health to deposit the sludge in the landfill.

18. Data must be provided regarding the dates that the homes were constructed in Baby Farm, Rose Addition, Pendel Hills, Mara Meadows, Falconhurst and Sherwood Forrest subdivisions. This information is necessary to determine the eligibility for funding.

19. Maps of the proposed sanitary sewers for all of the subdivisions must be provided. The maps should identify all homes in existence prior to October 18, 1972.

20. Is the Regency Mobile Home Park required to connect into a regional sewer district or can the park continue to operate its own wastewater treatment plant?

21. Has the infiltration problem from the church camp near Ingalls been discussed with the church officals? Is the church aware of the cost to treat the present flow?

22. The size of the flow equalization basin needs to be discussed in more detail, and more justifications must be provided for the proposed size. Since the dry weather infiltration rate is approximately 100,000 gallons per day, does the plant need to be designed for an infiltration rate of 310,000 gallons per day?

23. If the design population projections are decreased, the plant design must be modified to reflect the change in the design flow and the project cost.

24. Page 140 indicates that the projected flow will be 2.3 mgd yet it is proposed to construct a 2.5 mgd plant. The size of the plant to be constructed must be the same as the projected flow for the design period. The necessary changes in the estimated costs must be made.

25. The treatment costs for the different alternates are not discussed in the Facility Plan. A table should be provided which lists the construction costs, operation and maintenance costs and present worth for the different alternate types of treatment. The cost for land application must be completed.

26. The construction cost for the selected alternate appears to be very low. This cost should be reviewed and revised if necessary.

27. The proposed budget of $32,000 per year appears to be too low for a plant of this size. A detailed budget must be submitted. The budget should include the number of plant operators and other essential data.

28. A breakdown should be provided of the costs for sanitary sewers for each of the subdivisions to be served by the new system.

29. The cost of $12.00 per foot for sanitary sewers appears to be low. This figure should be checked and changed if necessary.

30. The Facility Plan does not list the industries located in the planning area. The industries located in the planning area and their waste problems must be discussed in the Facility Plan.

31. The requirements of PRM 78-9 have not been satisfied.

    a. No information has been provided regarding any pollution complaints in the Files of the Madison County Health Department.

    b. No walk-through surveys have been made by the Soil Conservation Service to determine the soil types in the various subdivisions for which it is proposed to be provide sanitary sewers.

    c. No information has been provided regarding the water supplies in the subdivision and any possible well contamination in the area to be sewered.

By a copy of this letter, a copy of the Fall Creek Regional Wastewater Facility Plan will be forewarded to the U.S. Environmental Protection Agency for their review and comments.

If you have any questions relating to this correspondence, do not hesitate to contact Mr. Max T. Orem at AC 317/633-0777.

Very truly yours,

Robert T. Penno

Robert Penno, Acting Chief
Construction Grants Section
Division of Water Pollution Control

MTOrem/rjh
Enclosures
cc: Mr. Keith Williams, President
Fall Creek Regional Wastewater District
Mr. Dan Banaszek, U.S. EPA

REVISED CONSTRUCTION COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	AMOUNT ELIGIBLE	AMOUNT NON-ELIGIBLE
PENDLETON				
Collect. Sys. Rehabilitation	LS	376,000	376,000	
Modification of Plant	LS	52,800	52,800	
Flow Equalization Basin	LS	225,000	225,000	
Outlying Areas Collection Systems (Idlewold, Anderson Pipe Systems)				
8" Gravity Sewer	6170 FT	14		86,380
Type 1 Manholes	17	1,000		17,000
Type 2 Manholes	1	1,400		1,400
Backfill	4060 TONS	5		20,300
Street Repair	1180 SYDS	8.50		10,030
House Laterals	1320 FT	10		13,200
Tee Connections	52	40		2,080
Lift Stations	2	25,000		50,000
4" Force Main	3970	6		23,820
Contingency	LS	22,420		22,420
Outlying Areas Pressure Systems (#2, #3, #4)				
2½" Pressure Sewer	6950 FT	4	27,800	
1¼" Laterals from Pumps	1540 FT	3	4,620	
Grinder Pump Units	77	5,000	385,000	
Valve Boxes	12	300	3,600	
Cleanouts	10	200	2,000	
Street Repair	1250 SYDS	8.50	10,630	
Backfill	3900 TONS	5	19,500	
Rock Excavations	600 CYDS	50	30,000	
Crushed Stone	3220 TONS	7	22,540	
Contingency	LS	50,570	50,570	
Murler's Addition				
2½" Pressure Sewer	2300 FT	4	9,200	
1¼" Laterals	240 FT	3	720	
Grinder Pumping Units	12	5,000	60,000	
Pump Station	1	6,000	6,000	
Backfill	680 TONS	5	3,400	
Cleanouts	2	200	400	
Highway Crossing	80 FT	100	8,000	
Contingency	LS	3,980	3,980	
Pendleton Lift Station	LS	40,000	40,000	
(SUBTOTALS THIS SHEET)			1,341,760	246,630

REVISED CONSTRUCTION COST ESTIMATE

ITEM	QUANTITY		UNIT PRICE	AMOUNT ELIGIBLE	AMOUNT NON-ELIGIBLE
INGALLS					
Ingalls Collection System					
8" Gravity Sewer	27,100	FT	14	379,400	
Manholes	81		1,000	81,000	
Backfill	31,200	TON	5	156,000	
Crushed Stone	1,500	TON	7	10,500	
RR Crossing	100	FT	100	10,000	
Street Repair	10,210	SYDS	8.50	86,790	
6" Laterals	790	FT	10		7,900
House Connections	270		40	10,800	
Highway Crossing	100	FT	100	10,000	
Lift Station	1		25,000	25,000	
4" Force Main	1,080	FT	6	6,480	
Contingency	LS		78,390	77,600	790
Ingalls Interceptor					
6" Force Main	4,900	FT	9	44,100	
Air Release Valves	4		1,500	6,000	
Clean Outs	3		1,200	3,600	
Backfill	2,720	TON	5	13,600	
Crushed Stone	200	TON	7	1,400	
Street Repair	980	SYDS	8.50	8,330	
Stream Crossing	1		3,000	3,000	
Lift Station	1		30,000	30,000	
Contingency	LS		11,000	11,000	
Development NW of Ingalls					
Manholes	8		1,000		8,000
Backfill	130	TON	5		650
Crushed Stone	450	TON	7		3,150
Street Repair	150	SYDS	8.50		1,280
8" Gravity Sewer	2,600	LFT	14		36,400
4" Force Main	3,800	LFT	6		22,800
House Connections	22		40		880
6" Laterals	820	LFT	10		8,200
Contingency	LS		8,140		8,140
Pentacostal Camp Interceptor					
Lift Station	1		25,000	25,000	
4" Force Main	1,300		6	7,800	
Stream Crossing	1		3,000	3,000	
Air Release Valve	2		1,500	3,000	
Cleanout	1		1,200	1,200	
Flowmeter	1		5,000	5,000	
Contingency	LS		4,500	4,500	
(SUBTOTALS THIS SHEET)				1,024,100	98,910

REVISED CONSTRUCTION COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	AMOUNT ELIGIBLE	AMOUNT NON-ELIGIBLE
REGIONAL INTERCEPTOR				
Type "A" Lift Stations	5	25,000	125,000	
Type "B" Lift Stations	2	40,000	80,000	
12" Force Main	12,000	15	180,000	
10" Force Main	12,890	12	154,680	
8" Force Main	14,150	10	141,500	
6" Force Main	13,030	8	104,240	
4" Force Main	13,270	6	79,260	
27" Gravity Sewer	6,200	35	217,000	
24" Gravity Sewer	3,330	30	99,900	
15" Gravity Sewer	7,800	23	179,400	
12" Gravity Sewer	1,800	78	32,400	
8" Gravity Sewer	5,050	14	70,700	
Type 1 Manholes	71	1,000	71,000	
Type 2 Manholes	16	1,400	22,400	
Crushed Stone	12,750	7	89,250	
Granular Backfill	99,945	5	499,730	
Air Release Valves	25	1,500	37,500	
Clean-outs	37	1,200	44,400	
Railroad Crossing	180	100	18,000	
Stream Crossing	440	50	22,000	
Highway Crossing	450	100	45,000	
Street Repair	12,780	8.50	108,630	
Telemetering System	LS	80,000	80,000	
Contingency	LS	250,110	250,110	
Mobile Home Park NE of Ingalls				
8" Gravity Sewer	1,100	14		15,400
Type 1 Manholes	3	1,000		3,000
Type 2 Manholes	1	1,400		1,400
House Laterals	450	10		4,500
Tee Connections	15	40		600
Contingency	LS	2,090		2,090
Lantern Meadows & Adjacent Areas				
8" Gravity Sewer	5,570	14	28,420	49,560
Type 1 Manholes	10	1,000	5,000	5,000
Type 2 Manholes	2	1,400	2,800	
Crushed Stone	1,040	7	7,280	
Granular Backfill	9,700	5	29,100	19,400
Street Repair	6,300	8.5	10,710	42,840
6" House Laterals	2,800	10		28,000
House Connections	80	40	2,040	1,160
Highway Crossing	100	100	10,000	
15" Gravity Sewer	1,350	23	31,050	
Contingency	LS		12,640	14,600
(SUBTOTALS THIS SHEET)			2,891,140	187,550

REVISED CONSTRUCTION COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	AMOUNT ELIGIBLE	AMOUNT NON-ELIGIBLE
SOUTH ANDERSON SUBDIVISIONS				
Fall Creek Heights				
8" Gravity Sewer	26,750	14	234,500	
Manholes	45	1,000	45,000	
Backfill	32,000	5	160,000	
Crushed Stone	1,000	7	7,000	
Street Repair	12,240	8.50	104,040	
House Connections	259	40	10,360	
6" House Laterals	6,480	10		64,800
Contingency	LS	62,570	56,090	6,480
Paradise Village				
8" Gravity Sewer	4,500	14	63,000	
Manholes	14	1,000	14,000	
Backfill	9,000	5	45,000	
Crushed Stone	400	7	2,800	
Street Repair	3,100	8.50	26,350	
House Connections	110	40	4,400	
6" House Laterals	2,750	10		27,500
Contingency	LS	18,310	15,560	2,750
Stottlemyer, Ballards & Norris Heights				
8" Gravity Sewer	9,300	14	130,200	
Manholes	36	1,000	36,000	
Backfill	15,400	5	77,000	
Crushed Stone	800	7	5,600	
Street Repair	5,360	850	45,560	
House Connections	130	40	5,200	
6" House Laterals	3,250			32,500
Contingency	LS	33,210	29,960	3,250
Village Colony				
8" Gravity Sewer	3,050	14		42,700
Manholes	9	1,000		9,000
Backfill	6,000	5		30,000
Crushed Stone	300	7		2,100
Street Repair	2,440	8.50		20,740
House Connections	75	40		3,000
6" House Laterals	1,880	10		18,800
Contingency	LS	12,630		12,630
(SUBTOTALS THIS SHEET)			1,117,620	275,980

REVISED CONSTRUCTION COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	AMOUNT ELIGIBLE	AMOUNT NON-ELIGIBLE
SOUTH ANDERSON CONT.				
Shock's Addition				
8" Gravity Sewer	7,650	14	107,100	
Manholes	22	1,000	22,000	
Backfill	9,100	5	45,500	
Crushed Stone	300	7	2,100	
Street Repair	5,600	8.50	47,600	
House Connections	32	40	1,280	
6" Laterals	800	10		8,000
Contingency	LS	23,360	22,560	800
Baby Farms				
8" Gravity Sewer	7,900	14	110,600	
Manholes	24	1,000	24,000	
Backfill	17,300	5	86,500	
Crushed Stone	500	7	3,500	
Street Repair	6,500	8.50	55,250	
House Connections	77	40	3,080	
6" Laterals	1,930	10		19,300
Contingency	LS	30,220	28,290	1,930
Rose Addition				
8" Gravity Sewer	6,610	14	29,400	63,140
Manholes	21	1,000	9,000	12,000
Backfill	12,480	5	13,650	48,750
Crushed Stone	20	7	50	90
Street Repair	5,700	8.50	12,150	36,300
House Connections	55	40	960	12,400
6" Laterals	1,380	10		13,800
Contingency	LS	25,170	6,250	18,650
FALL CREEK DEVELOPMENTS				
Pendle Hill				
8" Gravity Sewer	4,250	14		59,500
Manholes	18	1,000		18,000
Backfill	6,830	5		34,150
Crushed Stone	1,160	7		8,120
Street Repair	3,360	8.50		28,560
House Connections	72	40		2,880
6" Laterals	1,800	10		18,000
Lift Station	1	20,000		20,000
Force Main	1,350	6		8,100
Contingency	LS	19,730		19,730
(SUBTOTALS THIS SHEET)			630,820	452,200

REVISED CONSTRUCTION COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	AMOUNT ELIGIBLE	AMOUNT NON-ELIGIBLE
FALL CREEK DEVELOPMENTS, CONT.				
Fiddler's Green				
8" Gravity Sewer	4,850	14	16,970	50,920
Manholes	1,100	1,100	2,750	8,250
Backfill	6,300	5	7,880	23,620
Crushed Stone	20	7		140
Street Repair	5,770	10	14,430	43,270
House Connections	60	40	640	1,760
6" Laterals	1,500	10		15,000
Contingency	LS	18,570	4,270	14,300
Mara Meadows				
8" Gravity Sewer	3,300	14	36,400	9,800
Manholes	9	1,000	6,000	3,000
Backfill	1,950	5	5,200	4,550
Crushed Stone	25	7		180
Street Repair	1,370	8.50	6,210	5,440
House Connections	25	40	400	600
6" Laterals	525	10		5,250
Contingency	LS	7,320	5,420	1,900
Falconhurst				
8" Gravity Sewer	3,460	14		48,440
Manholes	16	1,000		16,000
Backfill	12,830	5		64,150
Crushed Stone	30	7		210
Street Repair	3,600	8.50		30,600
House Connections	68	40		2,720
6" Laterals	1,700	10		17,000
Lift Station	1	20,000		20,000
4" Force Main	4,290	6		25,740
Contingency	LS	23,470		23,470
Regency MHP & Area West of MHP				
Lift Station	LS	25,000		25,000
4" Force Main	800	6		4,800
8" Gravity Sewer	1,200	14		16,800
Manholes	4	1,000		4,000
Backfill	1,560	5		7,800
House Connections	18	40		720
6" Laterals	360	10		3,600
Bored Laterals	240	80		19,200
Contingency	LS	8,190		8,190
(SUBTOTALS THIS SHEET)			106,570	518,230

REVISED TREATMENT PLANT COSTS

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	AMOUNT
1.	Type 1 Manholes	EA	12	$ 1,000	$ 12,000
2.	Screw Pump	LS			44,850
3.	Comminutor & Bar Screen	LS			34,500
4.	Grit Removal Facilities	LS			38,120
5.	Primary Clarifiers	EA	2	132,250	264,500
6.	2.1 MGD Activated Sludge STP	LS			340,000
7.	Phosphorus Removal	LS			70,000
8.	Final Clarifier	EA	2	115,250	230,500
9.	Chlorination Building & Accessories	LS			58,500
10.	One Day Terminal Ponds	LS			282,760
11.	Flowmeter	LS			9,200
12.	Sludge Storage Lagoon	LS			159,200
13.	Sludge Digestors	LS			309,000
14.	Air Flotation Thickner	LS			132,000
15.	Heat Exchanger	LS			45,000
16.	Plant Building	LS			440,000
17.	Parking & Access	LS			54,400
18.	Landscaping & Sitework	LS			102,000
19.	12" Effluent Line	LFT	450	20	9,000
20.	Outfall Structure	LS			3,500
21.	Plant Piping	LS			124,000
22.	Blowers & Accessories	LS			75,000
23.	Lab Equipment	LS			55,000
24.	Electrical Equipment	LS			141,000
25.	Chain Link Fence	LFT	1,800	10	18,000
26.	Gates	EA	4	1,000	4,000
27.	Water Supply	LS			6,500
28.	Drainage Pipe	LFT	600	20	12,000
29.	Chemical Feed Equipment	LS			19,000
30.	Equipment Operation	LS			133,000
31.	Contingency	LS			322,650
					3,549,180

USER RATE CALCULATIONS

FALL CREEK REGIONAL WASTE DISTRICT

Construction Costs			
Total Non-Eligible Costs			1,779,500
Total Eligible Costs	Collection Systems		4,359,910
	Regional Interceptor		2,752,100
	Sewage Treatment Plant		3,549,180
	TOTAL CONSTRUCTION COSTS		12,440,690
Non-Construction Costs			
Engineering		870,800	
Supervision		216,100	
Core Borings		9,000	
O & M Manual		15,000	
Operator Familiarization		10,000	
Administrator		2,500	
			1,123,400
Non-Eligible Non-Construction Costs			
Engineering		143,980	
Land Acquisition & R/W		133,500	
Rate Consultant		12,000	
Legal		15,000	
Bond Council		5,000	
Interest During Const.		180,000	
			489,480
	TOTAL INITIAL COST		14,053,570

Annual Operation & Maintenance Costs

Clerk	8,320
Operator Training	500
Certified Operator	16,000
Chemist	14,500
Operator's Assistants (2)	20,800
Laborers (2½)	18,200
Chief of Maintenance	12,500
Consulting Services	4,500
District Board	2,700
Chemicals	27,000
Equipment & Repair	3,000
Power & Fuel	56,550
Insurance & Taxes	2,000
Contractual Services	1,500
Telemetering System	750
	188,820

USER COSTS - ESTIMATE

FALL CREEK REGIONAL WASTE DISTRICT

ELIGIBLE COSTS		
Treatment Plant		$3,549,180
Interceptor		2,752,100
Collection System		4,359,910
Non-Construction Costs		1,123,400
	TOTAL	$11,784,590
NON-ELIGIBLE COSTS		
Construction Costs		1,779,500
Non-Construction Costs		489,480
	TOTAL	$2,268,980
GRANTS		
Federal Grants (75%)		8,838,440
State Grants (10%)		1,178,460
	TOTAL	$10,016,900
OWNERS CAPITAL COST		
Total Project Costs		14,053,570
Less Grants		10,016,900
	TOTAL	$4,036,670
USER COSTS W/40 YEAR F.H.A. LOAN @ 5%		
Principal & Interest		235,260
Replacement Costs		89,970
Operation & Maintenance Costs		188,820
	TOTAL	$ 514,050

USER RATES 514,050/4082 USERS/12 MOS. = 10.24/USER/MONTH

USER COSTS W/6%, 20 YR. BOND		
Principal & Interest		351,920
Replacement Costs		67,290
Operation and Maintenance Costs		188,820
	TOTAL	$ 608,030

USER RATES 630,710/4082 USERS/12 MOS.= 12.41 /USER/MONTH

FALL CREEK REGIONAL WASTE DISTRICT

ESTIMATED USERS (CURRENT)

SOURCES OF FLOW	USER EQUIVALENTS
Pendleton Proper	800
Pendleton-Outlying Areas	128
Pendelton-Businesses	
Laundramat	45
Ex-Cell-O Corp.	57
Town of Pendleton	8
Grocery Markets (4)	16
Carwash	4
Clothing Cleaners	4
Restaurants (6)	24
Other Industrial	16
Light Commercial (51)	51
Pendleton-Schools	
High School	76
Middle School	40
Elementary School	49
State Highway Headquarters	10
Ingalls Proper	300
MHP N.E. of Ingalls	40
Area W. of Ingalls	35
Ingalls School	5
Ingalls Small Business (10)	12
Pendleton Reformatory	1360
Murler's Addition	12
Lantern Meadows	61
Fall Creek Heights	245
Paradise Village	97
Ballard's Addition	48
Stottlemyer Addition	29
Norris Heights	46
Shock's Addition	30
Baby Farms	70
Village Colony	58
Rose Addition	54
Pendle Hill	60
Fiddler's Green	42
Mara Meadows	20
Falconhurst	55
Regency MHD	31
Pentacostal Camp	44
TOTAL	4082

ESTIMATED REPLACEMENT COSTS

25% of 15 year Service Life/15 Year Service
40% of 30 year Service Life/30 Year Service Life
10% of 50 year Service Life/50 Year Service Life (40 year loan)

15 Year Service Life	2,015,810
30 Year Service Life	3,134,280
50 Year Service Life	7,290,600

Replacement Costs w/40 Year Loan

0.25 X 2,015,810/15 =	33,600
0.40 X 3,134,280/30 =	41,790
0.10 X 7,290,600/50 =	14,580
	89,970

Replacement Costs w/20 Year Loan

0.25 X 2,015,810/15 =	33,600
0.40 X 3,134,280/30 X $\frac{20}{30}$ =	27,860
0.10 X 7,290,600/50 X $\frac{20}{50}$ =	5,830
	$ 67,290

REVISED DESIGN SUMMARY

COLLECTION SYSTEMS AND INTERCEPTORS

No major Design Summary revisions are necessary for these items as a direct result of this Addendum.

TREATMENT PLANT

Revised Design Flow: 2.10 M.G.D.
*Existing Flow: 1.60 M.G.D.
*(without present estimated infiltration in Pendleton collection system)

Wastewater Strength - Design Sewage Strength
B.O.D. - 200 p.p.m. S.S. - 240 p.p.m.

Influent B.O.D. - 2.1 MGD X $\frac{200 \text{ parts}}{\text{million}}$ X 8.34 = 3500 LB/DAY

Influent S.S. - 2.1 MGD X $\frac{240 \text{ parts}}{\text{million}}$ X 8.34 = 4200 LB/DAY

Design Effluent (monthly average)

B.O.D. - 10 ppm, 175 LB/DAY (at design flow)

S.S. - 10 ppm, 175 LB/DAY (at design flow)

PRIMARY TREATMENT

A screw upmp will lift the gravity-flowed influent sewage to the primary treatment facilities. The primary treatment facilities will include a comminutor and bar screen unit, a grit removal facility and 4 rectangular primary clarifier units. Flow dividing units and a flow meter facility will also be included.

The bar screen will be the manually cleaned type with a maximum bar spacing of 2 inches and a total available screening area of 1,000 square inches. The bar screen will be installed at a slope of 30°.

The comminutor will be the reversive, revolving drum type with a minimum screen slot of 3/8 inches. Two comminutors will be provided and will operate in parallel. Slide gates will allow for isolation of one unit for maintenance purposes.

The grit chamber will follow the comminutor and bar screen unit and will be of the open channel-horizontal flow type. The chamber will be designed to provide controlled velocities as close to 1 foot per second as possible. Grit removal facilities will consist of a conveyor and storage facilities.

The flow meter shall have a chart recorder located in the plant building with a float actuated transmitter installed in a 12" Parshall Flume.

PRIMARY CLARIFIERS

4 Rectangular Units

Liquid depth - 10 feet (average) with 1.5 foot freeboard.

2,100,000/24 = 87,500 gallons/hour

2 hours minimum detention - 175,000 gal. = 23,400 cft.

23,400/4 = 5,850 cft/unit

5,850/10 = 585 sq.ft. surface area/unit
= 600 sq. ft.
use 4 units, each 12' X 50' X 10' S.W.D.

Detention time 4X 12 X 50 X 10 X 7.48/87,500 = 2.05 Hours

Surface Settling Rate = 2.1 MGD/(12X50)/4 = 875 GPD/sq.ft.

Weirs - 4 per unit - 16 total (each 2 sided)
4 X 2 X 12 X 4 = 384 LFT
Weir Overflow Rate -
2.1 MGD/384 Ft = 5,470 GAL/LFT/DAY

Approximately 1,400 # of B.O.D. and 1,680 # of S.S. will be removed by the Primary Treatment Facilities.

SECONDARY TREATMENT

The secondary treatment facilities will consist of a standard activated sludge unit with 6 hour detention time.

Aeration Tank - 4 rectangular units. Remaining B.O.D. = 2,100 LB.

6 hour detention - 2.1/4 = 525,000 GALLONS (TOTAL)

525,000/7.48 = 70,187 cft.

Depth (average) - 13 feet with 1.5 foot freeboard.
Surface Area Required = 70,187/13 = 5,400 sq.ft.
5,400/4 = 1,350 sq.ft. Surface Area/Unit.

Each unit shall be 15' wide, 90 feet long, 13' deep.

Total aeration loading - 2,100 LB/70,187 X 1,000 = 30 LB/cft

Sludge Return Range - 200% of design flow (maximum)

Blowers

Aeration: 2,100 # X 1,500/1,440 =		2,190 C.F.M.
Air Lifts: 8 X 20 =		160 C.F.M.
	TOTAL	2,350 C.F.M.

Use 3 - 1,175 C.F.M. BLOWERS

OTHER TREATMENT FACILITIES

Secondary Clarifiers - 2 circular units

2 hours detention time
Volume Required - 2 HRS X 87,500 GAL/HR = 175,000 GALS.
175,000/7.48/2 = 11,700 CFT/UNIT Required

Depth - 12'
Surface Area/Unit = 11,700/12 = 875 sq.ft.
$D^2/4 = 875$ D = 36 ft.

Surface Settling Rate = 1,030 gpd/sq.ft.

Weir Overflow Rate - 36 X 2 X = 226 LFT Weir
2,100,000/226 = 9,284 GAL/LNFT/DAY

Phosphorous Removal Facilities

These facilities will be located between the aeration tanks and the final clarifiers. These facilities will include a spiral type mixing zone and chemical addition equipment.

Estimated Alum Addition Required

Influent Phosphorus Concentration - 5 ppm

$$5 \text{ ppm} \times 2.10 \text{ MGD} \times \frac{8.34 \text{ LB}}{\text{gallon}} = 88 \text{ \#/DAY}$$

Alum dosage required - 1.2 # Alum per # P
1.2 X 88 = 106 #/DAY
Liquid Dosage Required at 0.5 # Alum
106 # X 1/0.5 = 212 gallons water/day

Chlorine Contact Tank

Chlorine Addition - Gas chlorinator with weir water level control. Normal solution - 10 ppm.

2,100,000/48 = 43,750 gallons/half hour
= 5,850 cft
Average depth - 8 ft. with 1.5 ft. freeboard
Surface area = 5,850/8 = 730 sq.ft.

Volume = 8' X 25' X 30' = 6,000 X 7.48 X 48 = 2.15 MGD

A building constructed above the chamber will house all chlorine addition equipment. Provisions will be made for dewatering the tank for removal of sludge by flushing.

ADVANCED TREATMENT

One Day Holding Ponds with Chemical Addition

2 earthen one day lagoons to operate in parallel.

Pond Depth - 12'
Liquid Length - 188' (each) Liquid Width - 125' (each)
Inside Slope - 3:1 Outside Slope - 3:1
1 Ft. Clay Liner. 10' Wide Roadway Around Pond.
Total Pond working volume - 2.16 MGD EACH.

Provisions will be made to isolate either pond for maintenance purposes.

Chemicals will be added to prevent algae growth. A dry feed mixer with added water mixing will be provided for alum addition.

SLUDGE HANDLING FACILITIES

Digestors

2 circular digestors w/floating covers.

After thickening of the wasted activated sludge, dry solids content in sludge will be 4%.

Sludge from primary & secondary treatment 4,200 # S.S./DAY/.04/
62.4 LB/cft = 1,682 cu.ft./DAY

Sludge produced from chemical precipitation.
106 # Alum/day/40 LB/cu.ft. = 2.65 cu.ft./day

Total Solids Produced

1,682 cu.ft. X 1.5	=	2,523
2.65 cu.ft. X 4.5	=	12
		2,535 cu.ft./day

30 day mean cell detention time.

Volume = 30 X 2,535 = 76,050 cft required.

Sidewater Depth - 22 feet
76,050 ÷ 22 = 3,456 sq.ft.
$\pi D^2/4 = 3,456$ D = 66 ft.

Capacity = [(22 X 66 X 66 X /4)]/13,550 P.E. = 2.78 cft/capita

Use 2 - 66' diameter, 22' deep tanks.

Facilities will be provided to bypass either digestor unit for maintenance purposes.

Air Floatation Thickener

An air floatation thickener will be included to thicken the waste activated sludge to an estimated 4% solids level. The unit shall include a pressure tank with water source, air injection line, reaction jet manifold, sludge thickening zone and sludge collection conveyor.

Heat Exchanger

The heat exchanger unit will be housed in a building located between the two digestors. The heat exchanger will provide heat for the digestors, heat exchanger building and lab building.

Capacity Required (Winter Conditions)

Digestor Loss	78,500 B.T.U.'s/Hr.
Sludge Heating	130,750 B.T.U.'s/Hr.
Building Heat	125,000 B.T.U.'s/Hr.
Lab Heat	400,000 B.T.U.'s/Hr.
	734,250 B.T.U.'s/Hr.

Use one 750,000 B.T.U./Hr. heat exchanger will be required.

Estimated gas production -
1,180 LB/DAY destroyed volatile S.S. X 18 $\frac{\text{LFT Methane Gas}}{\text{LB V.S.S.}}$ =
21,240 cft/day X 1 day/24 HRS X 650 B.T.U.'s/cft = 575,000 B.T.U.'s/HR

Oil-heat backup unit will be required for winter operation.

Sludge Storage Lagoon

Digested Sludge will be land applied twice per year (before planting and after harvest).

Storage Required

Time Period	Digested Sludge Produced (8,360 gal/day)	Sludge Removed Removed (101,700 GPD)	Storage Required
Mid November-Mid April	1.271 MG	0	1.271 MG
10 days in Spril	0.271 MG	1.017 MG	0.337 MG
May - late October	1.530 MG	0	1.867 MG
Late October - Mid November (20 days)	0.167 MG	1.034 MG	0

Maximum Required - 1.867 MG.

The floating covers in the anaerobic digesters will allow for 35 days additional storage. 35 X 8,360 = 292,600 gallons.

Total sludge storage required
1.867 - .292 = 1.574 MG

Earthen Lagoon
Depth = 8' Width = 200' Length = 200'
Slopes 3:1 (inside and out)

A 6 inch clay liner and 50 ml plastic liner will prevent groundwater pollution.

A sludge pump will be provided to fill sludge tanker.

PLANT BUILDING

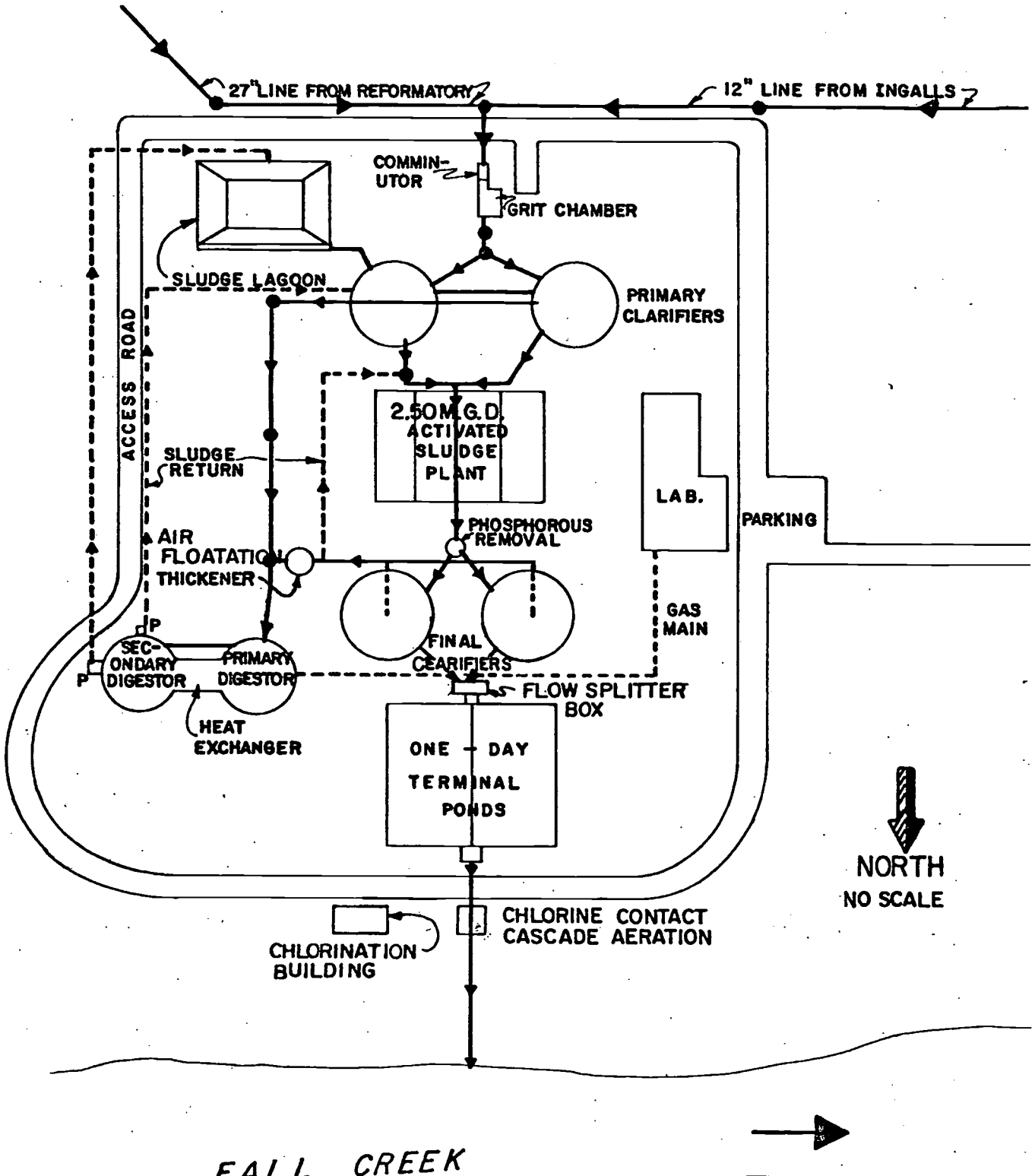
Plant building will include offices for chief operator, maintenance supervisor, clerk, Fall Creek Regional Waste District, laboratory and storage area for trucks, tools, equipment and blowers. Lab equipment shall be included so that the chemist can perform required tests.

Operational Equipment shall be included to operate and maintain the collection and interceptor systems and to dispose of the treated sludge from the plant. The equipment will include a sewer cleaning machine, a movable portable generator, a stationary generator, a landsludge disposal truck, a sludge hauler and other routine maintenance tools.

FLOW EQUALIZATION BASIN AT PENDLETON

Volume Required - 1.54 MG
Liquid Depth - 10' Length - 170' Width - 170'
Inside Slope 3:1 Outside Slope 3:1
3' Freeboard

The Flow Equalization Basin at Pendleton will be located just south of the existing treatment plant. The existing comminutor will be converted to a diversion chamber that will allow only the design wastewater flow from the Town to pass into the existing wet-well facility. All flows in excess will be bypassed at that point to the F.E.B. A weir will be installed upstream of the diversion chamber to measure the incoming flow. Whenever this flow falls below the average daily flow, an automatic gate valve will be activated at the F.E.B. which will allow the basin to drain into a pump station which will transport the sewage back into the manhole nearest the treatment plant.



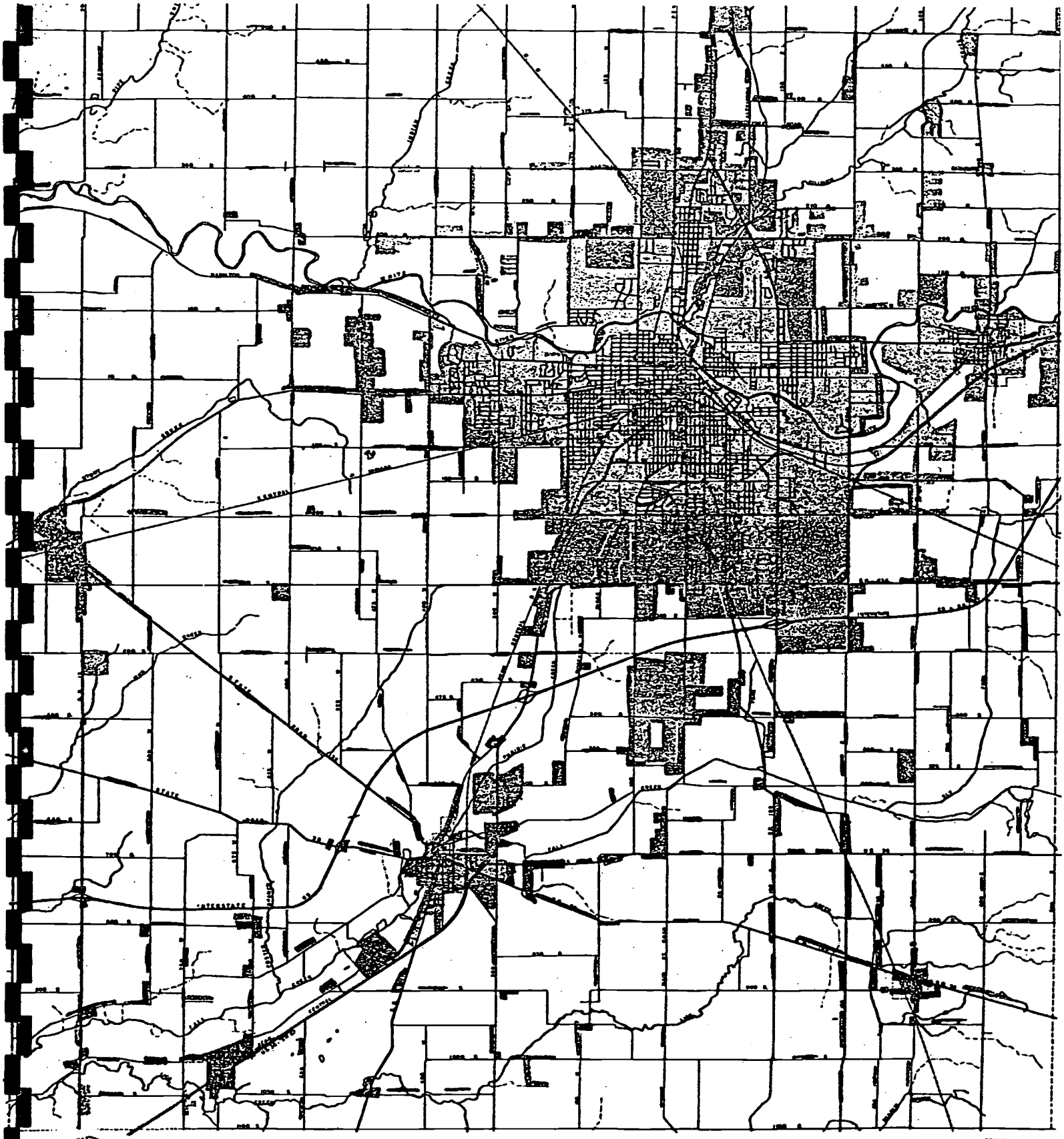
FALL CREEK REGIONAL WASTE DISTRICT
2.10 M.G.D. TREATMENT PLANT

BEAM, LONGEST & NEFF
CONSULTING ENGINEERS
INDIANAPOLIS, INDIANA

REVISED IMPLEMENTATION SCHEDULE

FALL CREEK REGIONAL WASTE DISTRICT

TASK	DURATION	COMPLETION DATE
Submit Addendum & Step 2 App. to I.S.B.H.		April 1, 1979
Receive Step II Grant Offer	3 months	July 1, 1979
Complete Step II	15 months	October 1, 1980
Receive Step III Grant Offer	2 months	December 1, 1980
Commence Construction	4 months	April 1, 1981
Complete Construction	18 months	October 1, 1982



Existing Trends Plan

Existing Urban
Future Urban
Open Space Corridors
Resource Protection Areas
Agricultural Protection Areas

Prepared by Madison County Council of Governments

STATE OF INDIANA

INDIANAPOLIS, 46204

DEPARTMENT OF NATURAL RESOURCES
JOSEPH D. CLOUD
DIRECTOR

January 12, 1979

Mr. Michael R. Cline
Environmental Engineer
Beam, Longest & Neff, Inc.
8136 Castleton Road
Indianapolis, Indiana 46250

Dear Mr. Cline:

We have reviewed the proposed sewage collection and treatment facilities for the Fall Creek Regional Waste District in Madison County.

No known historical, architectural, or archaeological sites will be affected by this project. If any archaeological artifacts are uncovered during construction, work will stop; and the discovery will be reported to the Department of Natural Resources' Division of Historic Preservation.

We appreciate the opportunity to be of service.

Very truly yours,

Joseph D. Cloud
State Historic Preservation Officer

JDC:RAG:kj

cc: John Feingold

"EQUAL OPPORTUNITY EMPLOYER"

STATE OF INDIANA

INDIANAPOLIS, 46204

DEPARTMENT OF NATURAL RESOURCES
JOSEPH D. CLOUD
DIRECTOR

February 23, 1979

Mr. Michael R. Cline
Beam, Longest & Neff, Inc.
8136 Castleton Road
Indianapolis, Indiana 46250

Re: Madison - Ingalls
T/O - Fall Creek

Dear Mr. Cline:

Reference is made to your letter, dated February 9, 1979, requesting various information for a proposed waste treatment plant to be located along the left (south) bank of Fall Creek in the NE¼ of Section 36, T. 18N., R. 6E., near Ingalls, Madison County, Indiana. This response will pertain only to the flood elevation requested, while your questions related to wetlands, environment and endangered species have been forwarded to Mr. John Feingold of the Division of Outdoor Recreation who coordinates the Inter-Division Environmental Review.

Recorded flood information indicates that the April 1964 and March 1963 floods reached about 814.5 feet, M.S.L. at the site. Based on nearby high water marks, it is estimated that the 1913 and 1943 floods reached elevations 816.8 feet and 815.3 feet, M.S.L., respectively, at the site.

Based on an analysis of nearby gaging station records on Fall Creek, it has been determined that the 100-year frequency flood would reach an elevation of about 815.6 feet, M.S.L. at the site.

We would have no objection to plans for construction on this site as long as existing ground is above 815.6 feet, M.S.L. Any plans for construction, excavation or filling below 815.6 feet, M.S.L. will require the approval of the Natural Resources Commission.

Pursuant to Indiana Administrative Rules and Regulations 13-2-22.5-2-11, any building to be constructed at the site shall be provided with a flood protection grade set at or above elevation 817.6 feet, M.S.L., which provides two (2) feet of freeboard above the 100-year flood elevation. The flood protection grade is the lowest point around the perimeter of the building at which floodwater may enter the interior of the building.

"EQUAL OPPORTUNITY EMPLOYER"

For slab-type structures, the flood protection grade would be the elevation of the top of the slab. If a crawl space or basement is used, the flood protection grade would pertain to the lowest land grade around the exterior of the building.

This letter should not be construed as a building permit or as approval of the proposed construction nor is it a waiver of the provisions of local building ordinances.

Your attention is crawn to the fact that the subject property may be located in a "Special Flood Hazard Area" as defined by the Federal Insurance Administration as part of the National Flood Insurance Program. As such, you or subsequent owners may be required to purchase flood insurance as a condition of obtaining a mortgage on this property. Flood insurance might also be required for any direct federal assistance for this property, such as disaster aid.

Under the regular phase of the flood insurance, premiums can be substantial, depending on the type of building and the lowest floor elevation, including basements. It is suggested that you discuss this matter with your insurance agent prior to initiating any plans for construction.

If you should have any questions concerning this matter, please contact us.

Very truly yours,

Robert F. Jackson, P.E.
Chief
Division of Water

RFJ/VHW/SW:paw

cc: Madison County Plan Commission
Mr. John Feingold, Division of Outdoor Recreation

STATE of INDIANA

INDIANAPOLIS, 46204

DEPARTMENT OF NATURAL RESOURCES

JOSEPH D. CLOUD
DIRECTOR

607 State Office Building

March 7, 1979

Mr. Mike Cline
Beam, Longest & Neff, Inc.
8136 Castleton Road
Indianapolis, Indiana 46250

Dear Mr. Cline:

The Division of Fish and Wildlife has reviewed the site of the proposed sewage treatment plant for Ingalls, Indiana.

It is highly unlikely that any threatened or endangered species of animals occur in this area. While portions of the Fall Creek flood-plain are probably seasonally flooded, there are no wetlands of consequence that would be adversely affected by this project.

Sincerely,

Robin F. Knox

Robin Knox
Watershed Biologist
Division of Fish & Wildlife

RK/jh

"EQUAL OPPORTUNITY EMPLOYER"

STATE of INDIANA

INDIANAPOLIS, 46204

DEPARTMENT OF ADMINISTRATION
510 STATE OFFICE BUILDING
100 NORTH SENATE AVENUE
317-633-5832

January 19, 1978

Beam, Longest & Neff
8136 Castleton Road
Indianapolis, Indiana 46250

ATTENTION: Mike Klein

RE: Design Sewage Quantity
Indiana State Reformatory, Pendleton, Ind.
To be used for: Design Flow for
Proposed District Sewage Treatment Plant

Dear Mr. Klein:

I have this day calculated the maximum sewage flow which we can expect at this institution, using present metered quantities (our meters are now repaired and functioning fairly accurately); present inmate, staff and visitor population; and maximum inmate population which we could have under present Federal Regulations, which are expected to remain reasonably so in the future.

Present adjusted population (consisting of 1300 inmates, 500 staff and 100 visitors per maximum day) gives an equivalent population of 1500. Present sewage use is 400,000 GPD. This gives a per capita figure of 267GPCD.

Maximum allowable inmate population is 1800, but 2,000 has been used here as a temporary maximum population which is allowed on a short term basis. Maximum equivalent population for design will be 2217, assuming 50 more visitors per day.

At the time the district plant is built, we will discharge filter backwash water along with the sewage. At present, the filter backwash water is discharged directly to Fall Creek and bypasses the sewage treatment plant. Design sewage flows for average maximum days will then be:

AN EQUAL OPPORTUNITY EMPLOYER

1.	Sewage $\frac{2217}{1500}$	X 400,000 GPD	=	591,200 GPD
2.	Backwash water - $\frac{2217}{1500}$	X 108,000 GPD	=	159,624 GPD
			Total	751,000 GPD

The figure of 751,000 GPD should be the figure to use for plant and sewer design. You will, of course, apply whatever multiplier you are using for maximum day for design purposes. We would, of course, expect to pay for actual metered sewage flow, as measured by a sewage meter which would be installed in our outfall sewer at the junction with the future District interceptor.

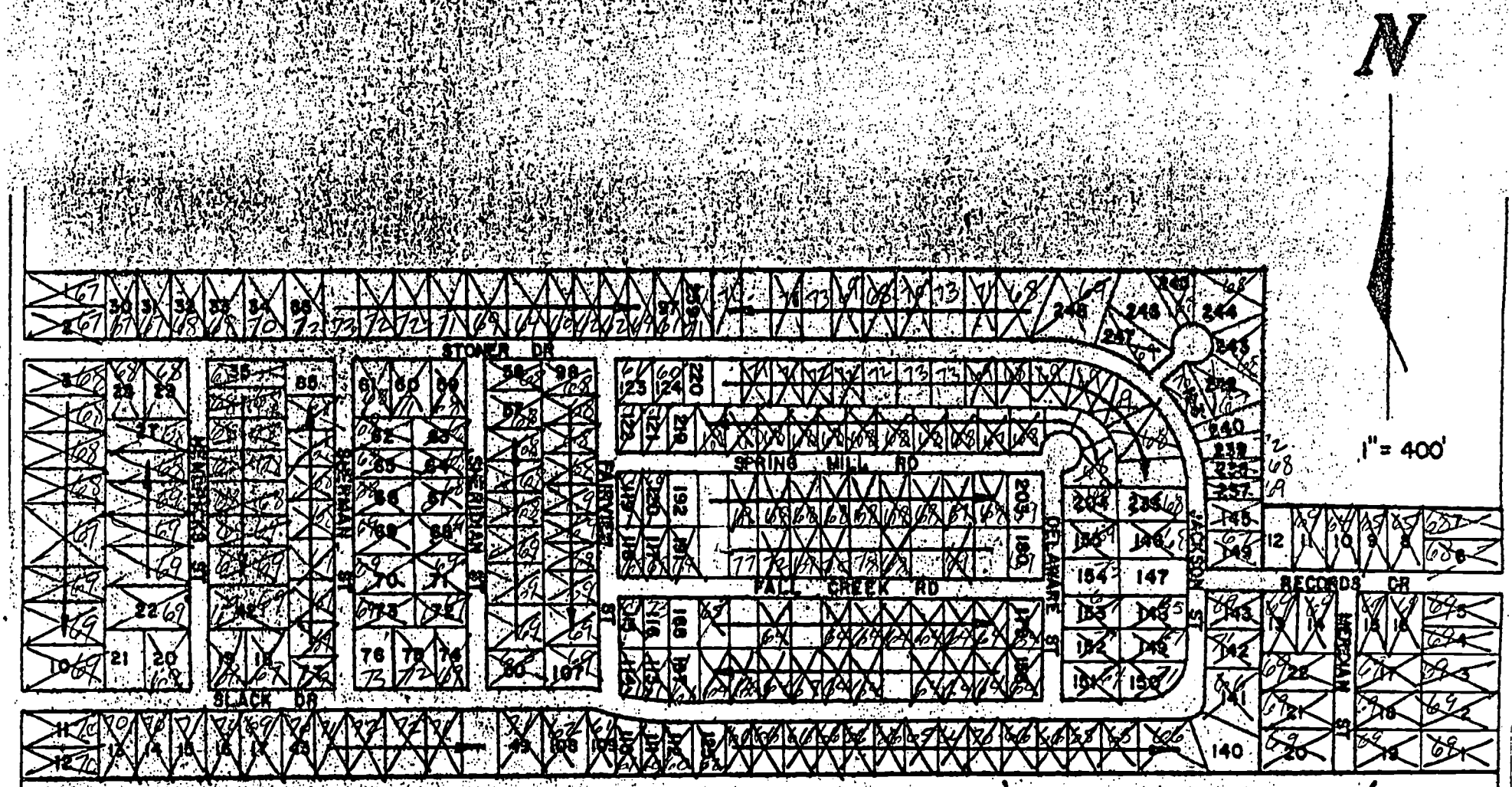
If you have any questions concerning these figures, I will be glad to discuss them with you.

Sincerely yours,

E. C. Kridler
Asst. State Engr. Civil

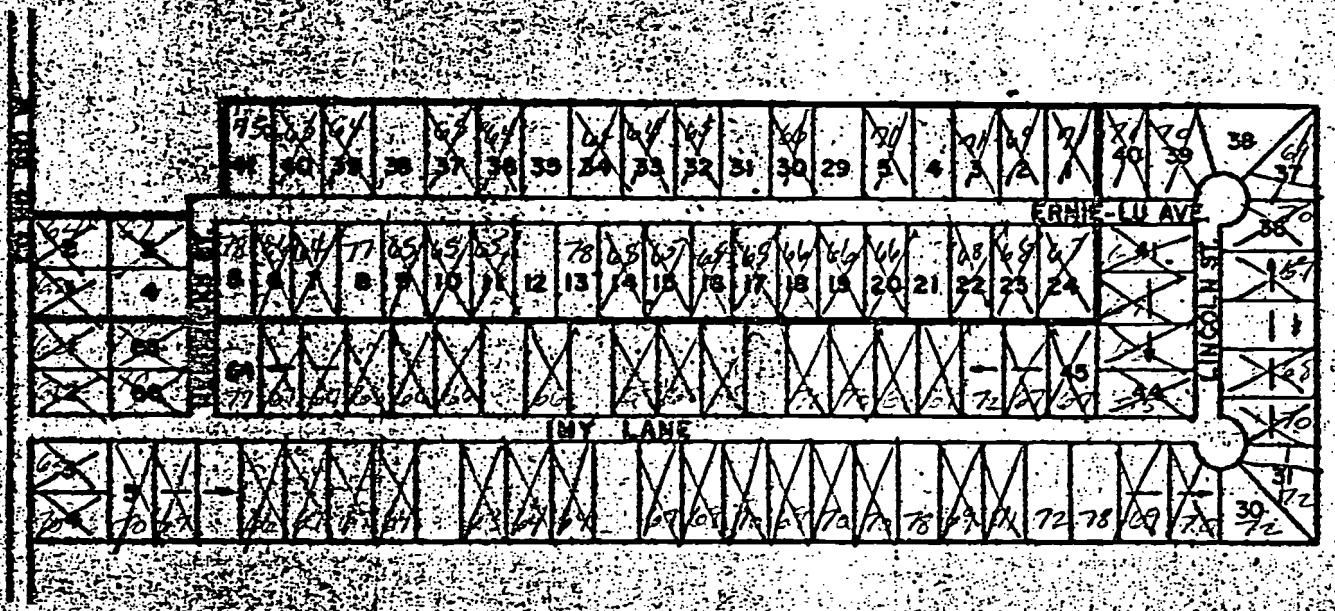
ECK: np

cc: Gordon Faulkner
Phil Spencer
Harry Burkart
Rod Pennell
Eldon Woods
George W. Phend



FALL CREEK HEIGHTS

PARADISE VILLAGE



PARADISE COLONY

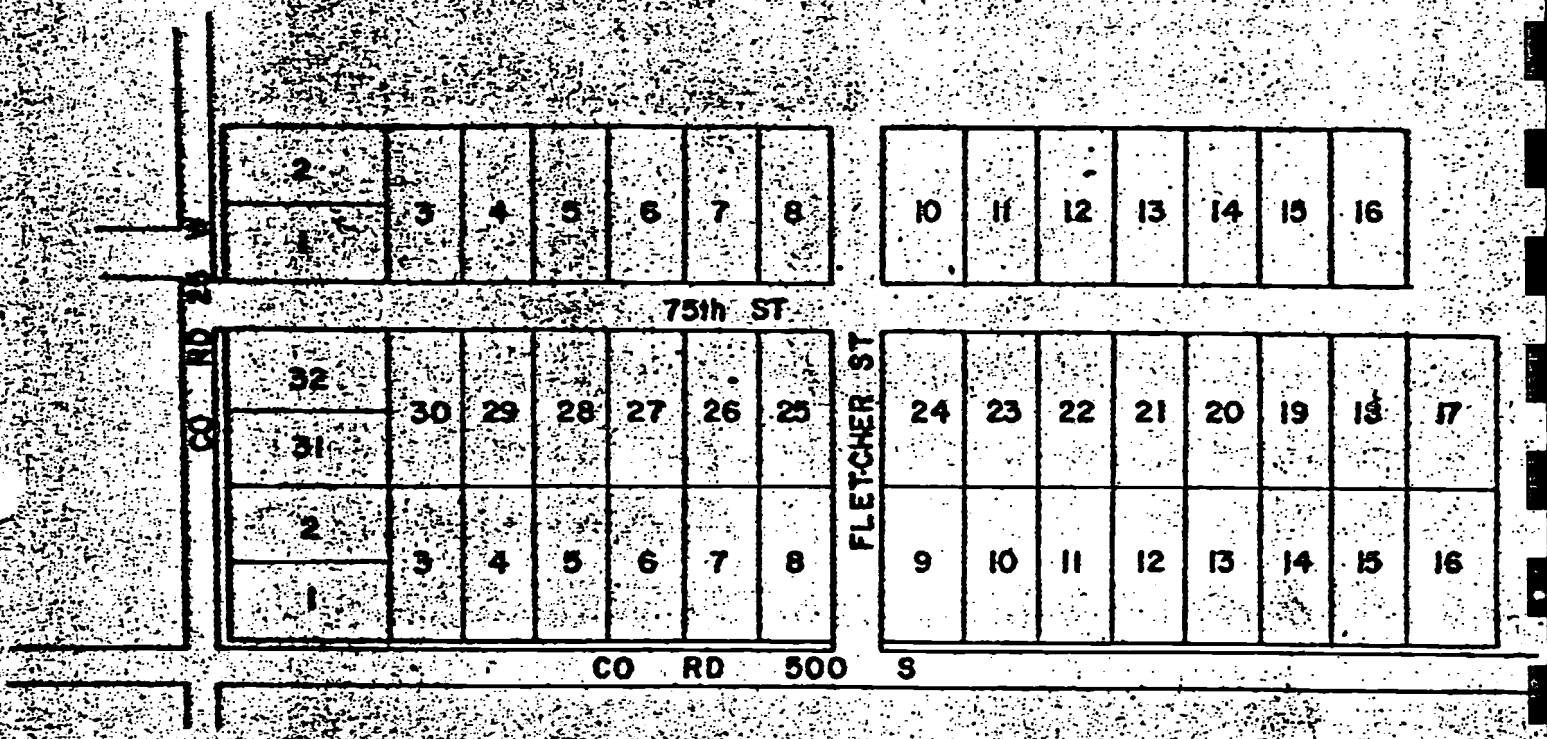
N

SEC. 1-TWP. 16N-RANGE 7E

1" = 300'

BALLARD'S 1 ST

NOTE: ALL LOTS IN THIS SUBDIVISION WERE DEVELOPED PRIOR TO 1960



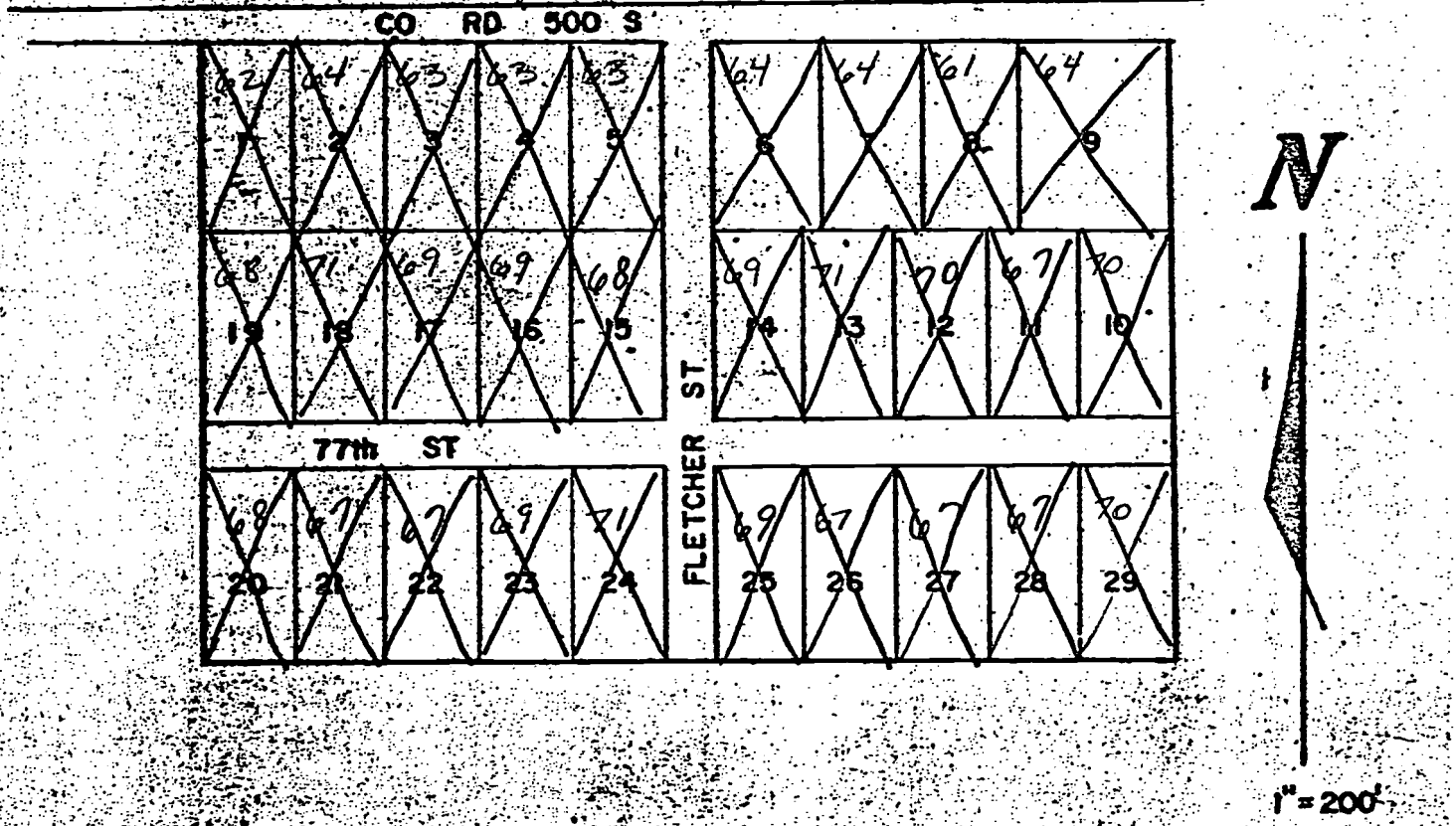
STOTTLEMEYER ADD.

N

1" = 200'

SEC. 1 TWP. 10 N. RANGE 7E

BALLARD'S 2ND

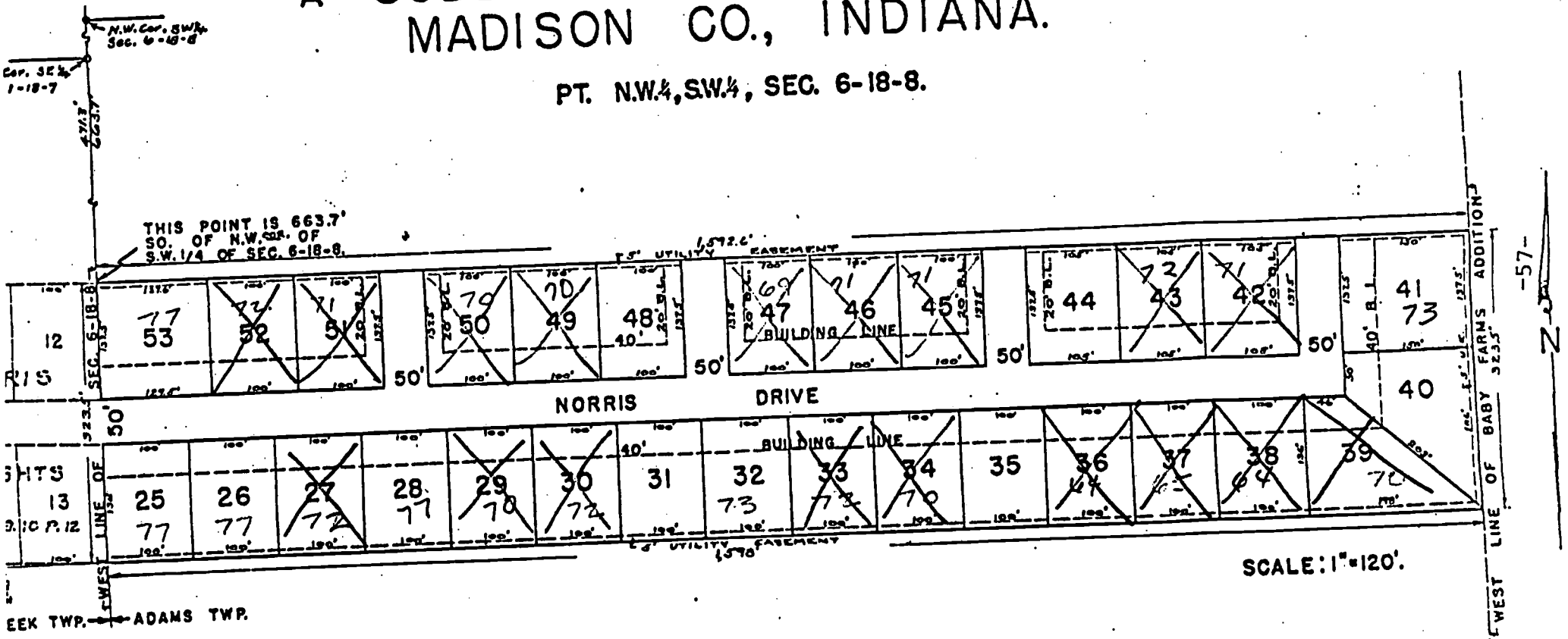


SEC. 12-TWP. 18N-RANGE 7E

NORRIS HEIGHTS 1ST CONTINUATION

A SUBDIVISION IN ADAMS TWP., MADISON CO., INDIANA.

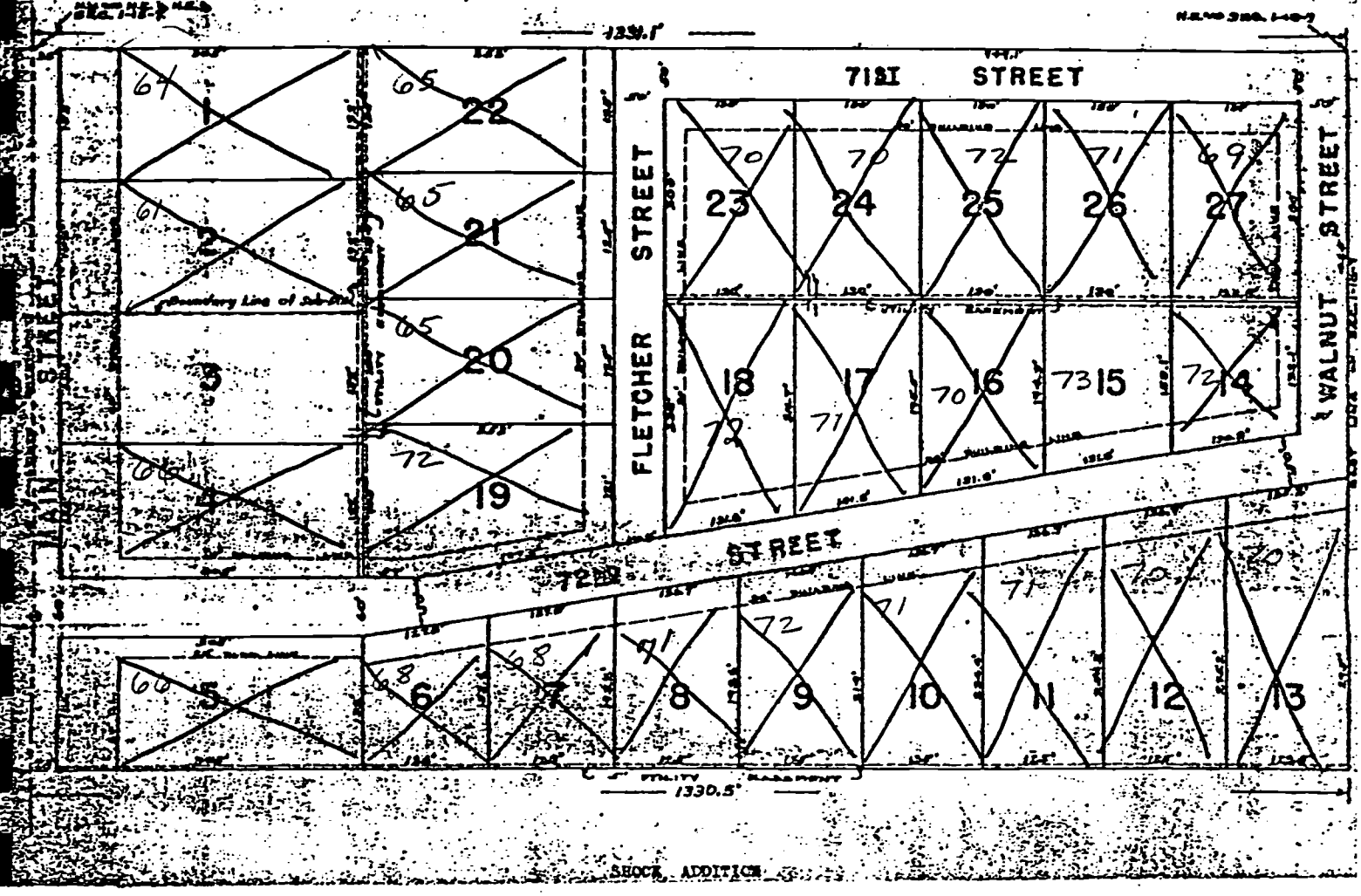
PT. N.W.¼, S.W.¼, SEC. 6-18-8.



SHOCK ADDITION

A SUB-DIVISION IN FALL CREEK TWP., MADISON CO., IND.

PT. N.E.¼ SEC. 1-18-7



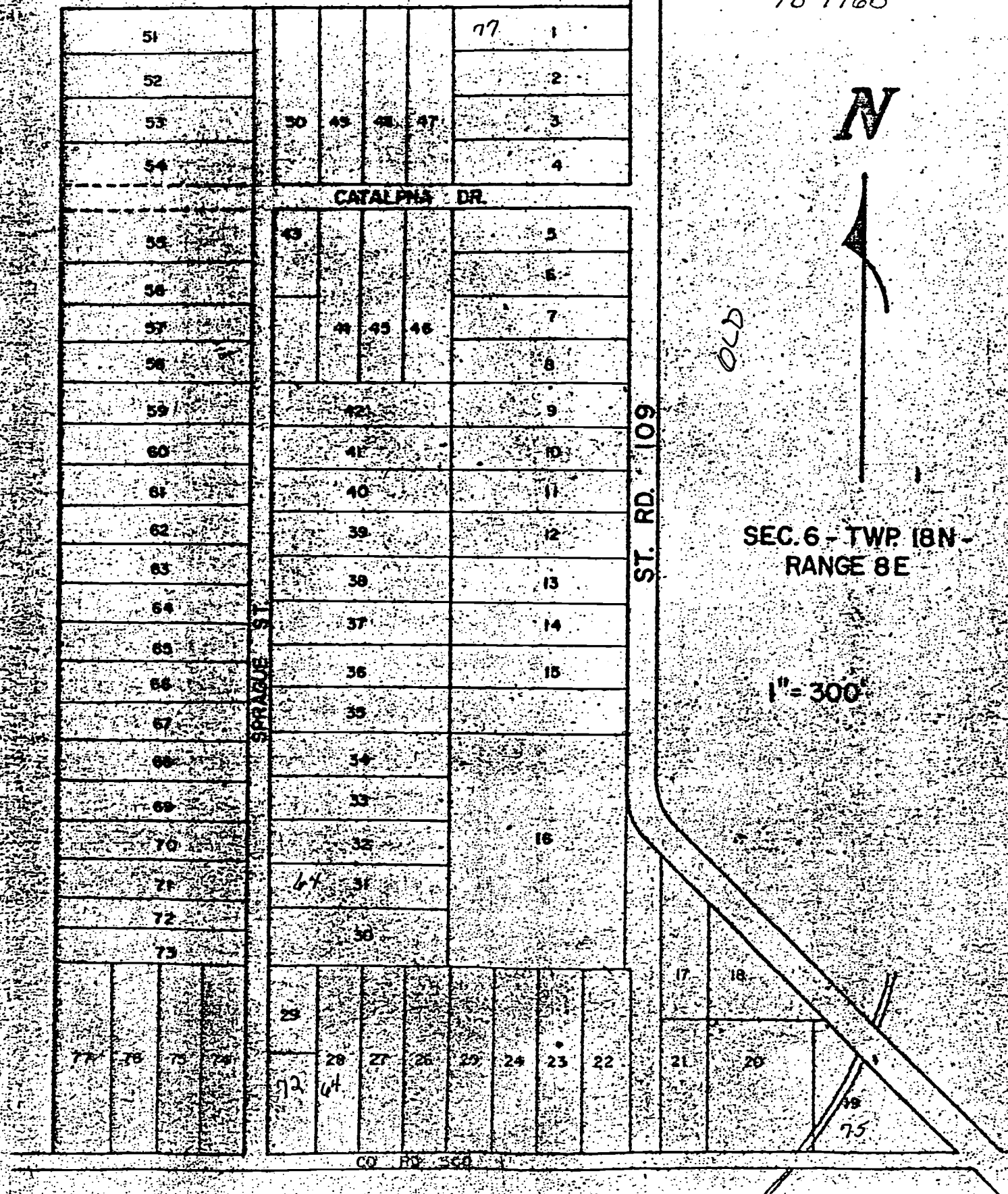
LOT ** 8

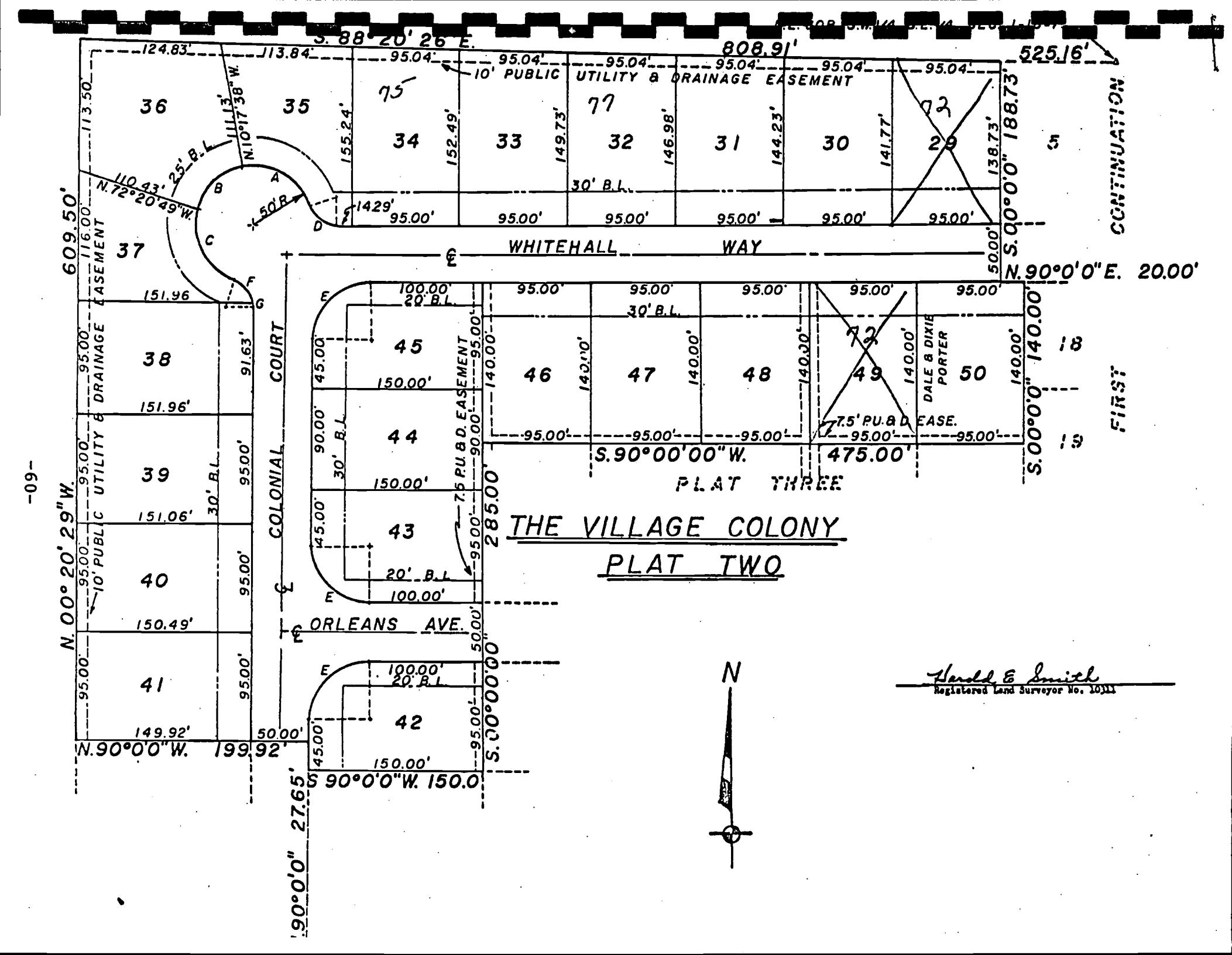
BABY FARMS SUB-DIVISION

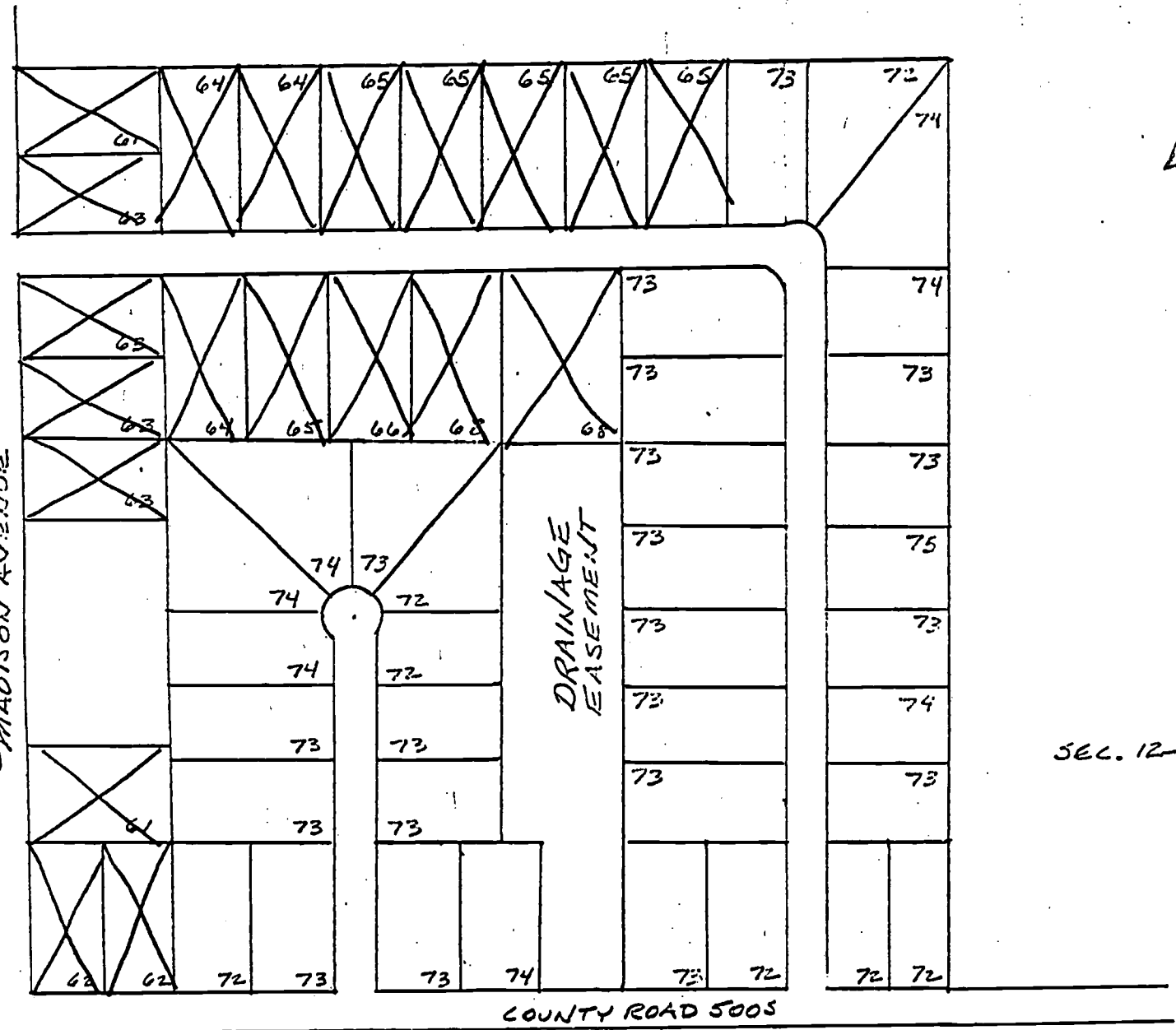
NOTE: ALL LOTS EXCEPT THOSE INDICATED WERE DEVELOPED PRIOR TO 1960

SEC. 6 - TWP. 18N - RANGE 8E

1" = 300'




S. 88° 20' 26" E.
808.91'
525.16'
10' PUBLIC UTILITY & DRAINAGE EASEMENT
CONTINUATION
FIRST
WHITEHALL WAY
N.90°0'0"E. 20.00'
S.90°0'0" 188.73'
S.00°0'0" 140.00'
609.50'
N. 00° 20' 29" W.
10' PUBLIC UTILITY & DRAINAGE EASEMENT
COLONIAL COURT
ORLEANS AVE.
30' B.L.
20' B.L.
7.5' P.U.& D. EASE.
DALE & DIXIE PORTER
S.90°00'00"W. 475.00'
PLAT THREE
THE VILLAGE COLONY
PLAT TWO
N.90°0'0"W. 199.92'
S 90°0'0"W. 150.0
S.00°0'0" 285.00'
90°0'0" 27.65'
N
Harold E. Smith
Registered Land Surveyor No. 10311
-09-

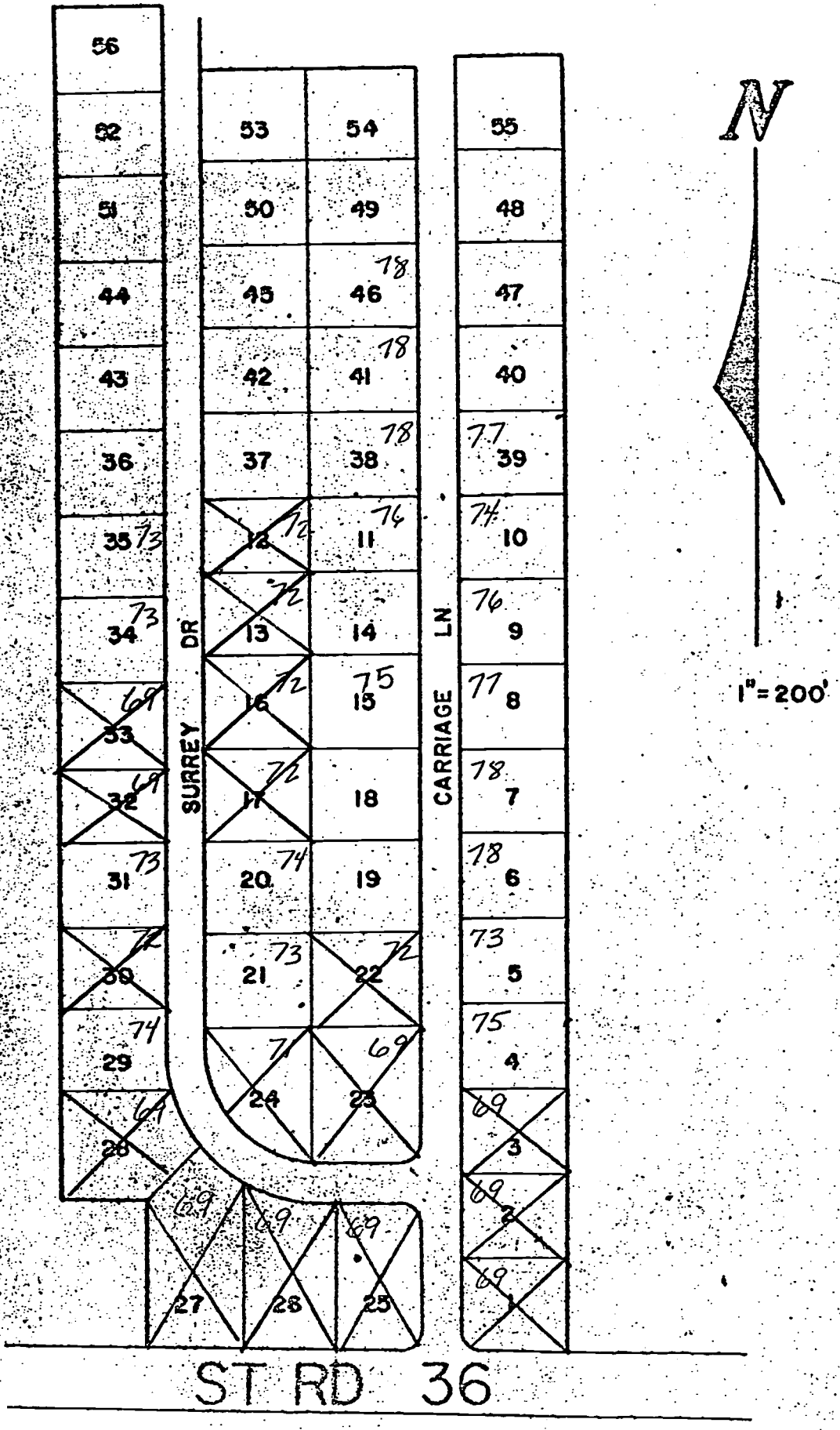


SEC. 12 TWP 18N
RANGE 7E

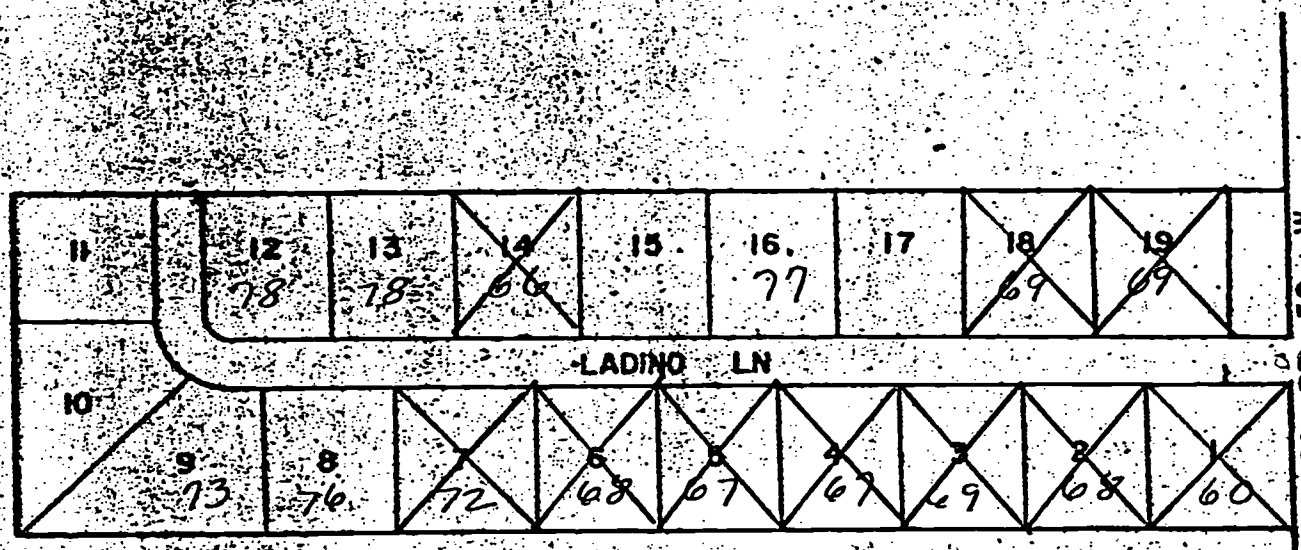
ROSE FARMS ADDITION

SCALE 1" = 200'

FIDDLERS GREEN

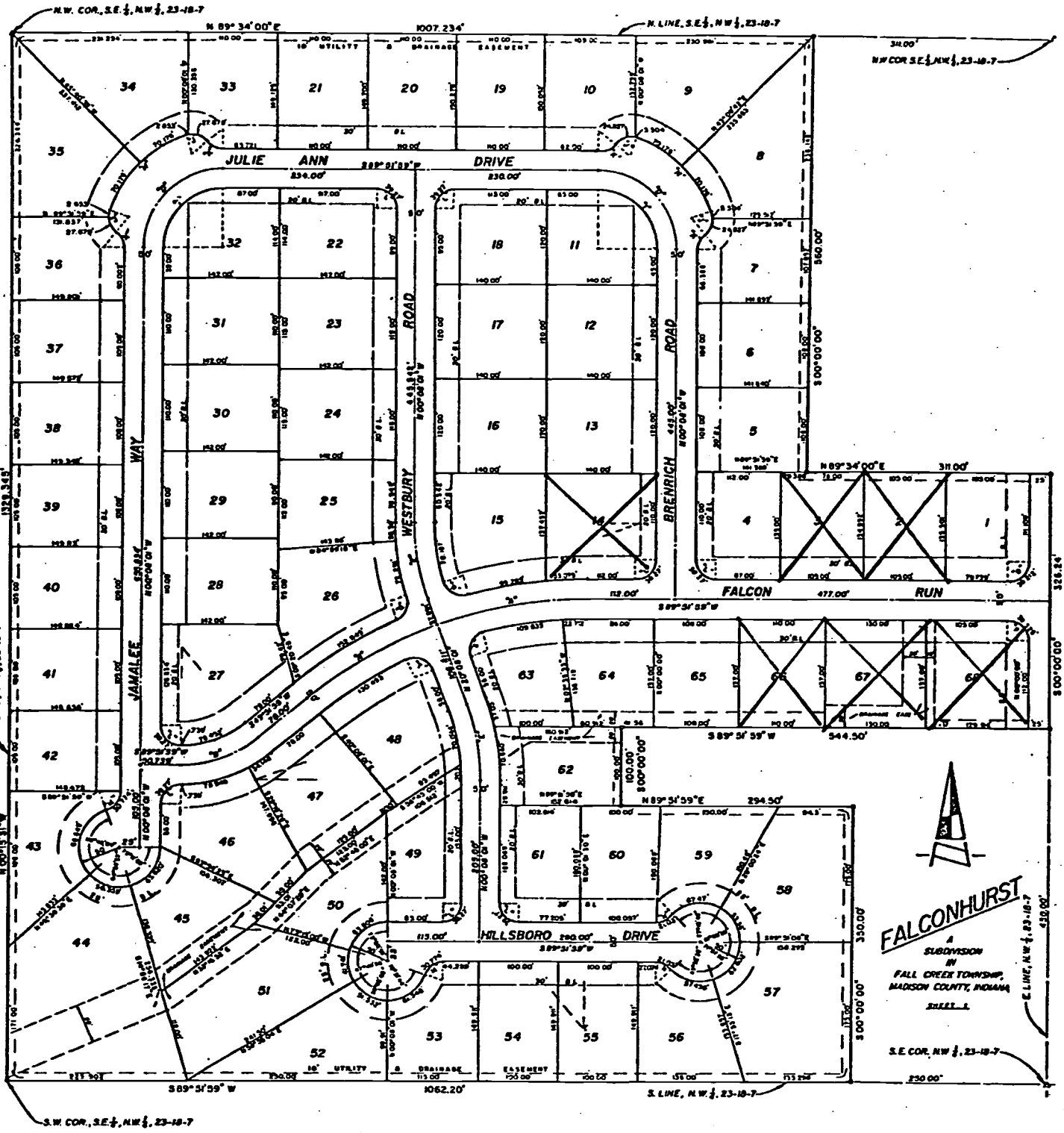


MARA MEADOWS

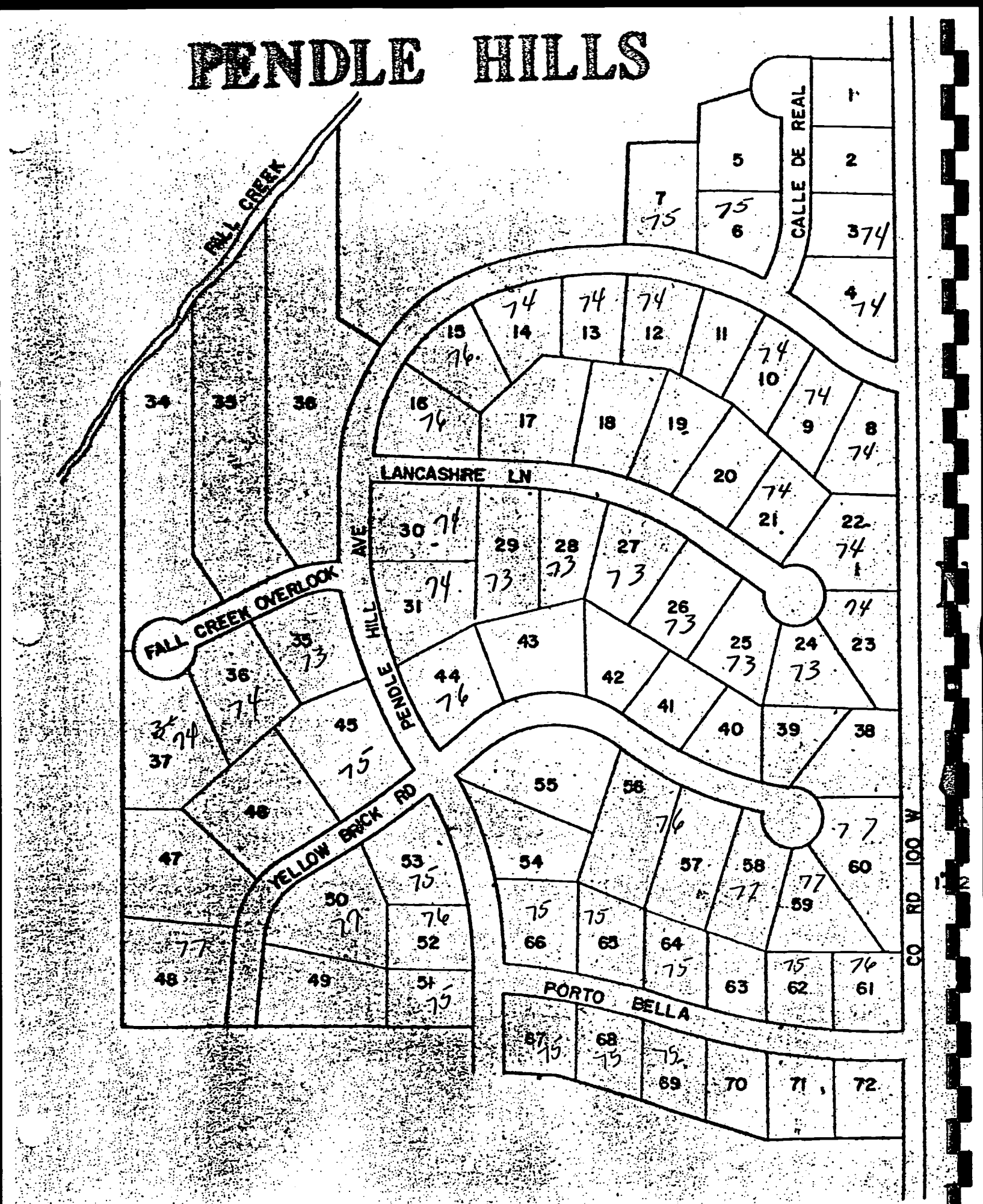


1"=200'

SEC. 13-TWP 18N-RANGE 7E


FALCONHURST
A SUBDIVISION IN FALL CREEK TOWNSHIP, MADISON COUNTY, INDIANA
SHEET 1
JULIE ANN DRIVE
WESTBURY ROAD
BRENRICH ROAD
JAMALEE WAY
FALCON RUN
HILLSBORO DRIVE
N. LINE, S.E.¼, N.W.¼, 23-18-7
N.W. COR., S.E.¼, N.W.¼, 23-18-7
N.W. COR. S.E.¼, N.W.¼, 23-18-7
S.W. COR., S.E.¼, N.W.¼, 23-18-7
S.E. COR., N.W.¼, 23-18-7
S. LINE, N.W.¼, 23-18-7
E. LINE, N.W.¼, 23-18-7
N 89° 34' 00" E 1007.234'
S 89° 51' 59" W 1062.20'
N 89° 34' 00" E 311.00'
S 89° 51' 59" W 544.50'
N 89° 51' 59" E 294.50'
S 89° 51' 59" W 230.00'
S 00° 00' 00" E 560.00'
S 00° 00' 00" E 526.24'
S 00° 00' 00" E 350.00'
S 00° 00' 00" E 430.00'
N 00° 15' 31" W 1329.345'
N 00° 08' 01" W 652.84'
N 00° 08' 01" W 443.84'
N 00° 08' 01" W 443.90'
S 00° 00' 00" E 100.00'
S 00° 00' 00" E 100.00'
S 89° 51' 59" W 113.00'
S 89° 51' 59" W 113.00'
S 89° 51' 59" W 230.00'
S 89° 51' 59" W 75.00'
S 89° 51' 59" W 74.00'
S 89° 51' 59" W 73.00'
S 89° 51' 59" W 73.00'
S 89° 51' 59" W 73

PENDLE HILLS



EVERETT W. GAUNT, M.D.
HEALTH OFFICER

ROBERT C. JONES
ADMINISTRATOR

Madison County Health Department

Madison County Government Center
ANDERSON, INDIANA 46016

HEALTH DEPARTMENT
PHONE 646-9247

S.T.D. CLINIC
PHONE 646-9247

February 20, 1979

Keith Williams
P.O. Box 44
Pendleton, IN

Re: Fall Creek Regional Waste District

Dear Mr. Williams:

Please be advised, Mr. Michael Cline, Environmental Engineer with Beam, Longest and Neff, Inc., has requested information regarding sewage disposal problems within the Fall Creek Regional Waste District.

Representatives of this office over the past several years have investigated numerous sewage disposal problems within the area which presently makes up the District.

It would be difficult to provide information on each of these investigations. However, within the scope of this letter, information can be provided concerning some of the more serious sewage problems.

You may recall the closure of the swimming pool facility in Fall Creek Park in Pendleton in 1967. This was due to the high fecal coliform count which existed in water samples taken from the pool. The sewage apparently originated from malfunctioning sewage disposal systems and animal waste being deposited in the creek.

Another example is the current mechanical condition of the Pendleton Sewage Treatment Plant. It is hydrologically overloaded, especially during times of excessive rainfall. Accordingly, water quality in the receiving stream, Fall Creek, suffers.

In the town of Ingalls, representatives of this office are aware of two large sewage outfalls, one on the north side of town, and the other on the west side. Both of these outfalls apparently stem from drainage tile systems which are connected to numerous septic tanks. In addition, malfunctioning septic systems have been noted within the property lines of numerous residences.

Pendle Hill Subdivision, east of Pendleton, is a residential area which has experienced severe sewage disposal problems. Soil types, topography, and lot size in relationship to the square footage of some of these homes, have all been instrumental in creating these problems.

EVERETT W. GAUNT, M.D.
HEALTH OFFICER

ROBERT C. JONES
ADMINISTRATOR

Madison County Health Department

Madison County Government Center
ANDERSON, INDIANA 46016

HEALTH DEPARTMENT
PHONE 646-9247

S.T.D. CLINIC
PHONE 646-9247

February 20, 1979

Mr. Keith Williams cont. page 2

This department no longer issues sewage disposal permits for this addition, unless a soil study conducted by an engineering firm of each lot, indicates it is acceptable for the usage of a sewage disposal system.

In addition, in the large unincorporated residential areas in the north-eastern section of the district, such as Ballards Addition, Fall Creek Heights, and Baby Farms, sewage problems have been noteworthy, especially during the late winter-early spring months of the year.

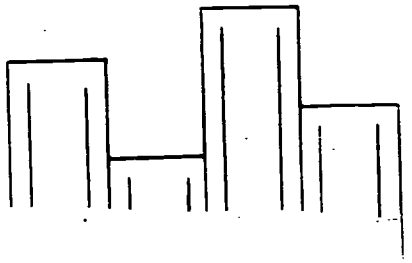
This department trusts this information will be of use to you in your endeavors concerning the Waste District. If more detailed information is needed, please contact this office.

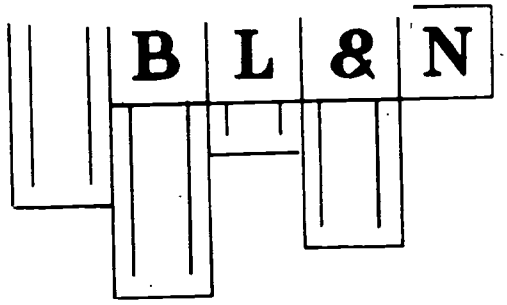
Sincerely,

Robert C. Jones

Robert C. Jones, R.P.S.
Administrator

RCJ:CG





BEAM LONGEST AND NEFF, INC.

INDIANAPOLIS INDIANA

FACILITIES PLAN
for
WASTEWATER TREATMENT
for the
FALL CREEK REGIONAL
WASTE DISTRICT

PREPARED FOR

DISTRICT BOARD OF TRUSTEES

PREPARED BY:

BEAM, LONGEST & NEFF, INC.
8136 Castleton Road
Indianapolis, Indiana 46250

February 1, 1978

Keith Williams

TABLE OF CONTENTS

		Page
	Table of Contents	i
	List of Tables	iv
	List of Figures	v
1.0	Summary, Conclusions and Recommendations	1
2.0	Introduction	
	2.1 Study Purpose and Scope	4
	2.2 Planning Area Map	5
3.0	Effluent Limitations	
	3.1 Water Quality Standards	6
	3.2 NPDES Permits	7
4.0	Current and Future Situation	
	4.1 Study Scheme for current and Future Situation	8
	4.2 Current Situation (General)	
	4.2.1 Conditions in the Planning Area	9
	4.2.1.1 Planning Area Description	9
	4.2.1.2. Organizational Context	11
	4.2.1.3 Demographic and Land Use Data	13
	4.2.1.4 Water Quality and Uses	18
	4.2.1.5 Other Environmental Conditions	19
	4.2.2 Infiltration and Inflow (General)	19
	4.2.3. Existing Wastewater Flows and Treatment Systems (General)	20
	4.2.4 Performance of Existing Systems (General)	20
	4.2.5 Pollution Source Map	22
	4.3 Future Situation (General)	23
	4.3.1 Land Use (General)	23
	4.3.2 Demographic and Economic Projections (General)	23
	4.3.3 Forecast of Flow and Waste Load (General)	25
	4.3.4. Future Environment of Planning Area Without the Project (General)	27
	4.4. Current and Future Situation (Pendleton)	28
	4.4.1 Land Use	28
	4.4.2 Existing Flows & Treatment Systems	30
	4.4.2.1 Users Served	30
	4.4.2.2 Existing Facilities	30
	4.4.2.3 Infiltration and Inflow Study	33
	4.4.2.4 Status of S.S.E.S.	34
	4.4.3 Water Quality	35
	4.4.4 No Action	38
	4.4.5 Proposed Service Area	38
	4.4.6 Forecast of Wastewater Flow	38
	4.5 Current and Future Situation (Ingalls)	42

TABLE OF CONTENTS
(continued)

		Page
4.5.1	Land Use	42
4.5.2	Existing Treatment Systems and Water Quality	42
4.5.2.1	Septic Systems	42
4.5.2.2	Development Northwest of Ingalls	44
4.5.3	No Action	44
4.5.4	Proposed Service Area	45
4.5.5	Forecast of Wastewater Flow	45
4.6	Current and Future Situation (Markleville)	47
4.6.1	Land Use	47
4.6.2	Existing Treatment - Systems and Water Quality	47
4.6.3	No Action	50
4.6.4	Proposed Service Area	51
4.6.5	Forecast of Wastewater Flow	51
4.7	Current and Future Situation (Fortville)	53
4.7.1	Land Use	53
4.7.2	Existing Flows and Treatment Systems	53
4.7.2.1	Infiltration and Inflow Study	54
4.7.2.2	Status of SSES	54
4.7.3	Water Quality	54
4.7.4	No Action	54
4.7.5	Study Scheme	54
4.8	Current and Future Situation (Unincorporated Areas)	55
4.8.1	Developments & Subdivisions Involved	55
4.8.1.1	Fall Creek Heights, Fall Creek Manor, Paradise Village, and Paradise Colony.	55
4.8.1.2	Village Colony, Stottlemyer, Ballard's Addition	57
4.8.1.3	Shock's Addition	59
4.8.1.4	Norris Heights	60
4.8.1.5	Baby Farms	61
4.8.1.6	Alliance & Surrounding Area	61
4.8.1.7	Sherwood Forest	62
4.8.1.8	Rose Addition	63
4.8.1.9	Main St. from I-69 to Fall Creek	64
4.8.1.10	New Columbus and Surrounding Area	64
4.8.1.11	Emporia	65
4.8.1.12	Pendle Hill	66
4.8.1.13	Fiddler's Green	67
4.8.1.14	Mara Meadows	68
4.8.1.15	Falconhurst	68
4.8.1.16	US 36 to SR 38, West of Falconhurst & East of 300 W.	70
4.8.1.17	Huntsville	71
4.8.1.18	White Oaks, Wooded Ridge and Candlewood Village	71

TABLE OF CONTENTS
(Continued)

4.8.1.19 Lantern Meadows 72
4.8.1.20 DeShong Addision 73
4.8.1.21 Murcer's Addition 74
4.8.1.22 Sunview Addition 75
4.8.1.23 Mt. Vernon Community Schools 75
4.8.2. Mobile Home Parks & Camps 77
4.8.2.1 Five Star Mobile Home Park 77
4.8.2.2 Regency Park Mobile Home Court 78
4.8.2.3 Pentacostal Camp 79
4.8.2.4 Mobile Home Park Northeast of Ingalls 80
4.8.3 The Indiana State Reformatory at Pendleton 82
4.8.4 Interceptor Service Areas 86
4.8.5 Forecast of Wastewater Flows (Unincorporated Areas) 87

5.0 Alternatives 90
5.1 Optimum Operation of Existing Facilities 90
5.2 Regional Solutions 91
5.3 Alternate Types of Waste Treatment Systems 105
5.3.1 Primary Treatment 107
5.3.2 Secondary Treatment 108
5.3.3 Advanced Treatment 110
5.3.4 Sludge Handling 113
5.3.5 Sludge Disposal 114
5.4 Evaluation of Treatment Alternatives 115
5.5 Evaluation and Ranking of Proposals 129
5.5.1 Environmental Effects 133
5.5.2 Monetary Considerations 135
5.5.3 Implementation Capacity 135
5.5.4 Other Considerations 136

6.0 Plan Selection 137
6.1 Views of Public and Concerned Interests of Alternatives 137
6.2 Selected Plan and Reasons for Selection 138
6.3 Environmental Impacts of the Selected Plan 139

7.0 Preliminary Design and Cost Estimates 140
7.1 Fall Creek Regional Waste District 140
7.1.1 Basin at Pendleton (Flow Equalization Basin) 143
7.1.2 Basin at the Reformatory (Flow Equalization Basin) 146
7.1.3 Regional Interceptors 146
7.1.4 Treatment Plant 148
7.1.4.1 Primary Treatment 148
7.1.4.2 Secondary Treatment 149
7.1.4.3 Advanced Treatment 151
7.1.4.4 Sludge Handling 151
7.2 Markleville Regional Waste District 153
7.2.1 Interceptor 153
7.2.2 Treatment Plant 154

TABLE OF CONTENTS
(continued)

		Page
7.3	Summary of Cost Estimates	157
7.3.1	FCRWD	157
7.3.2	Markleville RWD	157
7.4	Treatment Plant Layout	
7.4.1	FCRWD	158
7.4.2	Markleville RWD	159
8.0	Arrangements for Implementation	160
8.1	Fall Creek Regional Waste District	160
8.1.1	Institutional Responsibility and Implementation Steps	160
8.1.2	Operation and Maintenance	161
8.1.3	Financial Requirements	161
8.2	Markleville and Surrounding Area	163
8.1.1	Institutional Responsibility and Implementation Steps	163
8.2.2	Operation and Maintenance	164
8.2.3	Financial Requirements	165
9.0	Summary of Environmental Conditions	167
10.0	Glossary	168-174
11.0	Appendix	175

LIST OF TABLES
ITEM

TABLE NO.		
1.	NPDES Permit Schedule	7
2.	Past and Present Population Data	13
3.	Population Projections	24
4.	Design Flow - School Systems	26
5.	Design Flow - Pendleton Outskirts	38
6.	Pendleton Design Flow	39
7.	Cost Analysis - Ingalls Wastewater Treatment System	44
8.	Design Flow - Ingalls	45
9.	Design Flow - Markleville	51
10.	Fortville Industries	53
11.	Design Flow - Pendleton State Reformatory	83
12.	Population Projections for Future Interceptor Service Areas	87
13.	Design Flow - Interceptor for Service Areas	88
14.	Regional Flow - Interceptor Service Areas	89
15.	Present Worth - Sludge Handling Facilities	115
16.	Present Worth Values of Alternative Treatment Systems	118-119
17.	Total Present Worth of Regional Alternatives	130
18.	Evaluation of Alternatives	132
19.	FCRWD Design Data	140
20.	FCRWD Lift Station Design Summary	142
21.	Regional Interceptor Design Summary	147
22.	Markleville RWD Design Summary	153
23.	Implementation Schedule	166

LIST OF FIGURES

Figure No.	Item	Page
1.	Planning Area Map	5
2.	Adams Township Land Use "Pie"	15
3.	Fall Creek Township Land Use "Pie"	16
4.	Green Township Land Use "Pie"	17
5.	Pollution Source Map	22
6.	Pendleton Land Use "Pie"	29
7.	Current Sewer Service Area - Pendleton	31
8.	Pendleton Outlying Areas	40
9.	Proposed Service Map - Pendleton	41
10.	Ingalls Land Use "Pie"	43
11.	Ingalls Proposed Service Area	46
12.	Markleville Land Use "Pie"	48
13.	Markleville Proposed Service Area	52
14.	Existing Sewer System - State Reformatory	84
15.	Proposed Sewer System - State Reformatory	85
15-28	Schematics of Regional Alternatives	93-104
29-37	Treatment Facility Cost Curves	120-128
38.	Fall Creek Regional Treatment Plant Layout	158
39.	Markleville Regional Treatment Plant Layout	159
40.		

1.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY - The Planning Area for the Facilities Plan includes the Towns of Fortville, Ingalls, Markleville and Pendleton and a number of unincorporated towns and subdivisions. The Planning Area lies within the drainage boundaries of Fall Creek and Lick Creek in Southern Madison County and a portion of northern Hancock County. Lack of proper wastewater management has caused a pollution problem in these waterways.

The Towns of Pendleton and Fortville have been forced to bypass raw wastewater past their overloaded treatment plants to Fall Creek because of excessive infiltration/inflow in the collection systems. Lack of phosphorous removal facilities and sewer bypasses of backwash water and untreated wastewater at the Pendleton State Reformatory is causing a pollution problem. A majority of the homes in the Towns of Ingalls and Markleville have tapped their laterals directly into the community storm sewers that discharge to Lick Creek. There are a series of county draintile systems in the south Anderson area that receive raw, untreated sewage from the homes in the south Anderson subdivisions. These tiles discharge the wastewater to either Fall Creek, Sugar Fork Creek or Michael Ditch which drains to Prairie Creek. Because of these discharges, the water quality of the streams in this area are considered to be poor.

Demographic data was used to project the design populations and design flows in the Planning Area. Various methods of wastewater treatment were analyzed once the design flows were determined. Twelve regional alternatives were evaluated to determine the best way to correct the pollution problems. Specific conclusions and recommendations from this study are presented on the following pages.

Based on the results of this investigation, it can be concluded:

1. That excessive infiltration and/or inflow does exist in the collection systems of the Towns of Pendleton and Fortville, the State Reformatory and the United Pentacostal Camp.

2. That the Towns of Pendleton and Fortville, the State Reformatory, the Regency Park Mobile Home Court, and the 5 Star Mobile Home Park are currently not meeting their NPDES permit standards.

3. That the present discharging of untreated sewage to waterways in the subdivisions of the South Anderson and the Fall Creek Developments area and in the outlying areas of Pendleton and Ingalls is causing public health hazards, odor problems and surface water pollution problems.

4. That the soil conditions in the Huntsville area and the area north of Huntsville are capable of supporting properly operating septic systems. The pollution that this area is contributing to the local streams can be corrected if the offending residents that are discharging to draintiles build new septic systems. If this area continues to grow and expand, pollution problems associated with denser living areas could occur. At that time, the area will be sewered and brought into the regional system.

5. That it is not cost effective to incorporate the Town of Fortville and Markleville into the Regional Waste District.

After evaluating the economic, environmental and social costs related to the alternatate plans, it is recommended:

1. That a regional wastewater treatment system be built to serve the Towns of Pendleton and Ingalls and their outlying areas, The State Reformatory, the subdivisions in the South Anderson area and the subdivisions in the Fall Creek Developments area.

2. That a wastewater treatment and collection system be built to treat the wastewater from the Town of Markleville and the area of West Markleville.

3. That the unincorporated Town of Huntsville and the subdivisions north of Huntsville correct their pollution problem by upgrading the septic systems of the homes that are currently discharging directly into the draintile systems.

4. That the Town of Fortville proceed on their own in applying for federal grants to complete their Facilities Plan and to correct their pollution problems.

5. That the components of the Regional Waste District Treatment Plant be an activated sludge treatment facility followed by two one-day ponds, chlorination facilities and phosphorus

removal facilities. Primary treatment will consist of grit chambers and communitors followed by Primary Clarifiers. Sludge digestion will be anaerobic with drying beds and land application for disposal.

6. That the components of the Markleville treatment plant be an Oxidation Ditch facility followed by two one-day ponds and chlorination facilities. Sludge digestion will be aerobic with drying beds and land application for disposal.

7. That the Town of Pendleton discontinue use of their existing treatment plant and transport their wastewater to the Fall Creek Regional Treatment Plant.

8. That the Pendleton collection system be rehabilitated per the recommendations of the Pendleton Sewer System Evaluation Survey.

9. That a wastewater collection and interceptor system be built to collect the wastewater from the Town of Ingalls and the development northwest of Ingalls.

10. That the Indiana United Pentacostal Camp discontinue use of their existing treatment plant and transport their wastewater to the Ingalls collection system.

11. That the Indiana State Reformatory discontinue use of their existing treatment plant and transport their wastewater to the Fall Creek Regional Treatment Plant.

12. That the State Reformatory renovate their collection system per the recommendations of the Facilities Plan.

13. That the Fall Creek Regional Waste District expand its present boundaries to include all of Madison County south of I-69 and west of State Route 109 south of Fall Creek and County Road 200 east north of Fall Creek.

14. That the Fall Creek Regional Waste District apply for Step 2 and 3 grants to design and construct the collection interceptor and treatment systems within the district and to renovate the Pendleton and Reformatory Collection Systems.

15. That the Town of Markleville petition the Indiana Stream Pollution Control Board to create a new regional waste district. The proposed District boundaries would be the Henry County line to the east, the Hancock County line to the south, Fall Creek to the north and County Road 100 East to the west.

16. That the Markleville Regional Waste District apply for Step 2 and 3 grants to design and construct the treatment systems.

17. That the Towns of Ingalls, Pendleton, Markleville and Fortville and the Fall Creek Regional Waste District resolve to accept and implement the provisions of this Facilities Plan.

2.0 INTRODUCTION

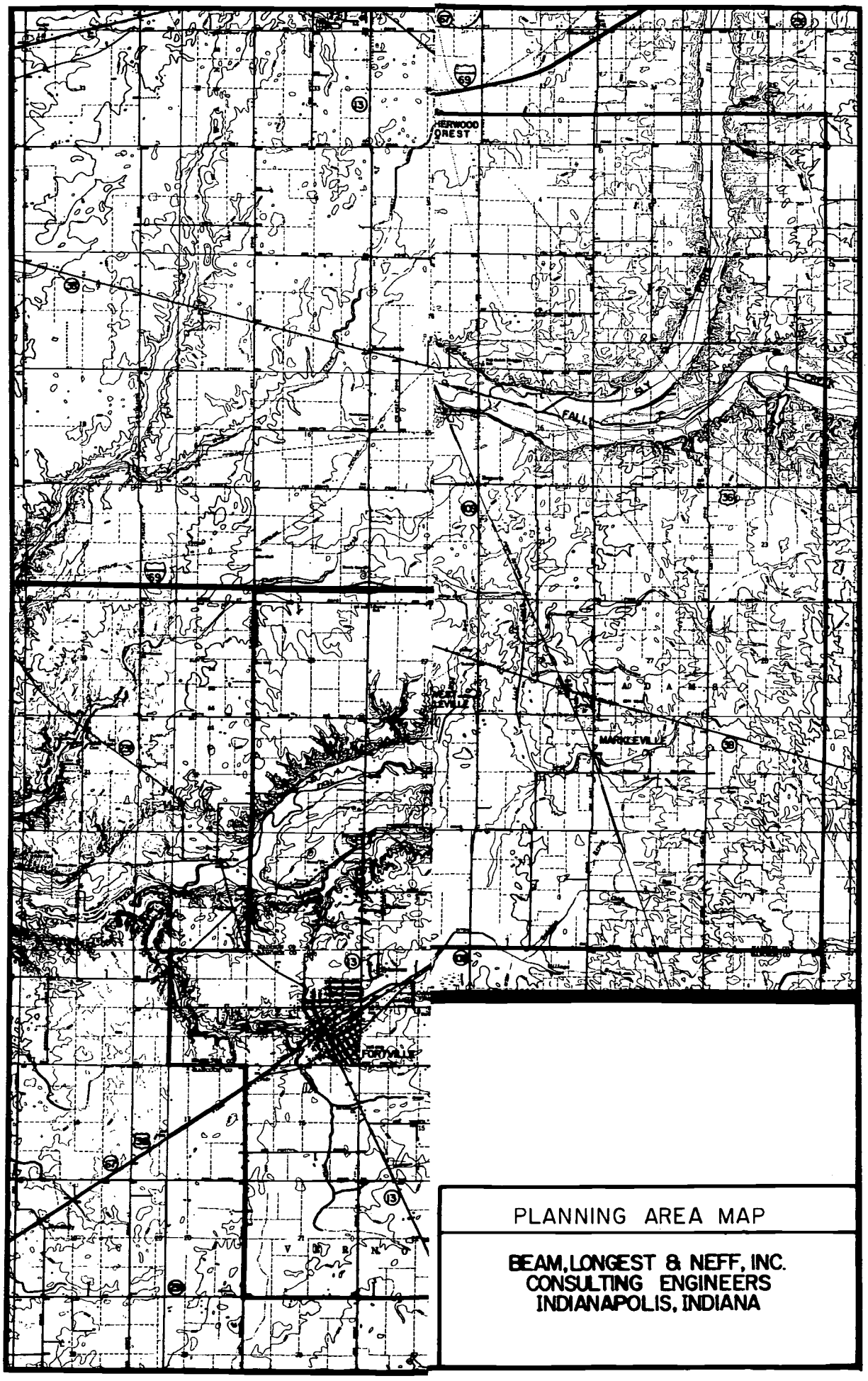
2.1 Study Purpose and Scope

The study purpose of the Fall Creek Regional Waste District Facilities Plan is to determine the most economically environmentally and socially cost effective plan to provide adequate wastewater treatment for the Towns and communities in the Planning Area. The wastewater treatment facilities will be designed to discharge an effluent which meets all applicable Federal and State water pollution control laws.

The scope of the Facilities Plan includes the review of pertinent data and analysis of several alternative plans for wastewater treatment facilities. Applicable water quality and environmental inventory will be made of the existing conditions. Predictions of future waste loads and flows will be made. Regional alternatives invorporating different combinations of problem areas will be evaluated. The selected alternative will be more fully described and reviewed. Finally, implementation of the selected plan will be discussed.

2.2 Planning Area Map

The Planning Area is located in South Madison County and portions of north Hancock County and southeast Hamilton County in east central Indiana. The Planning Area, as determined by the Planning Section of the State Board of Health, encompasses the Towns of Fortville, Ingalls, Markleville and Pendleton, the State Reformatory and many small independent and unincorporated towns. Figure One shows the Planning Area on a USGS map.



PLANNING AREA MAP

BEAM, LONGEST & NEFF, INC.
CONSULTING ENGINEERS
INDIANAPOLIS, INDIANA

3.0 EFFLUENT LIMITATIONS

3.1 Water Quality Standards

All of the water segments in the Planning Area have been classified by the Stream Pollution Control Board of the State of Indiana as "effluent limitation segments". Thus, any project that involves the construction of a municipally owned waste treatment works must provide for the application of the best practivable waste treatment technology (BPWTT). The identification of and provision for applying BPWTT is to be based upon consideration of alternative waste treatment management techniques. These techniques include biological or physical chemical treatment and discharge to receiving waters, treatment and reuse and land application.

The Indiana Stream Pollution Control Board has assigned wastewater discharge permits to the areas directly involved by these standards in the Planning Area. The National Pollutant Discharge Elimination System Permits are summarized in the next section.

3.2 NPDES Permits

Table One lists the NPDES Permits and the applicants in the Planning Area.

The methods of sampling and allowable deviations are outlined in the permits. All permits are attached in the Appendix B.

TABLE ONE
NPDES SCHEDULE
AVERAGE EFFLUENT CONCENTRATIONS
Parameter
30 Consecutive Day Period

Applicant	Receiving Stream	BOD_5 mg/l	Suspended Solids	Fecal Coliform#/100 ml	Ph Range	Phos. mg/L	Completion Date
IN 0021261 Pendleton	Fall Creek	30	30	200	6.0-9.0	1.0	3/31/80
IN 0020958 Fortville	Flatrock Creek	30	30	200	6.0-9.0	1.0	8/1/79
IN 0040142 Ingalls	Jones Ditch & Lick Creek	30	30	200	6.0-9.0	1.0	7/1/81
IN 0040304 Markleville	Lick Creek	10	10	200	6.0-9.0		7/1/81
IN 0053031 State Reformatory	Fall Creek	10	10	200	6.0-9.0	1.0	6/30/80
IN 0038458 Regency Park Mobile Home Ct.	Fall Creek	30	30	200	6.0-9.0		4/31/80
IN 0043281 Five Star Mobile Home Pk.	Thorpe Creek	10	10	200	6.0-9.0		5/30/80
IN 0032824 EI duPont deNemours Co.	Stottlemeyer Ditch		10		6.0-9.0		11/30/79

The Facility Plan will determine the design capacity of the sewage treatment facilities, the level of treatment to be employed, treatment site and discharge of the receiving stream on cost effective and environmental impact analysis and amended effluent requirements may be necessary.

4.0 CURRENT AND FUTURE SITUATION

4.1 Study Scheme for Current and Future Situation

This Facility Plan covers not only a wide geographical area but also a wide range of waste disposal and water quality situations. It includes two towns with existing sewers, two towns with no sewers and widely scattered sub-divisions using septic tanks in a variety of soil conditions.

In order to insure that the plan developed here is the most cost effective, it will be necessary to first break the planning area down into smaller areas in order to study the needs, pollution problems, and wastewater flows from those areas. The first thing that must be evaluated for each of these areas is the degree of the current and future pollution problems. This, in effect, is a study of the "no action" alternative on an area by area basis. This will avoid the placement of sewers in areas where they are not needed and it will enable this Facility Plan to consider the implications of land use planning in the area. The likely future of the area in terms of growth, business, and industry will be considered next. Environmental considerations will be reviewed. Then, if appropriate, an estimate of current and future flows will be made. All future flow projections will be to the year 2000.

The first two sections will be a general overview of the current and future situations. These sections will follow the EPA's suggested format for Facility Plans. Then, more detailed sections for current and future situations of smaller area will follow. There will be one such section for each of the following areas:

Pendleton
Ingalls
Markleville
Fortville
Unincorporated Areas
Indiana State Reformatory

The section on unincorporated areas will be further broken down into many smaller sub-divison size areas. Population, density and future growth will be examined. Since most of these areas use septic tanks, soil types will be considered. Observed septic tank failures and pollution will be reported and a determination of each area's need for an improved wastewater treatment facilities will be made. Since it is difficult to define the exact population and boundaries

of these areas, a preliminary sewer layout and house count will be used to estimate flows where appropriate. This process will result in the development of a map of rural areas to be served without showing interceptor routes and treatment sites. This will be used to consider the land use implications of the Facility Plan.

4.2 Current Situation (General)

4.2.1 Conditions in the Planning Area

4.2.1.1 Planning Area Description

The majority of the Planning Area lies in southern Madison County which is in east central Indiana. A small portion of the Planning Area contains the Town of Fortville which is in northern Hancock County and southeastern Hamilton County. Generally, the area is bounded to the north by Interstate 69, to the south by the Hancock County line, to the east by the Henry County line and to the west by the Hamilton County line. The Area covers approximately 96 square miles. The Planning Area map illustrates the area and its surroundings.

The Planning Area covers the Towns of Fortville, Ingalls, Markleville and Pendleton, the Pendleton State Reformatory, and a large area of rural land where many subdivisions, mobile home parks and unincorporated towns are developing. The Mt. Vernon Community Schools, the Pendleton Heights High School, the Markleville and Pendleton Middle Schools, and the Markleville, Ingalls, Fall Creek Heights, and Pendleton South Elemenatry Schools are the learning institutions in the Planning Area.

The Planning Area is almost entirely within the watershed of Fall Creek. Fall Creek runs from the eastern edge of the area, crosses the north edge of Pendleton, passes north of Ingalls and Fortville and leaves at the southwest corner of the Planning Area. Prairie Creek, which starts on the south side of Anderson, runs south and joins Fall Creek just north of Pendleton. Lick Creek enters at the southeastern corner of the area, passes south of Markleville and Pendleton, crosses the south side of Ingalls and joins Fall Creek near Fortville. The Sly Fork Creek and Sugar Fork Creek are tributaries of Fall Creek in the northeastern portion of the Area.

The Conn Rail Railroad owns two separate tracks that trave through the Planning Area. One double set of tracks runs throu Fortville, Ingalls and Pendleton to the City of Anderson. A second track runs north through Markleville and South Anderson. U. S. Highway 36 and Indiana State Highway 38 runs east-west through the area. Indiana State Highways 9, 13, 67, 109 and 132 run north-south through the area. Most of the county roads in the area follow the rectangular, one square mile grid patter typical of northern Indiana.

The major soil associations in the Area are Brookston-Crosby, Fox-Ockley and Miami-Celina-Fox. The Brookston-Crosby association occurs on level to gently rolling depressional upland areas. These soils are severely limited to the use of septic tanks due to a seasonally high water table and slow permeability. Soils of the Fox-Ockley association are located in the bottomlands and terraces along the major streams. These soils range from moderate limitations to no limitations for septic tank use except for possible pollution of ground water. The Miami-Celina-Fox association occurs on breaks and terraces of the major streams. The limitations of these soils for septic tanks ranges from moderate to slight. The Brookston-Crosby and Fox-Ockley association dominate the Planning Area while the Miami-Celina-Fox association occuplies only small areas. More information on soils can be found in Section 4.8.1.

The Town of Fortville, Ingalls, Pendleton and the State Reformatory all own and operate their own water systems. Markleville and the remainder of the Planning Area use individual wells for water supply. Power for the Towns of Pendleton, Fortville and Ingalls and the State Reformatory is provided by the Public Service Company of Noblesville. Markleville receives power from the Public Service Company of New Castle. Pendleton, the State Reformatory and Ingalls receive gas from the Central Indiana Gas Company in Muncie. Markleville's gas is provided by the Indiana Gas Company in Anderson while the Central Indiana Gas Company of Greenfield supplies the gas for the Town of Fortville. Telephone service for Pendleton and the Reformatory is from the General Telephone Company of Pendleton. Ingalls and Fortville service is from the United Telephone Company of Fortville. The Hancock Row Telephone Company out of Maxwell, Indiana provides telephone service for Markleville.

4.2.1.2 Organizational Context (General)

The Planning Area covers portions of these counties in two different 208 regions. The major part of the Planning Area is in Madison County which is in the 208 study area of the Region 6 Planning and Development Commission. Fortville, Hancock County, and Hamilton County are in the Indiana Heartland Coordinating Commission's area. Both of the 208 agencies involved have expressed strong interest in participating in the Facility Planning process. Indiana Heartland has requested that they be given an opportunity to review the alternatives before a final selection is proposed. Region 6 has also taken this opportunity. The 208 plans for these two regions are still being formulated.

In Madison County, the Madison County Board of Health is responsible for regulation of wastewater management. On April 1, 1974 the County Sewage Ordinance was passed. This ordinance requires that a permit from the Board of Health be obtained prior to construction of sewage disposal systems including septic tanks. Its aim is to restrict the use of septic systems in unsuitable areas. Prior to 1974, there was a lack of control over the installation and use of septic systems.

The Madison County Planning Commission administers the county wide zoning ordinance. There is no comprehensive land use plan for the county, and the zoning does not reflect any type of planning goals. The zoning, as it now stands, will not have a significant impact in changing the area's residential growth pattern.

The legal drains in Madison County are constructed and managed by the County Drainage Board. Many private agricultural drains are designed by the Soil Conservation Service of the USDA.

The SCS also provide information on soils and the suitability of areas for construction, roads, and septic systems. A Soil Survey for Madison County has been completed and has been used extensively in the preparation of this Facility Plan.

The Madison County Council of Governments (COG) is composed of representatives from Madison County and the cities of Anderson, Elwood, and Alexandria. COG's purpose is research and planning for land use, transportation, and water quality. COG has no governmental power but acts only as an advisory agency. Much of the 208 work in Madison County is being performed by COG.

The Towns of Pendleton, Ingalls, Markleville and Fortville all have Town Boards. These Boards are organized and get their

authority from the Indiana Code, Title 18, Article 3, Chapter 1. These Boards have the necessary power to finance, construct, and manage sewage treatment facilities or to petition the Stream Pollution Control Board to organize regional districts for this purpose. The Towns of Pendleton and Ingalls both have zoning ordinances and planning commissions. The jurisdiction of the zoning is a two-mile radius around the town. Pendleton has ordinances requiring all homes and commercial buildings within the sewer and water service areas to connect to the municipal sewer and water systems. Outside the service areas, private systems meeting state standards must be constructed. Ingalls has an ordinance controlling mobile homes that requires that septic systems conforming to County Board of Health standards be installed. Both towns have passed resolutions meeting the National Flood Insurance Administration standards to insure effective development within flood plains. The Town of Markleville has no ordinances relating to water quality.

On November 22, 1974, the Fall Creek Regional Waste District was formed by authority of the Indiana Stream Pollution Control Board of 1971, 17-3-1.1. The District includes the incorporated areas of Pendleton and Ingalls only. It was formed for the purpose of implementing a plan to treat sewage from Pendleton, Ingalls and the State Reformatory at a new regional plant to be located between Pendleton and Ingalls on Fall Creek. After this plan had been developed and the District established, the State Board of Health delineated the current planning area and required that this facility plan consider inclusion of the State Reformatory, Markleville, Fortville and the unincorporated areas into the regional waste district.

The Towns of Pendleton, Ingalls, Markleville and Fortville have signed resolutions to accept the District as the lead agency in applying for facility planning grants. The Federal Government is paying 75 percent, the State is paying 10 percent and the towns, through the District, are paying 15 percent of the cost of this Facility Plan.

The District has applied for and received Step I grant offers for the Pendleton I/I and SSES. The I/I has been completed and approved and the SSES has been submitted to the Indiana State Board of Health for review.

The Reformatory and its treatment plant are administered by the Indiana State Department of Correction. In the implementation of the plan proposed by the 1973 engineering report, the Reformatory would have been a customer of the District but would not have been in the District.

Under a contract with the Town of Fortville, the engineering firm of Reid, Quebe, Allison and Wilcox and Associates, Inc., has conducted an Infiltration/Inflow Analysis and is currently conducting a Sewer System Evaluation Survey. The results of these reports will be incorporated into the facilities plan. If it is

found that it is not economical for Fortville to regionalize with the Fall Creek Regional Waste District, the Town will be excluded from the waste district boundaries and will proceed to correct their pollution problems on their own.

4.2.1.3. Demographic and Land Use Data

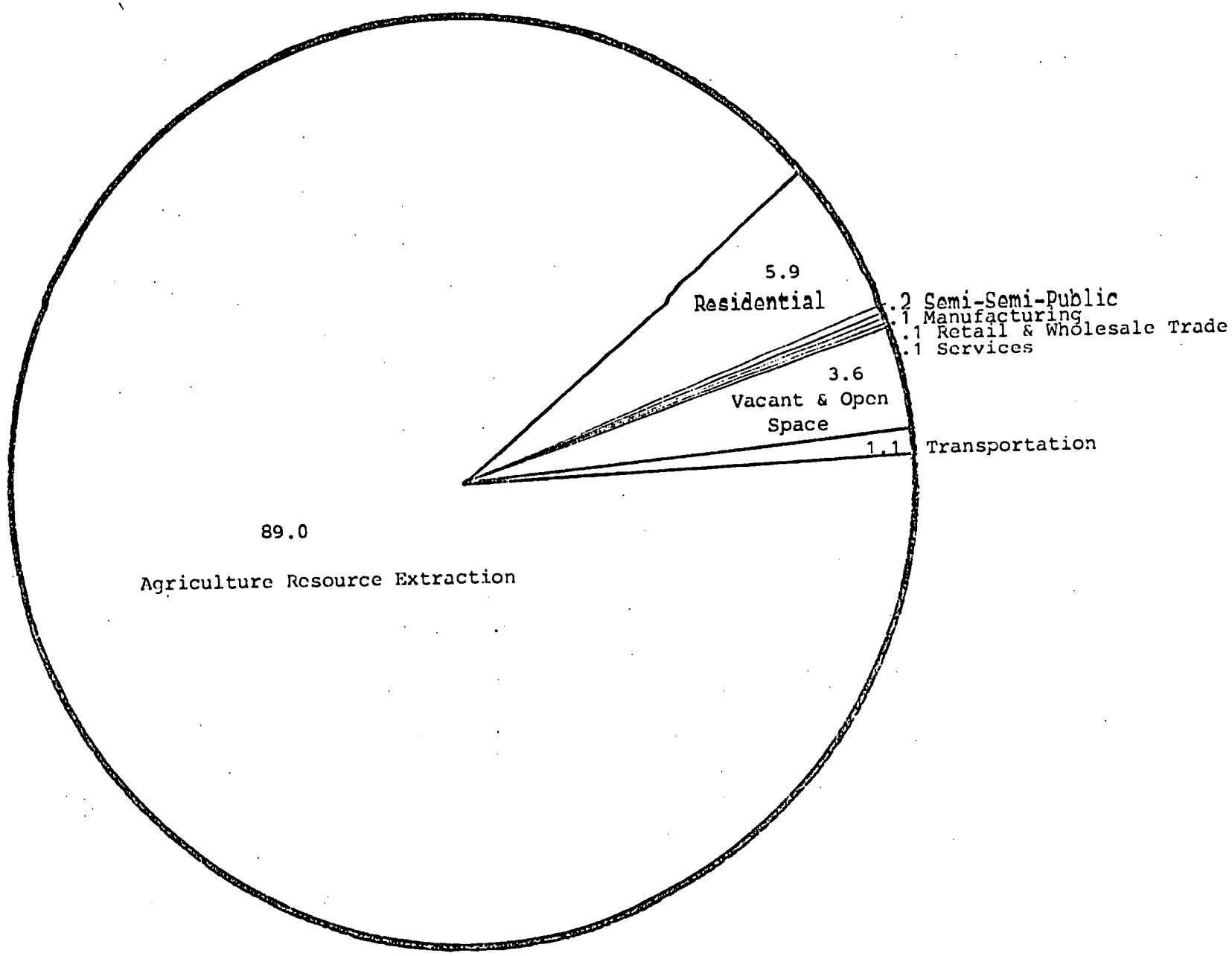
The past populations for the towns, townships and counties involved are listed below:

TABLE TWO
PAST AND PRESENT POPULATION DATA

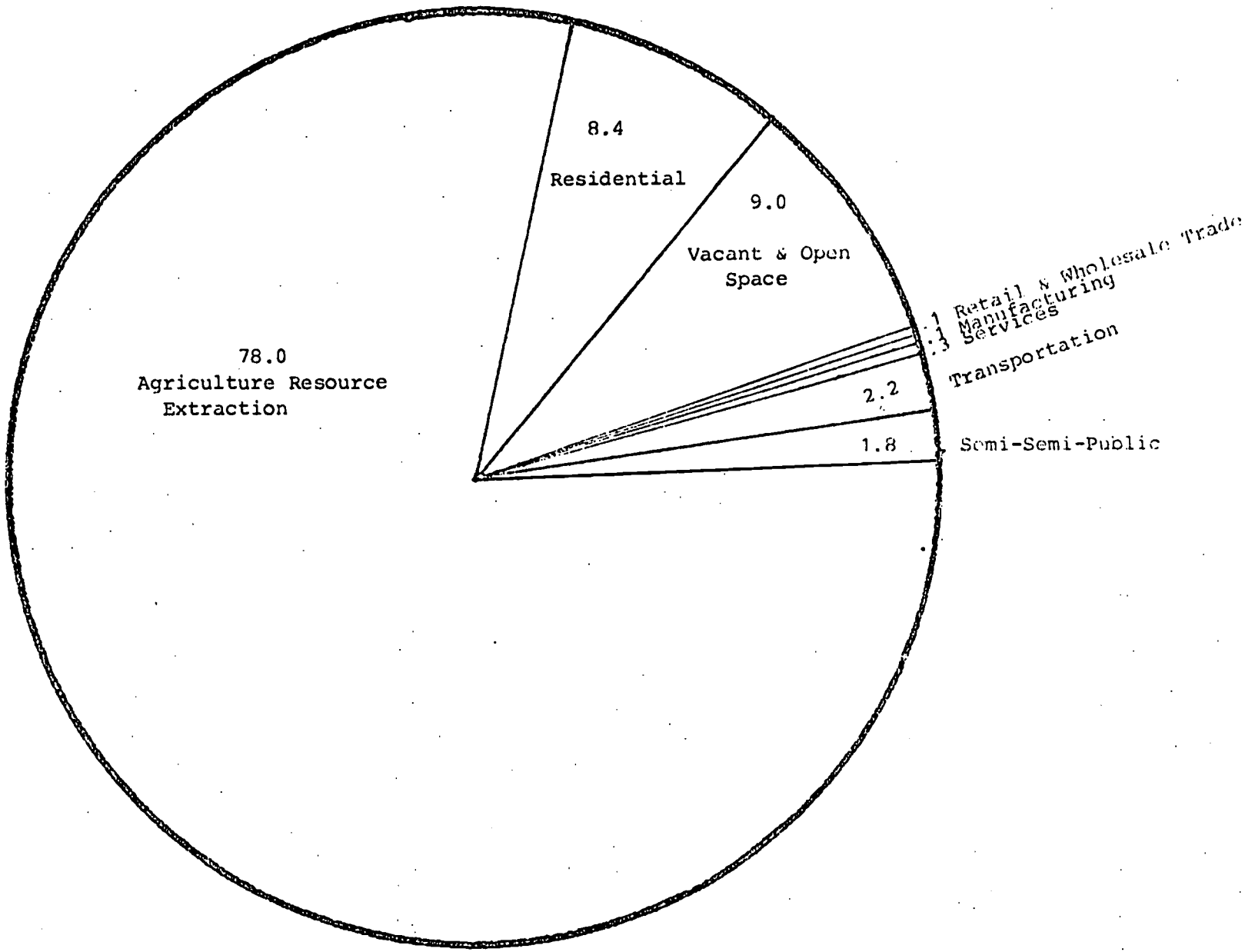
	1940	1950	1960	1970	1973
Pendleton	1681	2082	2472	2243	2223
Ingalls	442	666	873	888	907
Markleville	226	314	402	457	452
Fortville	1463	1786	2209	2460	2530
Madison Co. Townships:					
Adams	1956	2236	2746	3381	3696
Fall Creek	5103	6127	8703	10,005	10,205
Green	1182	1410	1796	2208	2270
Hancock Co. Townships:					
Vernon	2569	3118	4174	5034	5374
Hamilton Co. Townships:					
Fall Creek	950	981	1384	2046	2078
Madison County	88,575	103,911	125,819	138,522	140,751
Hancock County	17,302	20,332	26,665	35,096	38,650
Hamilton County	24,614	28,491	40,132	54,532	62,624

As part of the 208 planning project, COG has prepared a detailed study of the current land use in Madison County. The report is entitled "Existing Land Use Data for Madison County". Various land use categories were established including agricultural, public and semi-public, manufacturing, retail trade, services, various residential categories and several other categories. The number of acres and number of structures in each category were counted in each one-square mile section and included in the report. Land use in each township and town was summarized by "pie" diagrams.

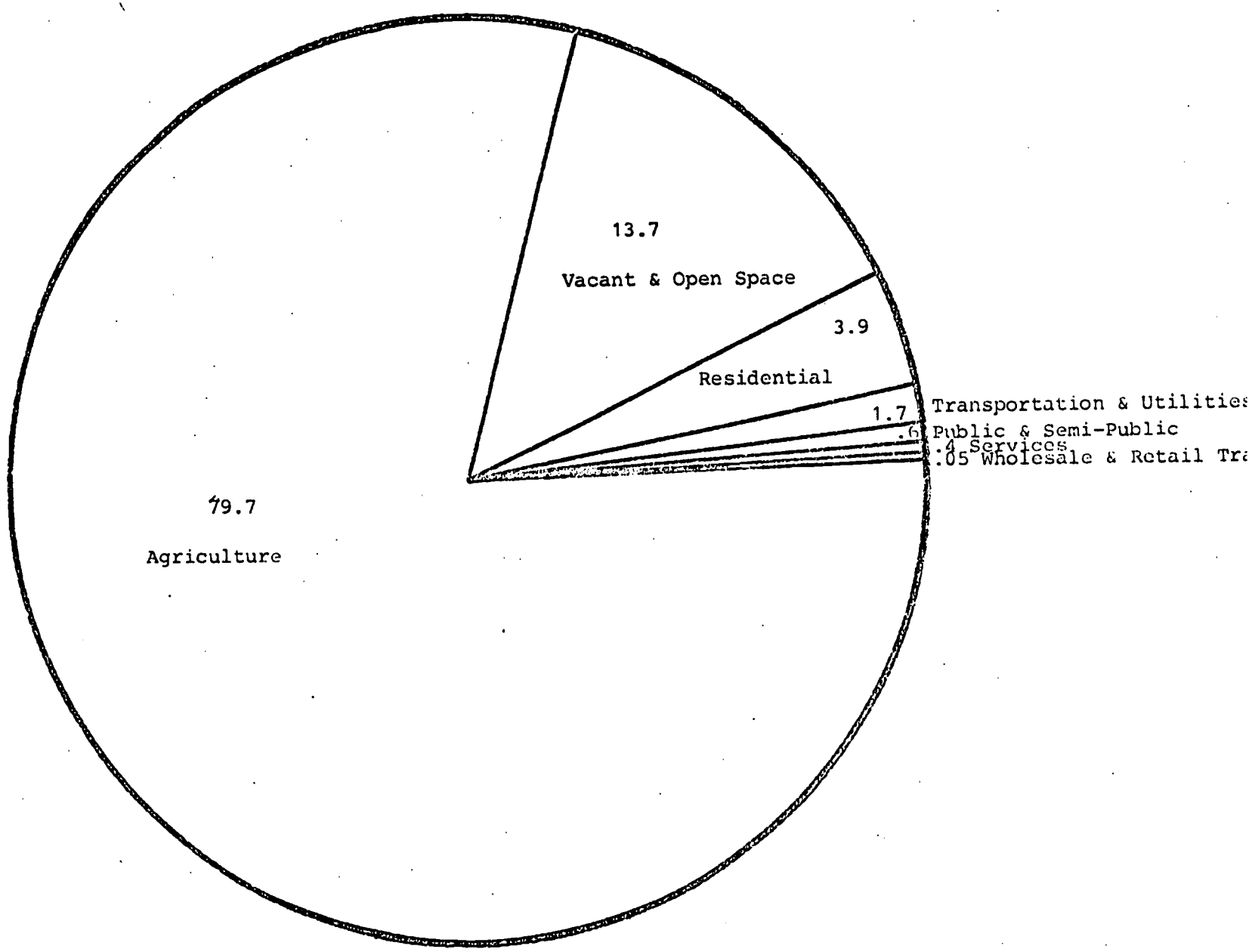
Following are reproductions of these diagrams for Adams, Fall Creek and Green Townships. All of Adams Township, about 80% of Fall Creek Township and about half of Green Township are included in the Planning Area. Small slivers of Anderson and Union Townships are also included. Similar diagrams for Pendleton, Ingalls and Markleville can be found in sections 4.4.1, 4.5.1 and 4.6.1 respectively.



ADAMS TOWNSHIP LAND USE %'s



FALL CREEK TOWNSHIP LAND USE %'s



GREEN TOWNSHIP LAND USE %

4.2.1.4 Water Quality and Users (General)

Region 6 is currently preparing a report on water quality for the basin of the West Fork of the White River. This basin includes the Fall Creek Watershed.

Fall Creek receives sewage from the Middletown sewage treatment plant, some of the subdivisions in the northern part of the planning area, the Pendleton sewage treatment plant, the Reformatory plant, Ingalls, and the Fortville plant. The sewer systems in Pendleton and Fortville have infiltration/inflow problems that cause the plants to become overloaded and bypass raw sewage to the creek. The Reformatory sewer system also is experiencing infiltration/inflow problems that result in the by-passing of untreated wastewater to Fall Creek. Much of the septic tanks waste in Ingalls is transported via subsurface drain or open ditch to either Fall Creek or Lick Creek.

Some of Fall Creek's tributaries carry significant pollution. Prairie Creek receives pollution from a number of houses and mobile homes on the south side of Anderson and nutrient runoff from a sod farm before entering the planning area. Then it receives pollution from some of the subdivisions just south of Interstate 69 and also from some small industries north of Pendleton. Lick Creek receives sewage from the Markleville School and many homes in Markleville and from Ingalls.

Prairie Creek and Fall Creek are often green with algae due to the nutrients in the water. A swimming pool that is filled by water diverted from Fall Creek at Pendleton has been closed for several years because of high bacteria counts.

The Towns of Fortville, Ingalls and Pendleton have municipal water systems which take their water from wells. The rest of the water supply in the area comes from private wells. The ground-water supply in the planning area is pentiful. There have been no cases of contaminated groundwater in the Planning Area reported to the county sanitarian.

After leaving the planning area, Fall Creek flows into Geist Reservoir which was built by the Indianapolis Water Company to maintain adequate streamflow in Fall Creek. The reservoir is also used for recreation. The Indianapolis Water Company has an intake where Fall Creek crosses Keystone Avenue in Indianapolis. 28 to 30 million gallons per day are taken from this point for the municipal water supply.

4.2.1.5 Other Environmental Conditions (General)

The climate in the Planning Area is temperate with moderate winters and warm summers. The average January temperature is 28.2°F and the average July temperature is 74.3°F. Annual precipitation amounts to approximately 42.5 inches of which about 20% is snow. A 2 inch rainfall is considered a one hour, 10 year storm.

There is relatively little industry in the area and there are no municipal activities that would discharge pollutants to the air.

Outside of the populated areas there is an abundance of small streams and woodland where wildlife flourishes. Fish populations in the lower portion of Fall Creek are expected to increase when the pollution sources are stopped. There are no wetlands or environmentally sensitive areas that will be affected by the proposed project.

The State Historic Preservation Office has stated that there is no known historical or architectural sites which will be affected by the project. The letters from SHPO are presented in Appendix B.

4.2.2 Infiltration and Inflow (General)

Infiltration/Inflow studies for the towns of Fortville and Pendleton have been completed and approved by the State and the E. P. A. In both towns, the studies concluded that excessive I/I was present and that rehabilitation of the sewers was likely to be cost effective. The Pendleton Sewer System Evaluation Survey has been completed and submitted to the Indiana State Board of Health for approval. The Fortville S.S.E.S. is currently into the television inspection phases.

4.2.3 Existing Wastewater Flows and Treatment Systems (General)

Section 4.2.1.4 gives a brief description of the sewage treatment plants at Pendleton, Fortville and the Reformatory. More detailed discussion of these plants can be found in Sections 4.4.2, 4.7.2 and 4.8.3 respectively.

There are four other sewage treatment plants in the Planning Area. One plant is located at the Five Star Mobile Home Park at the junction of Interstate 69 and Indiana State Road 12. The second plant serves the Regency Park Mobile Home Court on U. S. Highway 36 east of Pendleton. A third plant is located at the Indiana Pentacostal Camp on Indiana State Route 67, just southwest of Ingalls. The fourth plant serves the Mt. Vernon Community Schools located on State Route 234 in Hancock County. Sections 4.8.2.1, 4.8.2.2, 4.8.2.3 and 4.8.1.23 respectively, include discussion of these treatment plants in detail.

Outside of the areas served by these treatment plants, all domestic and most commercial wastewater is disposed of by septic systems. These systems usually consist of a septic tank and an absorption field although some use drywells in place of absorption fields. Some tanks have direct connections to subsurface drains rather than to absorption fields.

The septic systems in the unincorporated areas are discussed in section 4.8.1. The septic systems in Ingalls, Markleville and some of the mobile home parks are discussed in sections 4.5.2, 4.6.2 and 4.8.2 respectively.

4.2.4 Performance of Existing Systems (General)

The sewage collection systems in Fortville and Pendleton both have excessive infiltration/inflow as determined by I/I Analysis approved by the State and the Federal EPA (see sections 4.4.2.3. and 4.7.2.3). This causes these plants to become hydrailically overloaded and bypass raw sewage to the stream in wet weather. The Pendleton plant has had problems in meeting its effluent standards that are largely due to the age and wear of the plant (See section 4.4.2.2.) The Fortville plant is considered to be in good condition and will require only minor modification once the majority of the excessive I/I is eliminated (see section 4.7).

In Markleville and Ingalls, the soils are too tight and the lots are too small for many absorption fields to be used successfully. Many homes in these towns have septic tanks with no absorption fields, only direct connections to subsurface drains. Other homes have absorption fields with a discharge pipe to subsurface drains. Others have no discharges, but sometimes back up or cause ponding in wet weather. For these reasons, the septic systems in Markleville and Ingalls are a pollution problem, a nuisance and a health hazard (see sections 4.5.2 and 4.6.2).

Some of the rural subdivisions are built on poorly drained soils, and others are on better drained soils. Generally, where drainage is poor, septic tank performance is often poor. This causes health hazards where back-up and ponding occur and pollution where absorption fields have been connected to sub-surface drains. On better soils, and low density housing, the septic systems are satisfactory. Where there is a higher density on well drained soils, the septic systems often seem to perform well, but a hazard of ground water pollution may exist in some cases (see Section 4.8.1).

The sewage treatment plant at the Five Star Mobile Home Park is a package extended aeration plant that has a design capacity of 62,600 GPD. Unfortunately, the average daily flow has been less than one-fifth of the design capacity. Consequently, the plant has not been operated in recent years. The influent passes through the plant and directly into a nearby lake without the benefit of mechanical aeration treatment.

The sewage treatment plant at the Regency Park Mobile Home Court consists of a 12,500 GPD Extended Aeration facility with discharge to a circular, 24 hour holding pond as final treatment. This plant lacks chemical addition facilities and is in need of better operation and maintenance if it is to meet the standards on the NPDES Permit.

The sewage treatment plant at the Mt. Vernon Community Schools is a 40,000 GPD Extended Aeration Facility with discharge to two-one day holding ponds. The plant is relatively new and has been successful in meeting the NPDES effluent quality limits.

There are some areas in the Planning Area that have no current pollution problems and are not likely to develop any. There are some areas that may develop pollution problems in the future due to residential or industrial growth. The present and potential pollution source map is shown on the next page. The extent of the pollution problems in the area are covered in detail in later sections.

4.3. FUTURE SITUATION (GENERAL)

4.3.1 Land Use (General)

The Madison County Council of Governments has done research on the future growth and needs of the County and on public opinion and feasibility of different types of growth patterns. Their conclusion is that growth centered around the existing developed areas is preferred by the public over uncontrolled development, strip development, or restriction of development to urbanized centers.

The main type of growth that is expected in the planning area is residential growth. There will be a growth in retail trade accompanying the residential growth. A small amount of industrial growth is also expected.

4.3.2 Demographic and Economic Projections (General)

Region 6 has developed population projections for all of the townships in the Region. It has also calculated town population based on the simple assumption that the towns will grow in proportion to the townships. Since it is anticipated that most growth will be centered around the already populated areas, these town estimates are probably too low. The township projections by Region 6 have been approved by the Stream Pollution Control Board.

Indiana Heartland has prepared population projections for the townships and for the Fortville sewer service area.

Shown below are the Region 6 "High" population projections (high and low projections were made). Heartland projections were used for the townships and Fortville, and least squares projections for the towns in Madison County. These are the figures that will be used in calculating design flows. The staff of the State Board of Health has given approval of these figures.

The economic outlook for the planning area is continued moderate growth. Area planners foresee no sharp surges or downturns that would effect wastewater management planning.

TABLE THREE
POPULATION PROJECTIONS

Year		1940	1950	1960	1970	1973	1990	2000
Towns:	Pendleton*	1680	2082	2472	2243	2223	2631	2788
	Ingalls *	442	666	873	888	907	1187	1325
	Markleville*	226	314	402	457	452	570	631
	Fortville*	1463	1786	2209	2460	2530	3123	3453
Madison Co. Townships:								
	Adams+	1956	2236	2746	3381	3696	4352	4821
	Fall Creek+	5103	6127	8703	10,055	10,205	13,015	14,445
	Green+	1182	1410	1798	2208	2270	2870	3190
Hancock Co:								
	Vernon **	2569	3118	4174	5034	5374	7014	8103
Madison Co..+		88,575	103,911	125,819	138,522	140,751	164,943	177,738
Hamilton Co. **		---	----	---	54,500	78,800	110,600	140,800

* Projection by least square method

** Projection by Indiana Heartland Coordinating Commission

\+ Projection by Region 6 Planning and Development Commission

4.3.3 Forecast of Flow and Waste Load (General)

All of the schools in the planning area except for the Mt. Vernon Community Schools in Hancock County are in the South Madison Community School Corporation. The following are enrollment projections for the schools in the Planning Area and in the S.M.C.S.C. obtained from the corporation.

The projections were:

Year	Enrollment
1976-77	3920
77-78	3840
78-79	3771
79-80	3661
80-81	3587
81-82	3460
82-83	3345
83-84	3252

The enrollment figures shown are in Full Time Equivalents. One full time student in grades 1 - 12 counts as one Full Time Equivalent. Kindergarten students count one- half since they are only there half the day.

The corporation has plans to build a new elementary school in the near future. The proposed site of the new school is at the junction of U.S. Highway 36 and State Road 109. The estimated enrollment of the school is approximately 800 students. Plans are to have the school operating by the fall of 1979.

The 1976-77 enrollment of the existing schools in the Planning Area as as follows:

School	Grade	Enrollment
Markleville Middle School	6 - 8	235
Markleville Elementary School	K - 5	215
Fall Creek Heights Elementary School	1 - 5	148
Ingalls Elementary School	K - 5	230
Pendleton Heights High School	9 - 12	1340
Pendleton Middle School	6 - 8	810
Pendleton South Elementary School	K - 5	1040
Mt. Vernon Community Schools	6 - 12	1600

For the purpose of wastwater flow projections, it will be assumed that the enrollment after 1984 will remain at the 1983-84 level. This should be a safe assumption since the birth rate seems to be declining. It will also be assumed that the new elementary school will be completed in 1979, and will enroll all of the out-of-town elementary students. Other than that, it will be assumed that the school's enrollments will change in proportion to the corporation's enrollment.

In calculating wasteloads from schools located in towns it must be remembered that the wasteload created by students living in town has already been accounted for by the wasteload calculation that is made using the population of the town. Only out-of-town students should be counted in calculating the school's contribution to the town wasteload. From the corporation's data it was found that there are currently 110 students living in Markleville, 180 in Ingalls and 360 in Pendleton. No data was available on how these students were distributed among the schools within the towns so it will be assumed that they are distributed according to the schools current enrollments. It will also be assumed that the percentage of students living in town will remain constant.

From these assumptions, the following projections are derived.

TABLE FOUR
Design Flow-School Systems

	Enrollment	In Town Students	Out of Town Students	GPD Design Flow
Markleville Middle School	235	57	178	4450
Markleville Elementary	215	53	162	4050
Fall Creek Heights Elementary	148	-	148	3700
Ingalls Elementary	230	180	50	1250
Pendleton Heights High School	1340	150	1190	29,750
Pendleton Middle School	810	92	718	17,950
Pendleton South Elementary School	1040	118	922	23,050
Mt. Vernon Community Schools	1600	-	1600	40,000

The design flows were calculated by multiplying the number of out-of-town students by an average design flow of 25 gallons/students/day.

As the proposed new elementary school will be approximately one and one-half miles from the proposed Markleville treatment

plant site, the wastewater flow from this school must be taken into regional consideration. Therefore, the design flow for this proposed school is shown below.

	Estimated Enrollment	Markleville Students	Out of Town Students	GPD Flow
Proposed Elementary School	800	53	747	18670

4.3.4 Future Environment of the Planning Area Without the Project (General)

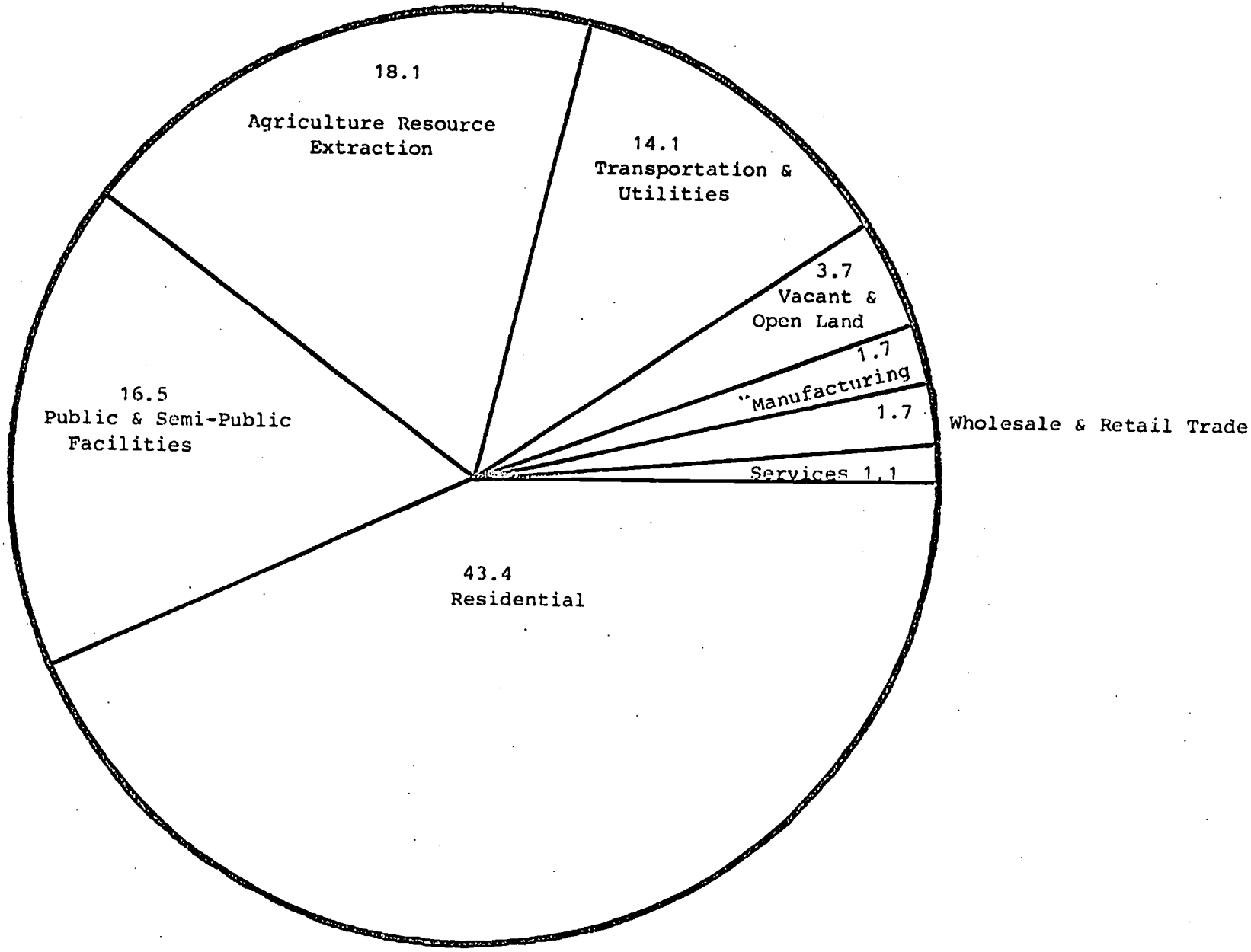
If no action is taken to correct the wastewater disposal problems existing in the planning area, these problems will continue to grow as the population increases. The infiltration/inflow to the Fortville and Pendleton plants will continue to cause bypasses of raw sewage to Fall Creek. Septic tanks discharges to storm drains in Markleville, Ingalls and many rural subdivisions will continue to pollute Fall Creek and its tributaries. Back-ups and ponding of septic waste in yards will continue to cause nuisances and health hazards in areas where septic systems are used in unsuitable soil.

4.4 CURRENT AND FUTURE SITUATION - PENDLETON

4.4.1 Land Use (Pendleton)

On the following page is the land use "pie" for Pendleton from the C.O.G. study "Existing Land Use Data for Madison County".

This pattern of land use is not expected to change greatly in the near future.



PENDLETON LAND USE %'s

4.4.2 Existing Flows and Treatment Systems (Pendleton)

The existing sewer system serves most of the incorporated area of Pendleton plus the Arrowhead Trailer Park which was hooked on in late 1976. There are three areas that lie within the corporate limits but are currently not served by the sewer system. Two of the areas lie between Water Street and Fall Creek while the other area is centered along Anderson Pike Drive north of Fall Creek. The current service area is shown on the map on the next page.

4.4.2.2 Existing Treatment Facilities (Pendleton)

An existing wastewater treatment plant located at the west side of town currently treats the wastewater from most of the homes in Pendleton. The homes at the north side of town that are not on the sewer treat their wastewater by septic tanks with or without drain fields. A portion of these homes are discharging directly from their septic tanks to storm drain tiles.

The present treatment plant is a comination aerator-clarifier activated sludge type, developed by the Chicago Pump Company. It was designed in 1945 to handle 212,000 gal/day and was placed in operation in 1947. It consists of the following major components:

1. A comminutor and by-pass bar screen installed in a concrete intake chamber. It is capable of handling 0.5 mdg (million gallons per day).

2. Two wet well raw sewage pumps, originally designed to pump 175 gpm each, but which actually pump 250 to 240 gpm, respectively, under 15 feet of head.

3. The wetwell is a 5' x 12' x 10' deep concrete tank attached to the main concrete structure.

4. The primary settling tank is 10' x 23' x 8.25' average water depth, which provides 230 ft^2 surface area and 1900 $ft.^3$ volume. It is too small in relation to the aeration and clarifier (final settling) tanks, being approximately 1/2 their capacity, but is nearly impossible to enlarge because it is completely inclosed by the control building, aeration tanks and the chlorine contact chamber. It can be expected to remove approximately 5 to 10% of the BOD_5.

5. The aerator-clarifier sections are two concrete structures in which steel tanks have been installed. The area between the steel tanks and the concrete structure serve as the aeration tanks, while the steel tanks function as final settling tanks and also contain a mechanical aerator device stated by the manufacturer to have a capacity of 5,100 gpm and an oxygen transfer of 4 to 8 ppm per pass through the propeller. In 1963 two osolated blowers were added providing additional diffused air which raised theDO level from a minimum to an average acceptable range.

   The aeration tanks have a net volume of 16,340 ft^3. A report of the Standards committee of the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers,"Recommended Standards for Sewage Works", 1968 Edition, lists a recommended retention time of 7.5 hours and a load of 30 lb. BOD_5/1000 ft^3 for aerators of this type. This allows a maximum of Q=0.391 mdg and BOD_5=490 lb load to the aeration tanks.

   The clarifiers, (final settling tanks) have a net surface area of 509 ft^2 and a net volume of 6072 $ft.^3$. The above mentioned report recommends a 3.0 hour detention time and a 600 gal/day/ft^2 surface settling rate. The daily flow capacities are computed then as follows:

   $Q = 509\ ft^2 \times 600\ gal/day/ft^2 = 0.305$ mgd
   $Q = 6072\ ft^3 \times 7.48\ gal/ft^3 \times 24\ hr/day \div 3\ hr = 0.363$ mg

   The limiting parameters for the aerator-clarifier tank are therefore Q = 0.305 mgd and 490 lb BOD_5 load.

6. The sludge digestor consists of one unit with a 25 foot inside diameter and a 20 foot side water depth which provides 10,300 ft^3 volume. It has a cover, gas collection equipment which is not in working order (presently gas is being allowed to escape to the atmosphere through a 2" pipe) and a circulated hot water system. Supernatant liquor with-drawals are being made to a lagoon just west of the plant.

7. The chlorine contact chamber is one unit with 3000 gallon capacity.

8. There are two sludge drying beds of equal size with 2,600 ft^2 bet surface area. Currently, the effluent from the drying beds is discharged directly to Fall Creek.

4.4.2.3 Infiltration and Inflow Study (Pendleton)

The infiltration/inflow study gives an estimated average wastewater flow of 0.272 mgd without I/I and a peak domestic flow of 0.462 mgd without I/I. Peak inflow is estimated at 1.9 mgd and peak infiltration is 0.3 mgd.

The conclusion of the I/I analysis was that rehabilitation of the existing system was potentially cost-effective. A Sewer System Evaluation Survey was recommended to determine the most cost effective was to eliminate the excessive I/I. The S.S.E.S. will also determine a more exact quantity of I/I in the system.

4.4.2.4 Sewer System Evaluation Survey (Pendleton)

The Pendleton Sewer System Evaluation Survey (SSES) has been completed and submitted to the State Board of Health. The SSES concluded that Pendleton is currently experiencing a peak daily infiltration/inflow (I/I) of approximately 2.4 million gallons per day (mgd) which consists of about 1.85 mgd infiltration and 0.5 mgd inflow. Specific I/I sources such as leaky manholes or broken sewer lines were found and documented in the Appendix of the report. The amount of I/I that each source contributed was determined and tabulated.

A cost analysis was conducted in the SSES to determine the cost to remove one gallon per day of I/I. These costs were then arranged in order of increasing dollars per gallon per day of I/I eliminated and then divided into seven groups A through G. From these groups a rehabilitation cost curve was developed. A cost to transport and treat the remaining I/I in each group was then made. As the cost to treat the excess I/I was unknown, a series of curves based upon varying treatment costs were developed. For each treatment cost a composite cost curve was made my adding the rehabilitation costs, the transport and treat costs. The optimum point of the composite cost curve was the lowest point on the curve. From this point a rehabilitation group was chosen for each treatment cost curve.

An estimate of the treatment cost was made in the Report. Based upon the estimated cost of $0.50/1000 gallons, Group F was the optimum rehabilitation group. At this treatment cost, a rehabilitation program would be undertaken which would reduce infiltration by about 1.23 mgd and eliminate almost all of the inflow. The program would have an estimated initial cost of $648,000.

The proposed rehabilitation program consists of replacing 119 manholes, sealing the ring and lids of 30 manholes, grouting or repairing 8 manholes and installing or constructing 3 new manholes. In addition, about 10,300 linear feet (LFT) of sewer line would be repaired by replacement of certain sections and service connections and testing and sealing the joints. Another 6,100 LFT would be sliplined and about 3,125 LFT would be replaced entirely.

The transport and treat cost estimates in the SSES were based on several assumptions. First, it was assumed that the existing treatment plant at Pendleton was too old and small to upgrade to handle the remaining wastewater flow. It was assumed that all the wastewater from Pendleton would have to be pumped to a regional treatment plant located north of Ingalls. Secondly, it was assumed that a flow equalization basin (or holding pond) located at Pendleton will be the selected method for controlling the flow variations caused by the I/I remaining in the collection system after the completion of the rehabilitation program. As stated earlier, a treatment cost of $0.50/1000 gallons was used to determine the extent of the sewer rehabilitation program. This cost was also based upon these assumptions.

This method of transport and treatment of the Pendleton wastewater may or may not correspond to the recommendations of the Facilities Plan. However, the concepts and costs of the selected rehabilitation program and flow equalization pond at Pendleton were used in determining estimated design flows, and costs in the evaluation of the regional alternatives (see Section S.2.). After a regional alternative and method of treatment is selected, a cost analysis must be made to see if these assumptions were accurate. Three alternatives for the transport and treatment concept exist. One alternative is to ignore rehabilitation of the Pendleton Sewer System and treat the entire amount of I/I at the Regional Plant. A second alternative would be to rehabilitate the sewer system as recommended in the S.S.E.S. and pump the remaining wastewater to a flow equalization pond at the proposed treatment plant. The third alternative is similar to the second only the equalization pond will be located at Pendleton. These three alternatives will be evaluated in section 5.5.

4.4.3 Water Quality (Pendleton)

Because of excessive infiltration/inflow, the Pendleton sewage treatment plant is often overloaded and bypasses sewage directly to Fall Creek. In addition, the final plant effluent has been below the ecpected quality for secondary wastewater treatment. The cause of this can be attributed to the run down condition of the plant. In general, it can be said that the final water quality of the wastewater produced by the sewered areas of Pendleton is poor.

There are 6 areas of Pendleton which lie in or adjacent to the city limits but are not currently served by the sanitary sewer systems. These areas are numbered and shown on Figure .

Area one is located north of Fall Creek in the northern most section of town. This is a wooded area bounded by Prairie Creek on the east and an unnamed Ditch on the west. The homes in this area are clustered in several places and scattered otherwise. There are also several Industrial developments in the area. The main soil groups in this area are eroded Miami soils in the hilly areas located above Anderson Pike Road and Eel Soils between Anderson Pike and Fall Creek. These soils have moderate and severe limitations for septic system use respectively. There are several draintile outlets along Prairie Creek and Fall Creek that are discharging raw sewage directly into the creeks. The unnamed stream also receives raw sewage from the three or four homes that are built along side of it. A sample taken from this ditch showed a high fecal coliform count of 21,000 parts per 100 ml. The ditch contained approximately 3" of standing water. The smell of water in the area and the high fecal coliform count indicated the presence of sewage. If no corrective action is taken, the quality of surface water in this area will remain in poor condition.

Area Two is located between Main Street and Pendleton Avenue just South of Fall Creek. There are 4 homes on Pendleton Avenue that are not currently connected to the Town Sewer. There is also a small mobile home park in the area. Several of the mobile homes have tapped into a portion of the Town Sanitary Sewer. The remaining mobile homes tie into a community septic system that consists of a spetic tank and absorption field. Unfortunately, the drainfield is located on the bank of Fall Creek and is of inadequate size. The effluent will pass directly through the drainfield out onto the bank and into the creek. The major soil group of the area is Eel, which has very severe limitations due to periodic flooding. Therefore, it is not likely that the septic tank drainfield wastewater treatment system will work in this area.

Area Three is directly west of area Two between Water Street and Fall Creek Drive. Area Three is well developed residential area which drains away from Town to Fall Creek. Most of the homes in this area have their septic tanks discharge directly to a county draintile system. The untreated effluent then passes directly into Fall Creek. A test sample taken from a storm tile catch basin in this area revealed a high Fecal Coliform count of 230,000 parts per 100 ml. The outfall discharges the untreated effluent from these homes into the creek right in the center of Fall Creek Park. This condition has given rise to mosquito breeding and unpleasant odors. Without corrective action, the wastewater from the homes in this area will be a nuisance and continue to pollute both Fall Creek Park and Fall Creek.

Area Four is located between the Conrail Railroad and State Route 9 north of State Street. The area south of Water Street is mainly residential with the exception of a car dealer and garage. A new park with a swimming pool has been proposed to be built north of Water Street. There have also been several 2-story apartment complexes built recently in this area. The major soil groups in the area are Crosby Mahalesville with limestone substructure and Sleeth which have very severe and moderate to severe limitations for septic system use, respectively. The major problem with the soils in this area is the underlying limestone bed which lies only 2 to 3 feet below the surface. The effluent will percolate down to this bed then travel along the limestone until there is an outlet. Because of this impervious layer, it is not likely that septic systems will work in this area.

Area #5 consists of the group of homes located along South Broadway Street between the Town Corporation line and State Route 67. This area lies on Sleeth and Westland Soils which have moderate to severe soil limitations for septic systems. The area drains away from the town to a ditch running along side S.R. 67. Although the soil conditions are suspect in a door to door survey, no homeowner reported having or knowing of anyone who has had any septic system problems. There was also no evidence of pollution in the south drainage ditch. Therefore, it can be said that this area does not have a present water quality problem. In areas #1 and #6

Area #6 is located southwest of town between the Idlewold Golf Course and Main Street. There are two subdivisions in the area: Board of Trade and Idlewold Gardens. The homes in these subdivisions use septic tanks with drainfields for sewage disposal. The soils in Board of Trade are Sleeth which have moderate to severe limitations for septic system use. The soils in Idlewold are Crosby which have severe to very severe limitations and a small area of Fox with only slight limitations. Because of the unfavorable soil conditions, the septic systems in this area create a pollution hazard.

Various alternatives of wastewater treatment were analyzed for technical feasibility and cost effectiveness in these areas. The alternate methods included holding tanks with honeydipper trucks, mound drainfield systems and community septic systems. In the outlying areas to the north, hilly areas or areas with underlying rock beds limited the use of some of the methods. The operation and maintenance costs of the holding tank systems made this alternative uneconomical when compared to constructing sewers.

In areas #1 and #6 it was found to be cost effective to install gravity sanitary sewers to collect the wastewater and to construct pump stations to transport it to the nearby Pendleton sewers. In areas #2, #3 and #4, an underlying limestone rock formation located 3 feet below the ground surface made the cost of installing gravity sewers prohibitive. Pressure sewer systems were evaluated along with the other forms of wastewater treatment in these areas and were found to be cost effective. These pressure systems will collect and transport the sewage from these areas to the nearby Pendleton sewers.

4.4.4 No Action (Pendleton)

If no action is taken to control water pollution in Pendleton, the current pollution problem will worsen. Moderate population growth will increase the waste loading and the continuing deterioration of the sewer system will increase the infiltration rate. The result will be larger and more frequent bypasses of raw sewage to the stream. The areas not served by the sewer will continue to pollute Fall Creek because of septic tank discharge.

4.4.5 Proposed Service Area (Pendleton)

It is recommended that the Pendleton sewer system be extended to serve the area just south of Fall Creek, the area north of the creek on Anderson Pike, Central Way on the east side of town, and Board of Trade and Idlewood Gardens south of town. A proposed service area map is shown on the next page.

4.4.6 Forecast of Waste Flow (Pendleton)

The table below shows the calculation of the additional flow from the new areas to be served. The township figure of 3.39 persons per home is used. This township figure excludes the Town of Pendleton and the State Reformatory. A flow of 100 GPD per capita is used.

TABLE FIVE
Design Flow - Pendleton Outskirts

Area	Homes	Persons/Home	Pop.	GPD
In Pendleton So. of Fall Creek	15	3.39	52	5,200
Anderson Pike No. of Fall Creek	18	3.39	61	6,100
Central Way	47	3.39	159	15,900
Idlewood Gardens	29	3.39	98	9,800
Board of Trade	19	3.39	64	6,400
		Total		43,400

The design flow will equal the flow shown above times the Fall Creek Township 20 year growth rate of 30%.

$$43,400 + 43,400\ (0.30) = 56,420\ \text{GPD (Design Flow)}$$

The Arrowhead Mobile Home Park has recently connected into the Pendleton Collection System. There are currently 105 mobile homes in the Park. At an average daily flow of 200 gallons per mobile home per day, this will give an estimated flow of 21,000 gallons per day. As the Park is at its full capacity, this figure will be used as the design flow.

From Table Three, the population of the Town of Pendleton in the year 2000 will be approximately 2788 persons. At 100 gallons per capita per day, this will give a daily design flow of 278,800 gallons per day. Rehabilitation group F will eliminate 1.23 mgd of infiltration and almost all of the inflow that is currently in the sewer system. After the sewer system has been rehabilitated, the estimated total remaining infiltration per year will be 113.9 million gallons. Dividing by 365 days per year will give an average daily infiltration flow of 310,000 GPD.

The Design Flow for the Town of Pendleton and surrounding area is shown in Table Six.

TABLE SIX
PENDLETON DESIGN FLOW

Arrowhead	21,000 GPD
Outlying Areas	56,420 GPD
Pendleton	278,800 GPD
Infiltration (average)	310,000 GPD
Pendleton Schools	70,750 GPD
Total Design Flow	736,970 GPD

4.5 CURRENT AND FUTURE SITUATION - INGALLS

4.5.1 Land Use (Ingalls)

On the following page is the land use "Pie" for Ingalls from the COG Study "Existing Land Use Data for Madison County".

This pattern of lane use is not expected to change greatly in the near future.

4.5.2 Existing Treatment Systems and Water Quality (Ingalls)

4.5.2.1 Septic Systems (Ingalls)

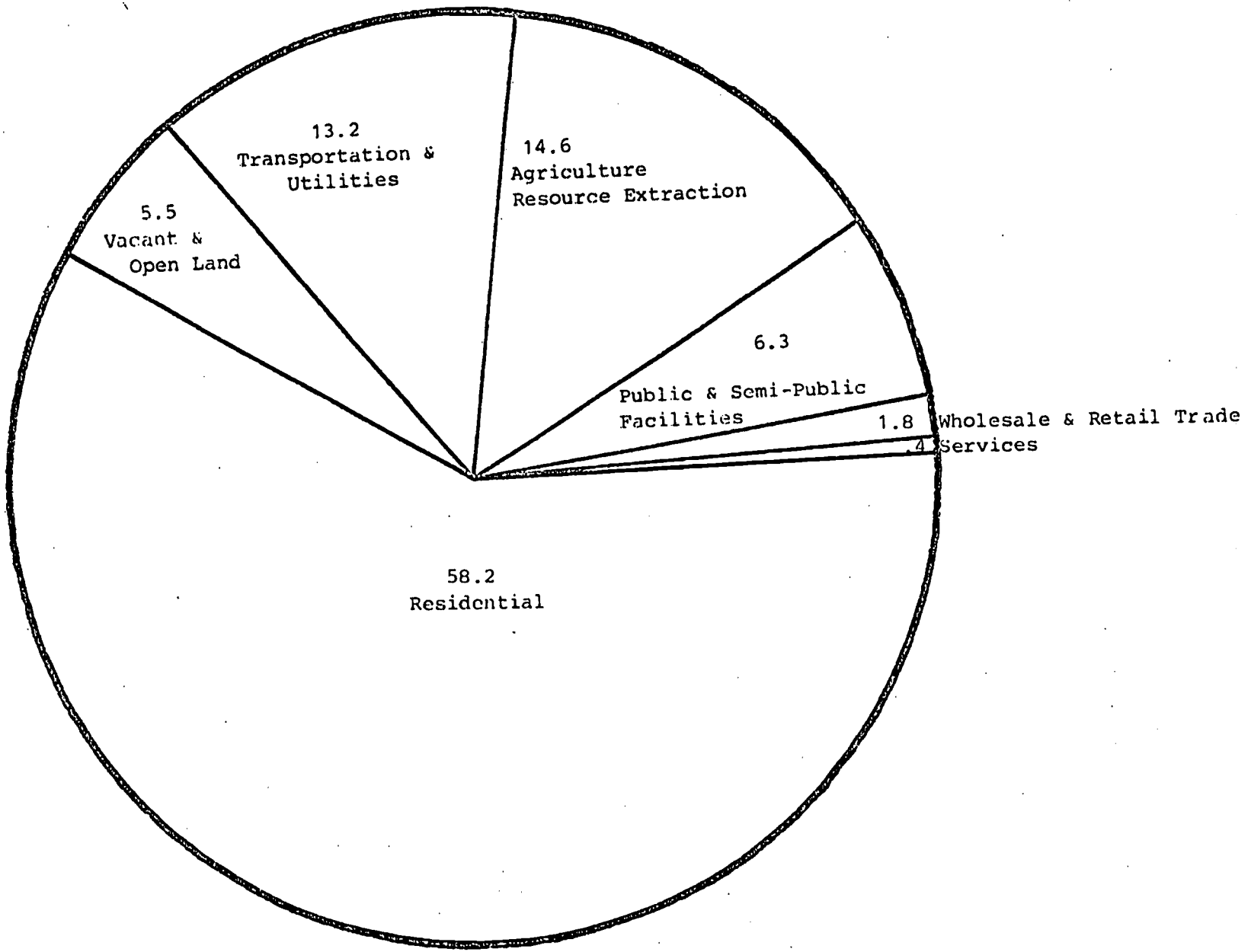
The existing septic systems in Ingalls are causing a severe pollution problem. Most of the lots are 40' by 130' on the plat map. Although there is only one dwelling for every 2 or 3 lots, and many owners are living on more than one lot, the plat layout makes it difficult to find a site for an absorption field. The soils in Ingalls are about 60% Crosby and 40% Camden. Crosby has severe limitations for septic tank use and Camden has slight limitations.

It appears likely that most of the septic tanks are connected to the storm sewers either with or without absorption fields. Dark, septic, wastewater can be seen flowing in the catch basins. Open ditches to the north to Fall Creek and to the south to Lick Creek carry septic wastewater. These ditches have also been heavy mosquito breeding areas.

As most of the homes in Ingalls lie in areas with unfavorable soils for septic systems, it appears unlikely that attempts to install new or upgrade existing systems will work. However, there is a portion of town that have soils that will support septic systems if properly maintained.

Therefore, two alternatives for correcting the current pollution in Ingalls exist. Alternative One would require the homes on Camden soil to upgrade their existing septic systems and the homes on Crosby soils will discharge their sewage to Holding Tanks. Community septic systems in this area were not considered because there simply is not enough available favorable soil areas in or near the town.

The second alternative involved collecting the wastewater in a sewer system and transporting it to the proper treatment facilities. The present worth values of the two alternatives are shown in Table Seven.



INGALLS LAND USE %'s

TABLE SEVEN
COST ANALYSIS
INGALLS WASTEWATER TREATMENT SYSTEM

ITEM	Alternative One (On-site Disposal)	Alternative Two (Collection System) and Interceptor
Total Construction Costs	614,680	953,330
Total Non-Constr. Costs	84,000	101,200
Present worth-annual operation and Maintenance Costs	641,780	223,710
Less P/W or Salvage Value	(61,470)	(171,600)
Total Present Worth	1,278,990	1,106,640

The recommended alternative is number Two, collecting and transporting the sewage from Ingalls to proper treatment and disposal.

4.5.2.2 Development Northwest of Ingalls

There are 32 mobile homes in the development northwest of Ingalls. Each home has an average lot size of 11,000 sq. ft. The park has recently put in water and gas mains from Ingalls along the back property lines of the homes. The area drains to a ditch that drains directly to Fall Creek.

Most of the area is located on Crosby soils although some areas on the western side are on Miami soils. These soils have severe and moderate limitations for septic tank use respectively. These conditions are the probable cause of the current pollution in the drainage ditch that runs through the development. A recent pollution sample taken from the ditch indicated a fecal coliform count of 43,000 parts per 100 ml. This is well above the ISBH Standards. This area is also a breeding area for mosquitoes and snakes which are a health hazard to the community.

Although each home in the area has a septic tank and drainfield, this form of treatment is not satisfactory. In an analysis of other forms for wastewater treatment, a collection system with treatment at the proposed regional sewage treatment plant proved to be the most cost effective and environmentally sound alternative.

The unincorporated town of Alfont, west of Ingalls, is on Ockley soil. This soil has no restrictions for septic tank use other than possible pollution of groundwater. As the homes in this area are built atop of hills, this pollution condition is unlikely to happen. Therefore, there is no currently water quality problem in this area.

4.5.3 No Action (Ingalls)

If no action is taken, the current pollution and health problem will continue and worsen as the population grows moderately.

4.5.4 Proposed Service Area (Ingalls)

It is recommended that a sewer system be installed in the Town of Ingalls and the area northwest of Ingalls to collect and transport the wastewater to the proper treatment facility. This facility will be disussed in Section 5.2.

A service area map is shown following this section

4.5.6 Forecast of Wastewater Flow (Ingalls)

The table below shows the calculations for present flow. The 1973 census population of Ingalls and the Green Township average of persons per home are used. A flow of 100 GPD per capita is used for the residents of Ingalls and 200 gallons per day per hom for the mobile homes in the area northwest of Ingalls.

Area	Homes	Per/Home	Population	Flow
Town of Ingalls			907	90,700
Area NW of Ingalls	32	3.38	108	6,400
Ingalls Elementary School				1,250
			Total	98,350 GPD

The future design wastewater flow is shown in Table 8. The design flow for the Town of Ingalls was derived from the figures presented in section 4.3.3. The development northwest of Ingalls is expected to grow at the Green Township growth rate of 29%. 32 + 32 (0.29) = 41 homes will be considered in the design flow. As stated in Section 4.3.3, the enrollment of the Ingalls Elementary School is not expected to increase. In fact, the South Madison Community School Corporation has been considering abandoning the school in the future. Therefore, the present flow from the school will be considered as the design flow

TABLE EIGHT
WASTEWATER DESIGN FLOWS - INGALLS

Area	Homes	Per/Home	Population	GPD Flow
Ingalls			1,325	132,500
Ingalls Elem. School				1,250
Area NW of Ingalls	41	3.38	139	8,200
			Total	143,350

A municipal water system has recently been installed in the Town of Ingalls. Once this sewer project comes to the design stage, there will be enough water consumption records to give a more refined projection of wastewater flows.

4.6 CURRENT SITUATION - MARKLEVILLE

4.6.1 Land Use (Markleville)

On the following page is the land use "pie" for Markleville from the COG study "Existing Land Use Data for Madison County". The corporate limits of Markleville extend a considerable distance beyond the residential area. This accounts for the large proportion of land used for agriculture. Along State Road 38 near the junction of County Road 300 East, there are several retail stores, services, and small industries. There is a school on the south side of town and a firtilizer dealership on the west. The rest of the town is almost all residential.

This pattern of land use is not expected to change in the near future.

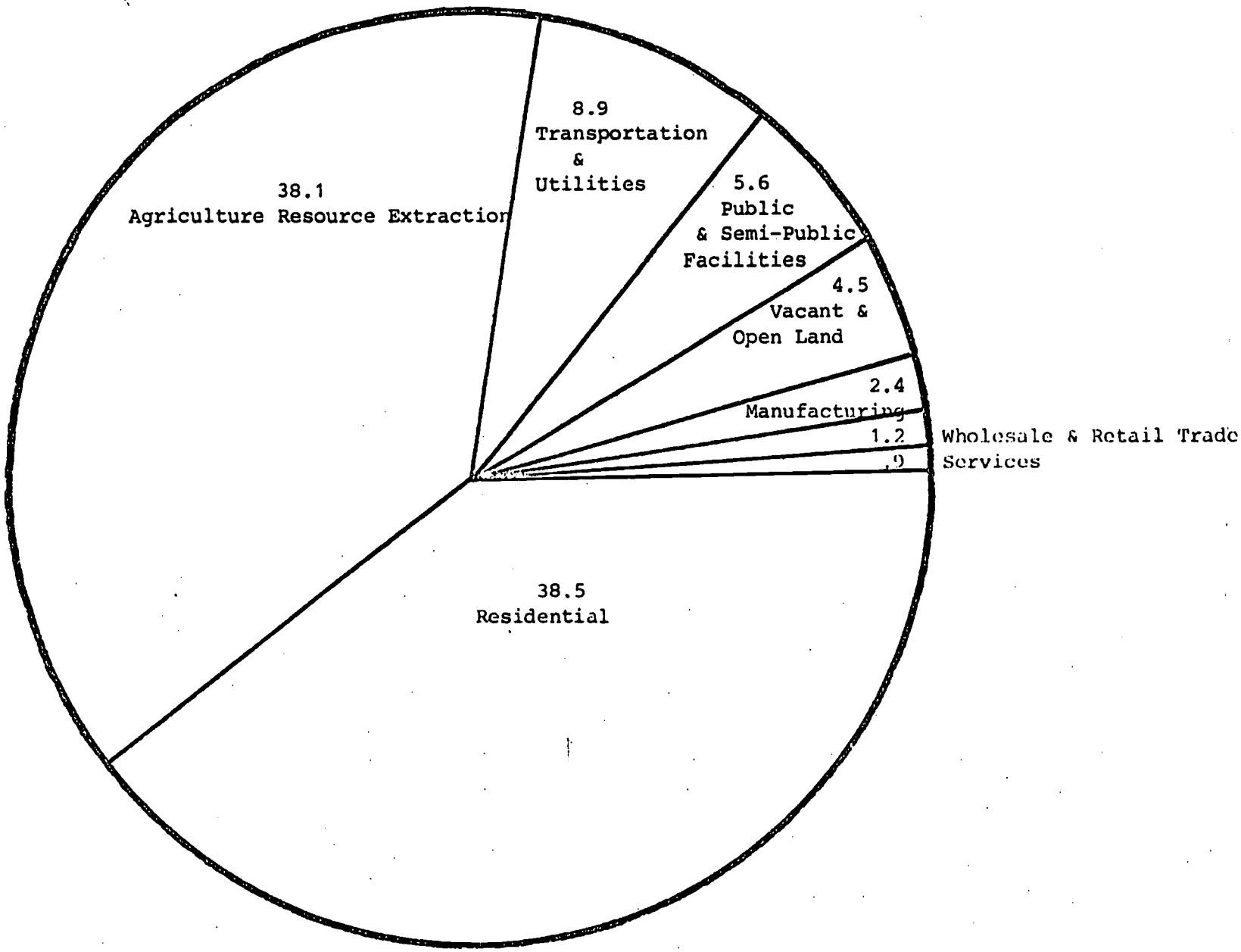
West of Markleville, outside of the corporate limits, there has been development of housing along State Road 38, County Road 900 South and State Road 109, called West Markleville. Northwest of Markleville there has been strip development of housing along County Road 250 East. These areas must be considered in the development of wastewater management plans for Markleville.

4.6.2 Existing Septic Systems and Water Quality (Markleville)

The homes in Markleville are on septic tanks, many of which have absorption fields. Except for a small area of Miami soil in the center of town, the soils are all Crosby and Brookston. Brookston occupies the depressional areas and the areas along drainage ways. It has very severe limitations for septic tank use due to its poor drainage and seasonal flooding and ponding. Crosby soils occupy the slightly higher areas and have severe limitations for septic tank use due to slow drainage and a seasonably high water table.

For the door to door survey, 10 homes were chosen at random. Five residents reported that they and/or their neighbors have bad back ups in their septic systems. One woman is sometimes unable to flush toilets for over a week during wet weather. One resident said that her tank was hooked to a drainage tile and that most of her neighbors were also on tiles.

Nearly all of the sub-surface drainage for the town goes to an 18-inch tile which discharges to Like Creek about 500 feet north of State Road 38. A sample from this tile had a high fecal coliform count of 210,000 parts per 100 ml, indicating the presence of sewage. Interviews with townspeople who are familiar with the drainage system revealed that the schools, as well as many of residents were connected to this tile.



MARKLEVILLE LAND USE %'s

Because of the pollution from the septic tanks hooked to drainage tiles, and the health hazard and nuisance of the backed up systems, the existing septic systems in Markleville are not adequate. Because of the highly unfavorable soils, it is not likely that attempts to upgrade these systems would succeed.

The area west of town along Highways 38 and 109 and County Road 900 County,has a mixture of Crosby and Miami soils with some areas of Celina and Brookston. The Miami and Celina soils have moderate limitations for septic systems. There are approximately 50 homes in the area.

Five homes from this area were chosen at random for the door to door survey. None of the residents reported that they or their neighbors had ever had septic tank problems, but two of them believed that they were connected directly to drainage tiles.

A walk along the section of Lick Creek east of Route 109 between Route 38 and County Road 900 South revealed no apparent sewage discharges. Several drainage tiles containing raw sewage were found discharging into Mud Run Creek west of State Route 109. It appears that at least a few of the homes in this area are connected to drainage tiles. The homes on the west side of State Route 109 are particularly suspect. As most of these homes are located on Crosby soils, it is not likely that upgrading these systems will halt the pollution problem.

The development along County Road 250 E, north of Route 38, has 18 homes. The soils are Miami, Fox and Crosby with limitations for septic tanks of moderate, slight and severe, respectively. Where Fort Ditch crosses the road there is an area of Eel soils which have severe limitations for septic system use. There was no evidence of furface water pollution found in this area during the field investigations.

The homes in this area have septic tanks with drain fields and are on large lots. Since there are areas of favorable soils, many of these septic systems probably work well. There may be some systems, particularly on the less favorable soils, that are connected to the Markleville drainage tile, or that have drainfields that are causing back-ups. Rennovations of these drainfields, such as enlarging them, or elevating them in a mound system, will correct these problems.

Approximately one mile east of Markleville there is a mobile home development along State Route 38. There are currently 15 mobile homes in the park, although there are twice that number of lots available. Unlike most mobile home developments,the lot sizes here range from 1/2 to 3/4 of an acre. The area lies on a variety of soil groupts including Celina, Crosby, Brookston and Miami, which have slight, severe, severe and moderate limitations for septic systems, respectively. The area drains south to a tributary of Collier ditch.

A stream sample taken downstream of the development indicated an acceptable Fecal Coliform count of 150 parts per 100 ml by the Indiana Stream Pollution Control Board Standards. As the lot sizes are large and there is no current evidence of pollution, this area is not considered to be a pollution problem.

According to the South Madison Community School Corporation and the Pendleton Superintendent of Schools, the elementary school and Middle school in the town will only operate through the year 1978 before they are shut down. A new regional elementary school is going to be built at the Junction of State Route 109 and U. S. 36. The enrollment of the new school will be approximately 800 students.

The school will be located in an area of Crosby and Brookston soils, which are unfavorable for septic systems. As the proposed treatment plant site for the Town of Markleville is only 1 1/2 miles away, it would be cost effective for the school to transport their wastewater to the proposed plant rather than build a small, package plant of their own.

There are very few areas in or near the Town of Markleville that lie on soils that are favorable for septic system use. Upgrading or installing new septic systems probably will not work. Markleville is so far away from the nearest treatment facility that collecting and hauling the sewage would be uneconomical. Installing sanitary sewers and transporting the sewage to the proper treatment facilities is the most economically and environmentally sound method of correcting the pollution problem.

4.6.3 No Action (Markleville)

If no action is taken, many residents of Markleville will continue to have septic tank problems that create a health hazard in many cases. As these problems continue, an increasing number of residents may be tempted to tie their septic systems to open ditches or subsurface drains. Along with a moderate increase in population, this could create an increasing pollution problem in the future.

The area known as West Markleville located near the intersection of State Routes 109 and 38 also will continue to have pollution problems. Mud Creek will continue to receive raw wastewater from the drainage tiles. Any new home that is built upon the unsatisfactory soil in the area will inherit the problems of an inoperating septic system.

4.6.4 Proposed Service Area (Markleville)

It is recommended that all the homes within the town limits of Markleville be served by a sanitary sewer system. As the proposed interceptor will pass through the area known as West Markleville, it is cost effective for this area also to be sewered rather than use some innovative form of on-site disposal. For the area north of State Route 38 on County Road 250 east, it is recommended that the existing septic systems which are not adequate be pinpointed and upgraded. It is recommended that wastewater from the proposed elementary school be brought into the treatment plant when the school is built.

A map showing the proposed service area for the town of Markleville is shown on the next page.

4.6.5 Forecast of Waste Flow (Markleville)

As shown on the tables in section 4.3.2, the current population of Markleville is 452 residents and there are 340 out of town students at the existing school. There are currently 38 homes that should be served in West Markleville. Using 100 GPD per capita and 25 GPD per out of town students, the present wastewater flow is shown below.

Area	Homes	Person/Home	POP.	GPD
Marklesville			452	45,200
Existing School			340	8,500
West Markleville	38	3.39	128	12,800
		Total		66,500 GPD

For the year 2000, the design population for Markleville is 631 residents. The number of out of town students will remain the same or decrease, therefore, the present flow will be used as the design flow. There are approximately four available lots in West Markleville where new homes can be built in the future. With this information, the future design wastewater flow from the Town of Markleville is shown in Table Nine.

TABLE NINE
Wastewater Design Flow - Markleville

Area	Homes	Person/Home	Pop.	GPD
Markleville			631	63,100
Proposed School			747	18,670
West Markleville	42	3.39	138	13,800
		Total		95,570 GPD

Design Flow will be 96,000 GPD

4.7 CURRENT AND FUTURE SITUATION (Fortville)

4.7.1 Land Use (Fortville)

Fortville is located in the northern portion of Hancock County just south of the Madison and Hamilton County lines. State Roads 13, 67 and 238 provide road access to the town. Rail service is provided by Conrail Railroad.

There are primarily two land uses in the Town of Fortville, residential and industrial. Table Ten, taken from the Fortville I/I report, shows the major industries in Fortville and their principal products. Industrial development accounts for approximately 25% of the total land use in Fortville. Residential development accounts for approximately 50% of the land use.

Agricultural extraction is the major land use in the outlying areas of Fortville. Residential land use is limited to scattered subdivisions and development along the State Highways. This pattern of land use in the Fortville Study area is not expected to change greatly in the near future.

TABLE TEN
Fortville Industries

Industry	Principal Product
Abrasive Products and Processing Division, Ind. Machinery & Supply	Tumbling and Blast Cleaning Machinery
Brandon & Son	Feed, Fertilizer, Seed
Central Tool, Inc.	Tools, Fixtures
Dickison Mold & Die	Dies, Molds, Aluminum patterns
DuPont DeNemours Co.	Sodium Silicate
Fortville Produce	Poultry

4.7.2 Existing Flows and Treatment Systems

The existing Fortville sewer system serves most of the incorporated area of Fortville, plus the Colonial Village and Helmcrest Subdivisions. The sewer system drains west to the sewage treatment plant on Flatfork Creek. The Town has no Lift Stations.

The existing treatment plant currently has a design capactiy of 0.50 mgd with the following units: Imhoff tank, single-stage trickling filter, final clarifier, effluent chlorination, and terminal lagoon. Recently, phosphorous removal facilities have been added.

4.7.2.1 Infiltration and Inflow Study (Fortville)

The Infiltration and Inflow Report for the Town of Fortville has been submitted to the Indiana State Board of Health and the EPA and has been approved. The report gave an estimated average daily flow at the treatment plant of 0.626 MGD. This flow did not include the Colonial Village and Helmcrest wastewater flow. Peak domestic wastewater flow was estimated to be 0.411 MGD. This indicated that there was an average of 0.185 MGD infiltration/inflow per day.

The conclusion of the I/I analysis was that rehabilitation of the existing system was potentially cost effective. A Sewer System Evaluation Survey was recommended.

4.7.2.2 Status of Sewer System Evaluation Survey (Fortville)

The S.S.E.S. is currently being conducted. As of this writing, the Town was televising several portions of the Fortville Sewer System. The estimated completion date of the report is the summer of 1978.

4.7.3 Water Quality (Fortville)

Because of excessive infiltration/inflow, the Fortville Sewage Treatment Plant is often hydraulically overloaded and bypasses raw sewage directly to Flat Fork Creek. This condition has produced generally poor water quality in the Flat Fork and Fall Creek.

4.7.4 No Action (Fortville)

If no action is taken to control the water pollution in Fortville, the current pollution problems will worsen. Population growth will increase the waste loading and the continuing deterioration of the sewer system will increase the infiltration rate. The result will be larger and more frequent by-passes of raw sewage to the stream.

4.7.5 Study Scheme (Fortville)

Because the FCRWD facilities plan will be completed before the completion of the Fortville S.S.E.S., the recommendations and flow and cost estimates of the I/I report will be used to evaluate regional solutions involving Fortville.

If it is determined that Fortville should not regionalize and correct their pollution problems on their own, the Facilities Plan will recommend eliminating Fortville from further Regional Waste District consideration. The Town will then apply for separate grant monies and prepare an independent facility plan on their own.

4.8 CURRENT AND FUTURE SITUATION (UNINCORPORATED AREAS)

4.8.1 Developments and Subdivisions Involved

4.8.1.1. Fall Creek Heights, Fall Creek Manor, Paradise Village and Paradise Colony

This group of subdivisions is located approximately in the North Half of Section 1, Range 7 East, Township 18 North in the northern part of Fall Creek Township in Madison County. It is between Madison Avenue and Main Street, immediately south of Interstate 69.

The area is flat with some slight rises and numerous slight depressions in which water often stands after rainy periods. Subsurface drains and surface ditches provide drainage for parts of the area, but standing water is still a problem for many residents. The soils in the area are Crosby and Brookston, which are unfavorable for septic tank absorption fields. All drainage from the area is to Michael Ditch, a tributary to Prairie Creek.

There are approximately 342 homes in the area. Most of the homes are at least 8 or 9 years old, and some are 20 to 25 years old. All household wastewater is disposed of by septic tanks with or without absorption fields. The lot sizes vary from 11,000 to 23,000 square feet with an average of about 15,000 square feet.

Sixteen homes were chosen at random for the door to door survey. The most common findings were that problems existed with ponding rainwater in the yards during rainy periods, and the many home owners have made major additions to their septic tank absorption fields. Some of the residents who made additions to their absorption fields report that this has solved their back-up problems. Some report that they still have back-ups or slow drainage in wet weather but that the problem is less severe now. Most of these additions were made during 1976. Since this survey was taken in February of 1977, there has not been adequate time for these new systems to prove their long term effectiveness.

Also, the months of August through December of 1976 were exceptionally dry. Therefore, it is likely that mant of these modified systems had not yet encountered sustained, saturated ground conditions.

Michael Ditch is severely polluted. Three tile outfalls were found near the head of this ditch. One is an old County tile which crosses the now developed area. The other two are of unknown origin. All three have been observed discharging water that is heavily contaminated with sewage. Michael Ditch itself was greyish in color and bacterial slime was seen on the bottom.

This is clear evidence that many of the residents in this area are causing pollution problems by directly connecting to subsurface drains. The only other possible source of pollution to Michael Ditch is Shock's Addition, a group of 29 homes about 1½ miles up the tile from the outfall. (See section 4.8.1.3). Shock's Addition probably does contribute to the waste flow but does not account for all of it.

In summary, this is an area of suburban development that is causing a severe pollution problem. An attempt to improve all the existing septic systems would be unlikely to succeed because of the unfavorable soil conditions. Because these soils have severe limitations for septic tank use, any new septic systems installed would be in violation of State Board of Health minimum standards. This could prevent the construction of new homes in this area.

Therefore, it is recommended that sanitary sewers be installed to collect and transport the wastewater to proper treatment and disposal. The terrain is flat enough so that the system can drain towards Main Street or towards Madison Avenue depending upon the lift station and interceptor locations. It may be desirable to drain the west half towards Main Street and the east half towards Madison. This would avoid the need for laying some lines at greater depth.

There are currently 342 homes which would be on this system. With a township average of 3.39 persons per household, the estimated current population is 1159.

4.8.1.2 Village Colony, Stollmeyer, Ballard's Addition

This group of subdivisions is located approximately in the SE¼ of Section 1 and the NE¼ of Section 12, Range 7 E, Township 18 N, in the northeast part of Fall Creek Township. It is at the junction of Main Street and Alliance Road.

The area is very flat and Crosby is the predominant soil type with some areas of Brookston soil. These soils, particularly the Brookston soils, are unfavorable for septic systems. Drainage for the area is provided by both surface and subsurface drains. There are small, grassed ditches in front of and between most of the houses to carry surface runoff. These ditches empty into subsurface drains that connect to county tiles. Apparently, these subsurface drains also act to lower the groundwater table in the area to allow more percolation area for the septic systems.

There are 135 homes in this area. All of them dispose of sewage through septic tanks and almost all probably have absorption fields. All of the homes are on their own private wells. Most homes are 10 to 20 years old. The average lot size is about 13,000 square feet.

In 1976, the Ballard-Norris county tile was completed. This tile provides drainage for the part of this area that is east of Main Street and runs south to Fall Creek. Prior to the construction of this tile, the entire area was on the Williams County Tile which drains southwest to Fall Creek. During rainy weather, backwater from the west half of the area would retard the drainage of the east half. Surface water from the east half would cause severe flooding along 77th Street in the southeast corner of the area. The new tile was installed to correct this problem as well as providing drainage for some other areas. The location of all storm drains and the exact boundary between the Williams Tile and the Ballard-Norris Tile drainage areas are not known.

For the door to door survey, 9 houses were chosen. Eight of these were east of Main Street. Most of the residents reported that they had no problems with their septic systems. Most were unsure of wheather their septic systems discharged to subsurface drains. Two residents had put in new laterals to relieve backups and one had put in a drywell. One resident on 77th Street had had problems until the new county tile relieved the flooding in the yard. All of the residents interviewed said that their own systems currently worked well, but a few commented that the odor of sewage hung over the neighborhood in wet weather. A few people also said they believed that the homes on the south side of 77th Street were connected to the storm drain.

An odor of sewage was noticed in the manhole on the south end of 77th Street where a storm drain that runs behind the homes on the south side of the street connects to the Ballard-Norris tile. County health official have noticed heavy odors from this manhole. This tends to confirm the belief that these homes are connected to the storm drain.

Samples were taken from the outfall of Williams Drain to an open ditch to Fall Creek. A definite sewage odor was noticed while the sample was being taken. The results of the sample are shown below.

Test	Williams
BOD	25 mg/l
Suspended Solids	5 mg/l
Fecal Coliform	75,000/100 ml
Ammonia Nitrogen	6.4 mg/l
Total Phosphorous	1.32 mg/l

The high fecal coliform count clearly indicates the presence of sewage in the outfall. Since this tile drains well over 500 acres of land, there is considerable stormwater dilution of the sewage. The Williams tile takes drainage from Rose Addition, and the Ballard-Norris tile also takes drainage from Norris Heights and a protion of Baby Farms. These areas may also be responsible for the pollution of these tiles.

On the west side of the area new streets are under construction and a developer has applied to the county for a plat approval. The area being developed is predominately Brookston soil, and problems can be expected from ponding, seasonally high water table and low percolation rates. The development of this area will likely be a source of future pollution problems.

In summary, this is an area of high housing concentration on soils that are unsuitable for septic tanks because of slow percolation and, in some areas, a seasonally high water table. Evidence exists that some homes have connections from the absorption field or septic tank to the storm drain but the number of such connections is unknown. In view of the soil types and the interviews with residents, it appears likely that many absorption fields will eventually fail and back up if they are not connected to storm drains. There is pollution coming from the area at present and a good possibility that this will increase in the future. Because of the severe limitations of the soil for septic tank use, any new septic systems installed would be in violation of State Board of Health minimum standards. This could prevent the construction of new homes in this area. These are the conditions that will persist if no action is taken.

Therefore, it is recommended that sanitary sewers be installed in this area to collect the waste and transport it to proper treatment and disposal. With 135 homes and a township average of 3.37 persons per home, the estimated current population is 458 persons.

4.8.1.3 Shock's Addition

This subdivision is located in part of the NE¼ of Section 1, Range 7 E, Township 18 N. It is east of Main Street and just south of Interstate 69.

The area is flat and the soils are Crosby and Brookston which are unsuitable for septic systems. Drainage from the area is to Michael Ditch through surface and subsurface drains.

There are approximately 29 homes in this area. Most of these homes are 10 to 20 years old. All of the homes are on septic systems and take their water from wells. The average lot size is about 26,000 square feet.

Four homes were chosen at random for the door to door survey. Of these, one owner reported that he has had considerable trouble with sewage backing up into the house and ponding in the yard. The other three reported no problems. There was one known case of a house that had its septic system connected to a storm drain but this house blew up several years ago.

It is likely that some of the pollution in Michael Ditch noted in Section 4.8.1.1, comes from this area. A portion of the Williams County tile also runs through this area. Shock's Addition adds to the pollution of this tile.

In summary, this is a small but relatively concentrated area of housing located near a large concentrated area. Because of the unsuitability of the soil and the likelihood that connections from septic systems to storm drains exist, there is both a present and future hazard of pollution from this area. Because of the severe limitation of the soil for septic tank use, any new systems installed would be in violation of State Board of Health minimum requirements. This could prevent the construction of new homes in the area. These are the conditions that will persist if no action is taken.

Therefore, it is recommended that sanitary sewers be installed in this area to collect the waste and transport it to proper treatment and disposal. With 27 homes and a township average of 3.39 persons per home, the estimated current population is 92 persons.

4.8.1.4 Norris Heights

This subdivision is located in the North Half of the Southeast Quarter of Section 1, Range 7 East, Township 18 North and the North Half of the Southwest Quarter of Section 6, Range 8 East, Township 18 North. It consists of one street, Norris Drive, extending east from Main Street for a distance of 2800 feet.

The area is flat with Crosby and Brookston soils which are unfavorable for septic systems.

There are 44 homes and a church in this area. All of these dispose of wastewater by septic tanks and take their water supply from wells. The homes are 10 to 20 years old. The developer left rights of way for several streets extending north from Norris Drive but these streets have not been constructed. The average lot size is about 14,000 square feet.

Drainage for the area is provided by a combination of shallow grassed ditches in front of and between the homes and subsurface drains. The western half of the area drains to the newly completed Ballard-Norris tile, the eastern half drains to the storm tile that runs through Baby Farms.

Four homes were chosen at random for the door to door survey. One resident reported that they had occasional back-up problems and needed to pump the tank every one or two years. Two other residents reported that their neighbor had had back-up problems and had added new laterals.

No evidence of sewage discharge to subsurface drains was found in this area although it is possible that this area conbutes to the pollution of the Ballard-Norris tile or the Baby Farms tile. Such discharges could easily be going on undetected.

In summary, this is a fairly concentrated strip of housing in an area of soil unsuitable for septic tanks. Although no definite evidence has been found that this area causes pollution, there is a good possibility that it does and a threat that it will increase in the future. A number of adjacent subdivisions on the same soil type are known to cause pollution problems. (See sections 4.8.1.1 to 4.8.1.3.). In addition, the poor performance of existing septic systems causes a health hazard for some residents. This problem is likely to worsen as the systems age. Because the soils have severe limitations for septic tank use, any new septic systems installed will be in violation of State Board of Health minimum requirements. This could prevent the construction of new housing in this area. These are the conditions that will persist if no action is taken.

Therefore, it is recommended that sanitary sewers be installed in this area to collect wastewater and transport it to proper treatment. The current population is estimated by multiplying 44 homes by the Fall Creek Township average of 3.39 persons

per home. Although half of this area is in Adams Township, it is more typical of the suburbs of Fall Creek Township. The current estimated population is 149 persons.

4.8.1.5. Baby Farms

This subdivision is located in the south half of section 6, Range 8 East, Township 18 North in the northwest corner of Adams Township. The predominant soil type in this area is Crosby with areas of Brookston and Miami. Crosby soils have severe limitations for septic system use due to slow percolation and seasonally high water table. Brookston and Miami soils have severe and moderate limitations, respectively. Part of this area drains to the Ballard-Norris tile but most of the area drains to an 8" draintile that empties into Sugar Fork Creek.

A stream sample taken at this outfall revealed an extremely high fecal coliform count of 430,000 parts per 100 ml. The stream at the outfall was gray in color and carried a very unpleasant odor. Although the lots in this area are large, the unsuitable soils and evidence of pollution in storm drain tiles has shown that the septic systems have been inadequate. Because of the soils, any new systems installed in the area would be in violation of State Board of Health Minimum Standards. This could prevent the construction of new homes in the area. Sugar Fork Creek will continue to receive pollution from this area if no action is taken.

Therefore, it is recommended that sanitary sewers be built to serve this area. There are currently 65 homes in the development. At a township average of 3.26 people per house, the estimated current population is 212 persons.

4.8.1.6 Alliance and the Area South of Alliance

The unincorporated town of Alliance is located in the South Half of the Southwest Quarter of Section 5, and the North Half of the Northwest Quarter of Section 8, Range 8 East, Township 18 North in the northwestern part of Adams Township. This discussion also includes an area of scattered housing extending about 3/4 of a mile south of Alliance along State Road 109 and County Road 100 East, and on County Road 500 South between these two roads.

Most of Alliance is on Crosby soil which is unsuitable for septic tanks. The area is relatively flat. Most of the housing south of Alliance is on Fox or Miami soils which are only moderately limited for use with septic systems. This area is more rolling. The entire area drains to Sugar Fork, a tributary to Fall Creek.

There are about 11 homes in Alliance itself and about 21 homes and 15 mobile homes in the area south of Alliance. Although the residents of Alliance probably do have trouble with their septic systems, there are not enough of them to make a significant pollution problem. In order to run a sanitary sewer to this area from Baby Farms, it would be necessary to bore and jack the line under State Road 109 and install 3,000 feet of sewer and perhaps a lift station. If there is pollution from the area south of Alliance, it can probably be remedied by upgrading the septic system since the soil is suitable. The housing in this area is so scattered that the cost of sanitary sewers would be very high in proportion to the users served.

Therefore, it is not recommended that sanitary sewers be installed in Alliance or in the area south of Alliance. Local health officials should do their best to control pollution from septic tanks in this area. Only a large increase in population would justify the cost of sewers in this area.

4.8.1.7 Sherwood Forest

This subdivision is located on road 400 South approximately one half mile southeast of the State Route 109 - Interstate 69 interchange. There are 36 homes in the area. Most of the homes are 5 to 15 years old and have an average lot size of 15,000 square feet.

The soils in ths area are Crosby and Brookston which are unsuitable for septic systems. The area is basically flat and drains via a ditch to the Schnell County tile, which drains to Sugar Fork Creek. This ditch is the most polluted and potentially dangerous health hazard in the Planning Area. A water sample taken from this ditch revealed a fecal coliform count of 150,000 parts per 100 ml. The ditch carried an obnoxious odor and provided a breeding home for many mosquitoes.

In a recent door to door survey three homes were chosen at random in different areas of the subdivision. All three residents surveyed did not know where their septic tanks discharged to, although they did acknowledge that they had septic tanks and that they need periodic pumping. All three residents also mentioned the polluted ditch in the subdivision.

Because of the poor soils and the extreme pollution in the ditch, the current method of wastewater treatment is entirely inadequate. This subdivision needs to correct their pollution problem as soon as possible. The solution of sewering the area and pumping the wastewater to proper treatment facilities was cost effective when compared to various on-site treatment alternatives. It was also found to be cost effective to pump the wastewater approximately one mile to the city of Anderson's sewer system rather than connecting into the proposed South Anderson area sewers.

Therefore, it is recommended that a sanitary sewer and interceptor system be built to connect and transport the wastewater to the Anderson sewer system.

At an Adams Township average population of 3.26 persons/home, the current population will be 117 persons. There are currently no lots available for future development.

4.8.1.8 Rose Addition

This subdivision is located mostly in the southwest quarter of section 12, Range 7 East, Township 18 North in the northeastern part of Fall Creek Township. The area under discussion here also includes a strip of homes to the west along County Road 550 South and a strip of homes to the north along Brown Street.

The soils in this area vary from very severely limited soils to slightly limited soils for septic system use. In Rose Addition itself, most of the homes are on Washtenaw, Crosby, Fox or Oxkley, which have very severe, severe, slight and slight limitations respectively for septic tank use. The strips of housing to the north and west are mostly on Crosby soils.

This is a rolling area that has a drainage way running through its center from northwest to southeast. At the south central section of the subdivision, the draintile that runs through Rose Addition joins the Williams County draintile at a concrete manhole. Although this manhole was inaccessable for sampling, dark, murky water containing sewage could be seen flowing from the tile through the manhole grating. Because the Williams tile is already being polluted by other subdivisions, it is very difficult to determine just how much pollution is coming from Rose Addition. Four homes were chosen at random for the door to door survey. One resident had had to install new laterals. The other three reported that they had no problems.

Because of the large number of homes that tie in areas where soils are unfavorable for septic sytems, and the fact that the subdivision draintile is carrying raw wastewater to Williams tile, there is a current pollution problem in the area. As more homes are built, this problem will worsen. If no action is taken to correct these problems, the sewage in the draintile will continue to pollute the Williams tile and Fall Creek. The Fox and Ockley soils groups are two small and spread apart to be considered for community septic system use. The rolling area limits the feasibility of mound systems. Holding tanks and honeydipper trucks were not cost effective when compared to providing sanitary sewer service.

Therefore, it is recommended that sanitary sewers be built to collect the wastewater from Rose Addition and the surrounding

area and transport it to the proper treatment facility. With 78 homes and a township average of 3.39 persons per household, the estimated current population is 264 persons.

4.8.1.9 Main Street from Interstate 69 to Fall Creek

This section ties together the discussions of sections 4.8.1.1 through 4.8.1.4. It concerns strips of housing along this street that are between the subdivisions that could be served by sanitary sewers.

With the exception of the area near Fall Creek, almost all of the homes are located on level Crosby and Brookston soils. Since these soils have severe limitations for septic systems it is likely that these houses are causing health and pollution problems and will do so in the future if no action is taken. Since any new septic systems would violate State Board of Health standards, future construction could be prevented.

In a study by the Madison County Council of Governments, it was found that the residents of Madison County do not consider strip development desirable. A sewer along this entire stretch of Main Street would encourage this type of development and be costly. On the other hand, leaving the street unsewered would be less desirable from the health and pollution standpoint.

Therefore, a compromise is recommended. It is recommended that sanitary sewers be installed to serve the four homes between Shocks Addition and Fall Creek Manor, the seven homes between Fall Creek Manor and Norris Street and the five homes between Norris Street and Village Colony. The next portion of Main Street is considered to be part of Village Colony and Ballards Addition and will be served. No additional lift stations will be needed to serve these areas so the cost will be kept to a minimum. This area is already heavily developed, so strip development will not be encouraged.

It is also recommended that a sewer be extended south of Ballards Addition as far as possible without adding another lift station. Once the depth of the southernmost lift station on Main Street has been designed, the length of gravity line that can be installed at minimum grade will be calculated. It is estimated that this line will be 800 feet long and serve 13 homes. Sewers are not recommended south of this line. At a township average of 3.39 persons per home, the current population for this area will be 44 persons.

4.8.1.10 New Columbus (or Ovid) and the Area South of New Columbus

New Columbus is in the North Half of the Northwest Quarter of Section 18 and the South Quarter of the Southwest Quarter of

Section 7, Range 8 East, Township 18 North. This discussion also includes an area of scattered housing along State Road 109 for about 3/4 of a mile south of New Columbus and on a few streets extending west from this section of the highway.

Fall Creek passes from east to west just north of New Columbus. The town is located on a transition from the upland to the floodplain of Fall Creek. The northern fringe of town slopes steeply toward the floodplain. The soils in New Columbus are Fox and Rodman which have only slight limitations for septic tank use. The Fox soils are on fairly level ground but the area with the Rodman soils has an 18 to 25 percent slope, requiring that absorption field laterals be laid on the contours.

The area south of New Columbus is on level Crosby and Brookston soils which are unsuitable for septic systems. Part of this area drains to Fall Creek and part drains to the Ridgeway county tile which joins Fall Creek near Huntsville.

No pollution from septic systems in New Columbus was found although some may have gone undetected. It should be possible to remedy any pollution in this town by upgrading failing septic systems. Because of the unfavorable soil, the homes in the area south of town may be causing pollution. There are only about 35 homes in this area and they are so widely scattered that the cost of installing sanitary sewers to serve them would be very high in proportion to the number of users served.

Therefore, it is not recommended that sanitary sewers be installed in New Columbus or in the area south of town. Local health officials should try to make sure that all the septic systems in New Columbus are adequate and should control pollution from the area south of town as well as possible.

4.8.1.11 Emporia and its Outskirts

Emporia is a crossroads at the southwest corner of Section 16, Range 8 East, Township 18 North. County Road 200 East (State Road 109) passes through from north to south and U S 36 (State Road 109) passes through from east to west. This discussion also includes areas of housing strung out in all four directions along this road.

The soils in Emporia are Fox and Ockly which are suitable for septic tanks. Most of the surrounding area is also on Fox soil except for some of the housing south of town along State Road 109. This area is mostly on Crosby soil which is unsuitable for septic systems.

Emporia has a grain elevator, a gas station, two machine shops and several houses. Houses along the roads outside the

town are spaced at a suburban density in some areas and are more scattered in others. All homes are on wells and septic systems.

Five homes were chosen at random for the door to door survey. One resident who used a drywell had had problems with contamination of well water. Another had a neighbor whose sewage ponded in the yard. These homes were both in or near Emporia where soils conditions will allow these systems to be successfully upgraded. The other residents interviewed reported that they had no problems. No homes in the area of Crosby soils on State Road 109 were surveyed.

With the exception of part of State Road 109 south of town, any failing septic systems in the area should be able to be upgraded because of the favorable soil conditions. In the area along 109 almost all of the homes are on the east side of the highway and are at a relatively close spacing. This is advantageous for sanitary sewers since house laterals are not allowed to cross a state highway. In addition, the proposed treatment plant site for Markleville is just south of this area.

Therefore, it is not recommended that sewers be installed in Emporia and its outskirts at this time. However, the area south of Emporia on State Road 109 where Crosby soils dominate should be considered a potential future service area. Should this area continue to develop pollution problems that are associated with dense living areas upon unfavorable soils might occur. At that time, sanitary sewers should be built to serve this area.

4.8.1.12 Pendle Hill

This subdivision is located in the Southeast Quarter of Section 14, Range 7 East, Township 18 North in the eastern part of Fall Creek Township.

This is a steeply rolling area on the edge of the Fall Creek floodplain. The soils in the southern third are Crosby, Brookston, and Miami. Crosby and Brookston are level, poorly drained soils that are unsuitable for septic tanks. The Miami soils have only slight limitations for septic tanks but the 6 to 12 percent slopes require careful construction of laterals that can cause problems. The soils in the northern two-thirds are Miami , Camden and Westland. The Camden soils have only slight limitations while the Westland soils have severe limitations for septic systems due to ponding and flooding. Drainage for the area is provided by storm sewers and open ditches to Fall Creek. There are also old agricultural tiles in the area.

This is probably the fastest growing subdivision in the planning area. There are currently 60 homes completed and 5 more under construction. 72 lots have been platted. Additional

residential plats and a small commercial center are being planned from the south edge of this area to U.S. 36. So far, the lots range from 14000 to 22000 square feet with an average of about 18000 square feet.

County health officials have encountered a number of problems with septic systems in this area either backing up or leaking out onto the yard. The tight soils in some areas and steeply sloped ground in others contribute to these problems. The combination of a large house on a relatively small lot with steep ground makes it difficult for the residents to maintain adequate septic systems. Dark, murky water and bad odors can be found in the storm sewer catch basins. Although no point pollution source to Fall Creek has been found yet, these problems are a present and future nuisance and health hazard and could eventually pollute Fall Creek.

Therefore, it is recommended that the present form of wastewater treatment be discontinued. Recommendations for the proper method of wastewater treatment and estimated flow projections is covered at the end of Section 4.8.1.15.

4.8.1.13 Fiddler's Green

This subdivision is located in the West Half of the Southwest Quarter of Section 13, Range 7 East, Township 18 North in the eastern part of Fall Creek Township. The entrance to the subdivision is one quarter mile east of County Road 100 west off of U. S. 36.

The area is on nearly level Crosby and Brookston soils which are unsuitable for septic tanks. The northern section of the area drains to the small stream that runs through Pendle Hill to Fall Creek. The southern portion drains to a ditch that connects later to the Ridgeway county draintile that parallels Fall Creek.

This is a relatively new subdivision that currently has 40 homes with an average lot size of 11000 square feet. Recently the two roads of the subdivision have been lengthened northward to allow for 20 more lots. This new area will be located on Brookston soils. The water is supplied by wells and the present form of treatment is by septic tanks with drainfields.

A stream sample was taken from the south drainage ditch where it passed under US 36. The sample revealed a fecal coliform count of 1430 parts per 100 ml. Soap suds and the smell of detergent was found in this culvert. There were approximately 5" of standing water in the 18" culvert when the sample was taken and this was during a very dry weather spell in the month of July. This evidence indicates that there are a number of homes in the area that discharge directly to this draintile.

Because of the unfavorable soils, the septic systems of these relatively new homes have a good chance of malfunctioning in the future. The homes that have currently connected into the drain tiles will continue to pollute the Ridgeway Ditch. If no action is taken, the current pollution problems will grow worse as more homes are built.

Therefore it is recommended that the wastewater from this area be collected and treated by some means other than conventional septic systems. The recommendations for wastewater treatment facilities and flow projections are included in section 4.8.1.15.

4.8.1.1.4 Mara Meadows

This subdivision is located between Fall Creek and Fiddler's Green, just west of County Road 50 West. There are currently 19 homes in the area with 25 lots platted. The area drains to a storm sewer system that discharges into Fall Creek.

The predominant soil type is Crosby which has severe limitations for septic systems, with Brookston, which has very severe limitations, and Miam, which has moderate limitations. All of the homes in the area have private wells and septic systems.

Two residents were interviewed in a random house to house survey. One reported that both her and her next door neighbors have had trouble with their drainfields discharging to the surface ever since they had lived there. The other reported no problems. A sample was taken from some standing water in the bottom of a manhole in the storm sewer system. The sample revealed a high fecal coliform count of 9300 parts per 100 ml, indicating the presence of sewage.

Because of the severe soil limitations there is a good chance for future pollution and health problems due to failing systems. The door to door interviews and the presence of polluted water in the storm sewers indicate that a number of these systems are malfunctioning right now. Also, because of the severe soil limitations, any new septic systems constructed in this area will be in violation of State Board of Health standards.

Therefore, it is recommended that the wastewater from this area be collected and treated by some means other than conventional septic systems. The recommendations for wastewater treatment facilities and flow projections are included in section 4.8.1.15.

4.8.1.15 Falconhurst

This subdivision is located in the Southeast Quarter of the Northwest Quarter of Section 23, Range 7 East, Township 18 North in the eastern part of Fall Creek Township.

The area has level Crosby soils which are severely limited for septic systems, Fox soils on 0 to 12% slopes which have slight limitations, and Miami soils with 6 to 18% slopes which have slight limitations. Washtenaw soils with very severe limitations are found along the drainageways.

Drainage is provided by a combination of surface ditches, subsurface drains and natural topography. The area drains to Spring Branch, a tributary to Fall Creek.

This is a new and rapidly growing subdivision with 37 homes and 5 more under construction. It is platted for 68 homes. The average lot size is 15,000 square feet. All homes are now using private wells and septic systems.

As with Pendle Hill, there are some homes here that lie on soil that has the capacity to support septic systems. However, most of the homes will probably experience the same problems with their systems in the future that the residents of Pendle Hill are experiencing right now. As the existing systems age and new ones are constructed, more health and pollution problems can be expected to surface.

Therefore, it is recommended that another form of wastewater treatment be constructed to correct the current and potential pollution problems. As Pendle Hill, Fiddler's Green, Mara Meadows, and Falconhurst have similar pollution problems due to soils, ground slopes and growth rate, these subdivisions will be grouped together in the evaluation of wastewater treatment alternatives.

Except for Fiddler's Green, there are soil groups in each subdivision that have only slight limitations for septic system use. One possible treatment alternative would be to upgrade and closely maintain the septic systems in the favorable soil areas and to build large, concrete holding tanks to collect the sewage from the homes that lie on areas that cannot support septic systems.

As the total amount of soil groups that have slight limitations for septic system use in this area are few and small in area, the possibility of community systems serving complete subdivisions is not practical. Severe slopes and ponding water in depressional areas limit the use of a mound system in the place of conventional absorption fields. For these reasons, neither of these alternatives will be considered in this area.

Another alternative would be to construct sanitary sewers to collect the wastewater from all of the homes and transport it to proper treatment and disposal.

The results of the cost analysis of the two alternatives showed that the selection of one alternative over another was

dependent upon the proposed locations or the regional interceptor in the Planning Area. It was found that it was not cost effective to sewer the area and transport the wastewater to the Pendleton system when compared to on-site disposal. However, if a regional interceptor passed through this area, it would be cost effective to sewer the area and tap into the interceptor. Also, if a regional treatment facility was built north of Fall Creek and just south of Rose Addition to serve the developments in that area, it would be cost effective to sewer this group of subdivisions and transport it to that plant.

Therefore, the recommendations for the form of wastewater treatment for these four areas cannot be made until the regional alternatives are evaluated. The design flow from this area is shown below. In the development of the design flow from this area it will be assumed that all of the available lots will be developed in the near future. This is a reasonable assumption when you consider the rapid growth rate of this area.

Area	Ext. Homes	Future Homes	Pop/ Home	Popula-tion	F.Creek Twnsp. Growth Rate	Design Popu-lation	Design Flow GPD
Pendle Hill	60	72	3.39	244	30%	317	31,700
Fiddler's Green	40	60	3.39	203	30%	264	26,400
Mara Meadows	19	25	3.39	85	30%	110	11,000
Falconhurst	42	68	3.39	230	30%	300	30,000
				762		991	99,100 GPD

4.8.1.16 From US 36 to State Road 38, West of Falconhurst and East of County Road 300 West

This area is located approximately in the North Half of Section 22 and the West Quarter of Section 23, Range 7 East, Township 18 in the eastern part of Fall Creek Township. It includes Merry Hills and Porters Addition.

Most of the housing in this area is on Fox soils which have slight limitations for septic systems, but there is also housing on Fox, Miami, Sleeth, Mahalsville and Crosby soils. The limitations of these soils are slight, moderate, moderate-severe and severe respectively. This area is on the terrace of Fall Creek. Most of it is underlain with sand and gravel and there is a gravel pit near one of the developed areas. Drainage is to Fall Creek and Spring Branch, a tributary to Fall Creek.

There are about 81 houses in this area all of which use private wells and septic systems.

Because most of the existing homes are on the favorable soils in this area, it is likely that most problems which occur can be remedied by upgrading the existing septic systems. As the area continues to expand and developments are made upon the unfavorable soils groups, pollution problems associated with

malfunctioning septic systems may occur. Therefore, this area will be considered as a potential future service area.

4.8.1.17 Huntsville

The unincorporated town of Huntsville is in the North Half of the Southeast Quarter of Section 16 and the North Half of the Southwest Quarter of Section 15, Range 7 East, Township 18 North in the eastern part of Fall Creek Township.

The town is entirely on level Fox soil underlain with sand and gravel. This soil has only slight limitations for septic tank use. The area drains to Fall Creek.

There are a few retail and office buildings and 78 homes. All use private wells and septic tanks. Most of the homes are 5 to 50 years old and have an average lot size of 15,000 square feet.

Ten homes were chosen at random for the door to door survey. One resident has to pump the tank yearly, another had installed a new tank after the initial one had rusted out and two others replaced their failed drainfield systems. None of the other residents interviewed had had problems. It appears that a number of the septic tanks discharge to drywells that are dug into the sand and gravel substratem.

A 12" drain tile was found south of Huntsville discharging into Fall Creek. A stream sample was taken at the outfall during the month of July. The sample revealed a fecal coliform count of 210 parts 100 ml, which is just barely above the acceptable limits. Two other small cement draintiles were also located in this area, but the flow in each, although it was sewage in nature, was almost negligible.

It appears that while a few residents that live along Fall Creek are discharging wastewater directly to Fall Creek, the majority of homes in Huntsville are not causing a pollution problem at this time. However, as the town continues to grow, there is a definite possibility that this gravel substratum can become overloaded with septic systems which could lead to groundwater pollution. Test samples were taken from two private wells in Huntsville and the results showed that the water was satisfactory for drinking.

Therefore, it is recommended that periodic samples from private wells in Huntsville be taken and tested at the proposed regional treatment plant. If at any time in the future, evidence of contamination in the drinking water is found, sanitary sewers should be extended to collect the wastewater from this area.

4.8.1.18 White Oaks, Wooded Ridge and Candlewood Village

This area of subdivisions is in the Southwest Quarter of Section 10 and the Northwest Quarter of Section 15, Range 7 East, Township 18 North in eastern Fall Creek Township.

Most of the area is on Fox soil underlain with till, although some is on Fox underlain with sand and gravel. The area drains to Prairie Creek through open ditches and subsurface drains. North of this area is a cornfield on the Prairie Creek floodplain. This field is heavily laced with agricultural tile draining to the creek.

There are 230 homes in this area, all of which use septic tanks and private wells. The homes are five to twenty years old. The lot sizes range from 13,000 square feet to over an acre with an average of about 15,000 square feet.

Eleven homes were chosen at random for the door to door survey. None of them reported having any septic tank problems. None of them have had their wells tested for bacteria.

A fecal coliform count of 75,000 per 100 ml was found in a sample taken from a field tile north of the area. This indicates the presence of sewage but there was only a very small flow in this tile. There may also be sewage in some of the other tiles but these tiles are nearly impossible to locate or sample. Since the cornfield being drained is at a low elevation, the tiles discharge beneath the surface of the creek and have been covered up with silt. Only tiles that have broken and started gullies can be easily found.

With 230 homes discharging sewage to the subsoil, there is a possibility of contamination of groundwater. However, the fact that most of the area is on till rather than sand and gravel reduces this hazard. A very small amount of surface water pollution exists but there may be more that has not been detected. However, with the favorable soil, this can probably be remedied by upgrading the septic systems. As for needing additional wastewater treatment, this area appears to be on the borderline.

Therefore, it is recommended that this area be considered a potential future service area.

4.8.1.19 Lantern Meadows and Surrounding Area

This subdivision is located approximately 3/4 mile south of the State Reformatory, 1/2 mile east of the junction of Road 900 South and Indiana State Rt. 9. There are approximately 33 homes currently in the area although 70 lots have been platted. There are currently 16 homes at the junction of 900 South and State Rt. 9. There are also approximately 10 homes on 900 South between the entrance to the subdivision and Route 9.

The homes in the subdivision lie on Fox soil underlain with sand and gravel, which has slight limitations for septic system use. The homes along road 900 South and at the junction of 900 South and Route 9 lie on Crosby and Brookston soils which have

severe and very severe limitations for septic system use, respectively. All of the land between the subdivision and route 9 and the land behind the cluster of homes at the 900 South and Route 9 intersection has been platted. Almost all of this land is upon Crosby and Brookston soil.

The area drains to a large county draintile that begins just south of Lantern Meadows and runs northwest to Fall Creek. The storm sewer system for the subdivision also drains to this draintile. A stream sample was taken from the draintile just north of the development at 900 South and Route 9. The sample revealed a fecal coliform count of 2300 parts/100 ml. The water in the tile was gray and sewage odor was noticed. Two residents from that development were surveyed and one reported that he has had problems with his septic system backing up. The other has had to expand his drainfield to prevent back-ups. Two homes were surveyed in the Lantern Meadows development. Neither of them reported knowing of any problems with their systems.

Because of the unsuitable soils, the septic systems for most of these homes in this area have a good chance of malfunctioning in the future. Also, any new septic systems built upon the unfavorable soils would be in violation of minimum State Board of Health standards. This would prevent construction of new homes in the area.

There is also a present pollution problem due to a number of homes that are discharging wastewater directly to the county tile. If no action is taken these homes will continue to pollute the draintile and Fall Creek.

The homes within the boundaries of the Lantern Meadows subdivision currently are not experiencing any problems with their septic systems. As the Fox soils are favorable for septic systems, this situation is not likely to change in the future. However, should the subdivision expand to the areas now platted for future expansion, the soil conditions will change which will prohibit the use of septic systems. Also, dense living areas atop sand and gravel substratum may cause groundwater pollution. Therefore, it is recommended that a sanitary sewer line be constructed to serve the homes on Route 900 South and the cluster of homes at the intersection of 900 South and Route 9. The Lantern Meadows will be considered as a future service area.

26 homes will be served by the sanitary sewer. There are 9 more available lots along the proposed collection sewer line. Therefore, the design flow will be the Fall Creek Township population/home times the number of homes times the average daily flow per capita. Or 3.26 x 35 x 100 = 11,410 GPD.

4.8.20 DeShong Addition

This subdivision is located in the northwestern corner of Section 34, Range 7 East, Township 18 North in south central

Fall Creek Township. The main road of the subdivision branches south off of road 900 South near County Road 300 West.

There are currently 18 homes in the area all of which use septic tanks with drainfields for wastewater disposal. The houses are 5 to 15 years old with an average lot size of 1/2 of an acre (22,000 square feet).

The area drains to a drainage ditch that runs west to Road 300 West. This ditch runs through the center of the subdivision. A sample taken from this ditch revealed a fecal coliform count of 430 parts per 100 ml, which is moderately above the State Board of Health Standard of 200 parts per 100 ml..

The soils in the area are Miami which has moderate limitations and some areas of Crosby which has severe limitations for septic systems. Two residents were surveyed and neither reported knowing of any problems with their septic systems.

The marginal soils and the moderate level of pollution in the drainage ditch indicate that there is presently a moderate pollution problem. Because this subdivision is over one mile away from the nearest proposed sanitary sewer, it is not cost effective to solve the pollution problem by collecting and transporting the wastewater.

Therefore, it is not recommended that sanitary sewer service be extended to DeShong Addition at this time. Local health officials should do their best to control pollution from septic systems in this area.

4.8.1.21 Murcer's Addition

This small subdivision is located on the south bank of Fall Creek about 1/4 mile east of Route 9 directly south of Huntsville. There are 12 homes in the area which are all located on the banks of Fall Creek.

All of the homes lie on Genesee soil, which has severe limitations for septic systems due to seasonal flooding and high groundwater table. A walk along the bank of Fall Creek revealed that almost every home is discharging wastewater to Fall Creek by either a malfunctioning septic system or by having house laterals discharging directly to the creek. The small of sewage was very strong.

As the soil conditions are unfavorable for septic systems, it is not likely that attempts to upgrade these systems or to build new systems will succeed. Because of the slope of the land dropping off to Fall Creek and the chance of seasonal flooding, mound systems will not be feasible here. As new sewers are going to be built in northeastern Pendleton about 800 feet away, sanitary sewer service for this area would be the most cost effective method of correcting the pollution problems.

In a cost analysis, it was found that the installation of small diameter pressure sewers had a lower total present worth value than the installation of conventional gravity sewers and a lift station.

Therefore, it is recommended that pressure sewers be installed in this area to collect and transport the sewage to the Pendleton System. The design flow will be 12x3.26x100 = 3910 GPD.

4.8.1.22 Sunview Addition

This subdivision is located approximately 3/4 mile north of Fortville on County Road 200 West. There are currently 32 homes in the area within 40 lots platted. The area lies on Crosby and Miami soils which have severe and moderate limitations for septic systems respectively. The area drains to a tributary of Lick Creek.

In a recent field investigation, no point surface discharges of sewage were made in this ditch. In a door to door survey, four homes were surveyed and none reported of having or knowing of any pollution problems in the area.

Although the soil conditions are suspect, the large lots may provide enough area for proper septic system treatment. However, future growth could bring about the pollution problems that are associated with dense growth patterns on unfavorable soils. At that time, it will be cost effective to collect the wastewater and pump it to the collection system in Fortville.

Therefore, it is recommended that this subdivision be considered a potential future service area.

4.8.1.23 Mt. Vernon Community Schools

The Mt. Vernon Community School and Middle School are located at the junction of State Route 234 and County Road 200 West approximately 2 miles south of Fortville. This area is in northern Hancock county in the extreme southwestern portion of the Planning Area.

The approximate enrollment of the two schools is 1400 students. Most of the students are from the Fortville area with some coming from the rural areas of north Hancock county. There are approximately 100 faculty and staff personnel employed by the two schools.

The school system is served by a small, mechanical treatment plant. The plant consists of a 40,000 GPD extended aeration unit with a sludge holding zone followed by a 2-one day holding lagoons and chlorination facilities. A lift station pumps the sewage from the middle school to the plant. The plant was designed for a capacity of 1600 students.

The treatment plant was constructed in 1974. In December of 1976 an NPDES Permit was issued to the school. Since that time, monthly reports have been sent into the State Board of Health. The Board of Health has indicated that the plant has been meeting its effluent quality limits.

Because of the good working conditions of this fairly new plant, there are no pollution problems foreseen in the near future. Therefore, it is recommended that the school system continue to use their present treatment plant for wastewater treatment.

4.8.2 Mobile Home Parks and Camps (General)

There are a total of seven mobile home parks and camps in the Planning Area. They include the 5 Star Mobile Home Park, the Regency Park Mobile Home Court, the Indiana Pentacostal Camp, the mobile home park northeast of Ingalls, the mobile home park north of Pendleton and the mobile home park east of Markleville.

4.8.2.1 5 Star Mobile Home Park

The 5 Star Mobile Home Park is located just south of I-69 at the I-69, Indiana State Route 13 exit. All wastewater from the Park is currently treated at a sewage treatment plant located on the northern edge of the Park. The plant is a 62,600 GPD mechanical extended aeration plant followed by rapid sand filters with chlorination facilities. The treated effluent discharges to a private lake then to a tributary of Thorpe Creek.

On June 24th, 1975, NPDES Permit No. In0043281 was issued to the Park by the Indiana State Board of Health. This permit is shown in Appendix B.

Unfortunately, the treatment plant has never had to treat more than a small fraction of the design flow. In recent years, the plant has not even operated mechanically at all. The daily flow through the plant is so small that the operator has shut off the plant, allowing it to act as a primary settling pond. The effluent receives aerobic digestion within the plant, then gravities into the nearly lake for final treatment. This form fo wastewater treatment is not satisfactory. The plant is currently rusted and overrun by shrubs and weeds.

The mobile home park is at least three miles from any other developed area, so regionalization with another treatment facility would be unreasonable. Therefore, three alternatives for satisfactory wastewater treatment exist. One would be to enforce the NPDES permit and require the plant to operate as designed in a routine matter.

The second would be to shut down the plant and install private treatment systems for each dwelling unit.

The third alternative would be to cover the plant and plug the outlet from the plant to the lake, then periodically haul the sewage to another facility using "honeydipper" tankers.

The first alternative would not require any construction of new facilities. It would, however, require an extensive rehabilitation of the existing plant and direct compliance in operation and maintenance of the plant as set forward in the NPDES Permit. Modifications could be made within the plant to handle small flows efficiently.

The second alternative is not technically feasible in this area. The soils in the Park are Brookston and Crosby which have very severe and severe limitations for standard septic system use, respectively. These soils are subject to seasonal flooding which would also limit the use of an elevated or aerated septic field. For these reasons, this alternative will not be considered further.

The final alternative will in effect change the present steel mechanical treatment plant to a large sewage holding tank. The modifications would be minor, although a new access road up to the plant must be constructed. A honeydipper truck must be purchased and maintained throughout the study period. The expense of gas and oil used in the daily trips to the Fortville system must also be considered. Finally, the Park must hire drivers for these vehicles and pay them a salary which would probably be higher than that of a full-time plant operator. Obviously, this alternative would not be cost-effective when compared to the first alternative. This alternative would also be very difficult to implement.

For these reasons, it is recommended that the plant be modified to efficiently handle small flows and that a full time operator be hired to run and operate the plant properly.

4.8.2.2 Regency Park Mobile Home Court

The Regency Park Mobile Home Court is located on US Route 36 about 1/2 mile west of county road 150 west. For the past few years the court has maintained its capacity of 50 mobile homes. There are no current plans for expanding the mobile home park.

All the wastewater from the park is currently treated at a small package sewage treatment plant located in the northeast corner of the development. The plant is a 11,500 GPD extended aeration plant followed by an earthen lagoon. The treatment effluent is discharged from the plant to a swamp north of the camp which eventually drains to Fall Creek.

On June 10, 1975, NPDES Permit No. IN0038458 was issued to the park by the Indiana State Board of Health. This permit is attached in Appendix B. On August 1st of that year the plant was inspected by Mr. David Shipe of the ISBH. A copy of his report is attached to the NPDES Permit in the appendix. In essence, the plant's final effluent was well over all of the NPDES permit limits at that time.

A field inspection of the plant in 1977 revealed the same physical characteristics as in 1975. The plant was rusted and overrun by weeds. The lagoon was filled with solids and algae. Although no samples were taken to evaluate the plant effluent, the physical condition of the plant and the lagoon indicated that the plant was not functioning properly. In addition, no

chlorination facilities were found at the plant. There has been no further correspondence between the ISBH and the Regency Park since the 1975 letter.

The final effluent from the plant is not meeting the NPDES permit limits and is polluting Fall Creek. If renovations are not made in the plant that will produce an effluent that meets the permit requirements, the Park will be subject to monetary fines by the State Board of Health.

Another alternative open to the Park is to close the plant and transport the wastewater to the nearest treatment facility. In this alternative, a small number of homes to the west of the Park will be serviced.

As this mobile home park is very near the Pendle Hill/Falconhurst area, the park will be considered with this group of subdivisions in the regional considerations. For the sake of simplicity, this area will be known as the Fall Creek Development and will include the Regency Park Mobile Home Court, Pendle Hill, Fiddler's Green, Mara Meadows and Falconhurst.

Should the selected regional alternative not include incorporation of the Fall Creek Developments into another sanitary sewer system, the Regency Park Treatment Plant will renovate their existing plant to meet NPDES standards. Should the selected alternative include incorporation of this area into a regional sanitary sewer district, then the Park will abandon the plant, install a lift station at the present plant site and transport its wastewater to the regional interceptor.

3.8.2.3. Indiana United Pentacostal Camp

The United Pentacostal Church camp is located on Indiana State Route 67 (U.S. 36) just south of Ingalls. The camp is owned by the church and is used only about three months per year. There are approximately 85 cabins in the camp with several large recreational facilities, a church and a cafeteria. A few of the cabins are occupied year round.

The wastewater from the camp is collected in a sewer system and is transported to a small mechanical extended aeration treatment plant on Lick Creek. The 25,000 GPD aeration chamber is followed by a concrete clarifier and chlorine addition facilities. The plant is approximately twelve years old and has never been issued an NPDES permit. There is no record of any effluent samples from the plant at the State Board of Health office.

During a field investigation in October of 1977, a flow measurement was taken from the parshall flume at the treatment plant. Although the camp has been closed for a month and there were only two cabins occupied, the measurement revealed a flow through the plant of approximately 75,000 GPD. This flow can be attributed almost entirely to infiltration of groundwater into the collection sewer lines. Had the 25,000 GPD plant been

operating at that time, a bypass would have been necessary to prevent an overloading of the plant. If the camp would have been occupied, this would have resulted in a discharge of raw wastewater directly to Fall Creek.

A NPDES Permit for the camp is currently being written by the ISBH. The permit will, in addition to settling water quality standards for the plant effluent disallow any sewage bypasses directly to Lick Creek. In order to meet the requirements of the permit the camp must either expand their existing facility to treat all of the flow in the collection lines or undergo an extensive rehabilitation program on their collection system to eliminate as much infiltration as possible. Both alternatives will be costly considering the plant will only operate two to three months per year.

A third alternative exists. It has been recommended that the Town of Ingalls install sanitary sewers to correct their existing pollution problem. As the town is only 1/4 mile away from the camp, it would be cost effective to install a lift station at the present camp plant site and pump the wastewater to the Ingalls collection system. This alternative would result in lower power and maintenance costs for the camp. It would also assure that the wastewater from the camp will receive the proper treatment at the regional treatment facility.

For these reasons, it is recommended that the Pentacostal camp discontinue use of their existing treatment facility and pump their wastewater to the Ingalls sewer system. The design flow will be the sum of the peak infiltration flow of 75,000 GPD and the average daily design flow of the plant of 25,000 GPD, which equals a flow of 100,000 GPD. To reduce costs, the camp should make an effort to rehabilitate their collection system and reduce the excessive I/I.

4.8.2.4 Mobile Home Park Northeast of Ingalls

This development is located on Reformatory Road approximately one half way between Ingalls and the Reformatory. There are currently 30 homes in the development, although there are 10 more lots available. The development is on Fox silt loam which has slight limitations for septic systems. The area drains to a ditch which flows to Fall Creek.

Wastewater treatment is currently being provided by a community septic system in the northwestern corner of the development. An 8" clay sewer line collects the wastewater and transports it to a series of septic tanks. The drain tile system lies in a lot that is approximately 1/3 of an acre in size. Allowing for a 10 foot clearance between drain lines, the total amount of draintile that the system can have in this area is 1200 feet. Fox silt loam at the 3 foot septh level has a permeability of approximately 15+ inches per hour. From the chart on page 35

of the Indiana State Board of Health Bulletin SE 13, 1970, this yields a percolation coefficient of 0.75. At a design flow of 8,000 GPD ÷ 2 square feet trench bottom x 0.75 will equal 3,000 feet of drain tile required to properly dispose of the sewage. It is obvious that the existing system is inadequate in size. Ponding water and the smell of sewage in the area during periods of high groundwater verify the fact that the system will not work.

As in most mobile home developments almost every square foot of the available land is occupied. There is simply not enough room in this development to operate and maintain individual septic systems. The existing community system is not large enough. As the regional interceptor is a gravity sewer and passes just in front of this development it would be relatively inexpensive to extend the existing 8" line to join the interceptor. Therefore, it is recommended that this development connect to the regional system and discontinue use of their community septic system. The design flow from this area will be 40 mobile homes times 200 gallons/day/home or 8,000 GPD.

The mobile home development northwest of Ingalls is covered in section 4.5.2.2. The mobile home development north of Pendleton is covered under Area number 2 in section 4.4.5. The mobile home park east of Markleville is included in section 4.6.4.

4.8.3 The Indiana State Reformatory

The Indiana State Reformatory is located approximately one mile southwest of Pendleton along the southern bank of Fall Creek. The population of the Reformatory has fluctuated from 3500 inmates in 1961 to a present low of 1300. The Reformatory also employs approximately 350 people who live outside of the institution. The Reformatory operates its own hospital, laundramat, flour mill and dairy farm. The Reformatory also operates and maintains its own water supply system and wastewater treatment system.

The existing treatment plant was constructed in 1965 and has a design capacity of 1.2 million gallons per day. The plant consists of primary treatment in a grit chamber with secondary treatment by an 80 foot diameter Trickling Filter followed by a final clarifier and chlorination facilities. The waste sludge is collected in a large, circular anaerobic sludge digestor. The digested solids are then removed and spread across farmland by a sludge tanker. In 1975 a floating cover was added to the digestor to better methane gas production and collection. The plant presently treats an average daily flow of 400,000 GPD.

The sanitary sewer system contains some sewer lines that are 35 years old up to some that are only 12 years old. Most of the older lines are within the walls of the institution. In 1961 a storm sewer separation project eliminated almost of the combined sewers. At that time many new storm sewers were constructed. Only one major interceptor, located along the outside of the western wall, remained a combined sewer after the project. In 1965 two 8" sanitary sewer interceptors were constructed to serve the staff residences and the warehouse and flour mill on the south side of the reformatory. At this time several older sewer lines were blocked off and abandoned. Also at this time the new water treatment facility was built on the south side. A 24" concrete interceptor was built then to transport the backwash directly to Fall Creek until that time when the proposed treatment plant could handle this flow. This direct bypass of the backwash water has never been eliminated.

A physical survey of the collection system revealed several significant items. The first is that the treatment plant is currently treating a good amount of stormwater from the west wall combined sewer interceptor. The second is that the sanitary Sewage that is collected from the staff residences never makes it to the treatment plant. Instead of entering the plant at the manhole before the communiter, as it was designed, the 8" interceptor ties into the 24 inch backwash water interceptor and flows directly to Fall Creek. Finally, no phosphorus removal facilities were found at the plant. Without these facilities, the limits of the NPDES cannot be met. This action may lead to possible monitary fines by the ISBH.

In 1973, the Indiana State Department of Administration recommended that the reformatory not be expanded to allow access for wastewater flows from the Town of Ingalls. It was determined at that time that the 1.2 MGD capacity of the plant would be needed if the reformatory experienced maximum institutional use.

If the combined sewer flows were not eliminated and the backwash water from the water plant treated at the treatment plant, then the present capacity of 1.2 MGD would be inadequate to handle these flows. The reformatory officials have expressed a desire not to expand the plant a third time. Also, past experience has shown that a trickling filter system is very difficult and costly to expand to incorporate more flow.

For these reasons, it is recommended that the Reformatory discontinue use of their present treatment plant and tie into the regional interceptor. At that time, the combined sewer overflows will be eliminated. Also, the backwash water and sanitary sewage from the area east of the institution will be incorporated into the regional system. A map showing the extent of these recommended renovations is shown on the next page.

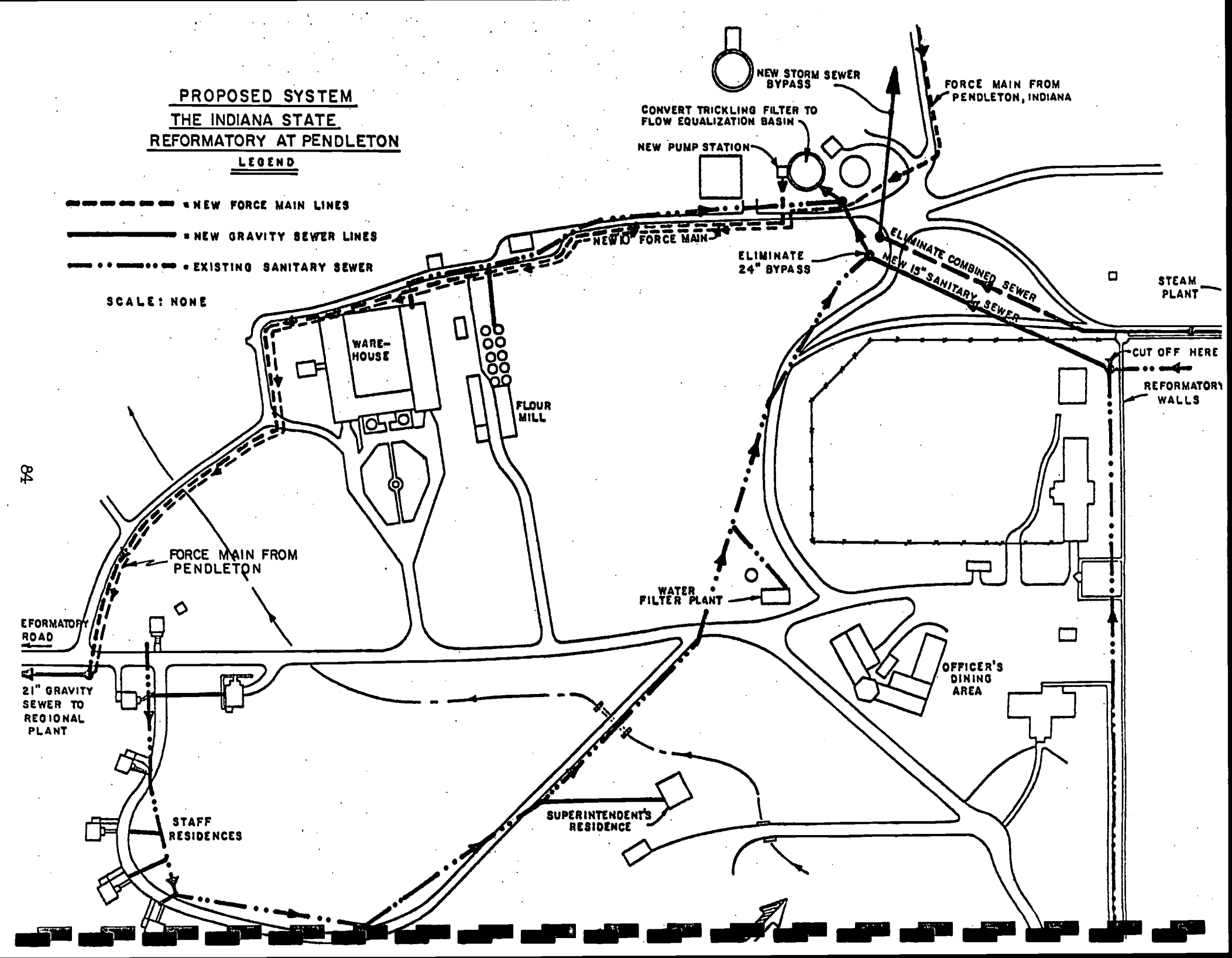
The design flow from the reformatory will be estimated as follows. First, the design flow per inmate will be determined assuming maximum institutional use; Second, an average daily flow per reformatory employee will be developed. Third, a flow estimate from the reformatory laundromat, and visitors will be made. Finally, the amount of backwash water from the water plant will be added. This figure was obtained from the water plant operator. These figures are shown below:

TABLE NINE
Design Flow - Pendleton Reformatory

Item	Quantity	Unit Flow (GPD)	Design Flow
Inmates	2500	200	500,000
Employees	350	25	8,750
Laundromat			190,000
Visitors	500	20	10,000
Backwash			160,000
Residences at Reformatory	6	330	2,000
		TOTAL	860,750

These figures allow for an infiltration rate of 200 gallons per inch diameter per mile per day.

The existing trickling filter will be constructed into a flow euqalization basin to handle the surge flows from the reformatory.


PROPOSED SYSTEM
THE INDIANA STATE
REFORMATORY AT PENDLETON
LEGEND
= NEW FORCE MAIN LINES
= NEW GRAVITY SEWER LINES
= EXISTING SANITARY SEWER
SCALE: NONE
NEW STORM SEWER BYPASS
FORCE MAIN FROM PENDLETON, INDIANA
CONVERT TRICKLING FILTER TO FLOW EQUALIZATION BASIN
NEW PUMP STATION
NEW FORCE MAIN
ELIMINATE 24" BYPASS
ELIMINATE COMBINED SEWER
NEW 15" SANITARY SEWER
STEAM PLANT
CUT OFF HERE
REFORMATORY WALLS
WARE-HOUSE
FLOUR MILL
FORCE MAIN FROM PENDLETON
WATER FILTER PLANT
EFORMATORY ROAD
21" GRAVITY SEWER TO REGIONAL PLANT
OFFICER'S DINING AREA
STAFF RESIDENCES
SUPERINTENDENT'S RESIDENCE

EXISTING SYSTEM

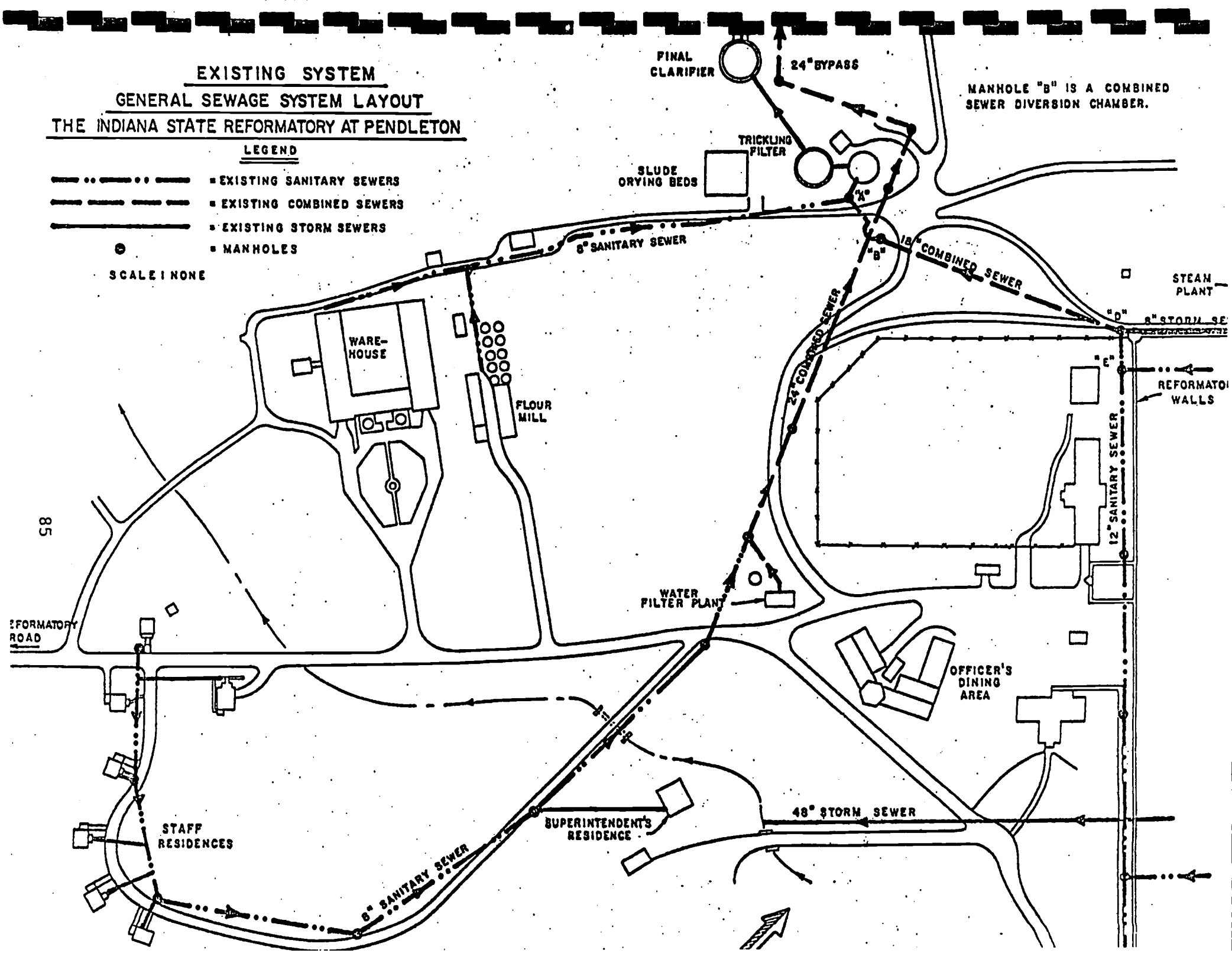
GENERAL SEWAGE SYSTEM LAYOUT

THE INDIANA STATE REFORMATORY AT PENDLETON

LEGEND

- = EXISTING SANITARY SEWERS
- = EXISTING COMBINED SEWERS
- = EXISTING STORM SEWERS
- = MANHOLES

SCALE I NONE



4.8.4 Interceptor Service Areas (Unincorporated Areas)

The Plan of Study calls for the study of several different alternative ways of combining towns and subdivided areas. The service areas of towns are described mostly by the corporate limits although some of the outskirts may be included. The service area of broad groups of subdivisions must be defined by the service areas of the interceptors. Population and flow projections can then be made for the interceptor service area in a similar way that they are made for the towns.

There are two general areas of growth in unincorporated areas that are recommended for sewer service at this time or possible service in the future. The first is the area just south of Interstate 69 from Fall Creek Heights to Baby Farms. This area will be referred to as South Anderson. The second is the area from Pendle Hill and Falconhurst west to the Regency Park Mobile Home Court. This area will be referred to as the Fall Creek Developments.

The area near the Lantern Meadows subdivision, Murcer's Addition, the Pentacostal Camp, the mobile home park on Reformatory Road are the only areas for which sewers are recommended that do not fall into one of these groups and are not a proposed part of a town's system. These areas will be considered alone.

The subdivisions in the Fortville area are discussed in a separate section.

The Table Ten gives the current populations of these service areas. Populations that are recommended to be given sewers at this time are distinguished from those which are recommended for possible service at a future date. The number of homes to be serviced in the future was determined by multiplying the existing number of homes by the Fall Creek Township 20 year growth rate of 30%.

TABLE TWELVE

Population Projections
Interceptor Service Areas

Area	Present Homes	Proposed Future Service Homes	Service Population	Design Population
SOUTH ANDERSON				
1) Fall Creek Hts. & Manor, Paradise Village; Colony	342	444	3.39	1505
2) Village Colony Stottlemeyer and Ballards addition	135	175	3.39	593
3) Shock's Addn.	27	35	3.39	119
4) Norris Heights	44	57	3.39	193
5) Baby Farms	65	85	3.26	277
6) Rose Addition	78	101	3.39	342
7) Main Street	13	17	3.39	58
TOTAL	703	914		3087
FALL CREEK DEVELOPMENTS				
1) Pendle Hills	60	94	3.39	317
2) Fiddler's Green	40	79	3.39	264
3) Mara Meadows	19	32	3.39	110
4) Falconhurst	42	88	3.39	300
5) Regency Park Mobile Home Ct.	50	50	2.30	115
TOTAL	196	343		1106

4.8.5 Forecast of Wastewater Flow (Interceptor Service Areas)

In general facilities planning there are two study period lengths that are considered. A twenty year study period is used to determine collection system and treatment plant design criteria. A forty or a twenty year study period is used to determine the interceptor system design criteria.

For the South Anderson and Fall Creek Service Areas, the design flows will be based upon the Future Service Population projections shown in Table 10. A flow of 100 gallons per capita per day will be used to determine the total daily flow. This figure allows for a groundwater infiltration rate of 200 gallons of water per inch of pipe diameter per mile of sewer per day. The design wastewater flows are shown in Table 11.

TABLE THIRTEEN

Design Flows - 20 years
Interceptor Service Areas

Area	Future Homes	Service Pop./Home	Population	GPD Flow
South Anderson	914	3.39	3087	308,700
Fall Creek Developments	343	3.39	1106	110,600

The collection systems will be designed to serve all of the lots that are currently platted in the subdivisions that will be receiving sanitary service.

There are several factors that must be taken into consideration when designing the capacity of a regional interceptor for a 40 year service life. One factor is the areas that are to be considered as future service areas. If positive action is not taken to correct the existing pollution problems in these areas in the near future, the problems will worsen as the areas develop.

It is difficult to determine which of these areas will require future service and which will not. Therefore, all of the potential future service areas will be taken into design consideration in the 40 year study period.

Another factor to be considered is the future growth that a trunk line interceptor will bring. Potential sanitary service will be a natural draw for future subdivisions along the interceptor route. To evaluate this factor, potential subdivision sites will be selected along the interceptor lines. From these presently non-existant subdivisions, wastewater flows will be calculated. The population that is presently being considered for sanitary service will be assumed to grow at the present 30% per 20-year rate.

In a cost analysis of interceptor service for a 20 year period or a 40 year period, it was found that it was economical to provide service for the 40 year period. The design flow that was used in the analysis is shown in Table Fourteen.

TABLE FOURTEEN

REGIONAL INTERCEPTOR
40 YEAR PERIOD
DESIGN FLOWS

	Present	Future
South Anderson	308,700 GPD	401,310 GPD
Fall Creek Developments	110,600 GPD	143,780 GPD
Huntsville + Area north of Huntsville	-	78,000 GPD
Area between Regency Park and Pendleton on US 36	-	85,000 GPD
Future Subdivisions on 36	-	75,000 GPD
Future Subdivisions near Huntsville	-	40,000 GPD
Future Subdivisions north of Fall Creek	-	50,000 GPD
TOTAL	419,300	873,090 GPD

5.0 ALTERNATIVES

5.1 Optimum Operation of Existing Facilities

In section 4.8.1 the current condition of the septic systems and the soil types for various sub-divisions were discussed. In many areas it was found that soils were unsuitable for absorption fields and that current septic systems are polluting. Optimum operation of septic systems in these areas is not feasible.

Other areas were found to have suitable or borderline soils, but still had pollution problems. Proper maintenance and/or renovation of these septic systems may be the best solution and will be considered.

The Towns of Ingalls and Markleville were found to have polluting septic systems and unsuitable soils. (See Sections 4.5.2 and 4.6.2). Optimum operation of these systems is not feasible.

In a 1974 Engineering Report for the Fall Creek Regional Waste District, it was concluded that a regional plant for Pendleton, Ingalls, and the Reformatory was more cost-effictive than optimum operation of the Pendleton and Reformatory plants. Also, reformatory personnel have expressed a desire to abandon their own plant and connect to a regional plant. Specific problems that these treatment plants are experiencing are mentioned in Sections 4.4 and 4.8.3.

The Town of Fortville currently has a pollution problem due to excessive infiltration/inflow resulting in bypasses of raw wastewater by the hydraulically overloaded treatment plant. Extensive rehabilitation of the collection system and modifications on the existing treatment facility will be required to correct this problem. Cost estimates for this work have been made in the Fortville I/I report. This estimate, which is the optimum operation of existing facilities, will be used in the evaluation of the regional alternatives involving Fortville in Section 5.4.

5.2 REGIONAL SOLUTIONS

This section will outline the alternative patterns of serving the various towns and areas with combinations of regional and/or separate treatment facilities. After careful screening in which many unpractical and unfeasible regional solutions were eliminated, there were twelve possible patterns remaining for evaluation. The twelve alternatives are listed below and general schematics of the alternatives are shown on Figures 15 through 28. The following abrieviations will be used in the alternatives description:

The Regional Waste District will consist of the Towns of Pendleton and Ingalls, the State Reformatory, the Indiana Pentacostal Camp, the Mobile home parks northeast and northwest of Ingalls, Murcer's Addition and the area south and east of Lantern Meadows.

Markleville will include West Markleville "Markleville alone" will consist of a treatment plant, collection system and Interceptor built to serve Markleville and West Markleville.

Fortville will include, in all cases, a rehabilitated Fortville collection system as outlined and estimated in the Fortville I/I."Fortville Alone" will include plant modifications and the construction of a storm retainage pond.

Fall Creek Developments Alone will consist of having the pollution problems in the Fall Creek Developments area corrected by various on-site methods as outlined in Section 4.8.1.15.

The twelve regional alternatives are:

1) Markleville alone, Fortville alone, one regional plant for the Regional Waste District only and one regional plant for Fall Creek Developments and South Anderson.

2) Markleville alone, Fortville alone, Fall Creek Developments alone, South Anderson to Anderson and one regional plant for the Regional Waste District.

3) Fortville alone, one regional plant for South Anderson, Markleville and Fall Creek Developments. One regional plant for the Regional Waste District.

4) Markleville alone, Fortville alone, Fall Creek Developments and South Anderson to Anderson, one regional plant for the Regional Waste District.

5) Markleville alone, Fortville alone, one regional plant for the Regional Wastewater District, South Anderson and Fall Creek Developments.

6) Markleville alone, one regional plant for the Regional Waste District, Fortville, Fall Creek Developments and South Anderson.

7) One regional plant for South Anderson, Fall Creek Developments and Markleville. One Regional plant for the Regional Waste District and Fortville.

8) Fall Creek Developments alone, Fortville alone, Markleville and South Anderson to Anderson, one regional plant for the Regional Waste District.

9) Fortville alone, South Anderson to Anderson, one regional plant for Markleville, Fall Creek Developments and the Regional Waste District.

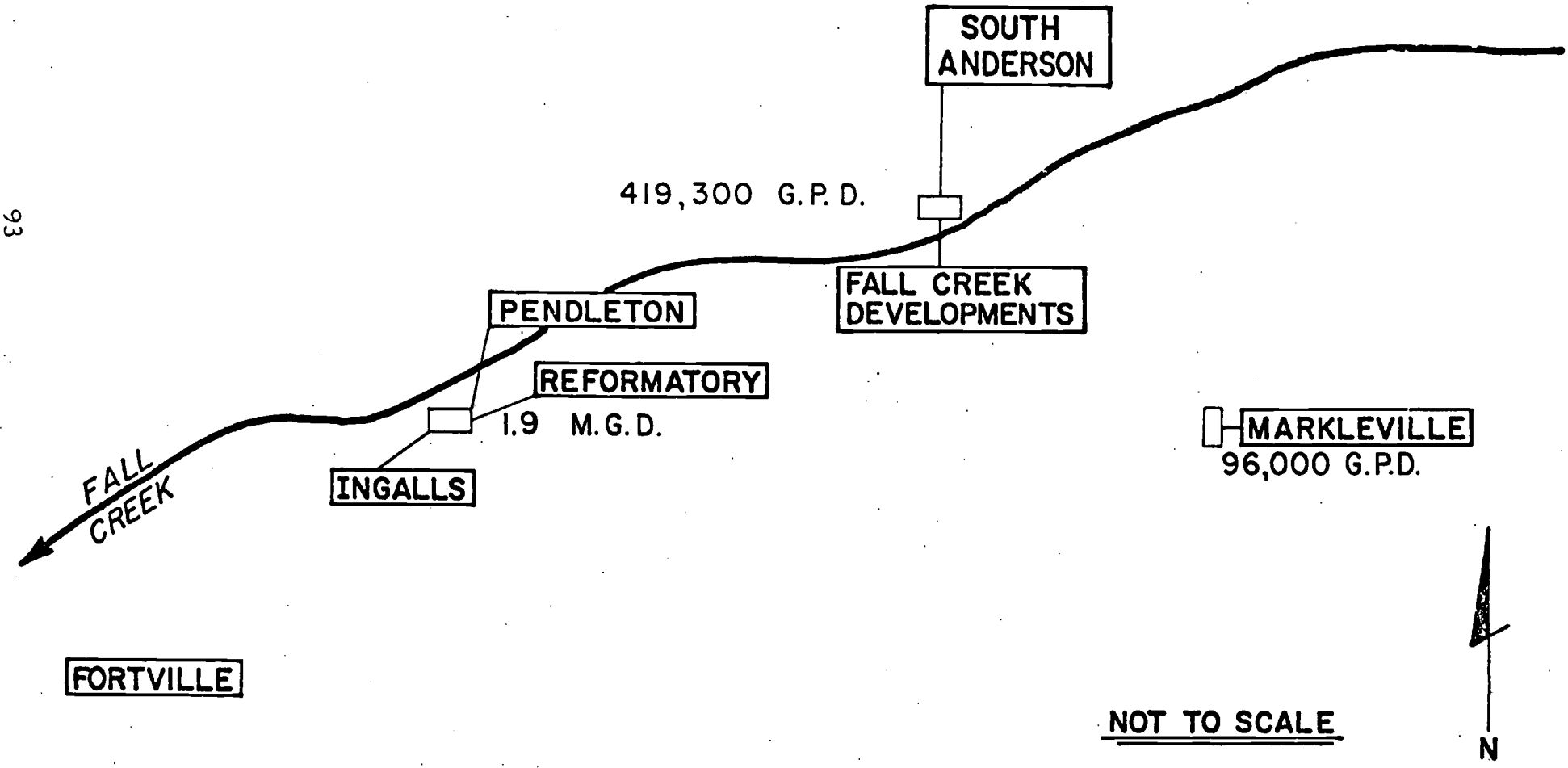
10) South Anderson to Anderson. One regional plant for the Regional Waste District, Markleville, Fortville and the Fall Creek Developments.

11) One regional plant for the Regional Waste District, South Anderson, Fall Creek Developments, Markleville and Fortville.

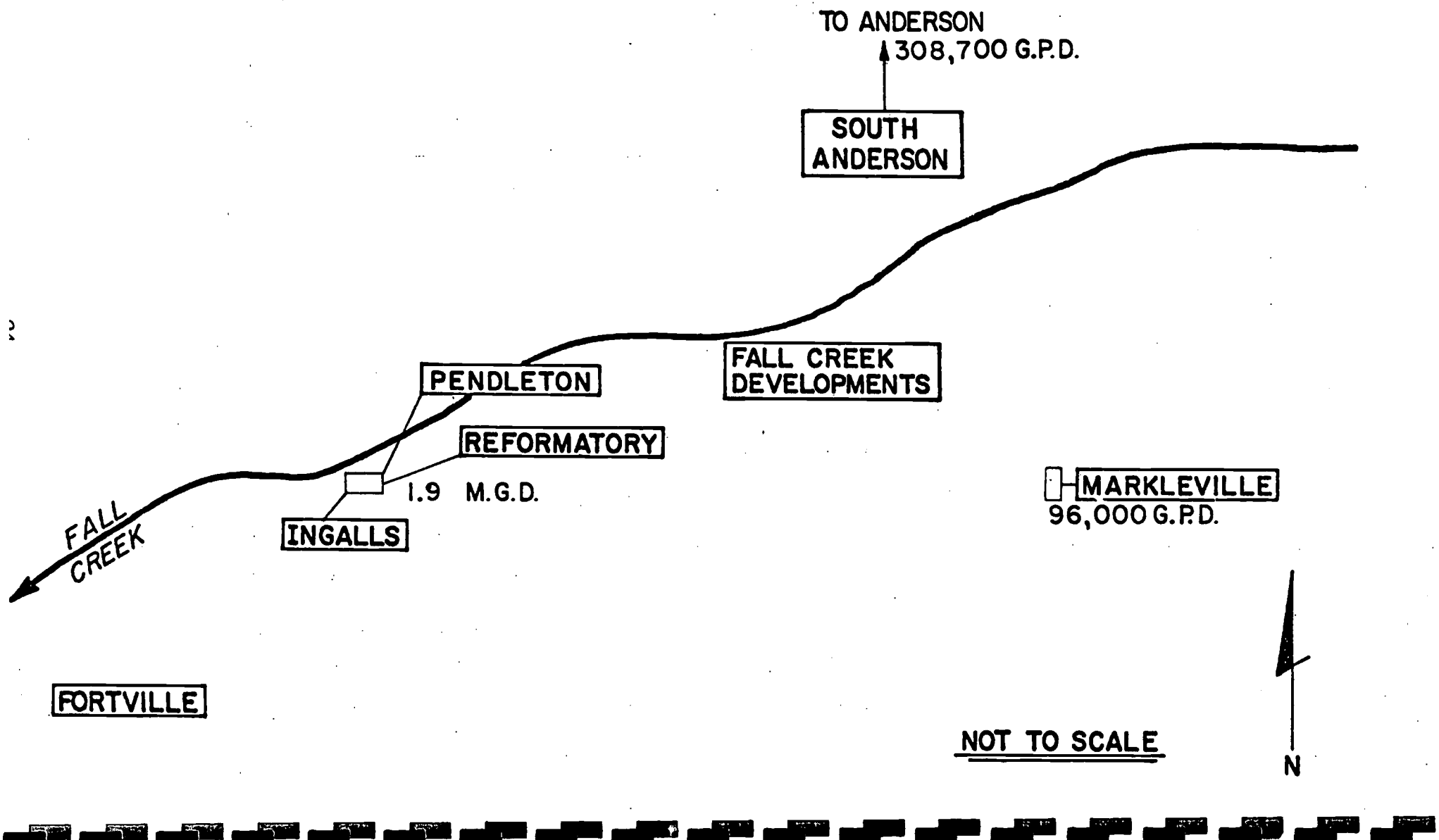
12) Fortville alone. One regional plant for the Regional Waste District, South Anderson, Markleville, and Fall Creek Developments.

The figures shown on the following pages are general schematics of the twelve alternatives.

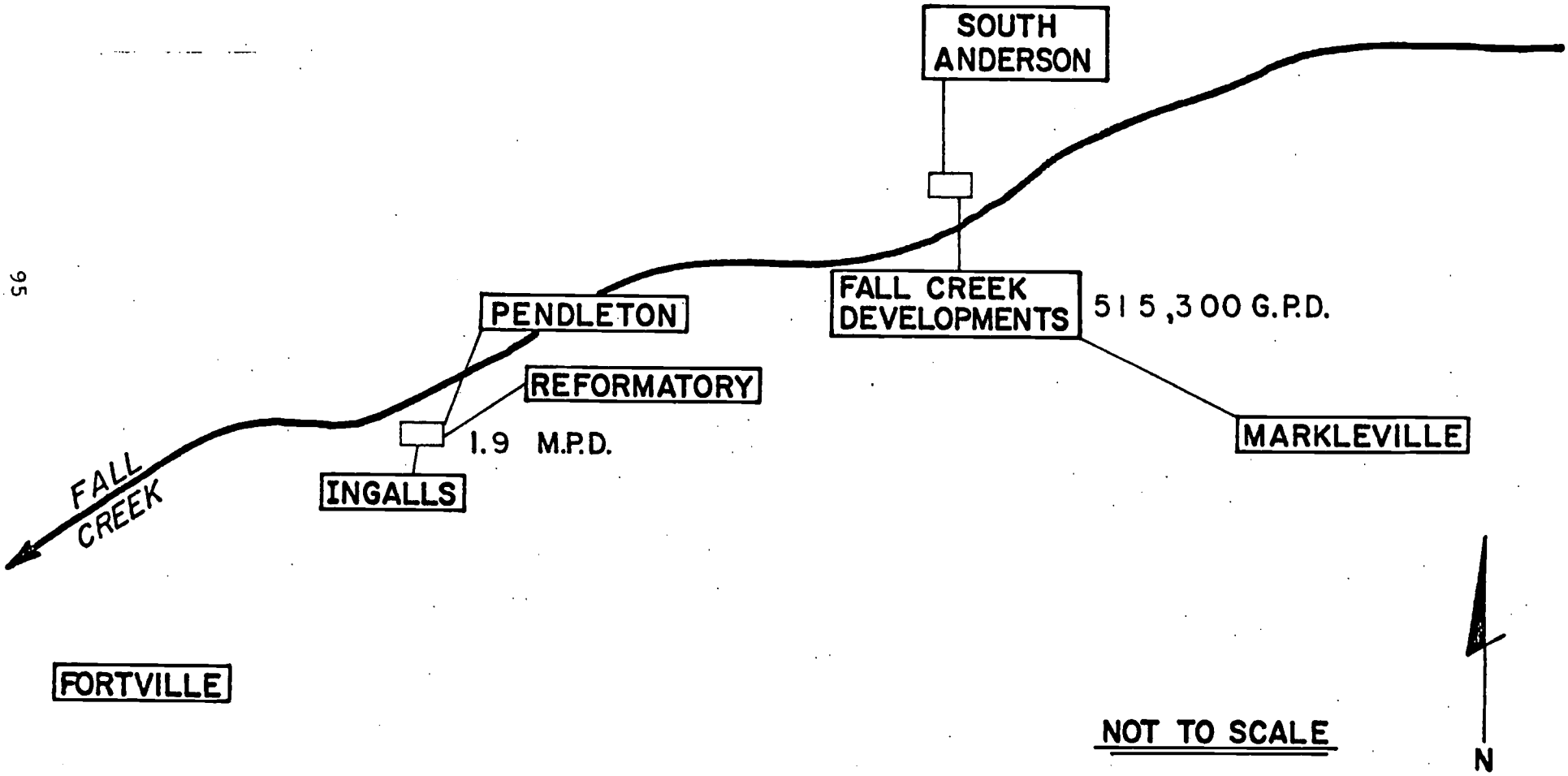
FALL CREEK REGIONAL ALTERNATIVE I



FALL CREEK REGIONAL ALTERNATIVE 2



FALL CREEK REGIONAL ALTERNATIVE 3



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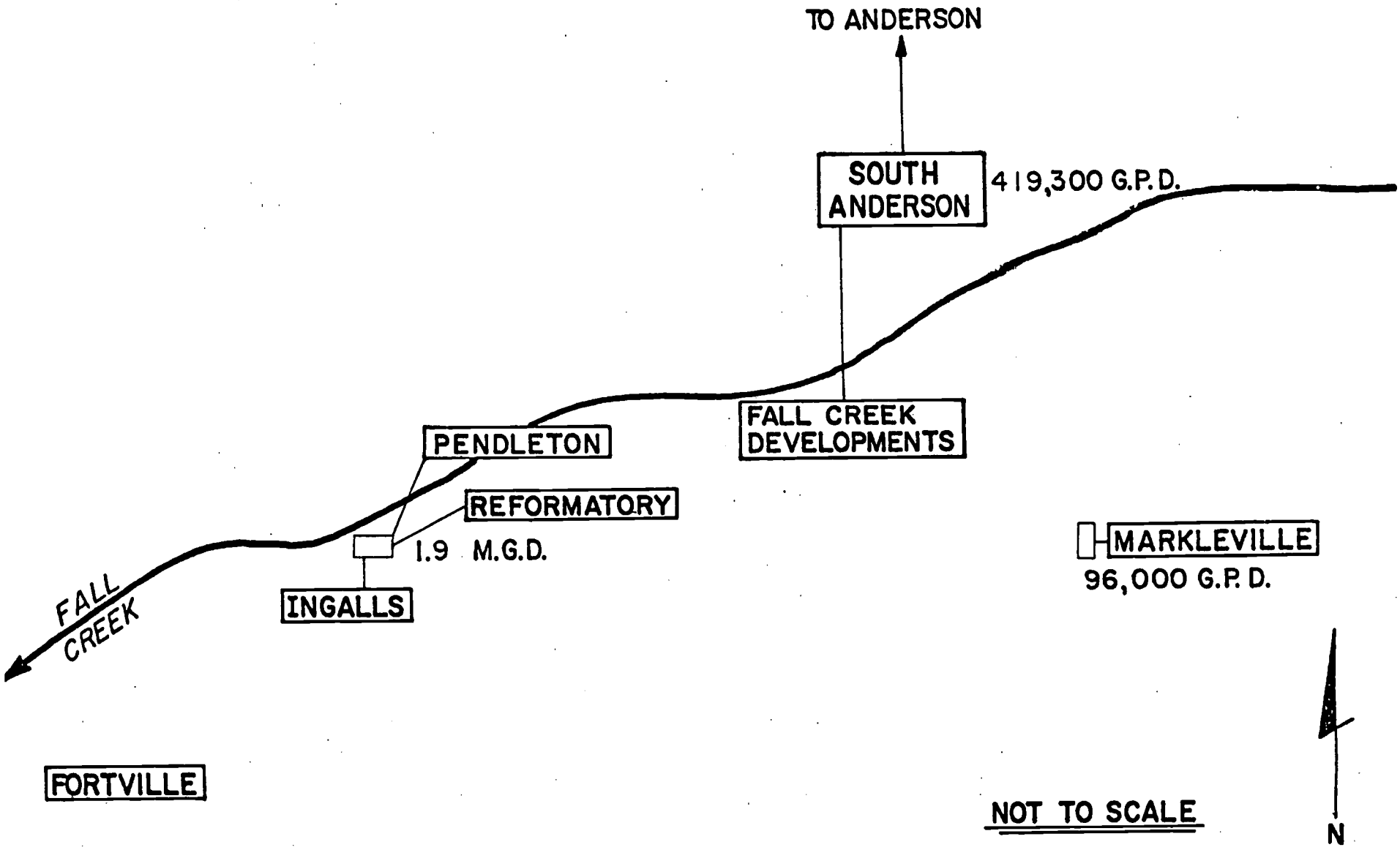

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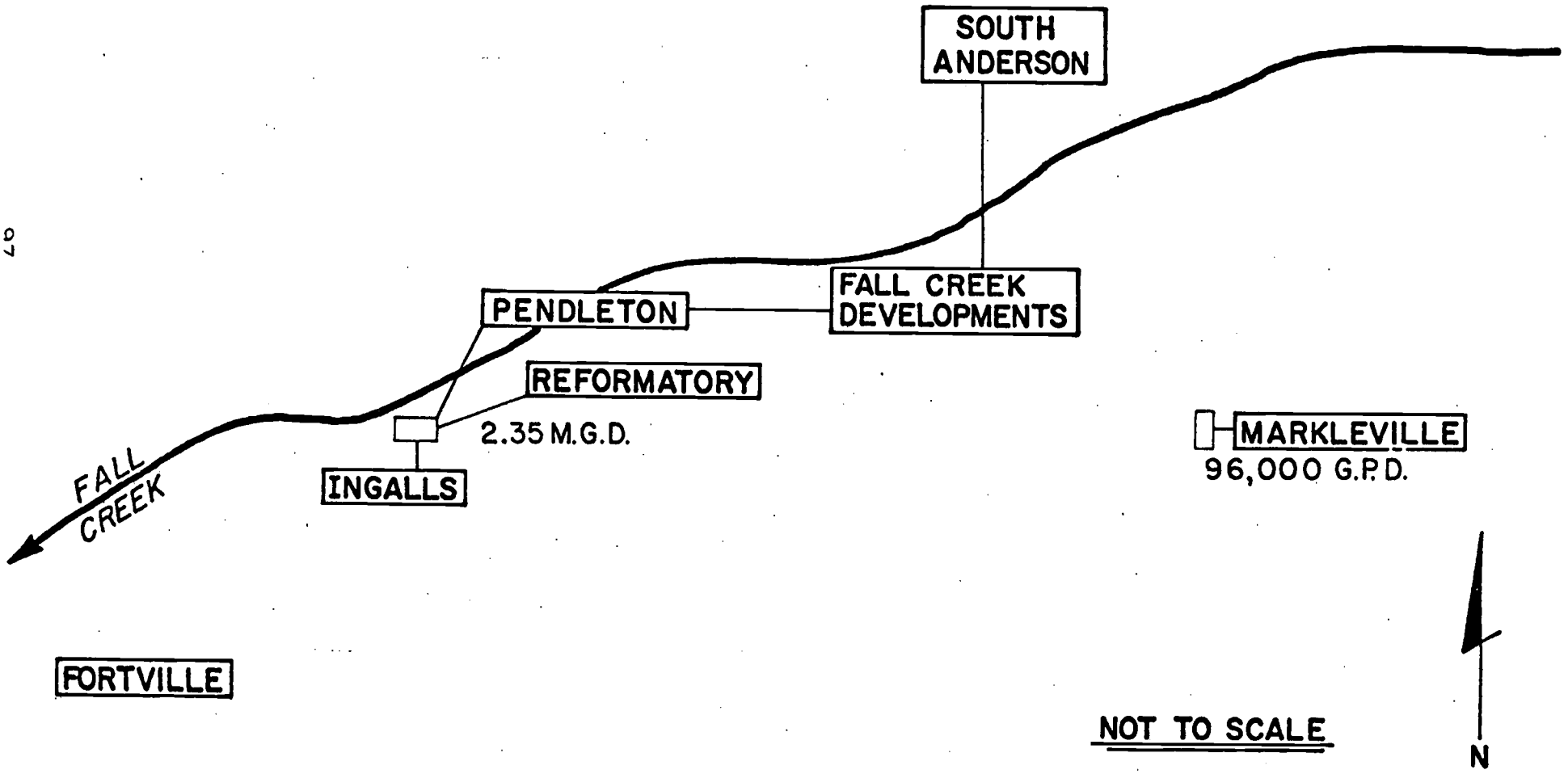

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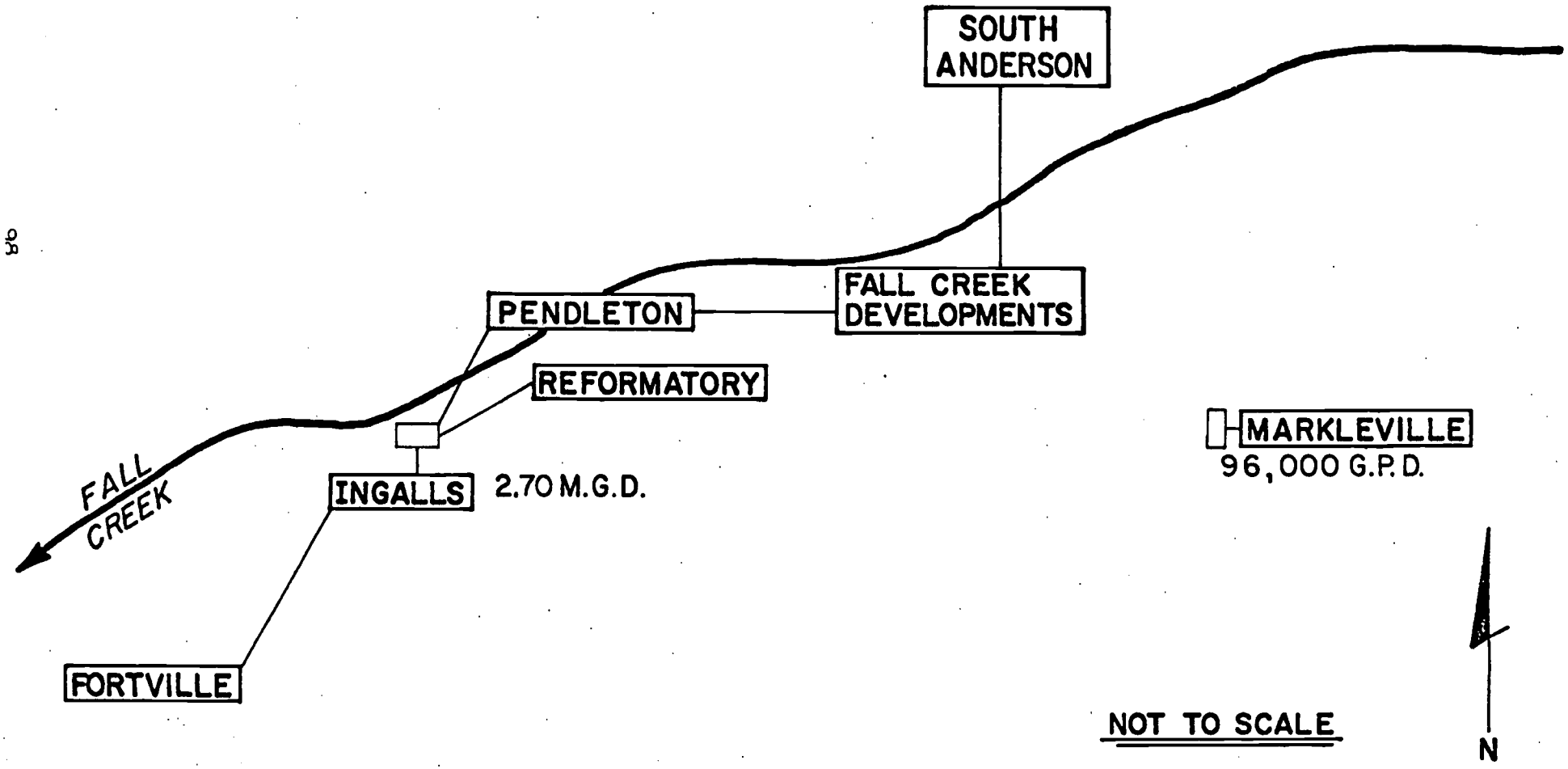

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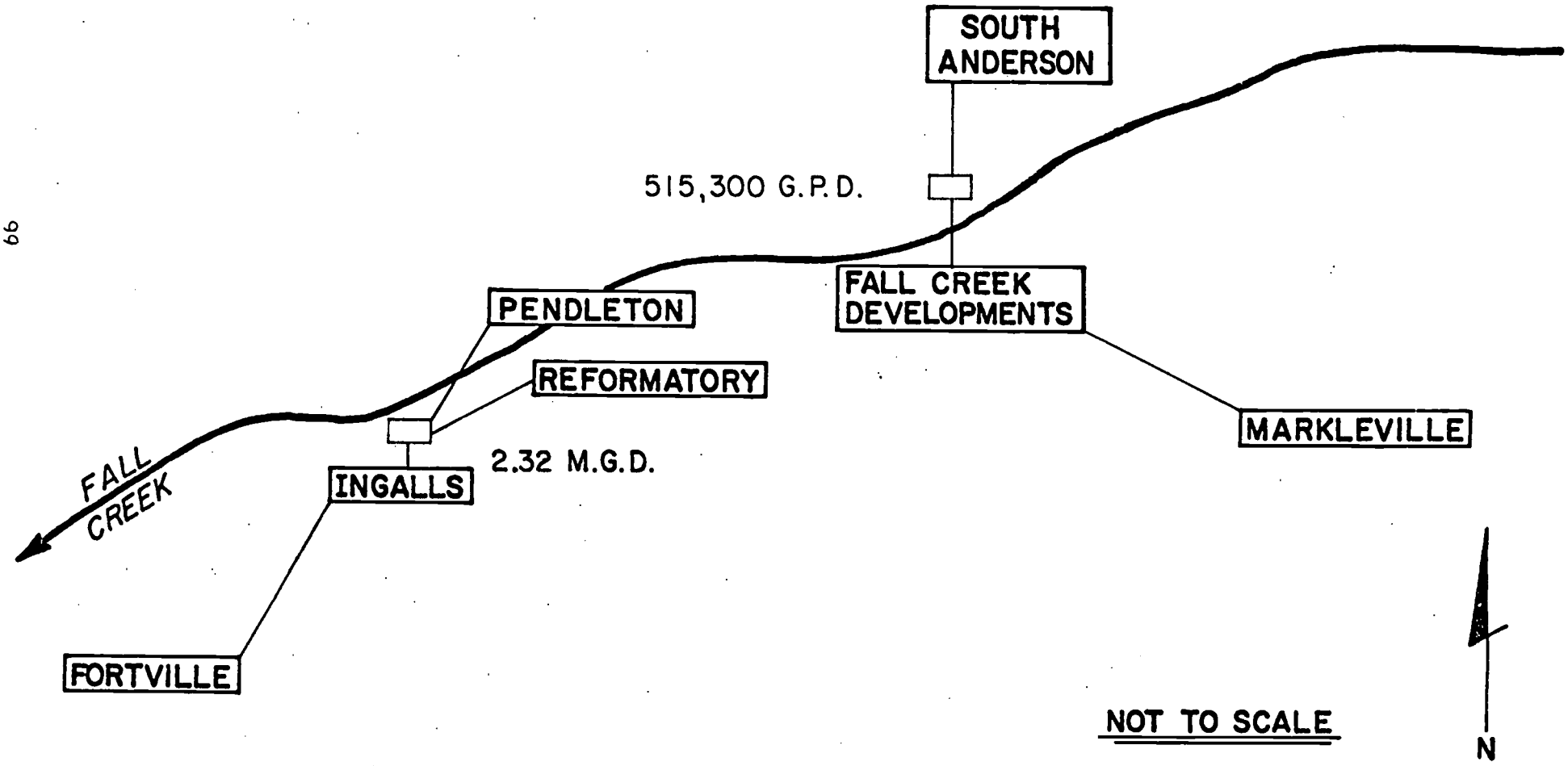

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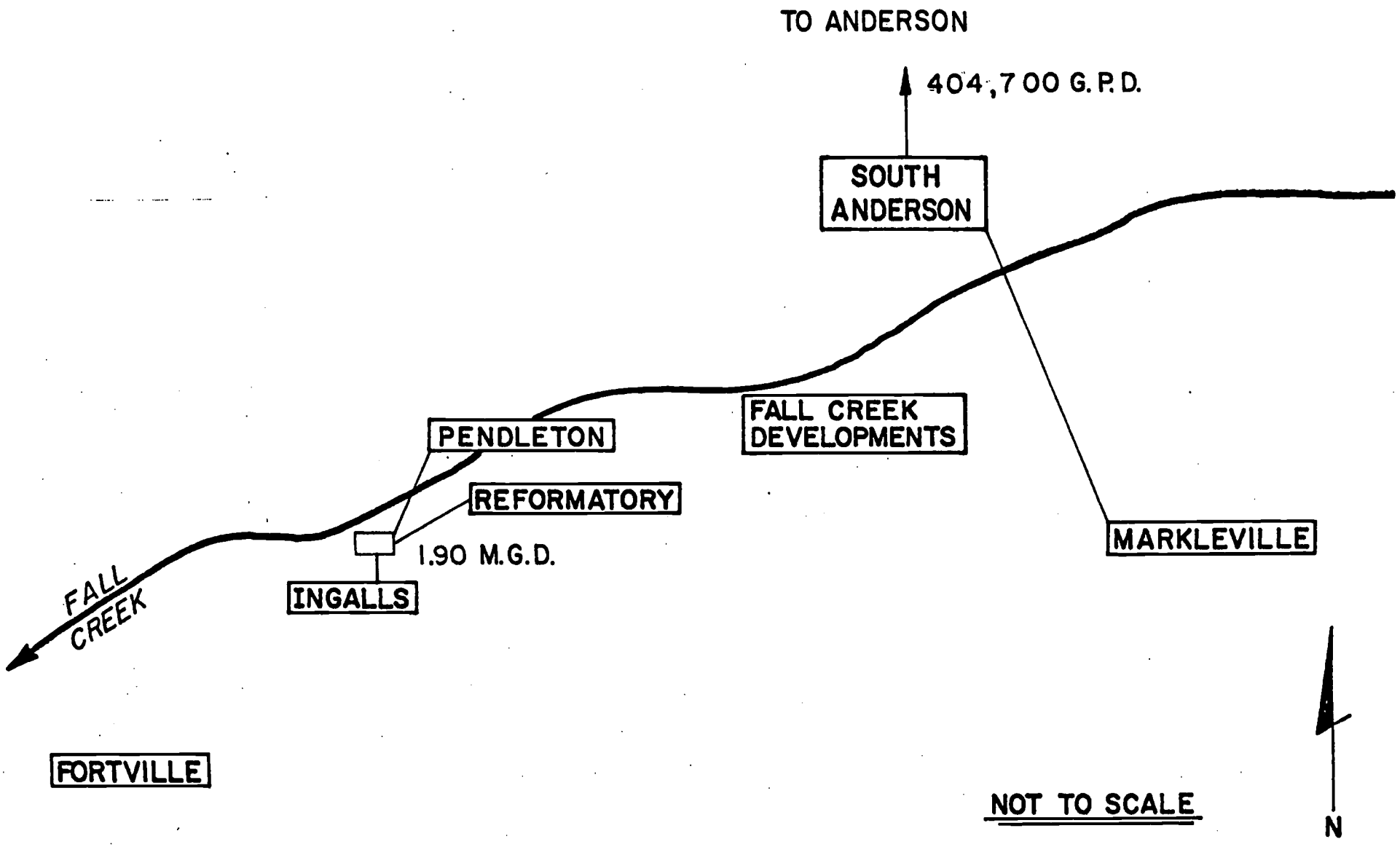

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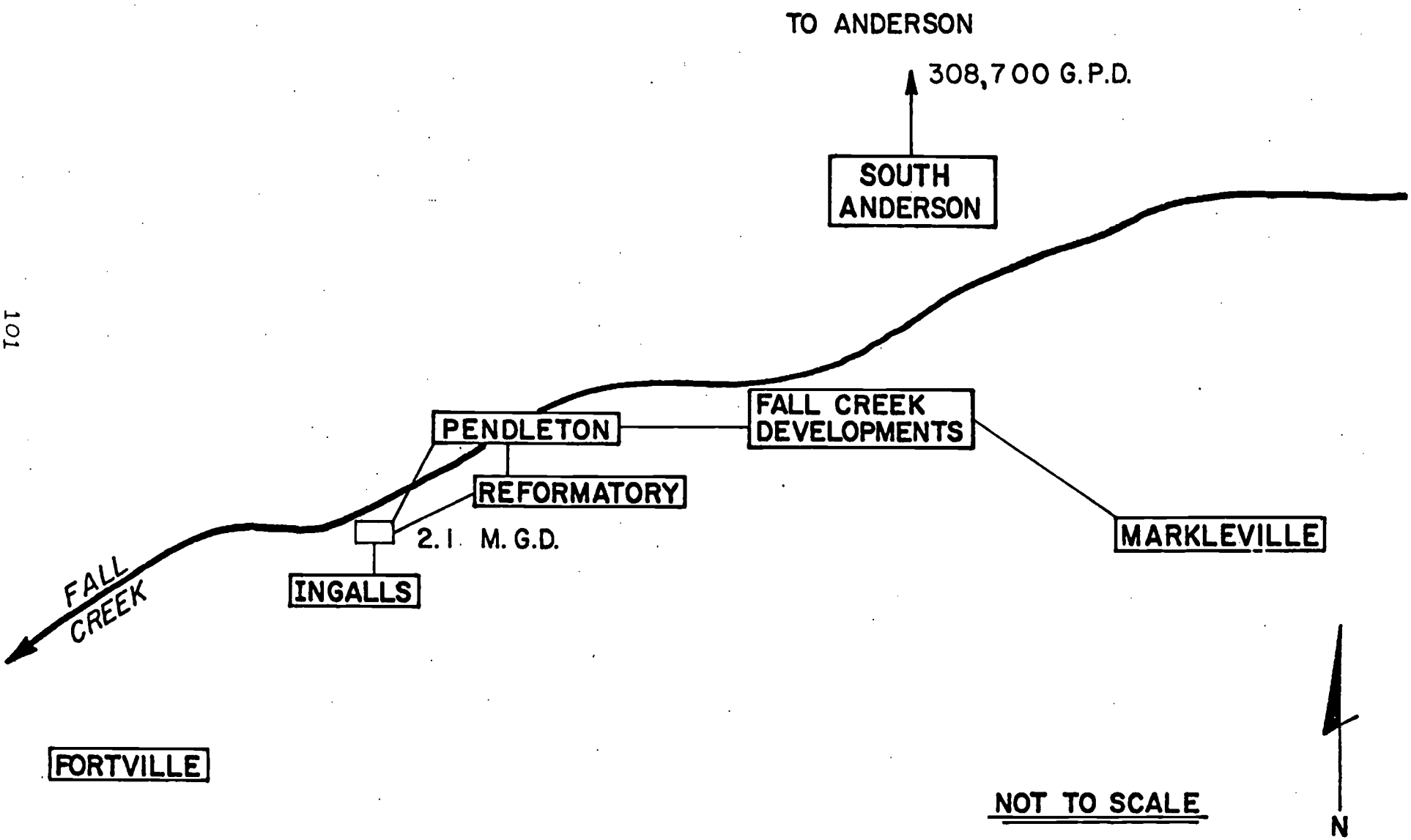

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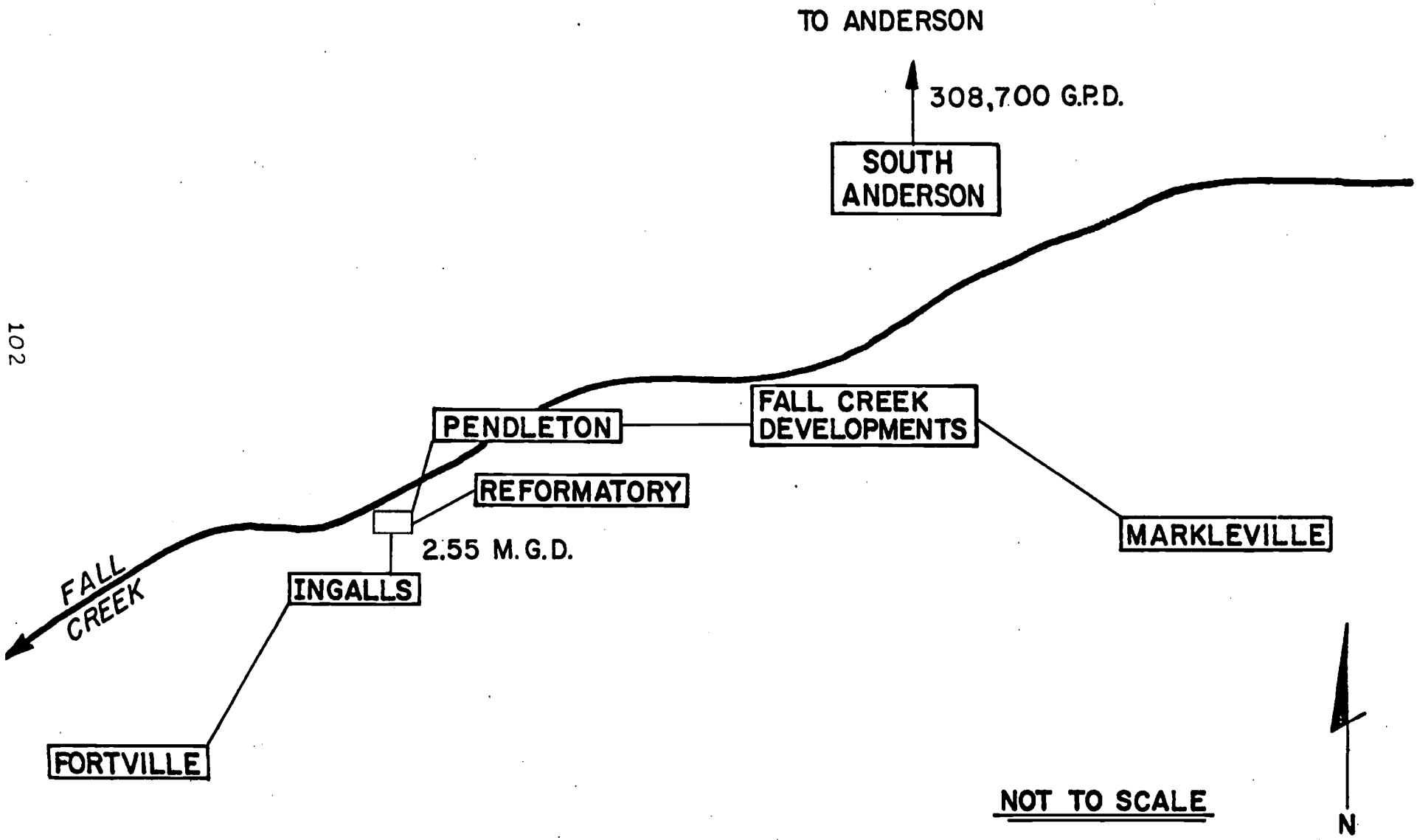
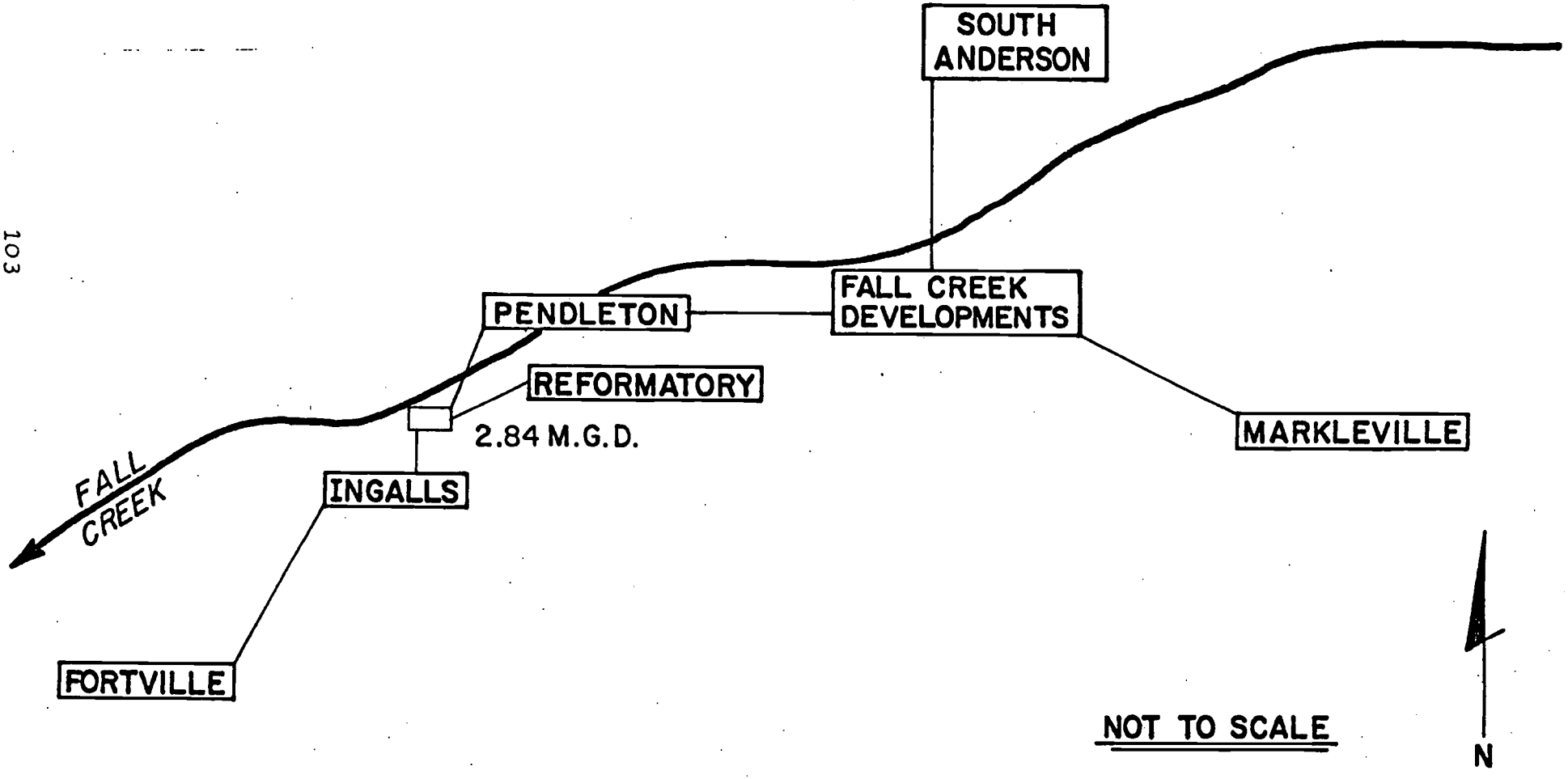
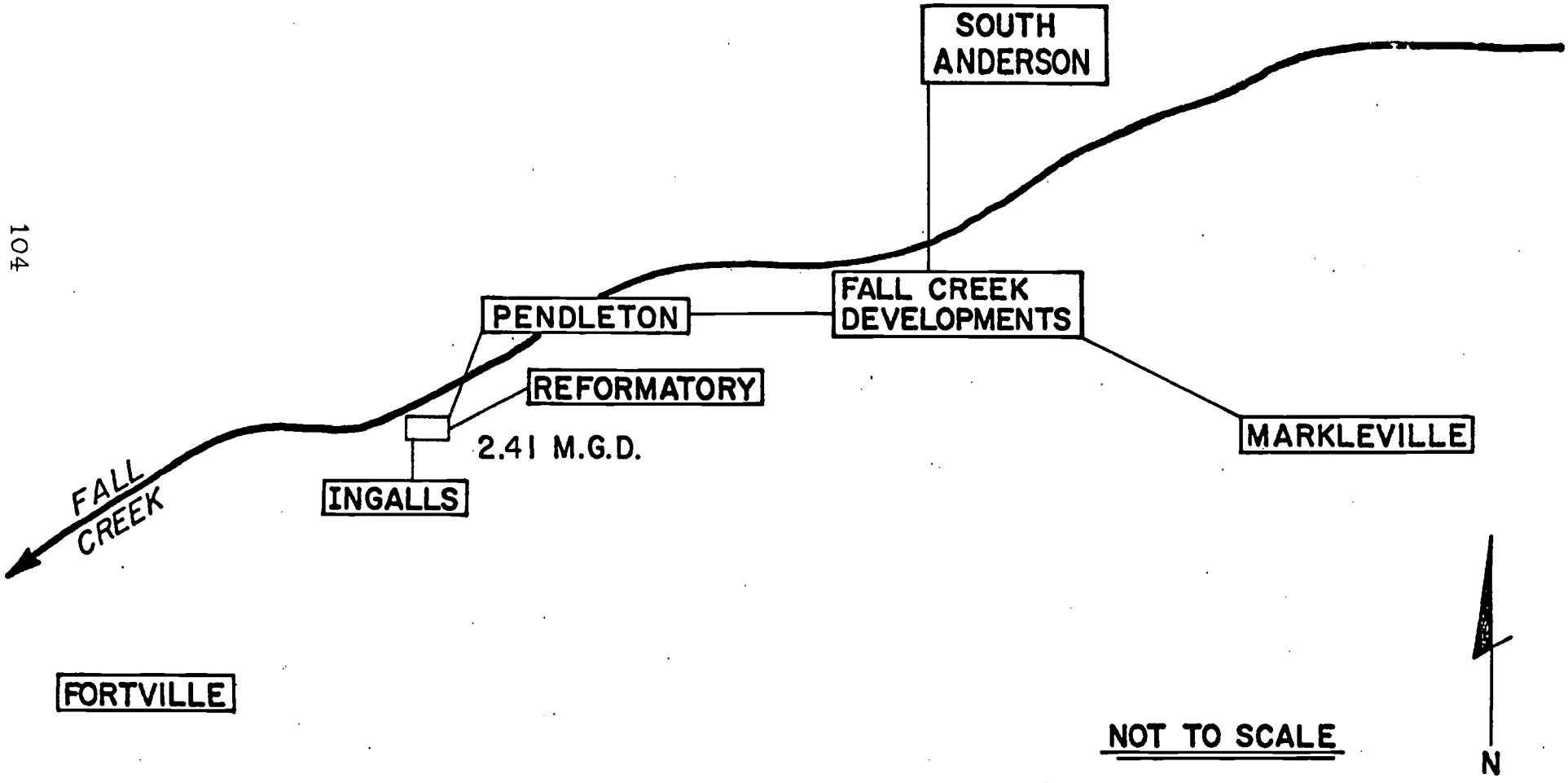


FALL CREEK REGIONAL ALTERNATIVE II



FALL CREEK REGIONAL ALTERNATIVE 12



5.3 ALTERNATE TYPES OF WASTE TREATMENT

There will be several treatment plant capacities that will be studied in the evaluation of the regional alternatives. As outlined in the Plan of Study, the following types of treatment will be considered for plants with a capacity of less than 1.0 MGD.

A. Primary Treatment
B. Secondary Treatment
    1. Extended Aeration
    2. Oxidation Ditch
    3. Waste Stabilization Ponds.
    4. Contact Stabilization
    5. Trickling Filter
    6. Aerated Lagoons
C. Advanced Treatment
    1. Two one-day holding ponds
    2. Rapid Sand Filter
    3. Microscreen
    4. Tertiary Clarifier w/chemical addition
    5. Land Application
D. Phosphorous Removal
E. Sludge Handling and Disposal

For the plants with a capacity greater than 1.0 MGD , the following types of treatment will be considered.

A. Primary Treatment
B. Secondary Treatment
    1. Conventional Activated Sludge
    2. Aerated Lagoons
    3. Waste Stabilization Ponds
C. Advanced Waste Treatment
    1. Two-one day holding ponds
    2. Rapid Sand Filter
    3. Microscreen
    4. Land Application
D. Phosphorous Removal
E. Sludge Handling
    1. Aerobic Digestion
    2. Anaerobic Digestion
F. Sludge Disposal
    1. Incineration and Landfill
    2. Land Application
    3. Drying Beds and Landfill

Each of these alternatives will receive a brief preliminary review. For those alternatives found worth further study, preliminary design and cost estimates will be made. The optimum facilities will be chosen on the basis of monetary, environmental and implementational factors.

There are fifteen different regional plant capacities that must be evaluated for their cost effectiveness. In order to reduce this number, the costs for the alternatives which pass the initial review will be based on four major groups of flows. The following capacities will be analyzed:

76,800 GPD (Markleville alone)
330,000 GPD (Markleville and South Anderson)
1.8 MGD (Fall Creek Regional Plant)
2.7 MGD (Total flow of the entire Planning Area)

The results of the cost analysis for the individual treatment systems for these capacities will be plotted on graph paper. General curves, similar to the ones presented in the EPA technical report 9-75-002 "A Guide to the Selection of Cost Effective Wastewater Treatment Systems" will be drawn to connect the points on the graph. From these general curves, a cost for a given capacity can be derived. When the most cost effective and environmentally sound alternative for the Planning Area has been selected, the costs will be developed based upon the exact design flows.

5.3.1 PRIMARY TREATMENT

The purpose of this Primary Treatment in a sewage treatment facility is to eliminate all large solids and grit from the sewage that might clog and hinder further treatment. For plants smaller than 1.0 MGD, experience has shown that a bar screen followed by a comminutor provides adequate debris removal. In plants larger than 1.0 MGD, especially in older collection systems, a grit chamber is required. A grit chamber is a long chamber that, through geometric shape and channel slope, will slow the velocity of the influent down to a point where solid grit particles will settle out. The grit on the bottom of the chamber is then removed by means of a bucket and chain system or a conveyor belt system.

After the grit is removed, the sewage will then flow into a circular primary clarifier. Here, further solid particles will be removed. Solids that are heavier than water will settle to the bottom of the clarifier and collect in a hopper. The solids that are lighter than water will float to the top and be collected in scum troughs. These collected solids will then be transported to the sludge handling facilities. The remaining sewage will be transported to the secondary treatment facilities.

5.3.2 SECONDARY TREATMENT

5.3.2.1 Extended Aeration - This is a variation of the conventional activated sludge treatment process. Raw wastewater is held in an aeration tank for 24 hours where BOD is reduced by biological action and suspended solids are coagulated into settleable solids. The waste then travels to a settling tank where the solids settle out and the liquid is passed on to advanced treatment. The contents of the settling tank are periodically pumped to disposal.

The 24-hour detention time (versus 6 hours detention time for conventional activated sludge processes) results in large tanks which are able to handle the surge loads that can be expected from small communities. Because of this ability to handle surge loads, less testing and monitoring is required. The larger amount of land required and the higher initial costs for the large tanks are offset by the low operational expense. The extended aeration process will be reviewed further.

5.3.2.2 Oxidation Ditch - This is also a variation of the activated sludge process. The raw wastewater will enter a circular or oval shaped track for 24 hours where BOD is reduced by biological action and suspended solids are coagulated into settleable solids. Mechanical rotors will keep the sewage moving about the track for aerated treatment.

An oxidation ditch to handle a small domestic flow would require only a small area. The initial construction cost for the ditch and secondary clarifier would be slightly higher, however, its operation and maintenance costs would be similar or less than an extended aeration treatment plant. Freezing or flow vaiations would not be significant problems for the oxidation ditch. This form of activated sludge will be reviewed further.

5.3.2.3 Waste Stabilization Ponds - These are large, shallow ponds with a surface area of 1 acre per 100 persons served. Wastewater is stabilized by aerobic organisms. Aeration in the shallow ponds occurs by wave action and diffusion. The ponds are large enough to store sludge for long periods of time, although dredging may be periodically necessary.

The main advantage of waste stabilization ponds is the low operation and maintenance costs. Because there is very little equipment in the system, careful monitoring is not required. The low operation and maintenance cost often offsets the high initial costs required for land acquisition and earthwork. Another disadvantage of the ponds is the unacceptably high algae concentration which sometimes develop. The algae problem can ususally be eliminated by series operation of the ponds. Waste stabilization ponds will be reviewed for their cost-effectiveness.

5.2.3.4. Contact Stabilization - The plant size, initial cost and operational efficiency of a contact stabilization plant is very similar to that of an extended aeration plant. However, the operational efficiency of a contact stabilization plant is more complex than extended aeration. Due to this more sensitive type of treatment, more operator control is required and operational cost will be higher. There is no need to further study the contact stabilization form of activated sludge for any of the alternates.

5.2.3.5. Trickling Filters - Past experience has shown that installation and maintenance costs are relatively high for this form of treatment. Its efficiency is effected by flow variations. Freezing weather also effects the removal effeciencies of trickling filters. For these reasons, trickling filters will not be considered further.

5.2.3.6. Aerated Lagoons - In this system, raw wastewater enters earthen lagoons which have mechanical aerators. The waste is broken down by biological action and then passes to an unaerated lagoon where the solids settle out. Chemicals are added to the influent of the unaerated lagoon to help improved BOD and SS removal. The wastewater then passes to a clarifier where the solids are further settled out.

Aerated lagoons have sometimes proven ineffective in reducing BOD and SS concentration to the required level. The unaerated lagoon followed by a clarifier should eliminate this problem. Another disadvantage is the large amount of land needed for the lagoons. This should not be a problem in rural areas. The main advantage of aerated lagoons is the low operation and maintenance costs. Because the low operation and maintenance costs often out-weigh the high initial costs, aerated lagoons will be reviewed further.

5.3.3 ADVANCED TREATMENT

5.3.3.1. Holding Ponds with Chemical Addition - Two holding ponds, each with a capacity to provide one day detention, are placed in series. Treatment is accomplished by allowing the solids to settle out. Holding ponds require the addition of chemicals to help settle the solids. A portable sludge pump is provided for periodic sludge remocal.

An advantage of terminal ponds is the low operation and maintenance. The chemical feed facilities are the only equipment that needs routine maintenance. Algae problems can be a problem with any wastewater pond but they are reduced with terminal ponds because of the one day detention time. Holding ponds with chemical addition will be reviewed for their cost-effectiveness.

5.3.3.2. Rapid Sand Filtration with and without Chemical Addition - In this system effluent from secondary treatment is filtered through a bed of sand overlain with coal. The filtered water is held in a backwash tank and discharged to a stream. Two filters are provided so one filter can be used while the other is being cleaned by backwashing with the water from the backwash tank. The backwash water is returned for secondary treatment.

Rapid sand filters can be used with or without chemical addition. Filters without chemical addition have proven unreliable in obtaining a high quality effluent. They are often ineffective in removing the BOD which is due to particles in solution rather than in suspension. For these reasons, chemical addition equipment will be added to rapid sand filters.

The main disadvantage of rapid sand filters is the complexity. Prefabricated systems with automatic controls are available. These systems reduce the complexity of operation. This alternative will be reviewed further.

5.3.3.3. Microscreens - A microscreen is usually a finely woven steel fabric through which wastewater flows to screen out solids. The screen rotates through a continuous backwash of water for cleaning.

Operation and maintenance costs are high for this alternative. Careful monitoring is required to prevent clogging. The initial costs are low, however, because of the minimal amount of land required. This alternative will be reviewed further.

5.3.3.4. Tertiary Clarifier with Chemical Addition - These are similar to the clarifiers used in the extended aeration process. The detention times and settling rates are similar. The main difference is there is no recycling of sludge and chemical addition is needed to insure proper settling.

Recent experience in Indiana has shown that tertiary clarifiers may not be a reliable method of advanced treatment. They will not be considered in the cost-effective analysis.

5.3.3.5. Land Application - There are three basic types of land application: irrigation, infiltration - percolation and overland flow. The three types vary in method and rate of application. The type of soil required also vaires for each type of application. The large number of alternative treatment plant sites that will be analyzed in the Facility Plan will probably have the types of soils required for any of the land application methods. Therefore, it will be assumed that a site with the proper soil for any land application method can be found.If any of the methods are found to be cost-effective, a more detailed site and cost analysis will be made. Each of the three methods of land application will be reviewed. The first method is irrigation. In irrigation systems a crop, such as a grass-legume hay, is irrigated with wastewater by spray or surface techniques. Treatment is accomplished by physical, chemical and biological means as the wastewater seeps into the soil. Irrigation systems can be further broken down into low-rate and high-rate systems. In low-rate systems the wastewater is applied to the crops only during the growing seasons and only when the crops need the water. Because Indiana's average evapotranspiration rate allows on the average 7 inches of excess railfall, most crops do not need excess water. The lack of need for excess water would require large storage facilities for the wastewater and a large area of crops. The extra cost would make low-rate irrigation systems much more expensive than other irrigation systems. Thus low-rate irrigation will not be reviewed further.

High-rate irrigation systems apply the water to the land as fast as the hydraulic limitations of the soil or loading rates of chemical constituents will allow. Well-drained soils without high water tables are preferred for both irrigation methods. Pre-application treatment is normally required for irrigation systems. The bacteriological quality of the water is usually limiting where food crops are to be irrigated. Also, reduction in BOD and SS is sometimes required to prevent clogging of the sprinkler, or to control odor problems. These reductions may be obtained in the pre-application storage lagoons. High-rate irrigation systems will be analyzed for their cost-effectiveness.

The second basic type of land application is overland flow. In this method, wastewater is applied to the top of sloped terraces and allowed to flow down to runoff collection ditches. Purification of the wastewater is accomplished as the water travels through the vegetation. Overland flow requires a poorly drained soil with slow permeability. Careful monitoring would be required for the seasonally high water table. Pre-application treatment includes the removal of grease and large debris. Overland flow will be analyzed for its cost-effectiveness.

The third method of land application is infiltration percolation. In this method, wastewater is applied to the land by spraying or spreading in basins. Treatment is accomplished as the water percolates through the soil. Again, careful monitoring would be required for the seasonally high water table. Because of the wide range of percent removal of BOD and SS with this method, quality standards are met. Infiltration-percolation will be analyzed further.

5.3.3.6. Phosphorous Removal - In this facility, alum will be added to remove the phosphorous in solution in the wastewater to a form that will settle out. The alum will be added in a rapid-mixing zone located between the secondary treatment facility and the final clarifiers. The precipitated alum/phosphorous material will be collected from the clarifiers and disposed of. In very large treatment plants (greater than 10 MGD) it has been found that this precipitate can be treated and dewatered to form an alum compound that can be reused in the removal facility. However, in treatment plants of smaller capacity, it is doubtful that enough precipitate can be produced to justify the cost of the dewatering and treatment equipment required. For this reason, this method of precipitate handling will not be considered further. The lime precipitate will be disposed of in the sludge handling facilities.

In the chemical reaction that takes place in forming the phosphorous precipitate, the PH level of the effluent may rise above the acceptable levels for the final effluent. In order to reduce the PH level, carbon dioxide must be added in the final clarifiers.

5.3.4. SLUDGE HANDLING

5.3.4.1 Aerobic Digestion - This form of sludge digestion is very similar to the Activated Sludge Process. Activated Sludge will enter the digestor chamber where further aerobic action will occur. This method of sludge digestion has been used primarily in small extended aeration or oxidation ditch treatment plants in the past. A disadvantage of this system is that it can only treat sludge that has been previously activated. Any sludge that is collected from a primary clarifier must be adequately mixed with the return activated sludge from the secondary treatment system. This problem can usually be solved with minor modifications in the treatment plant design. This alternative will be reviewed further.

5.3.4.2. Anaerobic Digestion - In this system, the sludge is thickened in the absence of oxygen in large, self-contained tanks. As the sludge digests, methane gas is produced. Heat may be added to speed the reaction and rate of gas production. This gas by product can be treated and used to heat the digestors and to heat boilers to produce heat for buildings. Smaller plants cannot produce enough gas to justify the expense of this operating equipment. The large, self contained structures are high in initial costs and require more maintenance than aerobic tanks. However, because of the useful byproduct produced this alternative will be analyzed further for the larger plants.

5.3.5. SLUDGE DISPOSAL

5.3.5.1 Incineration and Landfill - An incinerator is a complex machine that will reduce the solid sludge to ashes that are easily disposed of in a sanitary landfill. The incinerator has a high capital cost and high operational costs. The need for fuel is another expense. Another disadvantage is the potential air pollution problems that the smoke from the incinerator might cause. This form of disposal has been used with relative success in very large treatment plants that have limited access to landfills and land application. As these items are not problems at the plant sites in the Planning Area, and because of the other disadvantages of this system, this alternative will not be evaluated further.

5.3.5.2 Land Application - Land Application of sludge requires adequate soil characteristics. For the best results the soils should not have low percolation rates because of the possibility of pollutant run-offs. The soil group at the proposed Regional Treatment Plant site is the Fox Series which has good percolation characteristics. However, the soil groups in the Markleville area are Crosby, Brookston and Westland, all of which have unfavorable conditions for land application. This alternative will require transportation and application equipment, land purchase, land preparation, and initial testing of the soil and sludge. Operational costs would be similar to the operational costs for drying beds. There are also seasonal problems that might limit the time of application. Drying beds must be used in conjunction with sludge disposal at that time. Despite these limitations, this form of sludge disposal has proven to be cost effective in larger plants. This alternative will be evaluated further.

5.3.5.3 Drying Beds and Landfill - This alternative consists of a series of rectangular sand and gravel beds that will hold the digested sludge until removal. One square foot of drying beds per person served is normally required. The sand, concrete,drains and excavation necessary for construction would be a reasonable cost. The stabilized sludge is usually dried to a moisture content of 70% and scraped off and placed in a sanitary landfill. The operating costs would include annual replacement of the surface sand and the transporation costs involved in transporting the sludge to the nearest landfill. This alternative will be reviewed further.

5.4 Evaluation of Treatment Alternatives -

The remaining treatment plant components will be further evaluated in this section. Before total treatment facility costs can be estimated, the method of sludge handling and disposal must be selected. As stated in Sections 5.3.4.2, anerobic digestion will only be considered in plants with a capacity of 1.0 MGD or more.

Present worth cost estimates for aerobic and anaerobic sludge digestion were determined for a 1.8 MGD plant and are shown in the table below.

TABLE FIFTEEN
Present Worth
Sludge Handling Alternatives

	AEROBIC DIGESTION	ANAEROBIC DIGESTION
Total Construction Costs	198,000	301,000
Total Non-construction Costs	74,000	31,400
Total Replacement Costs	28,700	19,110
Total Initial Costs	290,700	351,510
Present Work of O & M	164,240	79,450
Less Present Worth of Salvage Value	(28,010)	(37,450)
Total Present Worth	436,930	393,540

From these figures it can be concluded that anaerobic digestion will be more cost effective in the larger plants than aerobic digestion for the sludge handling facilities.

Anaerobic digestion will produce a dryer and more solid sludge for disposal than aerobic digestion. This is an important factor in the selection of the sludge disposal method. A brief comparison of the Land Application and Sludge Drying Beds alternatives will determine the selected method.

One problem that might arise with sludge drying beds is the disposal of the dried sludge. At a design population equivalent to approximately 22,000 people, the required area of drying bed space would be over one half of an acre. Caked sludge would have to be scraped off by manual labor and hauled to the nearest sanitary landfill which is approximately 21 miles away in Alexandria, Indiana. If land application is used then only 1/4 of the square footage of drying beds will be required for storage during inclement weather. The cost of operating and maintaining a sludge truck for land disposal 9 months of the year would be about the same as the periodic scraping and hauling of the sludge in the drying beds. The only problem that arises with the land application of the sludge is the land itself. As stated in Section 5.3.5.2, the soils of the proposed treatment plant site appear to be suitable for this application. This land is currently owned by the State Reformatory. For the past three (3) years the dried sludge from the Reformatory treatment plant has been applied directly to the state owned farm land. There has been no evidence found of groundwater or soil pollution. The land will be made available for land application of sludge when the regional plant becomes operational and sludge wastes are created.

Therefore, it is recommended that land application be used for sludge disposal. Drying beds will be used during periods of inclement weather. Sludge disposal at the proposed Markleville Plant will consist of distributing the primary liquid sludge over pastureland and farm fields that lie well away from surface water areas.

The costs of the recommended methods of sludge handling and disposal have been added into the costs of the secondary treatment systems. The Phosporous removal costs were added into the costs of all plants greater than 0.104 MGD in capacity. Primary treatment costs were also added into the secondary treatment costs. Table 16 lists the methods of treatment and the respective costs for the four general design flows.

The figures shown in Table 16 have been plotted and general cost curves have been drawn in figures 29 through 37. For the four design flows, the following wastewater treatment systems have been shown to be cost effective.

Flow GPD	Recommended Treatment System
76,800 GPD	Oxidation Ditch with sludge holding zone followed by two, one-day ponds and chlorination facilities with Cascade Step Aeration. Sludge conditioning is aerobic with land application.
328,000 GPD	Oxidation Ditch with sludge holding zone followed by two, one-day ponds, chlorination facilities with Cascade Step Aeration and phosphorous removal facilities. Sludge conditioning is aerobic with land application.
1,800,000 GPD	Primary clarification with Activated Sludge followed by final clarifiers, phosphorous removal facilities and chlorination facilities. Sludge conditioning is anaerobic followed by land application.
2,700,000 GPD	Aerated Lagoons followed by final clarifiers, Microscreens, phosphorous removal and chlorination facilities. Sludge conditioning is anaerobic with land application.

TABLE SIXTEEN
Treatment Plant Cost Summary

Form of Treatment	Initial Costs	P/W of O & M	P/W of S.V.	Total Present Worth
(Secondary)				
76,800 GPD				
Extended Aeration	429,610	241,850	58,090	613,370
Flocculative Lagoon	464,600	197,570	62,000	600,170
Oxidation Ditch	412,870	239,460	53,170	599,160
Waste Ponds	587,440	162,370	85,550	664,260
(Advanced)				
Rapid Sand Filter	92,030	48,820	9,400	131,390
2-1 day ponds	101,470	24,980	12,920	113,480
Microscreen	122,410	48,820	13,320	157,900
High-rate Irrigation	171,090	77,210	21,030	227,270
Overland Flow	134,330	72,670	17,620	189,380
Infiltration-Percolation	96,440	57,910	12,050	142,300
328,000 GPD				
(Secondary)				
Extended Aeration	716,090	510,950	105,110	1,121,930
Aerated Lagoon	827,120	462,120	114,300	1,174,940
Oxidation Ditch	746,210	462,690	99,390	1,109,510
Waste Ponds	1,694,680	493,920	262,560	1,926,040
(Advanced)				
Rapid Sand Filter	153,490	86,290	17,380	222,400
2-1 day ponds	161,950	55,640	21,050	196,540
Microscreen	154,310	68,130	19,200	203,240
High-rate Irrigation	402,080	136,250	47,460	490,870
Infiltration-Percolation	180,070	106,730	21,030	265,770
Overland Flow	299,530	119,220	37,860	272,170

TABLE FOURTEEN
Present Worth Values of
Alternate Treatment Systems

Form of Treatment	Initial Costs	P/W of O & M	P/W. of S.V.	Total Present Worth
1.8 MGD				
(Secondary)				
Activated Sludge	1,854,770	976,480	254,740	2,576,510
Aerated Lagoon	2,203,520	914,030	326,010	2,791,540
Waste Ponds	5,854,480	651,740	993,760	4,208,980
(Advanced)				
Rapid Sand Filter	377,420	89,000	48,860	417,560
2-1 day ponds	294,840	90,840	42,350	343,330
Microscreen	343,360	93,670	44,630	382,400
Infiltration-Percolation	308,140	91,970	39,890	360,220
High-rate Irrigation	941,520	80,620	114,450	907,690
Overland Flow	905,150	71,530	103,240	873,440
2.7 MGD				
(Secondary)				
Activated Sludge	2,295,540	1,120,680	304,440	3,111,780
Aerated Lagoon	2,353,040	1,087,750	372,430	3,068,360
Waste Ponds	8,218,850	845,900	1,387,990	7,676,760
(Advanced)				
Rapid Sand Filter	472,650	99,920	40,300	532,270
2-1 day ponds	434,250	129,440	63,310	500,380
Microscreen	420,500	115,820	54,500	481,820
Infiltration-Percolation	450,480	103,320	57,050	496,750
High-rate Irrigation	2,286,390	309,330	2,071,870	
Overland Flow	1,323,100	91,400	176,380	1,238,120

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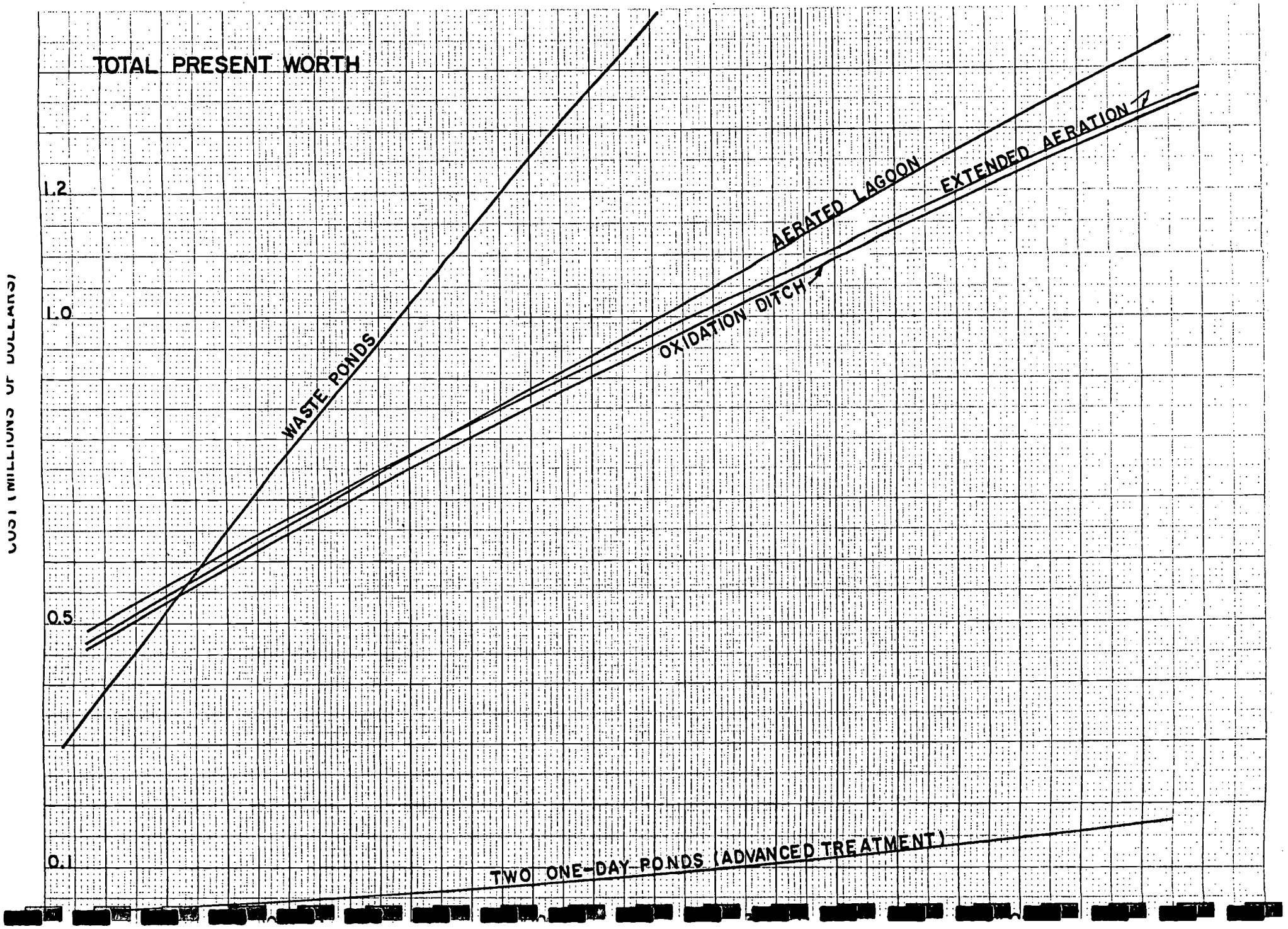

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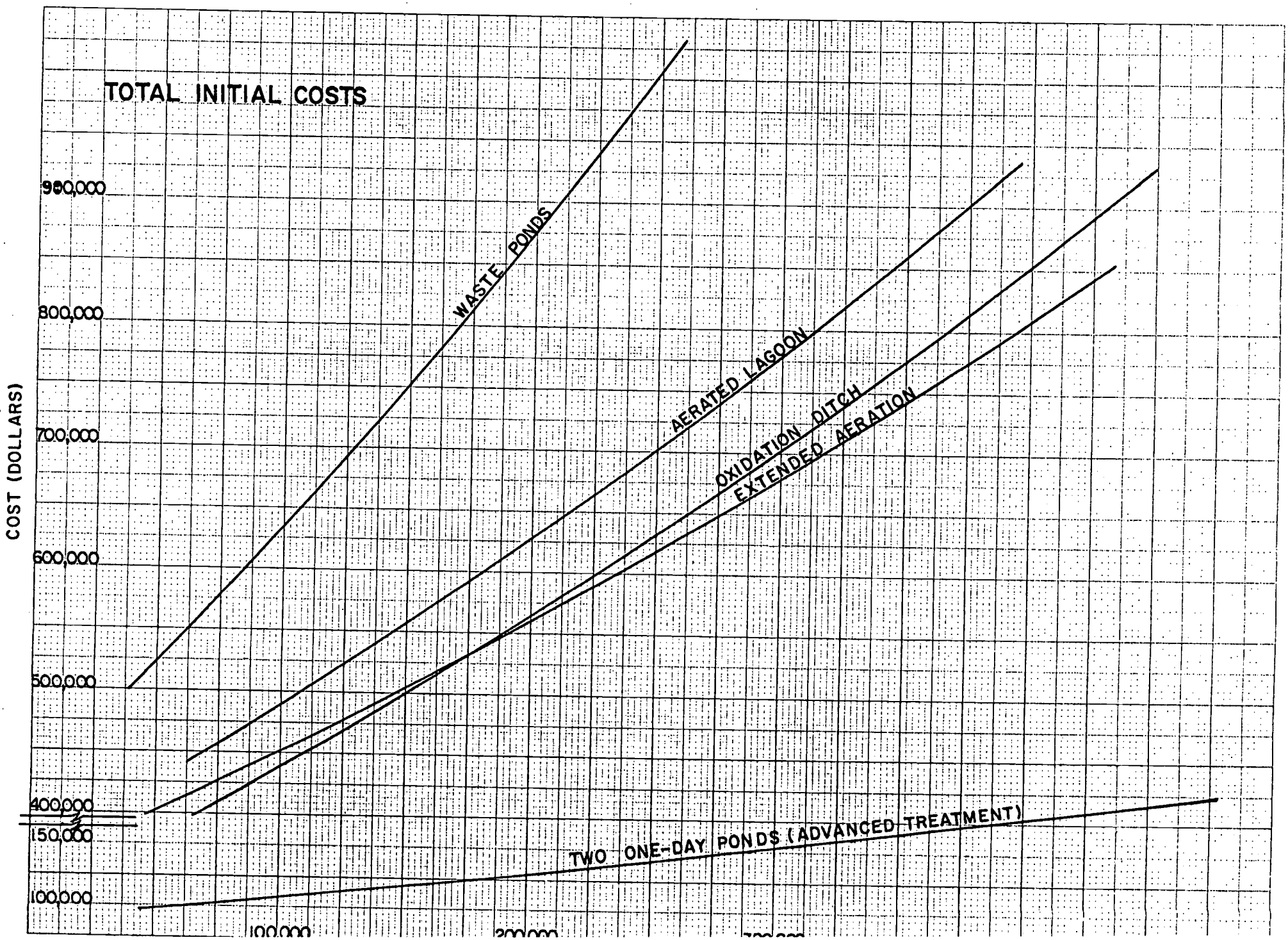

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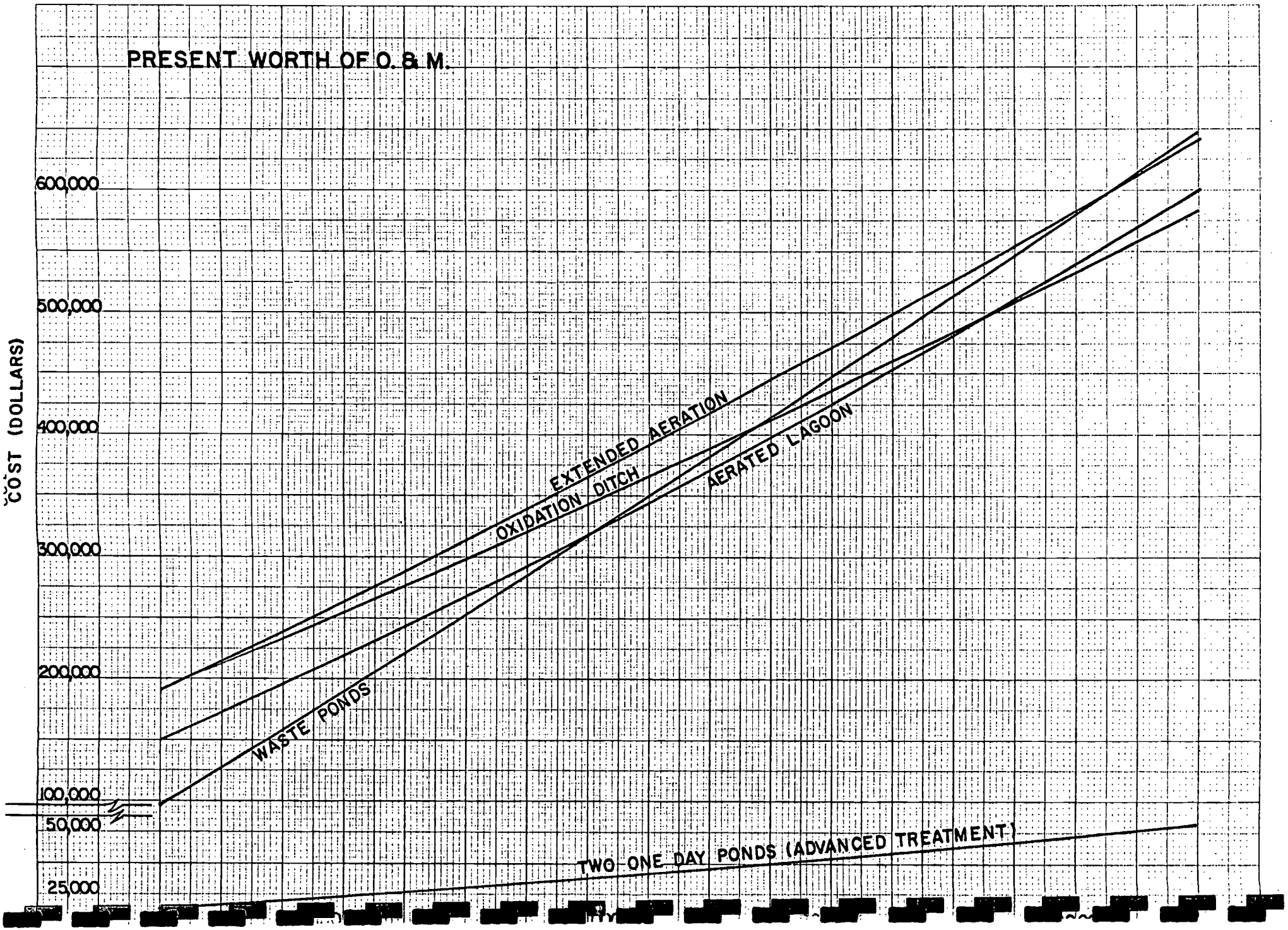

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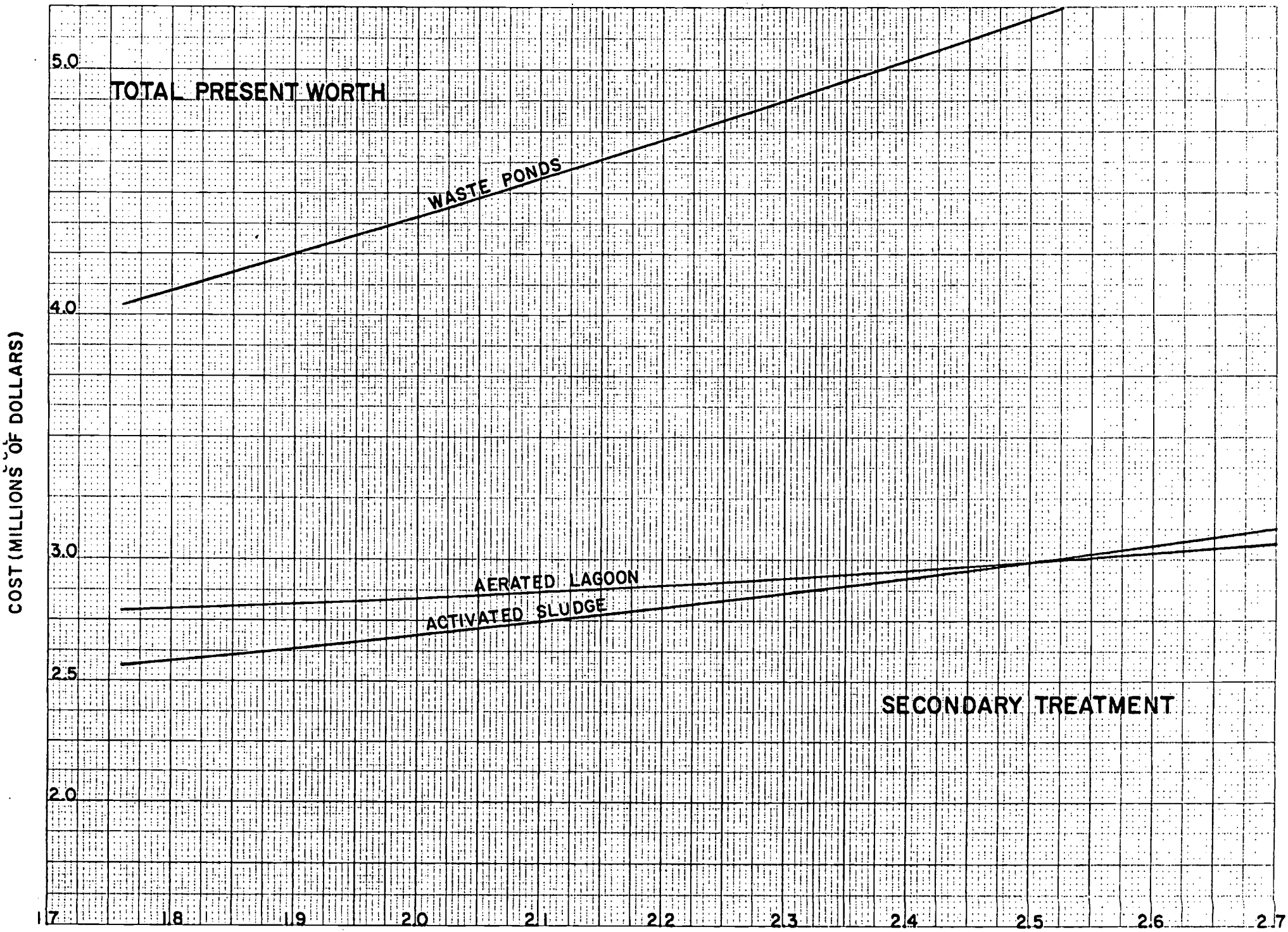

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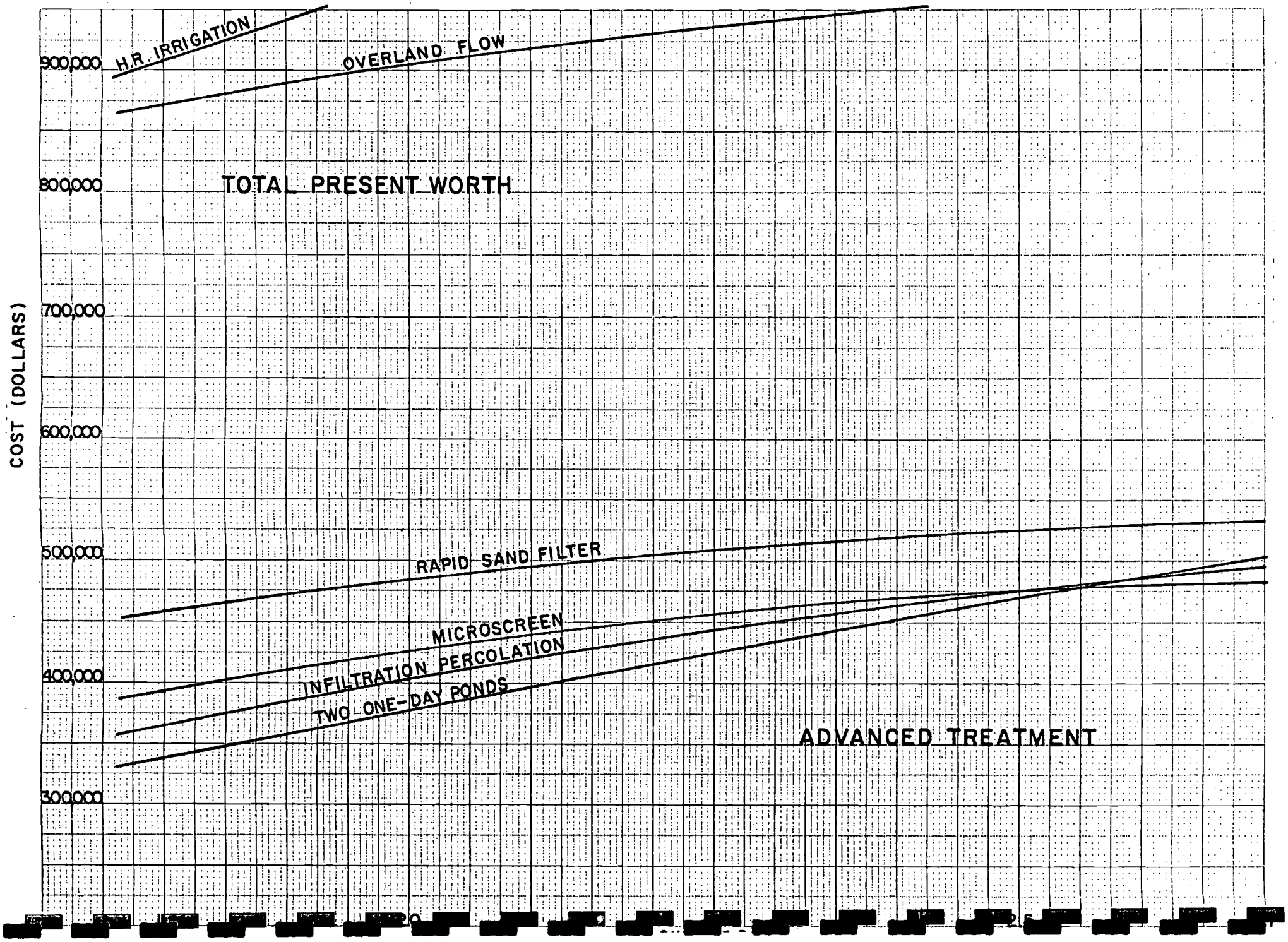

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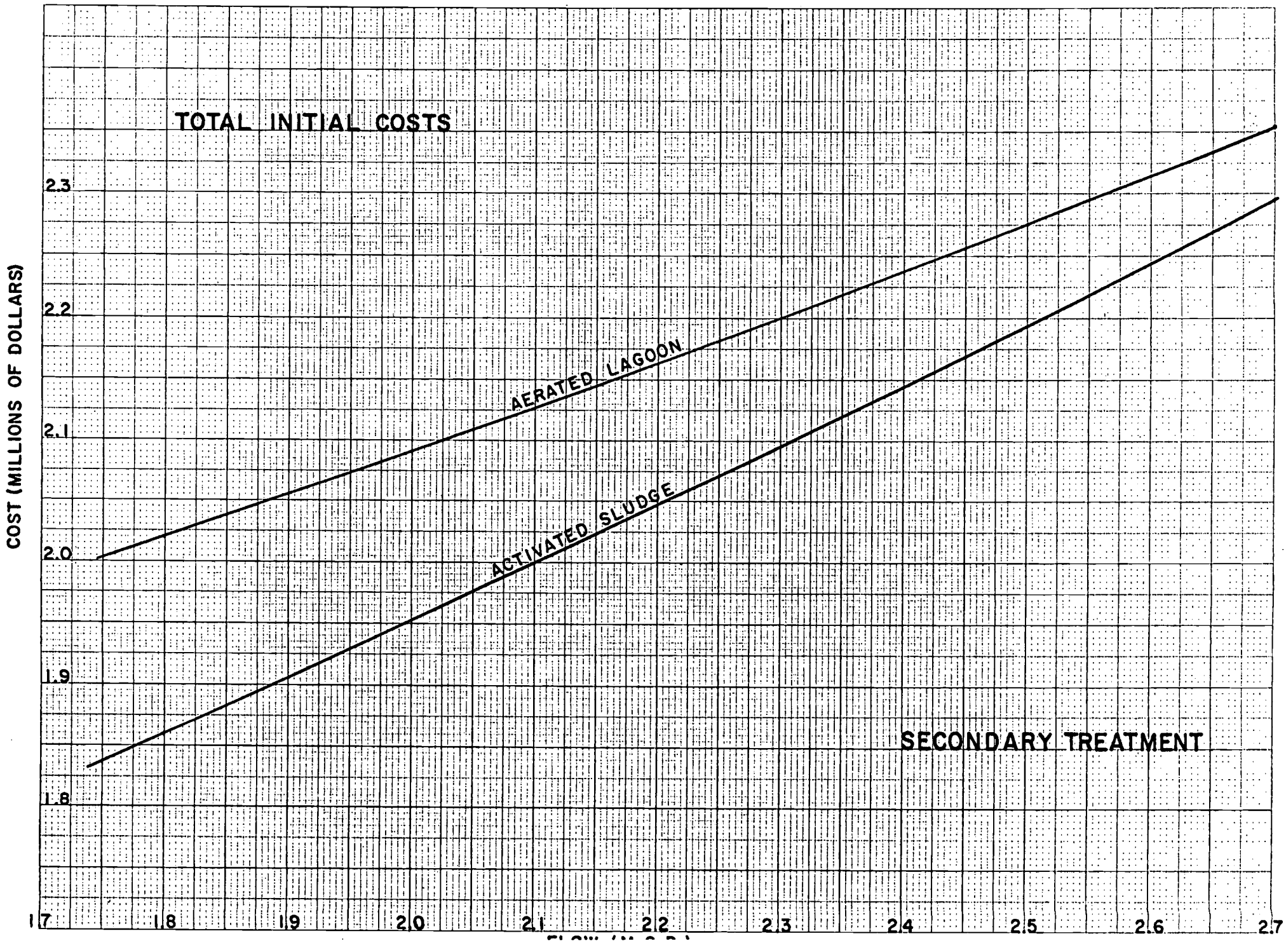

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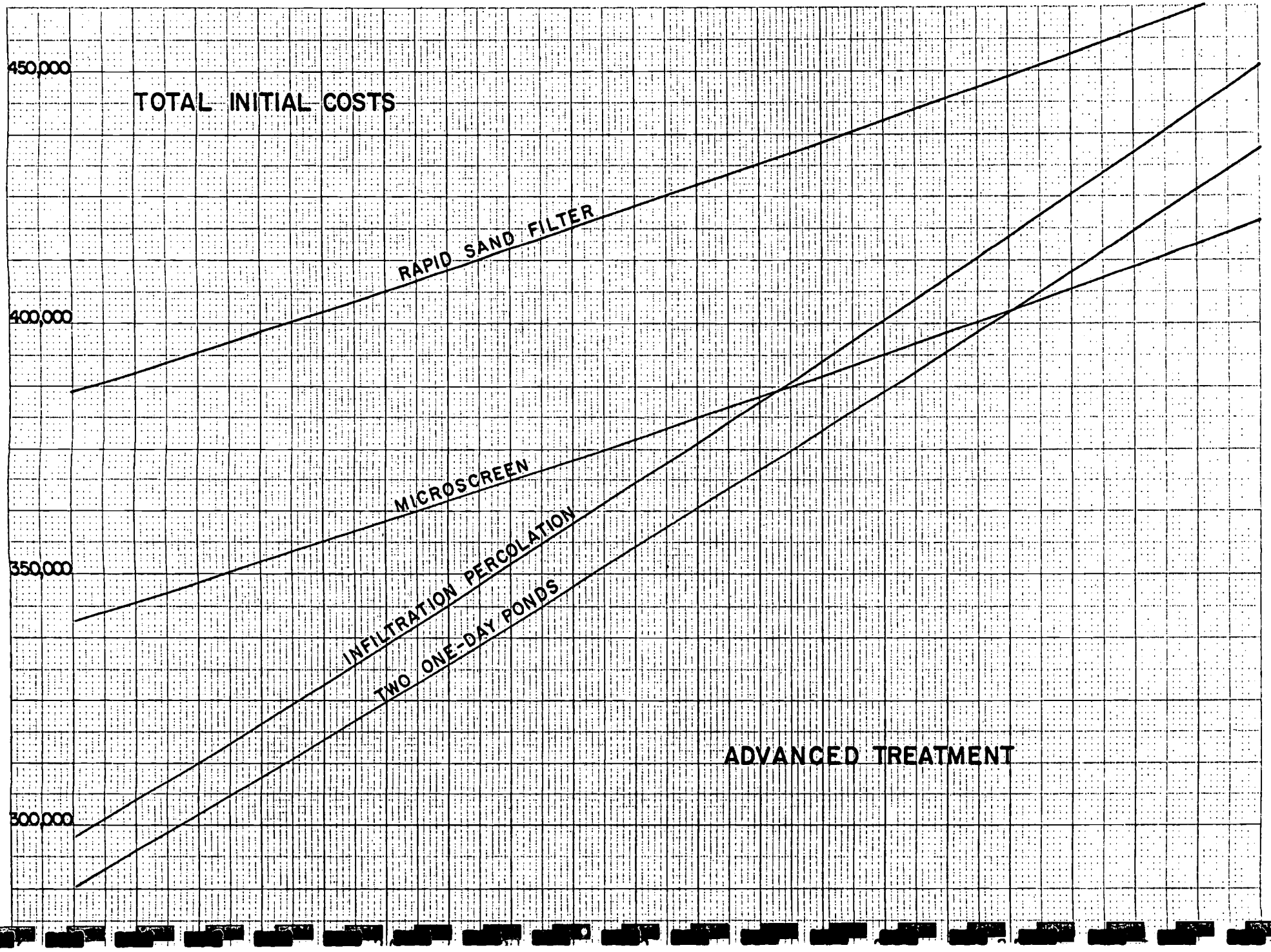

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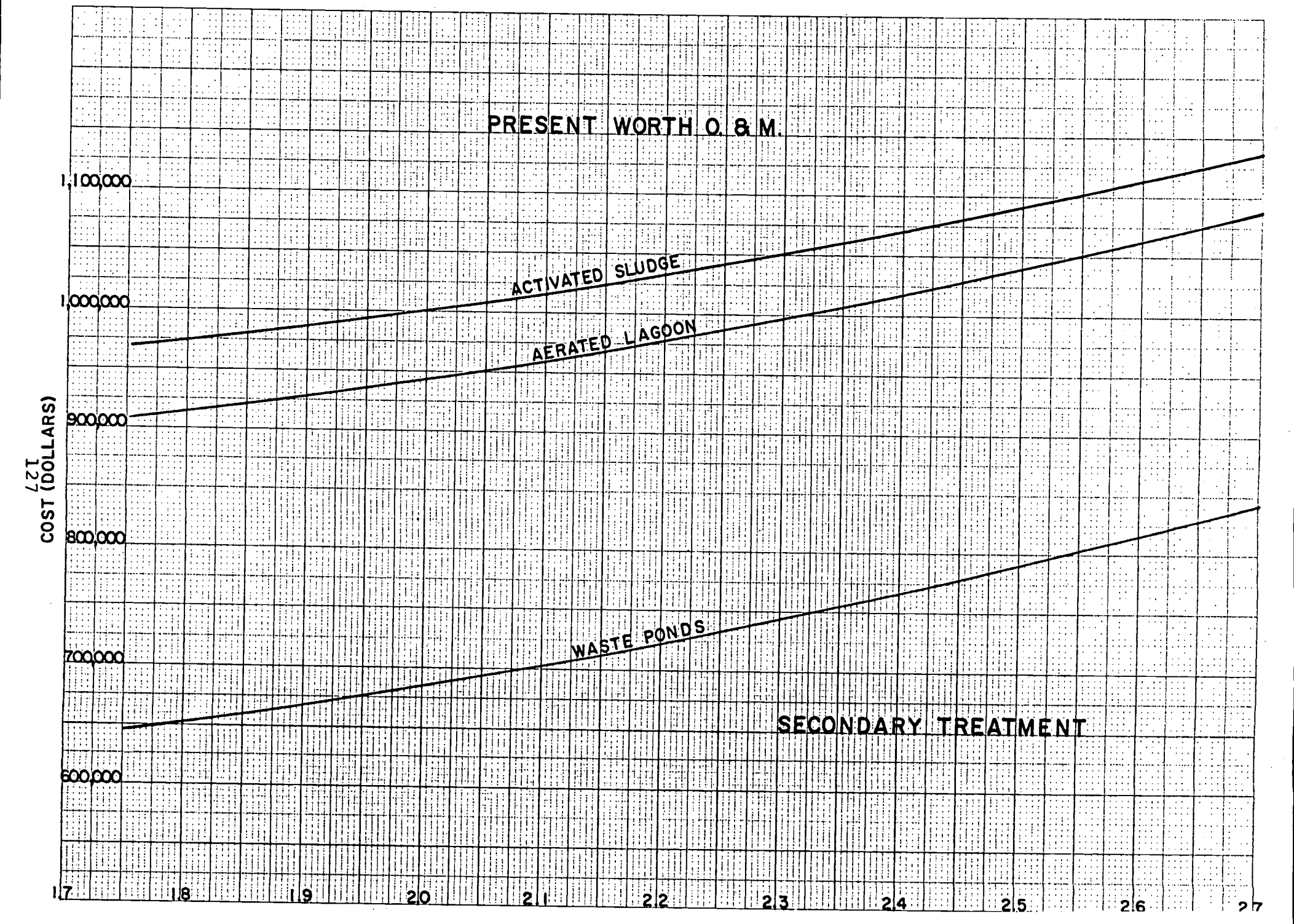

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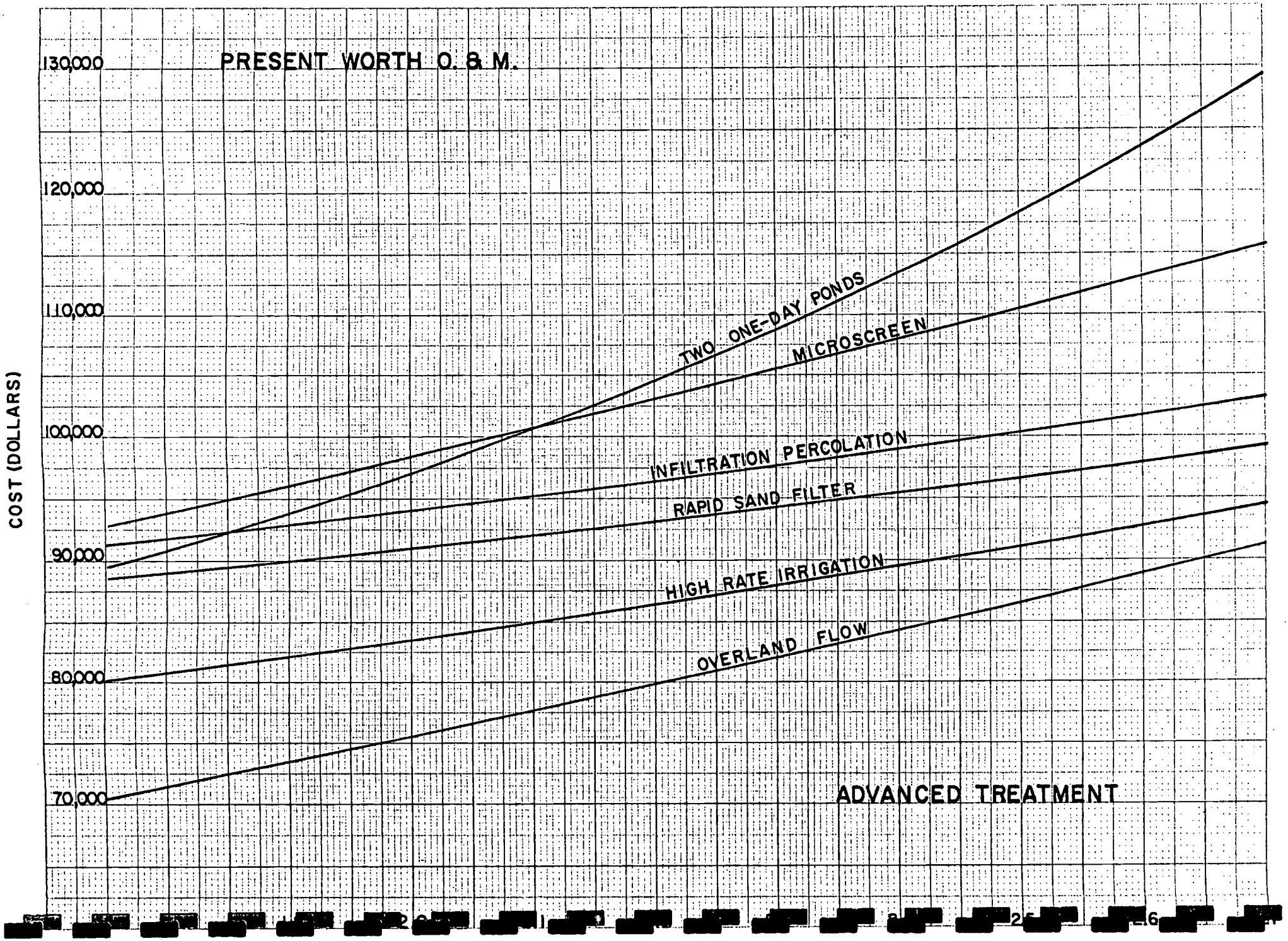


5.5 Evaluation and Ranking of Proposals

Collection system cost estimates were made for all of the proposed service areas. Cost estimates of the various interceptor lines involved in the regional alternatives were also made. Total Initial and Operation and Maintenance Costs were taken from the cost curves on figures 29 to 37.

Several regional alternatives involved transporting the wastewater from different regions in the Planning Area to the City of Anderson Sewer System. In this alternatives it was assumed that the contributing areas would be charged a base rate by the City for this service. The current rate of $0.68/1000 gallons was used in the calculations and included in the operation and maintenance costs of the system. A proposed sewer system rehabilitation program and a waste sludge disposal project for the City might possibly cause a rise in these rates in the future. A copy of the City Ordinance involving the sewage rates is included in Appendix B.

Cost estimates involving the Town of Fortville were taken from the Fortville Infiltration/Inflow report and the 610: Water Quality Management Plan, Volume E. In the evaluation of the alternatives, it was assumed that Fortville would undergo the sewer system rehabilitation program as outlined in addendum two of the Infiltration/Inflow report. For the regional alternatives that included transporting the Fortville sewage to the proposed regional plant, the annual estimated operation and maintenance costs of the sewer system and interceptor were $27,430.00. In those alternatives that did not involve regionalization of Fortville, the estimated annual O & M Costs for the Town to operate its own system was $105,270.00.

With these cost estimates, present worth values for the twelve regional alternatives were derived and are shown in Table Fifteen. Appendix A has an example of the method used in calculating the cost estimates.

TABLE SEVENTEEN
TOTAL PRESENT WORTH
REGIONAL ALTERNATIVES

	Alternative One	Alternative Two	Alternative Three	Alternative Four	Alternative Five	Alternative Six
Total Initial Costs	17,205,320	15,380,450	16,931,460	15,672,980	16,607,740	18,659,550
P/W of O & M	3,803,160	4,836,630	3,571,100	4,703,330	3,185,700	2,358,990
P/W of Salvage Value	(2,322,360)	(2,074,680)	(2,293,610)	(2,141,400)	(2,248,250)	(2,518,070)
Total Present Worth	18,686,220	18,142,400	18,308,950	18,234,910	17,545,190	18,500,470

	Alternative Seven	Alternative Eight	Alternative Nine	Alternative Ten	Alternative Eleven	Alternative Twelve
Total Initial Costs	18,644,540	15,114,920	15,979,640	17,452,910	19,113,870	16,400,180
P/W of O & M	2,959,300	5,002,750	4,327,500	3,500,110	2,672,030	3,388,950
P/W of Salvage Value	(2,526,700)	(1,970,670)	(2,135,150)	(2,379,580)	(2,340,140)	(2,230,060)
Total Present Worth	19,077,140	18,147,000	18,171,990	18,573,440	19,445,760	17,559,070

From Table 15, it can be seen that regional alternatives #5 and #12 have the lowest total present worth. These alternatives will be analyzed further.

The only difference between the two regional patterns is the method of treating the wastewater from Markleville. Alternative #12 involves transporting the sewage from this area to the regional treatment plant located north of Ingalls. The interceptor route will cover over 10 miles and will include sections of both gravity sewer and force main. Alternative #5 had the Markleville sewage treated at a separate treatment plant located northwest of the town.

Table Eighteen is an evaluation of the two alternatives based on environmental, monetary, implementational, and other considerations. The following sections will present the reasons for ranking in Table 18, item by item.

Since neither alternative included transporting the Fortville wastewater to the regional system, it can be concluded that it will be cost effective for Fortville to correct their pollution problem on their own. As outlined in Section 4.7.5, the Town should prepare a separate Facilities Plan to determine the most cost effective method of correcting this problem. The Town of Fortville and the immediate surrounding area will not be considered again in this facilities plan.

TABLE EIGHTEEN
EVALUATION OF ALTERNATIVES

Legend: 1 is most desirable
2 is less desirable
= is equal.

	Alternate Five	Alternate Nine
I. Environmental Effects		
A. Primary		
1) Aquatic Biota	=	=
2) Terrestial	2	1
3) Wildlife Habitat	2	1
4) Surface Pollution	1	2
5) Groundwater Pollution	1	2
6) Aesthetics		
Noise	=	=
Odor	1	2
Noticeability	2	1
B. Secondary		
1) Future Land Use	1	2
2) Dislocation	=	=
3) Employment	1	2

	Markleville	FCRWD	FCRWD
II. Monetary			
A. Present Worth			
B. Capital Cost-Public	330,510	3,286,570	3,643,910
C. Annual Public Costs			
1) Debt Servicing	19,260	191,540	212,390
2) O & M	6,020	93,470	120,110
3) Replacement	24,250	150,820	193,200
Total	49,530	436,330	525,680

III Implementation Capability		
A. Institutional	2	1
B. Social	1	2
C. Financial	1	2
D. Legal	=	=
IV. Other Considerations		
A. Contributions to Water Quality objectives	=	=
B. Energy and Rsources Use		
1) Energy	2	1
2) Chemicals	2	1
3) Land Commitment and Future re-use	2	1
C. Reliability		
1) Frequency of Upsets	1	2
2) Frequency of Spills	1	2
D. Simplicity	2	1

5.5.1 Environmental Effects - include all short and long range effects on plant, animal and human developments.

A. Primary Effects are those directly related to construction and operation of the treatment system.

1) Aquatic Biota - includes all plant and animal life which may be effected by water pollution during the operation of the treatment system. An upset or spill over of untreated wastewater in either one of the treatment plants in alternative five would have possible damaging effects to the water environment. The proposed interceptor from Markleville to the regional plant in alternative twelve crosses over four streams or ditches. A break in the interceptor at one of these points would have also damaging effects to the water environment.

2) Terrestical - Destruction of plant and animal habitats is the main factor effecting terrestical life. Construction at the plant site or along the interceptor route may have short-term effects. The alternatives were ranked according to the amount of land area used.

3) Wildlife Habitat - The alternatives were ranked in order of land area used.

4) Surface Pollution - On a short term basis, this would include all surface water pollution, mainly due to erosion, during construction. In the long run, possible leakage into standing water areas along interceptor routes could cause a surface pollution problem.

5) Groundwater Pollution - Breaks in a long interceptor poses the greatest threat of groundwater pollution.

6) Aesthetics - Noise should not be a problem at any of the plants. Any piece of equipment which could produce an undue amount of noise would be equipped with a noise reduction devise. Odor problems will be eliminated by a properly operated plant. Air relief valves that are associated with long interceptor lines can also present odor problems. Noticeability is directly related to the location and size of the treatment plants.

B. Secondary effects - include the effects of changes in patterns of land use and population growth.

1) Future Land Use - Neither proposed treatment plant site in alternative 5 are located in areas that might prevent nearby residential development. The linking of Markleville to the regional plant might promote an undesired strip development along the corridor between the two areas.

2) Dislocation - none of the alternatives are expected to force anyone out of their home.

3) No major shifts in employment will occur. More treatment plants and waste districts would employ more people.

5.5.2 Monetary - Since none of the environmental factors are prohibitive, the main consideration for selection of a system will be cost. The estimates are based on past bids and engineering judgement.

A) Present Worth includes construction, non-construction, operation and maintenance, equipment replacement and salvage value. The method of calculating present worth is shown in Appendix A. Since present worth accounts for all the costs involved in construction, operation and maintenance of a plant, it is the main figure used in determining cost-effectiveness.

B) Capital Cost includes initial construction and non-construction costs. The alternatives involving a larger amount of land are higher in public capital costs since land is ineligible for federal funding.

C) Annual Public Costs

1) Debt Servicing - This estimate is based on a 40-year FHA loan at 5% interest and a bond coverage of 0.6% of the loan amount.

2) Operation and Maintenance - Labor is the largest portion of this cost. It will vary widely from town to town and plant to plant. In general, the greater the complexity of the treatment system, the greater the amount of O & M. Power and fuel costs are another large annual cost.

3) The EPA requires all towns receiving grant assistance to establish a fund to replace all grant funded parts as they weat out. When the project has been bid, a rate consultant will calculate the annual payment to this fund on an item by item basis.

5.5.3 Implementational Capability - This is the most important item to be considered in the evaluation of the regional alternatives. Alternative Five will have two regional waste districts operating two separate plants. Alternative twelve will have only one regional district. The fewer number of districts will help eliminate some difficulty in financing a large construction project. However, problems might arise with the operation and maintenance of the Markleville collection and interceptor system that is located ten miles from the regional plant.

A) Institutional - Alternate five will require two regional waste districts. Alternate 12 will require only one.

B) Social - The Town of Markleville has expressed a strong desire to operate alone in regional considerations. As the alternatives have relatively the same costs and benefits involved, this social consideration becomes a very important factor in the plan selection.

C) Financial - The alternatives were ranked according to the annual costs to the districts.

D) Legal - The main legal problems that a district will have will be problems involving land aquisition and right of way. Both alternatives will experience similar legal problems.

5.5.4 Other Considerations

A) Contribution to Water Quality Objectives - Both of the proposed alternatives will meet the requirements of the NPDES permits. Both of the alternatives will provide about the same quality effluent.

B) Energy and Resources Use - The alternatives were ranked for energy use, chemical use, and land commitment and future re-use by cost for these three items.

C) Reliability - Small, mechanical treatment plants usually have the least ability to handle and properly treat surge loads. However, the oxidation ditch is considered the best mechanical treatment plant in handling these loads. Long interceptors have the possibility of a break in the force main.

D) Simplicity - A regional alternative with only one plant would have simpler operation capacity than an alternative with two plants.

6.0 Plan Selection

6.1 Views of Public and Concerned Interests on Alternatives - Public Hearings will be held in the Towns of Ingalls, Markleville and Pendleton and also in the Fall Creek Heights School for the people in the South Anderson and Fall Creek Developments Area to discuss the Facilities Plan and its recommendations. The dates of the hearings are listed below. Notices of these hearings have been posted in the towns and communities and advertised in the local newspapers 30 days in advance of the hearings. Copies of the Facilities Plan will be available in the Town Halls and in the School Office 15 days prior to the hearings. Proof of public notices and a summation of the hearings will be included in Appendix B. The Region VI Planning Commission, the Indiana Heartland Planning Commission, the Madison County Council of Governments, the Madison County Planning Commission, the Madison County Board of Health and the State Correctional Institution Board have been separately notified of the meetings.

Besides these public meetings, the monthly meetings of the Fall Creek Regional Waste District, the Markleville Town Board, the Pendleton Town Board and the Ingalls Town Board were always open to the Public. The Engineer attended and presented portions of the Facilities Plan at several of these meetings during the preparation of the Facilities Plan. Public input from these meetings was used in the analysis of the alternates.

Area	Date, Time	Location
Town of Ingalls	2-28-78, 7:30 P.M.	Ingalls Elementary School
Town of Markleville	3-7-78, 7:30 P.M.	Markleville Town Hall
Town of Pendleton	2-23-78, 7:30 P.M.	Pendleton Community Center
South Anderson/ Fall Creek Development Area	3-2-78 7:30 P.M.	Fall Creek Height Elementary School

6.2 Selected Plan and Reasons for Selection - In the economic evaluation of the regional alternatives, alternatives #5 and #12 were found to have the lowest Present Worth Value. An environmental comparison for these two alternatives was done by numerically ranking environmental factors between the alternatives. The alternatives were essentially the same in terms of environment effect.

There are two important points to be considered before a regional plan can be selected. The first is the problem associated with very long interceptors with small capacities. The Markleville interceptor will be over five miles long before it connects to the Fall Creek Developments. The sewage will take almost four hours to travel to the next lift station. During low flow conditions, raw wastewater may settle in the main until the next surge comes along. This sewage could become septic which is both a health hazard and an expensive effluent to treat. The ways to correct this problem would be to an in line form of treatment or to install sections of gravity sewer to aerate the sewage along the interceptor route. However, this would require more maintenance. The second problem is the social acceptance of regionalization of the Town of Markleville. This problem was discussed in Section 5.5.3.

For these reasons, alternative Twelve will not be recommended for the selected plan. Therefore, the selected plan is alternative Five. A 2.5 MGD treatment facility will be built north of Ingalls to treat the sanitary sewage from the Fall Creek Regional Waste District. A 96,000 GPD plant will be constructed to treat the sanitary sewage from the Markleville Regional Waste District. Regional interceptors will be constructed to transport the waste to the regional plants. A map showing the service areas, the regional interceptors and the treatment facilities is shown in figure 37. Section 7.4 has a layout map of the proposed treatment plant facilities for both waste districts.

Alternative five was selected mainly because it was the most cost effective alternative. It was also selected because it did not have the implementational and technical problems that regional alternative twelve had.

The construction of the new facilities will require that new NPDES permits be issued to the Fall Creek Regional Waste District. Ordinances will be written to regulate sewage treatment for the homes currently in the districts that will not be served by the sewer systems.

6.3 Environmental Impacts of the Selected Plan - The long-term effects of the selected plan will undoubtedly be beneficial. The elimination of septic tank or drainfield discharges into ditches and streams will remove the odor problems and health hazards which exist in the Fall Creek Developments, South Anderson, Ingalls and Markleville. The elimination of combined sewer overflows at Pendleton, the State Reformatory and Fortville will upgrade the water quality of Fall Creek. The quality of the streams and surrounding wildlife habitat will improve.

The Oxidation Ditch and Activated Sludge treatment plants will be steel or concrete so no pollution of groundwater should occur. If operated properly, odor should not be a problem.

In the short-run, there will be adverse environmental effects. Noise and dust from the construction will occur, but steps will be taken in the plans and specifications to minimize these problems. Erosion will also be minimized.

An archaeological survey of both proposed treatment plant sites will be conducted by the Office of Dr. Ronald Hicks of the Ball State University Department of Anthropology in the spring of 1978.

7.0 Preliminary Design and Cost Estimates

7.1 Fall Creek Regional Waste District

PRESENT EQUIVALENT POPULATION: 14,247

FUTURE DESIGN EQUIVALENT POPULATION: 15,790

TABLE NINETEEN
FCRWD DESIGN DATA

SERVICE AREA	PRESENT FLOW	DESIGN FLOW
Town of Pendleton	242,000	278,800
Average Daily Infiltration	920,000	310,000
Arrowhead Estates	21,000	21,000
Pendleton Schools	70,750	70,750
Murcer's Addition	3,910	3,910
Outlying Areas	43,400	56,420
Town of Ingalls	90,700	132,500
Development N.W. of Ingalls	6,400	8,200
Ingalls School	1,250	1,250
Mobile Home Park N.E. of Ingalls	6,000	8,000
Pentacostal Camp	100,000	100,000
State Reformatory	400,000	860,750
Lantern Meadows Area	8,500	11,400
South Anderson	238,320	308,700
Fall Creek Developments	82,400	110,600
Total Design Flow		2,282,280 GPD

Use a 2.5 MGD Plant

A preliminary layout of the collection and interceptor systems was made for the purpose of estimating costs and determining the District Service areas. The estimated costs for the selected alternative are included in Appendix A.

Drainage for most of the District is to Fall Creek. In South Anderson, Fall Creek Developments, Lantern Meadows and Ingalls, 8" gravity sanitary sewers will be installed with the general drainage pattern. Manholes will be spaced along the sewer mains to provide access for cleaning and maintenance. Manholes will be placed at any junction of mains or at any change in direction. All manholes will include watertight-type covers to reduce excessive inflow during wet weather.

Lift Stations will be constructed to transport the collected sewage to another point when it is either not economical or feasible to have gravity sewers. There will be a total of 20 new lift stations constructed in the District. The Lift Stations location, capacity and contributing areas are shown in Table 21.

In some service areas near Pendleton, it was found that, because of a rock layer three feet below the ground surface, it was cheaper to install small diameter pressure sewers than installing conventional gravity sewers.

In a small diameter pressure sewer system, small individual pumps are installed at every home. The existing septic tanks are converted to holding tanks which act as wet wells for these small pumps. The sewage is then transported, under pressure, to the small (2½") diameter force main. The sewage is then carried to the nearest Pendleton gravity sewer.

At Murcer's addition, the sewage from the homes there will have to travel a good distance before the pressure sewer can empty into a gravity sewer. Because of the small number of homes here, there may be some unwanted sewage settlement in the main between surges. This material could become septic in a very short period of time. For this reason a dosing tank will be installed to periodically flush the main with fresh water. The water will be taken from a small well and stored in a holding tank.

Flow meters will be installed at the Sherwood Forest and United Pentacostal Camp Lift Stations for billing purposes. These flow meters will be the in-line type located on the outlet of the lift stations. Small manholes will house the meters to provide access for flow readings.

TABLE TWENTY
DESIGN DATA - LIFT STATIONS

Station No.	Location	Contributing Area	Total Dynamic Head (ft.)	Peak Design Flow (GPM)	Force Main Capacity, Lgth. (Inches, feet)	Estimated Pump Size, HP
1	1/4 mile north of Rd.400 South on Scatterfield Road	Sherwood Forest	32	80	4", 4800'	4", 2 HP
2	On S.R. 109 and Rd. 500 South	Baby Farms and ½ of Norris Heights	31	80	4", 2400'	4", 2 HP
3	On Main St. South of Stottlemyer Addition	Shocks, Norris Heights Village Colony, Ballards Stottlemyer and flow From #2	45	170	6", 5300'	4", 4 HP
4	Madison Avenue South of Paradise Village	Fall Creek Heights Paradise Village	36	210	6", 3440'	4", 4 HP
5.	Madison Avenue South of Rose Addition	Rose Addition, flow from #3 and #4	72	630	8", 3500'	6", 18 HP
6	In the Pendle Hill Sub.	1/2 of Pendle Hill	19	80	4", 600'	4", 2 HP
7	On Madison Avenue just South of Fall Creek	Mara Meadows and flow from #5 & #6	36	670	8", 1350'	6", 18 HP
8	At the entrance of Pendle Hill at Madison Avenue	1/2 of Pendle Hill, Fiddler's Green, flow from #7	85	740	8", 6600'	8", 30 HP
9	In the Falconhurst Sub.	Falconhurst	40	80	4", 3960'	4", 2 HP
10	At the Regency MHP	Regency MHP	15	80	4", 800'	4", 2 HP
11	At the entrance of the Regency MPH and US 36	Area west of Regency MHP, flow from #8, #9 and #10	62	760	10", 12,890'	8", 30 HP
12	On Anderson Pike Road in Pendleton	Homes on Anderson Pike	36	80	4", 1970'	4", 2 HP
13	Main Street & Reformatory Road in Pendleton	Board of Trade and Idlewold Subdivision	28	80	4", 2000'	4", 2 HP
14	At Equalization Basin in Pendleton	Peak Infiltration from Pendleton	20	240	4", 2000	4", 6 HP
15	At existing Pendleton Treatment Plant	Flows from Pendleton and equalization basin	112	1030	12", 12,000'	8", 40 HP
16	At existing Reformatory Treatment Plant	State Reformatory	107	1200	10", 2700'	8", 36 HP
17	At existing Pentacostal Camp Treatment Plant	Pentacostal Camp	50	140	4", 1300'	4", 5 HP
18	In Southern Ingalls	So.Ingalls Flow from #18	25	80	4", 1080'	4", 2 HP
19	In the Development NW of Ingalls	Development NW of Ingalls	41	80	4", 3800'	4", 5 HP
20	On Reformatory Road No. of	Ingalls Flow from	[illegible]	[illegible]	[illegible]	[illegible]

7.1.1 Flow Equalization Basin at Pendleton

The Pendleton S.S.E.S. report determined what amount of rehabilitation of the sewer system would be economical given an estimated treatment cost and method of transportation of the remaining I/I to the proposed regional treatment plant. It was recommended in the S.S.E.S. that these estimated be re-evaluated once the degree and method of treatment is developed in the Facilities Plan.

As stated in Section 4.4.2.4, three alternative methods of correcting the pollution problems in Pendleton exist. The three alternatives are:

#1) Having no rehabilitation of the Pendleton Sewer system whatsoever. All of the I/I (2.4 MGD) will be collected and transported to the regional plant.

#2) Rehabilitating the sewer system and building a flow equalization pond at Pendleton to handle surge flows prior to transporting the flow to the regional plant.

#3) Rehabilitating the sewer system and building a flow equalization pond at the regional treatment plant to handle the surge flows transported from Pendleton.

The treatment costs must be estimated before the rehabilitation group in alternatives #2 and #3 can be selected.

From Appendix A of the Facilities Plan, the initial costs of the treatment plant and the annual operation and maintenance costs can be estimated and are shown below.

Estimated Initial Costs

Construction Costs	$ 2,561,740
Non-Construction Costs	385,820
	$ 2,947,560

Equivalent Annual Cost = $2,947,560 x 0.08807 = $259,590
(where 0.08807 is the capital recovery factor at 6 1/8% over a period of 20 years).

Estimated Annual Operation and Maintenance Costs

Personel	32,000
Chemicals	41,400
Equipment Maint.	3,000
Power and Fuel	28,000
Other Services	2,500
	106,900

Total Annual Costs
$106,900 + 259,590 = $366,490

Estimated Amount Treated Annually - (From SSES) - 650 mg

Annual Treatment Cost = $366,490/650,000 = $0.56/1000 gallons

Group "F" will be the recommended rehabilitation group since the estimated treatment cost used in the SSES is almost the same as the one determined in the Facilities Plan. The extent of Group "F" is outlined in Appendix G of the SSES report.

The only difference between Alternative Numbers 2 and 3 is the location of the flow equalization basin. An important factor that must be taken into consideration here is the size and location of the regional interceptor. The proposed interceptor begins at the southwestern corner of the reformatory area and travels down Reformatory Road to the regional plant. In alternative #2, the design wastewater flow from Pendleton will be 740,000 GPD (see Section 4.4.6) x 2 = 1,480,000 GPD. With a design peak flow of 1,760,000 GPD from the State Reformatory, the required design capacity of the gravity sewer interceptor will be 24". In alternative #3, the Pendleton design flow will be 2x (430,000 GPD + 630,000 peak infiltration) = 2,120,000 GPD. With the Reformatory flow, the interceptor capacity required for this alternative would be 30". Also, the pump station at Pendleton would be larger as will the force main interceptor. As there are essentially no cost savings involved in building regional plant, and the maintenance costs are similar, the higher interceptor costs for alternative #3 will make #2 cost effective.

Alternative #1 will require treatment of additional flow of 2.4 mgd in the regional plant. To accommodate this the plant would have to double in size. The capacity of the regional interceptor must also be increased. The only savings that this alternative would have over #2 is that there will be no sewer rehabilitation costs. These costs are insignificant when compared to the other construction costs involved in alternative #1. Alternative #1 will be eliminated from further study.

Therefore, it is recommended that the Pendleton sewer system be rehabilitated under the Group "F" plan presented in the S.S.E.S. and that a flow equalization basin be constructed at Pendleton to store the remaining excess infiltration until it can be safely discharged to the regional interceptor.

The Flow Equalization Basin at Pendleton will be located just south of the existing treatment plant. The existing comminutor will be converted to a diversion chamber that will allow only the design wastewater flow from the Town to pass into the existing wetwell facility. All flows in excess will be bypassed at that point to the F.E.B. A weir will be installed upstream of the diversion chamber to measure the incoming flow. Whenever this flow falls below the average daily flow, an automatic gate valve will be activated at the F.E.B. which will allow the basin to drain into a pump station which will transport the sewage back into the manhole nearest the treatment plant.

The Pendleton average daily design flow will be 740,000 GPD. This flow consists of a wastewater flow from Pendleton and the surrounding area of 430,000 GPD, and an average daily infiltration flow of 310,000 GPD. The regional treatment plant will be designed to handle this quantity of sewage from Pendleton. Anything in excess must be stored in the F.E.B. until low flow conditions.

In the S.S.E.S. it was estimated that Group "F" would eliminate all of the inflow and two-thirds of the infiltration remaining in the sewer system. Approximately 624,000 GPD of peak infiltration will remain after rehabilitation. The design peak flow during periods of infiltration would be the sum of the design wastewater flow (430,000 GPD) plus 624,000 GPD which equals 10,540,000 GPD.

Rainfall induced infiltration will last approximately 3 days. The amount of sewage bypassed to the FEB for one day will be:

1,054,000 GPD - 740,000 GPD = 314,000 GPD

Assuming that the amount of incoming flow will not fall below the design average daily flow, the storage required for 3 days infiltration will then be 3 x 314,000 = 942,000 gallons. A safety factor of 2 will be used to allow for possible increases in infiltration due to possible future failures in the sewers or house laterals.

Therefore, the design volume will then equal 2 x 942,000 or approximately 1.9 million gallons.

1.9 mg ÷ 7.48 = 254,010 cft.

Average depth = 6' with 2½" freeboard.

The basin will have a rectangular bottom area and vertical walls.

The general formula for the volume of the basin is:

V = b x h x w Surface Area = 42,335 sq. feet

base = 180', width = 236'

Total volume = 180 x 236 x 6 x 7.48 = 1.906 mg.

The basin will be made of concrete to prevent groundwater infiltration. The base and walls will be approximately 6" thick. A mechanical floating aerator will be installed to prevent the stored overflow from becoming septic.

7.1.2 Flow Equalization Basin at the Reformatory

A flow equalization basin will be needed at the Reformatory to handle surge flows from the institution and also the periodic backwash water surges from the water plant. To minimize costs, the existing 85 foot diameter trickling filter facility at the reformatory treatment plant will be converted into a retainage basin. At an average depth of 7½' (allowing 2' for freeboard) the volume of the basin will be

$V = \pi \times 85 \times 85 \times 7\frac{1}{2} \div 4 = 42{,}560$ cu. ft. x 7.48 = 318,340 gallon capacity.

This capacity is equal to approximately 40% of the total design flow from the reformatory. The pumps at the proposed lift station will be regulated to make sure this capacity will never be exceeded. An in-line type flow meter will be installed at the outlet of the lift station to measure flows for billing purposes.

7.1.3 Regional Interceptors

There are five major interceptors in the proposed Fall Creek Regional Waste District. As mentioned in Section 4.8.5, the interceptors will be designed for a service life of 40 years. Table No. 12 lists the 40 year design flow and the contributing areas. Table No. 20 lists the regional interceptors, the area contributing to that area, the design flow and the design capacity.

TABLE TWENTY
REGIONAL INTERCEPTOR
DESIGN SUMMARY

Interceptor	Material	Contributing Area Present (Future)	Design Flow GPD	Size
#1				
From Regency MHP to S.R.9 and S.R. 67 Jct.	PVC Force Main	South Anderson, Fall Creek Development (Subdivisions N. of F.C.)	620,090	10"
#2 From S.R. 9 and S.R. 67 Jct. to Reformatory Rd.	VCP Gravity	Area from #1, Lantern Meadows (U.S. 36 & Surrounding Area)	770,500	15"
#3 From Reformatory to Jct. with #2	RCP Gravity	Pendleton and Surrounding Area, Reformatory (Huntsville)	1,714,000	24"
#4 From #3 to Treatment Plant	RCP Gravity	Area for #2, #3, MHP N.E. of Ingalls	2,492,500	27"
#5 From Ingalls to Treatment Plant	VCP Gravity	Ingalls, MHP, N.W. of Ingalls, Pentacostal Camp	243,560	12"

7.1.4 Treatment Plant

Design Flow: 2.50 M.G.D.
Peak Flow 5.00 M.G.D.
Present Flow: 1.94 M.G.D.

Wastewater Strength - design sewage strength
B.O.D. = 300 ppm S.S. - 240 ppm

Influent B.O.D. - 2.50 MGD x $\frac{300 \text{ parts}}{1.0 \text{ million}}$ x 8.34 -6,255 lb/day

Influent S.S. - 2.50 MGD x $\frac{240 \text{ parts}}{1.0 \text{ million}}$ x 8.34 - 5,000 lb/day

Effluent Design Monthly Average

B.O.D. - 10 ppm, 210 lb/day (at design flow)

S.S. - 10 ppm, 210 lb/day (at design flow)

7.1.4.1 Primary Treatment

The Primary treatment facilities will include a comminutor and bar screen, a grit chamber and two circular primary clarifiers. Primary treatment will eliminate approximately 30% of the total influent B.O.D. and S.S..

The bar screen will be the manually cleaned type with a maximum bar spacing of 2 inches and a total available screening area of 1000 square inches. The bar screen will be placed on a slope of 30 degrees.

The comminutor will be the reversive, revolving drum type with a minimum screen slot of 3/8 inches.

The grit chamber will follow the communitor and bar screen and will be of the open channel- horizontal flow type. The chamber will be designed to provide controlled velocities as close to 1 foot per second as possible. Grit removal facilities will consist of the conveyor and system.

The Flow Meter shall have a chart recorder with float actuated transmitter and shall be installed in a 12" Parshall Flume.

Primary Clarifiers - 2 Circular Tanks

liquid depth - 8' (average) with 1.5 foot freeboard

2,500,000 / 24 = 104,170 gallons/hour

2 hours minimum detention = 208,340 gals = 27850 cu. ft.

Surface Area = 27850 ÷ 8 = 3480 sq. ft.
$\pi \times D^2/4 = 3480$ D = 67' diameter

Detention = (π x 67x 67/4 x 8 x 7.48) / 104170 = 2.02 hours

Surface Settling Rate = 2.50 MGD - ($\pi \times 0^2/4$) = 710 GPD/S.F.

Weir Overflow Rate = 2.50 MGD / π D = 11880 Gal/ln.ft./day

Use 2 primary tanks, 8 foot deep and 67 feet in diameter. Approximately 1875 # of B. O. D. and 1410 # of S.S. will be removed in the primary treatment facilities.

7.1.4.2 Secondary Treatment

Aeration Tank - 4 Rectangular Units

Remaining B. O. D. = 4380#

6 hour detention - 2.50/4 = 625,000 gallons (total)

625,000 Gal./7.48 = 83560 cft.

Depth (Average) = 13' with 1.5 foot freeboard.
D = W/3+5, width = 24 feet
L x W X D = 83560 L = 268'

Aeration Zone will consist of 4 tanks, each 13' deep, 24' wide and 67' long. Sludge Return Range - 200% of design flow (maximum)

Blowers

Aeration: 4380# x 1500/1440	=	4570 CFM
Air Lifts: 8 x 15	=	120 CFM
	Total	4690 CFM

Use 3 - 2350 CFM Blowers

Final Clarifiers

2 hours detention time - Volume Required
2 x 104170 = 208340 gallons = 27850 cubic ft.
Average depth = 8' with 2' freeboard

Surface Area = 27850 / 8 = 3480 sq. ft.
$\pi \times D^2/4 = 3480$, D = 67'

Surface Settling Rate = 710 G.P.S./S.F.

Weir Overflow = 11880 gal/ln.ft./day

Use 2 - 67' diameter Final Clarifiers

Phosphorous Removal Facilities - will be located between the aeration tanks and the final clarifiers. The facilities will include a spiral type mixing zone and chemical addition equipment.

Estimated Alum Addition Required

Influent Phosphorous Concentration - 15 mg/L (PPM)

$15 \text{ PPM} \times 2.50 \text{ MGD} \times \frac{8.34 \text{ lb.}}{\text{Gallon}} = 312\#/\text{day}$

Alum Dosage Required = 1.2# Alum per 1# P
1.2 x 312 = 375 # Alum/day

Liquid Dosage Required at
0.5# Alum per gallon = $375\# \times \frac{1 \text{ Gal}}{0.5\#} = 750$ Gallons/day

Chlorine Contact Tank - Gas chlorinator with weir water level control. Normal Solution - 10 ppm.
2,500,000 / 48 = 52080 gallons per half hour
= 6960 cft.

Average Depth = 9' with 1.5 foot freeboard
Surface Area = 6960 / 9 = 773 sq. ft.

Volume = 9 x 25 x 31 = 6975 cft.

Detention time = 250,000 / 1440 = 1739 GPM
52080/1739 = 30 minutes

Provisions will be made for dewatering the tank for removal of sludge by flushing

7.1.4.3 Advanced Treatment

One Day Holding Ponds - Two 13' deep concrete tanks with chemical addition.

Detention time - 24 hours

Volume required = 250,000 / 7.48 = 334220 cft.

Surface Area Required - 334220/13 = 25710 sq. ft.

13' x 100' x 258' x 7.48 = 2,588,000 gallons

Use two tanks 13' deep, 100' wide and 258' long

Chemicals will be added to prevent excessive algae growth.

7.1.4.4. Sludge Handling

Digestors - Primary (Fixed Cover) and Secondary (Floating Cover)

Assume sludge will be 95% moisture

Sludge produced for activated sludge plant

6255#/day / 62.4 $\frac{lb.}{cu.ft.}$ / 0.05 = 2000 cu.ft./day

Sludge produced from chemical preciptation

375#(Alum)/day/ 40 lb/cu.ft. = 9.4 cu. ft./day

Total Solids Produced 2000 cu.ft. x 1.5 = 3000
9.4 cu.ft. x 4.5 = 42
3042 cu.ft./day

36 day mean cell residual time

Volume = 36 days x 3042 cu.ft./day = 109,510 cu.ft.

Side water depth = 30'

Surface Area = 109,510/30 = 3650 square feet

$\pi \times D^2/4 = 3650$, D = 68'

Capacity = (68 x 68 x π x 30 / 4) / 15790 P.E. = 6.90 cu.ft./cap.

Use 2 - 68' diameter, 30' deep tanks

The primary digestor tank will act mostly as a thickener and will have a fixed roof cover. The secondary digestor will have a floating roof cover to better methane production.

Facilities will be provided to bypass either digestor for maintenance purposes.

Heat Exchanger - The heat exchanger unit will be housed in a building located between the two digestors.

Capacity Required - Digestor Loss = 78,500 BTU's/hour

Sludge Heating (Secondary Tank Only)	=	130,750 BTU's/hour
Building Heat	=	125,000 BTU's/hour
Lab Heat	=	400,000 BTU's/hour
Total		734,250 BTU's/hour

Use one 750,000 BTU's/hour Heat Exchanger

1570 cu.ft. of sewage gas produced will be required to operate exchanger. An oil-heat unit will be provided as a back-up.

Sludge Drying Beds

P. E. = 15790

Area = 15790 x 1 sq.ft./capita = 15790 sq. feet

Use 4 beds, each 35' by 113'

Beds will be sand and gravel with gravity drainage to the primary clarifiers.

Lab Building - Lab equipment shall be included so that the operator can perform the required tests. Lab to be provided with test equipment and tools for O & M of wastewater system. The garage portion of the lab building will house operation and maintenance tools, equipment and air blowers.

Operational Equipment -Operational equipment shall be included to operate and maintain the collection and interceptor systems and to dispose of the treated sludge from the plant. The equipment will include a sewer cleaning machine, a movable portable generator, a land sludge disposal truck and other routine maintenance tools.

7.2 Markleville Regional Waste District

7.2.1 Regional Interceptor

A preliminary layout of the collection and interceptor system for the service areas in the District was prepared for the purpose of cost estimates, eligibility determination and public comments. The layouts of the collection systems were made using U.S.G.S. topographic maps and observations from field investigations in the area.

The Town of Markleville generally drains to the northwest corner of town where it is picked up by a lift station and directed to the West Markleville Area. Drainage from the West Markleville Area is to the north. As the proposed treatment plant will lie north and west of the service areas, gravity sewers will be used to transport the wastewater to the treatment plant. A 10" gravity line will be used because of the possibility of future expansion of the service areas and because a 10" line has a lower minimum slope than an 8" line.

7.2.2 Regional Treatment Plant

TABLE TWENTY-TWO
MARKLEVILLE REGIONAL WASTE DISTRICT

Design Summary

Service Area	Equivalent Population		Design Flow
	Present	Future	
Markleville	452	631	63,100 GPD
West Markleville	128	138	13,800
Markleville Schools	85	-	-
Regional Elementary School	-	187	18,670
Total	665	956	95,570 GPD

7.2.2 Cont.

Flow - Design Average Daily Flow - 96,000 GPD
Peak Flow (2.0 x average) - 192,000 GPD

Wastewater Strength - design sewage strength

Assume BOD at 200 ppm

Assume SS at 240 ppm

Influent BOD -96,000 $x\frac{200}{1,000,000}$ x 8.34 = 160 lb/day

Influent SS - 96,000 $x\frac{240}{1,000,000}$ x 8.34 = 192 lb/day

Effluent Design Monthly Average

BOD - 10 ppm, 8.0 lb/day (at design flow)

SS - 10 ppm, 8.0 lb/day (at design flow)

Primary Treatment - will include a flow distribution box with adjustable weirs and slide gate, 8" communitor and 2 bar screens with a maximum 2" bar spacing and a total available screening area of 400 square inches.

Treatment Facility - One - 96,000 GPD circular Oxidation Ditch. 24 hour detention.

Volume - 96,000 GPD / 8.34 = 11,510 cubic feet

Liquid Depth - 6', side walls at a 45^0 slope.

Liquid Surface wdith - 20' center line.

Radius - 30'. Total ditch volume - 12,610 cu. ft.

An 18' diameter clarifier will be placed in the center of the ditch.

Clarifier (one zone)

4 hour detention time - 16,000 gallons total

Surface Settling Rate - 400 GPD/SF = 240 sq. ft. (minimum)

18 x 18 x /4 - 254 sq. ft.

Weir loading - 96,000 / π x 18 = 1700 GPD/LFT

Depth - 16,000 / 7.48 / (π x 18 x 18 / 4) = 8.41

Clarifier will be 9' deep and 18' in diameter, with 2' freeboard

Digestor (one zone)

2.65 cu. ft./capita - 2544 cubic feet

2544 x 7.48 - 19,030 gallons total
Average depth - 10' with 2' freeboard
Surface Area - 254 sq. ft.

Use a 12' x 22' long tank, 10' deep.

Capacity = 12 x 22 x 10 x 7.48 = 19,750 gallons

Sludge Drying Beds

1.0 square ft/capita = 960 square feet
Use 2, 16' x 12' sand and gravel filter beds

One Day Terminal Pond (2 xones)

Volume required - 96,000/7.48 - 12,835 cu. ft.
Average depth - 12' with 2' freeboard
Surface area = 1070 sq. ft.

12' x 20' x 53.5 x 7.48 - 96,040 gallons

Use two tanks 12' deep, 20' wide and 53.5' long

Provisions will be made to bypass each lagoon to allow for maintenance and sludge removal.

Chlorine Contact Tank -

30 minute detention = 2000 gallons, with baffles

Tablet chlorinator with weir level control

Normal solution of 10 ppm (8 lb/day) at 96,000 GPD. Maximum capacity - 50 lb/day

Post Aeration -

Cascade Step Aeration shall be provided with 16 square foot surface area, 4' depth.

Rotors - 2 required

9' in length and shall operate at a depth between 3 and 9.5 inches. Drive motor shall be designed for 7.5 HP.

Blowers -

S. H. Tank:	(20/1000) (2544)	=	51 CFM
Air Lift:	2 x 15	=	30 CFM
			81 CFM

Use two blowers, each to provide a minimum of 81 CFM so one blower is a standby.

Lab Building - Lab equipment shall be included so that the operator can perform the required tests. Lab to be provided with test equipment and tools for O & M of treatment system. The garage portion of the lab building will house operation and maintenance tools, equipment and air blowers.

Operational Equipment -

Shall be included to operate and maintain the collection and interceptor systems and to dispose of the sludge from the plant. The equipment will include a sewer-rodding type cleaning machine, a back-up generator, a sludge tanker and other routine maintenance tools.

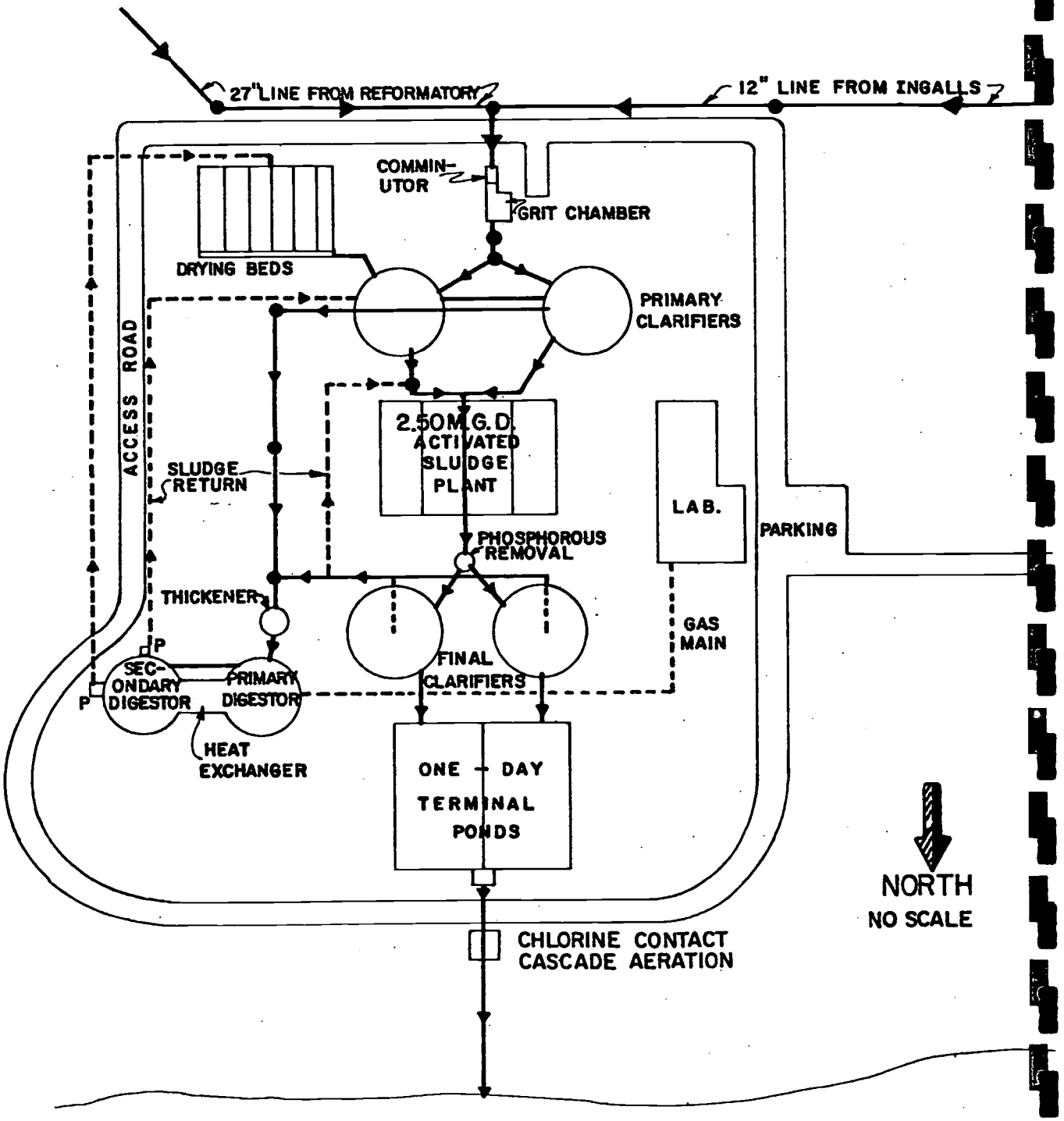
7.3 Summary of Cost Estimates

7.3.1 Fall Creek Regional Waste District -

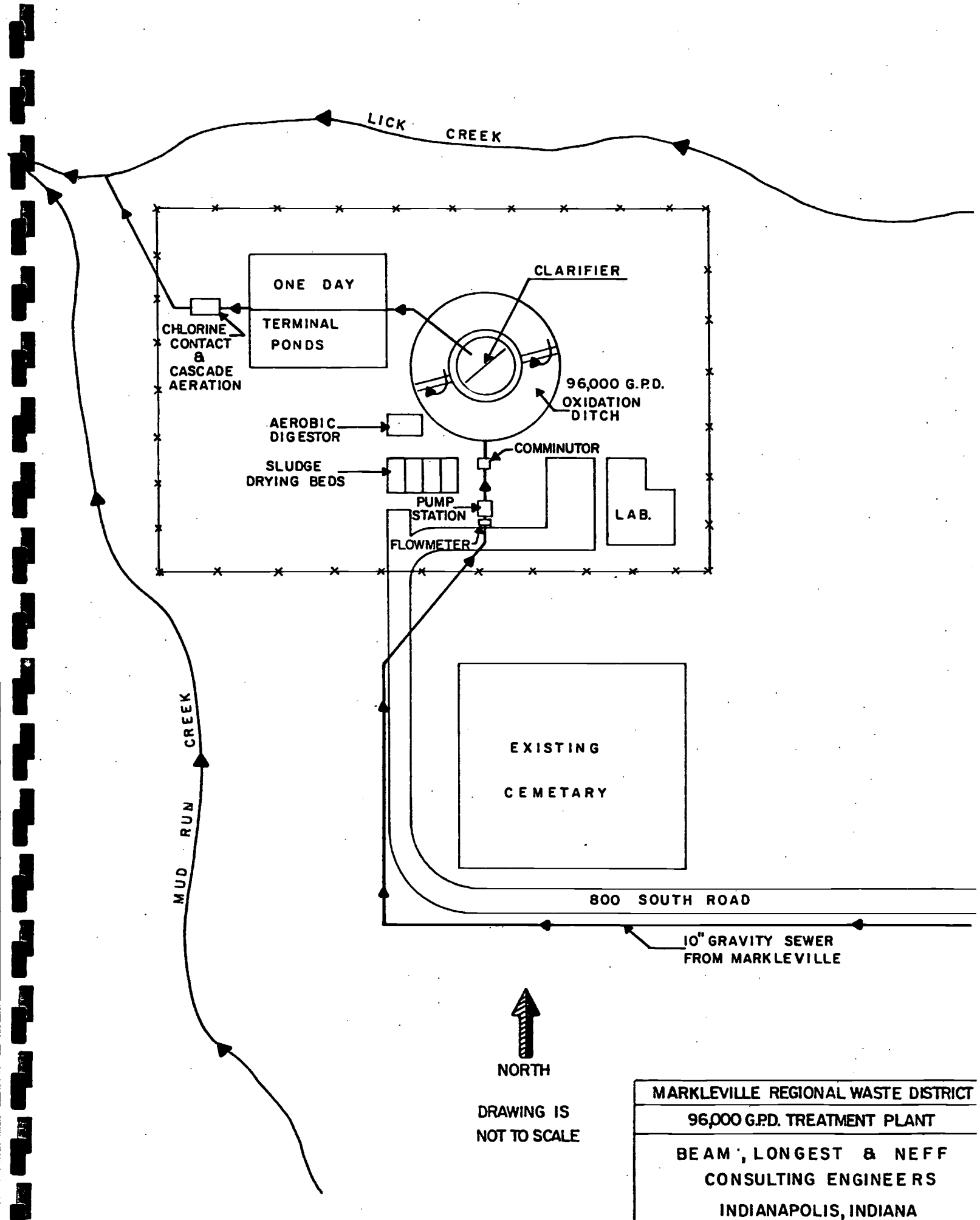
The cost estimates for the selected alternative are presented in Appendix A. With the estimated Federal and State Grants, the total share of the initial cost to the Fall Creek Regional Waste District will be $3,311,660. With operation and maintenance costs, estimated at $150,820 per year and the annual replacement costs of $92,340 the annual cost to the district was estimated to be $436,250 with a 40 year FHA loan at 5%. With an estimated 3955 sewer users in the district, the average monthly sewer rate is estimated to be $9.20 with FHA financing.

7.3.2 Markleville Regional Waste District

The cost estimates for the treatment facilities in the Markleville regional waste district are presented in Appendix A. With the estimated Federal and State grants, the total share of the initial costs to the Regional Waste District will be $330,510. With Operation and Maintenance costs, estimated at $24,250 per year and the annual replacement costs of $6020, the annual cost to the district was estimated to be $49,530 with a 40 year FHA loan at 5%. With a current estimated 258 users in the district, the average monthly sewer rate is estimated to be $16.00 with FHA financing.



FALL CREEK REGIONAL WASTE DISTRICT
2.50 M.G.D. TREATMENT PLANT
BEAM, LONGEST & NEFF
CONSULTING ENGINEERS
INDIANAPOLIS, INDIANA



MARKLEVILLE REGIONAL WASTE DISTRICT

96,000 G.P.D. TREATMENT PLANT

BEAM, LONGEST & NEFF
CONSULTING ENGINEERS
INDIANAPOLIS, INDIANA

8.0 ARRANGEMENTS FOR IMPLEMENTATION

8.1 Fall Creek Regional Waste Distict

8.1.1 Institutional Responsibility and Implementatioal Ste

The first step in implementing the selected plan will be to apply for Federal and State grant monies for design. With the assurance that grant monies are available, plat books will be revised to determine the exact areas where Federally funded collection sewers can be installed. Federal and State approval of these areas will be obtained. After the approval, design work will begin on plans and specifications. Completion and approval of the plans and specifications will be within 8 months.

The Fall Creek Regional Waste District presently consists of the Towns of Pendleton and Ingalls. Before construction can begin, the District must expand its boundaries to the limits shown in Figure 40. There are several steps involved in this expansion. First, the Madison County Commissioners will file an application with District Board of Trustees to have the recommended service areas included in the District. This application must be co-signed by the Adams, Green and Fall Creek Township Trustees. Once the application is approved by a majority of the District Board, the recommended service areas will legally become part of the District. At that time, the membership of the District Board will be reorganized to provide representation from the new service areas or possibly a Madison County representative. The expansion of the District must be made before the Step II design of the project is completed. During project design, the District Board would sign a contract concerning the Indiana State Reformatory at Pendleton. The contract would designate the amount of money the District will charge for treating a certain volume of wastewater. The contract will also spell out the method of determining the volume of wastewater to be treated. A similar contract will be made with the United Pentacostal Camp at Ingalls.

The recommended plan calls for the subdivision of Sherwood Forest to be sewered and have their wastewater pumped to the City of Anderson sewer system. During design of these facilities, the District Board would sign a contract with the City that will designate acceptance of the design flow and the amount of money the City will charge the District for treating a certain volume of wastewater. With the contract signed and the construction complete, the connection between the subdivisions new sewers and Anderson's sewers will be made. These three contracts must be signed before construction of the project can begin. The Project implementation schedule is presented in Table 22.

8.1.2 Operation and Maintenance.

The treatment plant is expected to require a licensed Class III treatment operator and two full time assistant operators. The duties of the Chief operator will include, but not be limited to, routine maintenance of all treatment plant equipment, ordering and installation of replacement parts, preparation of waste sludge, operation of chemical feed equipment, adjustment of plant processes, supervision of laboratory testing and recording for NPDES reports, and general administrative duties over his assistants. The duties of the operator assistants will include laboratory testing, waste sludge control, handling equipment, routine yardwork and assisting the chief operator in his duties.

A sewer and interceptor maintenance department will require a department supervisor, one full time assistant and one part time assistant. The duties of the maintenance department will include cleaning the sewers, monitoring and maintaining the lift stations and inspection of the wastewater flow meters throughout the system. In addition to these duties, the maintenance department will also be responsible for disposing of the waste sludge from the regional treatment plant either by land application or hauling it to a sanitary landfill. The maintenance department will also supervise the inspection of the individual lateral tap-ins once construction of the sewer systems has been completed.

A full time clerk will also be hired to keep all the financial records pertaining to the treatment system, including preparation of the monthly user's bill. The clerk, the Chief Treatment Plant Operator and the Maintenance Department Supervisor will all report directly to the District Board.

8.1.3 Financial Requirements

The costs of the proposed project are presented in the section entitled "Summary of Cost Estimates" in Appendix A. The following schedule estimates the date on which various percentages of grant monies will be requested.

Project	% of Grant	Date
Step I		
Facilities Plan	100%	April 1, 1978
Step II		
Preliminary Design and Field Work	40%	September 1, 1978
Final Plans and Specs. Submitted	35%	March 1, 1979
Final Plans and Specs. Approved	25%	May 1, 1979

Project	% of Grant	Date
Step III		
Award of Contract	10%	October 1, 1979
Partial Payment	30%	January 1, 1979
Partial Payment	30%	May 1, 1980
Partial Payment	10%	August 1, 1980
Partial Payment	10%	January 1, 1980
Final Payment	10%	April 1, 1981

8.2 Markleville and Surrounding Area

8.2.1 Institutional Responsibility and Implementational Steps.

The selected plan recommended installing sanitary sewers in the Town of Markleville and the area known as West Markleville to collect the wastewater and transport it to the proposed treatment plant. To avoid the potential bonding and institutional control problems that are associated with providing sanitary service to an unincorporated area, these two areas must be combined in some form of political entity. Two solutions are available here. One is to have the Town of Markleville legally annex West Markleville into its corporate limits. The second solution is to form a sanitary waste district.

Recently the Town Board of Markleville proposed a resolution to the Town that involved annexation of the surrounding areas of Markleville, which included West Markleville. This resolution was dropped prior to voting because of overwhelming opposition by the majority of the Towns people and the people in the surrounding areas. The new Town Board Members have indicated that the annexation issue will not be raised again in the near future.

Therefore, the second alternative, creating a sanitary waste district, must be implemented once the Facilities Plan has been accepted by the Town.

There are several considerations that must be taken into account when determining the boundaries of the proposed waste district. The first consideration is the proposed regional elementary school. This school will be constructed and occupied by the fall of 1979. As discussed in section 4.6.4, it would be cost effective for the school to tie into the proposed treatment plant once the plant is in operation. For this reason, the regional district boundaries should be extended to include the school. The second consideration is the unincorporated community of Emporia and the homes along Route 109 south of Emporia. It was concluded in Section 4.8.1.11 that the existing or potential pollution problems in this area were not severe enough to warrant community wastewater collection and treatment. For this reason the area was considered a potential pollution source area. Emporia is located approximately one mile north of the proposed treatment plant. The regional waste district boundaries should be extended to include this area so that sanitary service can be provided if pollution problems accur there in the future. These considerations were taken into account when the proposed District boundaries were included in Figure 40.

In a Regional Waste District, a governing body of elected or appointed officials is created to own, operate and pay for the entire system. The governing board members would be represenative of the communities involved. The Adams Township Trustee would also appoint a representative to the Board. The District would apply for all State and Federal Grants for the entire system. The cost of the project would be divided equitably among all users.

To create the District, the Town of Markleville must petition the Indiana Stream Pollution Control Board to accept the proposal. A Public Hearing will be held to receive public opinion on the proposal. The residents of Markleville, West Markleville, Emporia and the school officials will be invited to participate in this hearing.

After the District is formed, the next step is to apply for Step 2 State and Federal Grant Monies. With the assurance that grant monies are available, plat books will be reviewed to determine the exact areas where Federally funded collection sewers can be installed. Federal and State approval of these areas will be obtained. After the approval, design work will begin on the Plans and Specifications. Completion and approval of the plans and specifications will be within 8 months.

Once the step two design has been approved, the next step would be to apply for State and Federal monies for Construction. After the grant offer is made and land commitments have been obtained, the project will be released for bids. The time expected to begin the project is three months after the bids. Construction is expected to take twelve months. The project implementation schedule is presented in Table 22.

8.2.2 Operation and Maintenance

The treatment plant is expected to require a part-time clerk, a chief operator, a part-time Class I certified operator and a part-time assistant operator. The part-time clerk will keep all financial records pertaining to the treatment system, including preparing the monthly user's bill. The duties of the chief operator will include, but not be limited to, routine maintenance of all equipment, ordering and installation of replacement parts, disposal of waste sludge, operation of chemical feed and chlorination equipment, adjustment of plant processes, routine inspection of lift stations, maintenance of sewer lines and laboratory testing and recording forNPDES monitoring reports. The duties of the assistant operator will include assisting the chief operator in cleaning of sewers, inspection of lift stations,

handling equipment and routine yard work and labor. The duties of the certified operator will include advising and assisting the chief operator and submission of the monitoring report. The certified operator will be hired to work until the chief operator becomes certified. This may take one to three years.

The preferred method of liquid sludge disposal will be application on farm fields. A tanker truck or wagon will be purchased for this purpose. During periods when weather of field conditions prevent land application, the sludge will be dried on sludge drying beds and placed in the sanitary landfill at Alexandria. It is estimated that a month's worth of dried sludge (at 70% moisture) will weigh 9 tons and occupy approximately 14 cubic yards. Landfilling in a properly run sanitary landfill is an acceptable method of sludge disposal that is not expected to cause health or pollution problems.

Financial Requirements -

The costs of the proposed project are presented in the section entitled "Summary of Cost Estimates" and in Appendix A. The following schedule estimates the date on which various percentages of grant monies will be requested.

Project	% of Grant	Date
Step I		
Facilities Plan	100%	April 1, 1978
Step II		
Preliminary Design	40%	February 1, 1979
Final Plans and Specs. Submitted	35%	June 1, 1979
Final Plans and Specs Approved	25%	August 1, 1979
Step III		
Award of Contract	10%	February 1, 1980
Partial Payment	30%	December 1, 1980
Partial Payment	30%	April 1, 1980
Partial Payment	10%	July 1, 1980
Partial Payment	10%	September 1, 1980
Final Payment	10%	February 1, 1981

TABLE TWENTY-TWO

IMPLEMENTATION SCHEDULE

TASK	DURATION	COMPLETION DATE
Fall Creek Regional Waste District		
Public Hearing		March 1, 1978
Facilities Plan Approved		April 1, 1978
Expand District	1 month	May 1, 1978
Receive Step II Grant Offer	2 months	July 1, 1978
Complete Step II	10 months	May 1, 1979
Receive Step III Grant Offer	2 months	July 1, 1979
Commence Construction	3 months	October 1, 1979
Complete Construction	18 months	April 1, 1981
Markleville Regional Waste District		
Public Hearing		March 7, 1978
Facilities Plan Approved		April 1, 1978
Formation of District	6 months	October 1, 1978
Receive Step II Grant Offer	2 months	December 1, 1978
Complete Step II	8 months	August 1, 1979
Receive Step III Grant Offer	2 months	October 1, 1979
Commence Construction	4 months	February 1, 1980
Complete Construction	12 months	February 1, 1981

GLOSSARY

GLOSSARY

The following Glossary is an abridged extract of words and phrases commonly used in Sewage Works engineering taken from "Design and Construction of Sanitary and Storm Sewers" prepared by a joint committee of the Water Pollution Control Federation and the American Society of Civil Engineers, "Water Supply and Sewerage", McGraw-Hill and other sources.

ABSORPTION - The taking up of one substance into the body of another.

ADSORPTION - The adherence of finally divided solids on the surfaces of solid bodies with which they are brought into contact.

AERATION - Process of intimate contact between air and liquid by any of the following methods: Spraying the liquid in the air; agitation of the liquid to promote surface absorption of air; or by bubbling air through the liquid.

AERATOR - device that promotes aeration.

ALGAE - Cryptogamic plants, one or many-celled, usually aquatic, elaborating their food-stuffs by photosynthesis.

APPURTENANCES, SEWER - Structures, devices, and appliances other than pipe or conduit, which are integral parts of a sewerage system, such as manholes, flush tanks, surface inlets, etc.

BACTERIA, AEROBIC - Bacteria which require free (elementary) oxygen for their growth

BIOCHEMICAL OXYGEN DEMAND (BOD)- The quantity of oxygen utilized in the biochemical oxidation of organic matter in a specified time and at a specified temperature.

CHAMBER, GRIT - A small detention chamber or an enlargement of a sewer designed to reduce the velocity of flow of the liquid to permit the separation of minerals from organic solids by differential sedimentations.

CHLORINATION - The application of chlorine to water, sewage, or industrial wastes, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results.

COLLECTOR SEWER - A public sewer with "T" connections which receive wastewater from lateral lines from homes, public or commercial buildings, or any facility served by the sewer.

COMMINUTION- The process of screening sewage and pulverizing it into particles sufficiently fine to pass through the screen openings.

DEOXYGENATION - The depletion of dissolved oxygen in a liquid. Usually associated with the biochemical oxidation of organic matter present.

DIGESTION, SLUDGE - The anaerobic decomposition by which organic or volatile matter in sludge is gasified, liquified, mineralized, or converted into more stable organic matter, through the activities of living organisms.

DILUTION - (1) A method of disposing of sewage, industrial wastes, or sewage treatment plant effluent by discharging it into a stream of body of water. (2) The ratio of volume of flow of a stream to the total volume of sewage or sewage treatment plant effluent discharged into it.

DISTRIBUTOR, ROTARY - A movable distributor made up of horizontal arms that extend to the edge of the circular trickling filter bed, and revolving about a central post and distributing liquid over the bed through orifices in the arms.

EFFLUENT - (1) A liquid which flows out of a containing space. (2) Sewage, water, or other liquid, partially or completely treated, or in its natural state, as the case may be, flowing out of a reservoir, basin, or treatment plant or part thereof.

ELIGIBLE LINE - A sewer line in which at least two thirds (generally) of the design flow will be for wastewater from structures in existence on October 18, 1972.

ELUTRIATION Reduces coagulant demand and reduces alkalinity of a sludge by dilution, sedimentation and decantation in water of lower alkalinity than the sludge.

FILTER, TRICKLING - A filter, consisting of an artificial bed of coarse material, such as broken stone , slinkers, slate, slats, or brush, over which sewage is distributed and applied in drops, films, or spray, from troughs, drippers, moving distributors, or fixed nozzles, and through which it trickles to the underdrains, giving opportunity for the formation of zoogleal slimes which clarify and oxidize the sewage.

FLOCCULATION, SEWAGE - The coalescence of finely divided suspended matter by gentle stirring, primarily under

the influence of physical forces without the use of chemicals and in the absence of biologically active slime.

FLOTATION - A method of raising suspended matter to the surface of the liquid in a tank by aeration, etc., and subsequent removal of the scum by skimming.

FLOW, DRY WEATHER - The flow of sewage in a sewer during dry weather. This flow consists mainly of sewage and wastes with no storm water included.

FUNGI - Small nonchlorophyll-bearing plants without roots, stems or leaves occurring in water or sewage and growing best in the absence of light.

GASIFICATION - The transformation of sewage solids into gas in the decomposition of sewage.

GRIT - The heavy mineral matter in water or sewage, such as sand, gravel, cinders, etc.

INFILTRATION - The water entering a sewer system, including sewer service connections, from the ground, through such means as, but not limited to, defective pipes, pipe joints, connections, or manhole walls. Infiltration does not include and is distinguished from inflow (Federal Register, February 11, 1974).

INFLOW - The water discharged into a sewer system, including service connections from sources as, but not limited to, roof leaders, cellar, yard, and area drains, foundation drains, cooling water discharges, drains from springs and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, storm waters, surface run-off, street wash waters, or drainage. Inflow does not include and is distinguished from infiltration (Federal Register, February 11, 1974).

INFLUENT - Sewage, water, or other liquid, raw or partly treated, flowing into a reservoir, basin, or treatment plant, or part thereof.

INTERCEPTOR SEWER - A sewer whose primary purpose is to transport wastewater from collector sewers to a treatment facility (Federal Register, February 11, 1974).

INVERT - The floor, bottom, or lowest position of the internal cross section of a closed circuit.

LAGOON, SLUDGE - A relatively shallow basin, or natural depression, used for the storage or digestion of sludge, and sometimes for its ultimate detention or dewatering.

LATERAL - The sewer line from the source of wastewater to the collection sewer.

LIQUEFACTION - The changing of the organic matter in sewage from an insoluble to a soluble state, and effecting a reduction in its solid contents.

MIXED LIQUOR - Water, sewage and industrial wastes, or any combination of the three, as found in a secondary treatment process.

NITRIFICATION - The oxidation of organic nitrogen into nitrates through biochemical action.

NPDES PERMIT - A National Pollutant Discharge Elimination System Permit. A permit to discharge pollutants with limits on waste strength and quantity. The NPDES program is provided for by Federal Law and administered by the Indiana Stream Pollution Control Board.

OXIDATION (Sewage) - The process whereby, through the agency of living organisms in the presence of oxygen, the organic matter contained in sewage is converted into a more stable or mineral form.

PHOTOSYNTHESIS - The formation of complex organic compounds from simple inorganic ones under the stimulus of light and the presence of chlorophyll.

PLANKTON - An assemblage of drifting organisms, usually microscopic.

POLLUTION - The addition of sewage, industrial wastes, or other harmful or objectionable material to water.

POND (OXIDATION)- A natural or artificial pond in which natural purification processes take place under the influence of sunlight and air.

PROCESS, ACTIVATED SLUDGE - A biological sewage treatment process in which a mixture of sewage and activated sludge is agitated and aerated. The activated sludge is subsequently separated from the treated sewage (mixed liquor) by sedimentation, and wasted or returned to the process as needed. The treated sewage overflows the weir of the settling tank in which separation from the sludge takes place.

PROTOZOA - Small, single celled animals, including amoebae, ciliates and flagellants.

PUTREFACTION - Biological decomposition of organic matter with the production of foul smelling products associated with anaerobic conditions.

REAERATION (SLUDGE)- The continuous aeration of sludge after its initial aeration in the activated sludge process.

RESIDUAL, CHLORINE - The quantity of chlorine, in excess of the CHLORINE DEMAND, remaining in water, sewage, or effluents after a selected contact period of time, expressed in parts per million. The difference between the chlorine dose and the chlorine demand.

SAG (OXYGEN)- A curve representing the profile of D.O. content along the course of a stream, resulting from deoxygenation due to biochemical oxidation of organic matter, and reoxygenation due to absorption of atmospheric oxygen and through biological photosynthesis.

SEDIMENTATION - The process of subsidence and deposition of suspended matter carried by water, sewage, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point where it can transport the suspended solids.

SEWAGE - Largely the water supply of a community after it has been fouled by various uses. From the standpoint of source, it may be a combination of the liquid or water carried wastes from residences, business buildings, and institutions, together with those from industrial establishments, and with such ground water, surface water, and storm water as may be present.

SEWAGE DISPOSAL - The act of disposing of sewage by any method. The term is not synonymous with sewage treatment.

SEWAGE, SANITARY - (1) Domestic sewage with storm and surface water excluded. (2) Sewage discharging from the sanitary conveniences of dwellings (including apartment houses and hotels), office buildings, factories, or institutions. (3) The water supply of a community after it has been used and discharged into a sewer.

SEWER, BRANCH - A sewer which receives sewage from a relatively small area, and discharges into a main sewer.

SEWER, COMBINED - A sewer receiving both surface runoff and sanitary sewage.

SEWER, OUTFALL - A sewer which receives sewage from a treatment system and carries it to a point of final discharge.

SEWER, RELIEF OR AUXILIARY - A sewer built to carry the flows in excess of the capacity of an existing sewer.

SEWER, STORM - A sewer which carries storm water and surface water, street wash and other wash water, or drainage, but excludes sewage and industrial wastes; also called "Storm Drain".

SEWER, STORM-OVERFLOW - A sewer used to carry the excess of storm flow from a main or intercepting sewer to an independent outlet, generally in connection with a combined sewer system having limited main or intercepting sewer capacity.

SLUDGE - The accumulated settled solids deposited from sewage or industrial wastes, raw or treated, in tanks or basins, and containing more or less water to form a semiliquid mass.

SOLIDS, DISSOLVED - Solids which are present in solution.

SOLIDS, SUSPENDED - Solids that either float on the surface of, or are in suspension, in water, sewage, or other liquids; and which are largely removable by laboratory filtering.

TANK, FINAL SETTLING - A tank through which the effluent from a trickling filter, or aeration or contact aeration tank flows for the purpose of removing the settleable solids, also called FINAL SETTLING BASIN.

TANK, IMHOFF - A deep two-storied sewage tank originally patented by Karl Imhoff, consisting of an upper or continuous flow sedimentation chamber and a lower or sludge-digestion chamber. The floor of the upper chamber slopes deeply to trapped slots, through which solids may slide into the lower chamber. The lower chamber receives no fresh sewage directly, but is provided with gas vents and with means for drawing digested sludge from near the bottom.

TANK, PRIMARY SETTLING - The first settling tank through which sewage is passed in a treatment works.

TANK, SEDIMENTATION - A tank or basin, in which water, sewage, or other liquid containing settleable solids, is retained for a sufficient time, and which the velocity of flow is sufficiently low to remove by gravity a part of the suspended matter. Usually, in sewage treatment, the detention period is short enough to avoid aerobic decomposition. Also termed SETTLING TANK.

TANK, SEPTIC - A single-story settling tank in which the settled sludge is in immediate contact with the sewage flowing through the tank, while the organic solids are decomposed by anaerobic bacterial action.

TREATMENT, PRIMARY - The first major (sometimes the only) treatment in a sewage treatment works, usually sedimentation. The removal of a high percentage of suspended matter, but little or no colloidal and dissolved matter.

TANK, SECONDARY SEWAGE - The treatment of sewage by biological methods after primary treatment by sedimentation.

WEIR - A dam or wall used to retain the content of appurtenances until a predetermined level is reached, then permitting its overflow.

ZOOGLEA - A jelly-like matrix developed by bacteria. The word is usually associated with activated sludge growths in biological beds.

APPENDIX

Appendix A

Description	Page
Present Worth Calculations	A-1 - A-2
FCRWD Treatment Plant	A-3
FCRWD Interceptors	A-4
Pendleton Collection System	A-5
Rennovations at State Reformatory	A-6
Ingalls Collection System	A-6
Sherwood Forest, Lantern Meadows and Murcer's Addition Collection Systems	A-7
South Anderson and Fall Creek Developments Collection Systems	A-8
User Rate Calculations - FCRWD	A-9
Markleville Treatment Plant	A-11
Markleville Interceptors	A-12
Markleville and West Markleville Collection Systems	A-13
User Rate Calculations - Markleville	A-14

Appendix B

NPDES Permits

Authorization of Fall Creek Regional Waste District

Minutes from Public Hearing

Letter - Archaeological Survey

Letter - State Historic Preservation Office

Letter - Department of Natural Resources

Stream Samples

Ordinance for Anderson Sewer Rates

Notice of Public Hearing

APPENDIX A

PRESENT WORTH CALCULATIONS

REGIONAL ALTERNATIVE FIVE

INITIAL COSTS

Non-Eligible Construction Costs (Total)	1,346,680	
Eligible Construction Costs		
Fall Creek Regional Waste District		
Collection System	4,456,810	
Interceptor System	2,825,950	
Treatment System	2,561,740	
Markleville Regional Waste District		
Collection System	481,190	
Interceptor System	162,850	
Treatment System	582,000	
Fortville		
Collection (Rehabilitation)	1,296,630	
Interceptor and Treatment Plant (Rehabilitation)	411,400	
Total Construction Costs		14,125,250
Non-Construction Costs (Eligible)		
Engineering	1,150,070	
Supervision	150,000	
Core Borings	12,000	
O & M Manual	18,000	
Operator Training	7,000	
Administrative	15,000	
		1,352,070
Non-Construction Costs (Non-Eligible)		
Engineering	134,680	
Land Acquisition & R/W	90,000	
Rate Consultant	20,000	
Legal	15,000	
Bond Council	7,000	
Interest During Construction	175,380	
		442,060
Replace Equipment in 15 years (1,506,630) (0.4100)		617,720
Replace Maintenance Equipment in 10 years (128,000) (0.55185)		70,640
		16,607,740

ANNUAL OPERATION AND MAINTENANCE COSTS

Markleville District	(Lump Sum)	24,480	
FCRWD	(Lump Sum)	150,820	
Fortville	(Lump Sum)	105,870	
Total Present worth of O & M		280,570	
(11.3544) (280,570)	=		3,185,700

DEPRECIATION

Structures	20 years / 50 years	(7429640)	2,971,860
Process Equipment	20 years / 30 years	(5188980)	3,459,320
Auxillary Equip.	20 years / 15 years	(1506630)	2,008,840
Less Equipment in 15 years		-	(1,506,630)
Total Depreciation			6,933,390

SALVAGE VALUE

Construction Costs	14,125,250
Land	90,000
Less Depreciation	(6,933,390)
Total Salvage Value	7,281,860
Total Present Worth of Salvage Value (7281860) (0.30454)	2,248,250

TOTAL PRESENT WORTH

Total Initial Costs	16,607,740
Total Present Worth of O & M	3,185,700
Less Present Worth of Salvage Value	(2,248,250)
Total Present Worth	17,545,190

CONSTRUCTION COST ESTIMATE

2.50 MGD REGIONAL TREATMENT PLANT
Activated Sludge

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Type 1 Manholes	EA.	10	650	6,500
2.	Type 2 Manholes	EA.	3	1,400	4,200
3.	Comminutor & Bar Screen	LS			15,000
4.	Grit Chamber & Accessories	LS			40,000
5.	Primary Clarifiers	EA.	2	100,000	200,000
6.	2.50 MGD Activated Sludge Treatment Plant	LS			480,000
7.	Phosphorous Removal	LS			70,000
8.	Final Clarifiers	EA	2	130,000	260,000
9.	One-day Terminal Ponds	LS			245,000
10.	Chlorine Contact Chamber	LS			30,000
11.	Flow Meter	EA	2	7,500	15,000
12.	Drying Beds	LS			30,000
13.	Sludge Digestors	LS			323,000
14.	Heat Exchanger	LS			50,000
15.	Plant Building	LS			120,000
16.	Parking & Access	LS			15,000
17.	Landscaping & Sitework	LS			75,000
18.	12" Effluent Line	LFT	450	15	6,750
19.	Outfall Structure	LS			2,000
20.	Plant Channeling & Gates	LS			50,000
21.	Sludge Pumps & Piping	LS			25,000
22.	Motors and Compressors	LS			60,000
23.	Lab Equipment	LS			35,000
24.	Electrical Equipment	LS			25,000
25.	Chain Link Fence	LFT	1800	8	14,400
26.	Gate	LS			1,000
27.	Water Supply	LS			4,000
28.	Drainage Pipe	LFT	600	15	9,000
29.	Concrete	CYDS	20	300	6,000
30.	Equipment - Operation	LS			112,000
					2,328,850
		+ 10% Contingency			232,890
					2,561,740

OPERATION EQUIPMENT REQUIRED

Item	Description	Lump Sum Cost
1.	Back-up Generator (at Plant)	20,000
2.	Portable Generator for L.S.	30,000
3.	Sludge Tanker	35,000
4.	Sewer Cleaning Machine (Jet & Rodder)	25,000
5.	Tools - Specialty	2,000
	Total	112,000

CONSTRUCTION COST ESTIMATE
INTERCEPTORS
FALL CREEK
REGIONAL INTERCEPTOR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Pendleton Lift Station	LS	1		40,000
2.	Type "A" Lift Stations	EA	5	20,000	100,000
3.	Type "B" Lift Stations	EA	2	35,000	70,000
4.	12" Force Main	LFT	12,000	13.50	162,000
5.	10" Force Main	LS	12,890	11.00	141,800
6.	4" Force Main	LFT	13,270	6.00	79,620
7.	6" Force Main	LFT	13,030	7.00	91,210
8.	8" Force Main	LFT	14,150	8.50	120,280
9.	24" Gravity Sewer	LFT	3,330	30.00	99,900
10.	27" Gravity Sewer	LFT	6,200	35.00	21,700
11.	15" Gravity Sewer	LFT	7,800	20.00	156,000
12.	12" Gravity Sewer	LFT	1,800	15.00	27,000
13.	8" Gravity Sewer	LFT	5,050	12.00	60,600
14.	Type 1 Manholes	EA	71	650	46,150
15.	Type 2 Manholes	EA	16	1400	22,400
16.	Crushed Stone	TON	12,750	7.00	89,250
17.	Granular Backfill	TON	99,945	5.50	549,700
18.	Air Release Valves	EA.	25	1500	37,500
19.	Clean-outs	EA	37	1000	37,000
20.	Railroad Crossings	LFT	180	100	18,000
21.	Stream Crossings	LFT	440	50	22,000
22.	Highway Crossings	LFT	450	100	45,000
23.	Street Repair	SYDS	12,780	8.50	108,680
24.	Telemetering System	LS	-	80,000	80,000
					2,421,090
			10% Contingency		242,110
					2,663,200

INGALLS INTERCEPTOR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	6" Force Main	LFT	4,900	7	34,300
2.	Air Release Valves	RA.	4	1500	6,000
3.	Clean-out Valves	EA	3	1000	3,000
4.	Granular Backfill	TON	2,725	5.50	15,000
5.	Crushed Stone	TON	200	7	1,400
6.	Street Repair	SYDS	980	8.50	8,340
7.	Stream Crossing	EA	1	2000	2,000
8.	Lift Station	EA.	1	30,000	30,000
					100,040
		10% Contingency			10,000
					110,040

PENTACOSTAL CAMP INTERCEPTOR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Lift Station	LS	1		25,000
2.	4" Force Main	LDFT	1300	7.00	9,100
3.	Stream Crossing	LS			3,000
4.	Air Release Valves	EA	2	1,500	3,000
5.	Clean-outs	EA	1	1,000	1,000
6.	Flow Meter	LS		5,000	5,000
					46,100
		10% Contingency			4,610
					50.710

CONSTRUCTION COST ESTIMATES

COLLECTION SYSTEMS
PENDLETON

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Collection System Rehabilitation	LS			496,000
2.	Modification of Existing Treatment Plant to Pump Station	LS			48,000
3.	Flow Equalization Basin	LS			231,440
	PENDLETON OUTLYING AREAS				
4.	Type I Manholes	EA	17	650	11,050
5.	Type 2 Manholes	EA	4	1400	5,600
6.	8" Gravity Sewer	LFT	6170	13	80,210
7.	Crushed Stone	TON	3220	7	22,540
8.	Granular Backfill	TON	12470	5.50	68,580
9.	2½" PVC Pressure Sewer	LFT	6950	3.50	24,330
10.	1¼" PVC Laterals	LFT	1540	2.50	3,850
11.	Curb Box and Stop	EA.	77	90	6,930
12.	Individual Pump Units	EA.	77	1000	77,000
13.	Valve Box	EA	12	300	3,600
14.	Clean-outs	EA	10	200	2,000
15.	6" VCP Laterals	LFT	1320	6	7,920
16.	House Connection Tees	EA	52	40	2,080
17.	Street Repair	SYDS	9560	8.50	81,250
18.	Lift Stations	EA	2	20,000	40,000
19.	4" Force Main	LFT	3970	6.00	23,820
20.	Rock Excavation	CYDS	600	50.00	30,000
				Total	1,266,200
				+ 10% Contingency	126,600
					1,392,800

MOBILE HOME PARK NE OF INGALLS

1.	8" Gravity Sewer	LFT	1100	12	13,200
2.	Type 1 Manholes	EA	3	650	1,950
3.	Type 2 Manhole	EA	1	2100	2,100
4.	House Laterals (New)	LFT	450	6	2,700
5.	Tee Connections (New)	EA	15	40	600
6.	Contingency				2,050
					22,600

CONSTRUCTION COST ESTIMATE
STATE REFORMATORY

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Convert Trickling Filter	LS	1		75,000
2.	Lift Station	LS	1		46,150
3.	10" Force Main	LFT	2840	11.00	31,300
4.	33" Gravity Sewer	LFT	120	40.00	4,800
5.	15" Gravity Sewer	LFT	480	20.00	9,600
6.	Type 1 Manholes	EA.	2	650	1,300
7.	Rennovation of existing Manholes	LS	4		6,750
8.	Granular Backfill	Ton	7450	5.50	40,980
9.	Street Repair	SYDS	3060	8.50	26,010
10.	Stream Crossing	LFT	150	50	7,500
11.	Flow Meter	LS	1	5000	5,000
					254,390
		+ 10% Contingency			25,610
					280,000

CONSTRUCTION COST ESTIMATE
INGALLS COLLECTION SYSTEM

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Manholes	EA	81	650	52,800
2.	8" Gravity Sewer	LFT	27,100	12.00	325.200
3.	Crushed Stone	TON	1,500	7.00	10,500
4.	Granular Backfill	TON	31,200	5.50	171,600
5.	Railroad Crossing	LFT	100	80	8,000
6.	Street Repair	SYDS	10,210	8.50	86,800
7.	6" Laterals	LFT	790	6.50	5,140
8.	8 x 6" Wyes	EA.	270	40	10,800
9.	Highway Crossing	LFT	100	50	5,000
10.	4" Force Main	LFT	1080	6.00	6,480
11.	Lift Station	LS	1		20,000
					702,320
		+ 10% Contingency			70,230
					772,550

DEVELOPMENT WEST OF INGALLS
COLLECTION SYSTEM AND INTERCEPTORS

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Type 1 Manholes	EA	8	650	5,200
2.	8" Gravity Sewer	LFT	2600	12.00	31,200
3.	4" Force Main	LFT	3800	7.00	26,600
4.	Crushed Stone	TON	450	7.00	3,150
5.	Granular Backfill	TON	1130	5.00	5,650
6.	Street Repair	SYDS	150	8.50	1,280
7.	Lift Station	LS	1		25,000
8.	6 x 8" Wyes	EA.	22	40.00	880
9.	House Laterals	LFT	820	6.00	4,940
					103,860
		+ 10% Contingency			10,390
					114,250

CONSTRUCTION COST ESTIMATE
SHERWOOD FOREST

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	8" Gravity Sewer	LFT	2900	12.00	34,800
2.	8" Gravity Sewer(10-15' deep)	LFT	2100	13.00	27,300
3.	Type 1 Manholes	EA	8	650	5,200
4.	Granular Backfill	Ton	3770	5.00	18,850
5.	Crushed Stone	Ton	1020	7.00	7,140
6.	Street Repair	SYDS	1610	8.50	13,690
7.	Tee Connections	EA	36	40	1,440
8.	House Laterals	LFT	1080	6.50	7,020
9.	Lift Station	LS			16,000
10.	4" Force Main	LFT	4800	6.00	28,800
11.	Stream Crossing	LFT	30	80	2,400
12.	Flow Meter	LS			5,000
					167,640
			10% Contingency		16,760
					184,400

CONSTRUCTION COST ESTIMATE
LANTERN MEADOWS & ADJACENT AREA
COLLECTION SYSTEM

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	8" Gravity Sewer	LFT	5570	12.00	66,840
2.	Type 1 Manholes	EA	10	650	6,500
3.	Type 2 Manholes	EA	2	1400	2,800
4.	Crushed Stone	TON	1040	7.00	7,280
5.	Granular Backfill	TON	9700	5.50	53,350
6.	Street Repair	SYS	6300	8.50	53,550
7.	6" House Laterals	LFT	2800	6.00	16,800
8.	8 x 6 Wye Connections	EA	80	40.00	3,200
9.	15" Gravity Sewer	LFT	1350	20.00	27,000
					237,330
			10% Contingency		23,730
					261,060

MURCER'S ADDITION
COLLECTION SYSTEM AND INTERCEPTOR

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	2½" Pressure Sewer	LFT	2300	3.50	8,050
2.	1¼" Laterals	LFT	240	2.50	600
3.	Curb box and Stop	EA	12	90	1,080
4.	Individual Pumps	EA	12	1000	12,000
5.	Flushing Device	LS			6,000
6.	Granular Backfill	Ton	680	5.50	3,740
7.	Clean-outs	EA	2	200	400
8.	Highway Crossing	LFT	80	100	8,000
					39,870
			10% Contingency		3,980
					43,850

CONSTRUCTION COST ESTIMATE
SOUTH ANDERSON
FALL CREEK DEVELOPMENTS
COLLECTION SYSTEMS

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	Pendle Hill, Mara Meadows Falconhurst, Fiddler's Green				
1.	8" Gravity Sewer	LFT	11,510	12.00	138,120
2.	Type 1 Manholes	EA	38	650	24,700
3.	Type 2 Manholes	EA	3	1400	4,200
4.	Granular Backfill	Ton	14,730	5.50	81,010
5.	Street Repair	SYDS	10,630	8.50	90,320
6.	4" Force Main	LFT	1,270	7.00	8,900
7.	Lift Station	EA	3	20,000	60,000
8.	House Laterals	LFT	9060	6.00	54,360
9.	House Connection Tees	EA	259	40	10,360
10	Contingency	LS	1		47,200
					519,170
	Fall Creek Hts, Paradise Village Shocks, Rose, Village Colony Ballards, Baby Farms, Stottlemyer, Norris Hts.				
1.	8" Gravity Sewer	LFT	55,760	12	669,120
2.	Type 1 Manhole	EA	175	650	113,750
3.	Type 2 Manhole	EA	3	1400	4,200
4.	Crushed Stone	TON	3320	7	23,240
5.	Granular Backfill	TON	111,480	5.50	613,140
6.	Street Repair	SYDS	40,930	8.50	347,910
7.	House Laterals	LFT	21,190	6	127,140
8.	Tee Connections	EA	767	40	30,680
					1,929,180
		10% Contingency			192,920
					2,122,100

AREA WEST OF REGENCY MHP

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	8" Gravity Sewer	LFT	1200	12	14,400
2.	Type 1 manholes	EA	4	650	2,600
3.	Street Repair	SYDS	300	8.50	2,550
4.	Laterals	LFT	360	6	2,160
5.	Bored Laterals	LFT	240	30	7,200
6.	Tee Connections (18 users)	EA	14	40	560
					29,470

USER RATE CALCULATIONS
FCRWD ONLY - ALTERNATIVE FIVE

INITIAL COSTS

Non-Eligible Construction Costs		1,285,440
Eligible Construction Costs	Collection	4,456,810
	Interceptor	2,825,950
	Treatment	2,561,740
Total Construction Costs		11,129,940

Non-Construction Costs		
Engineering	886,010	
Supervision	205,680	
Core Borings	8,000	
O & M Manual	15,000	
Operator Familiarization	10,000	
Administrative	2,000	
		1,126,690

Non-Eligible Non-Construction Costs		
Engineering	128,540	
Land Aquisition & R/W	75,000	
Rate Consultant	12,000	
Legal	10,000	
Bond Council	5,000	
Interest During Construction	150,000	
		380,540
Total Initial Costs		12,637,170

ANNUAL OPERATION & MAINTENANCE

Clerk	8,000
Operator Training	1,000
Certified Operator	16,000
Operator's Assistants	25,400
Chief of Maintenance Dept.	10,000
Chemicals	37,000
Equip. Maint. & Repair	5,000
Power & Fuel	43,720
Insurance and Taxes	2,000
Contractural Services	2,000
Telemetering System	700
	150,820

USER COSTS - ESTIMATE
FCRWD

Eligible Costs		
Treatment Plant		2,561,740
Interceptor		2,825,950
Collection System		4,456,810
Non-Construction Costs		1,126,690
	Total	10,971,190
Non-Eligible Costs		
Construction Costs		1,285,440
Non-Construction Costs		380,540
	Total	1,665,980
Grants		
Federal Grants (75%)		8,228,390
State Grants (10%)		1,097,120
	Total	9,325,510
Owner's Capital Costs		
Total Project Capital Costs		12,637,170
Less Grants		(9,325,510)
	Total	3,311,660
User Costs with 40 year FHA Loan at 5%		
Principal and Interest		193,000
Annual Owner Replacement Cost		92,430
Annual Operation & Maintenance		150,820
	Total	436,250

User Cost
(A.O.E./#users/#12 months) = 9.20/user/month

User Costs with 23 year Municipal Bond at 7%		
Principal and Interest		290,460
Annual Owner Replacement Cost		92,430
Annual Operation and Maintenance		150,820
	Total	533,710

User Cost
(A.O.E./#users/#12 months) = 11.25/user/month

CONSTRUCTION COST ESTIMATE
MARKLEVILLE
96,000 GPD REGIONAL TREATMENT PLANT
OXIDATION DITCH

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Type 1 Manholes	EA	4	650	2,600
2.	Type 2 Manholes	EA	2	1,400	2,800
3.	Comminuter & Bar Screen	LS			5,000
4.	Flow Meter	LS			3,200
5.	96,000 GPD Oxidation Ditch	LS			94,000
6.	Clarifier	LS			45,000
7.	Aerobic Digestor	LS			36,000
8.	Sludge Pump	LS			5,000
9.	Sludge Drying Beds	LS			15,000
10.	One day terminal ponds	LS			75,000
11.	Plant Piping	LS			12,000
12.	Plant Building	LS			35,000
13.	Parking Lot & Access	LS			12,000
14.	Lab Equipment	LS			25,000
15.	Electrical Equipment	LS			20,000
16.	Water Supply	LS			4,000
17.	CSP Drainage Pipe	LFT	200	15	3,000
18.	Chain Link Fence	LFT	940	8	7,520
19.	Motors and Diffusers	LS			15,000
20.	Concrete	SYDS	5	300	1,500
21	Mudwell & Appurtenances	LS			10,000
22.	Landscaping & Sitework	LS			35,000
23.	8" Effluent line	LFT	200	12.50	2,480
24.	Chlorination Equipment	LS			12,000
25.	Contact Chamber	LS			5,000
26.	Utilities	LS			6,000
27.	Equipment - Operation	LS			40,000
					529,100
		10% Contingency			52,900
					582,000

OPERATION EQUIPMENT REQUIRED

ITEM	DESCRIPTION	LUMP SUM COST
1.	Back-up Generator	15,000
2.	Sewer Cleaning Machine	8,000
3.	Sludge Tanker	15,000
4.	Tools - Specialty	2,000
	Total	40,000

CONSTRUCTION COST ESTIMATE
MARKLEVILLE
REGIONAL INTERCEPTORS

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	8" Gravity Sewer	LFT	1,220	12.00	14,640
2.	10" Gravity Sewer	LFT	3,650	15.00	54,750
3.	Crushed Stone	TON	430	7.00	3,010
4.	Granular Backfill	TON	4,080	5.50	22,450
5.	Type 1 Manholes	EA	4	650	2,600
6.	Type 2 Manholes	EA	2	1450	2,900
7.	Lift Station	EA	1	25,000	25,000
8.	4" Force Main	LFT	1,700	6.00	10,200
9.	Railroad Crossing	LFT	100	100	10,000
10.	Stream Crossing	LFT	50	50	2,500
					148,050
		10% Contingency			14,800
					162,850

CONSTRUCTION COST ESTIMATE
MARKLEVILLE
COLLECTION SYSTEM

ITEM	DESCRIPTION	UNIT	QUANTIRY	UNIT PRICE	AMOUNT
1.	8" Gravity Sewer	LFT	7,140	12.00	85,680
2.	8" Gravity Sewer (10-15' deep)	LFT	1,650	13.00	21,450
3.	Type 1 Manholes	EA	24	650	15,600
4.	Type 2 Manholes	EA	4	1200	4,800
5.	4" Force Main	LFT	1050	6.00	6,300
6.	Crushed Stone	TON	1510	7.00	10,570
7.	Granular Backfill	TON	14,350	5.50	78,930
8.	Street Repair	SYDS	7440	8.50	63,230
9.	Railroad Crossing	LFT	210	80	16,800
10.	8 x 6" Wyes	EA	150	40	6,000
11.	Laterals	LFT	450	6.00	27,000
12.	Lift Station	LS	1		20,000
					356,360
		10% Contingency			35,640
					392,000

WEST MARKLEVILLE
COLLECTION SYSTEM

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	8" Gravity Sewer	LFT	1830	12.00	21,960
2.	8" Gravity Sewer (10-15' Deep)	LFT	950	13.00	12,350
3.	Type 1 Manholes	EA	14	650	9,100
4.	Crushed Stone	TON	1100	7.00	7,700
5.	Granular Backfill	TON	5760	5.50	31,680
6.	Street Repair	SYDS	95	8.50	810
7.	House Connection Tees	EA	35	40.00	880
8.	Laterals (Bored)	LFT	605	40.00	24,200
9.	Laterals	LFT	440	6.00	2,640
					111,320
			10% Contingency		10,870
					122,190

USER RATE CALCULATIONS
MARKLEVILLE RWD

INITIAL COSTS

Non-Eligible Construction Costs		61,240
Eligible Construction Costs	Collection	453,470
	Interceptor	162,850
	Treatment	582,000
Total Construction Costs		1,259,560

Non-Construction Costs		
Engineering	107,850	
Supervision	52,000	
Core Borings	4,000	
O & M Manual	9,000	
Operator Familiarization	2,000	
Administrative	3,000	
		177,850

Non-Eligible Non-Construction Costs		
Engineering	6,120	
Land Aquisition & R/W	25,000	
Rate Consultant	5,000	
Legal	5,000	
Bond Council	5,000	
Interest During Constr.	16,730	
		62,850
Total Initial Costs		1,500,260

ANNUAL OPERATION & MAINTENANCE

Clerk	2,500	2400
Non-Certified Operator	8,000	6500
Certified Operator	2,000	1200
Operator's Assistant	2,000	1500
Chemicals	2,600	900
Equip. Maint. & Repair	800	500
Power and Fuel	5,000	2600
Insurance and Taxes	850	750
Contractural Services	500	500
	24,250	16850

USER COSTS - ESTIMATE
MARKLEVILLE RWD

Eligible Costs

Treatment Plant	582,000
Interceptor	162,850
Collection System	453,470
Non-Construction Costs	177,850
Total	1,376,170

Non-Eligible Costs

Construction Costs	61,240
Non-Construction Costs	62,850
Total	124,090

Grants

Federal Grants (75%)	1,032,130
State Grants (10%)	137,620
Total	1,169,750

Owner's Capital Costs

Total Project Capital Costs	1,500,260
Less Grants	(1,169,750)
Total	330,510

User Costs with 40 year FHA loan at 5%

Prinicial and Interest	19,260
Annual Owner Replacement Cost	6,020
Annual Operation & Maint.	24,250
Total	49,530

User Cost
(A.O.E./258 users/12 months) 16.00/user/month

User Costs with 40 year FHA loan at 5% and 50% FHA Grant on Non-Eligible Costs

Principal and Interest	15,650
Annual Owner Replacement Costs	6,020
Annual Operation & Maint.	24,250
Total	45,920

User Cost
(A.O.E./#258 users/12 months) 14.83/user/month

APPENDIX B

STATE OF INDIANA

STREAM POLLUTION CONTROL BOARD

INDIANAPOLIS 46206

1330 West Michigan Street
633-5467

November 22, 1974

Mr. Walter R. Johnson
Attorney at Law
25 South Main Street
Fortville, Indiana 46040

Dear Mr. Johnson:

Re: Fall Creek Regional Waste District
Cause Number S-254

On November 19, 1974, at its regularly scheduled meeting, the Stream Pollution Control Board of the State of Indiana, by motion made, duly seconded and unanimously passed, adopted the Findings of Fact and Recommendations of Robert G. Grant, Hearing Officer, and issued its order, copy attached, to organize the Fall Creek Regional Waste District.

Dated at Indianapolis, Indiana, this 22nd day of November, 1974.

Very truly yours,

Oral H. Hert

Oral H. Hert
Technical Secretary

WDC/se
Enclosure
cc: Town Board of Ingalls
Town Board of Pendleton
Mr. John Vasoni
Mr. Eric Reeke

STATE of INDIANA

STREAM POLLUTION CONTROL BOARD

INDIANAPOLIS 46206

1330 West Michigan Street

VIA CERTIFIED MAIL

IN THE MATTER OF THE PETITION OF THE BOARD OF TRUSTEES FOR THE TOWNS OF PENDLETON AND INGALLS, INDIANA, FOR THE FORMATION OF A REGIONAL SEWAGE DISTRICT TO BE KNOWN AS THE FALL CREEK REGIONAL WASTE DISTRICT, MADISON COUNTY, INDIANA, PURSUANT TO IC 1971, 19-3-1.1

CAUSE NO. B-254

RESOLVED: That the findings of fact and recommendations of Robert G. Grant, Hearing Officer, on the above captioned matter dated October 22, 1974, which are adopted and incorporated herein by reference, show that the organization of the proposed Fall Creek Regional Waste District complies with the conditions of IC 1971, 19-3-1.1, for the creation of a district, and

That the purposed Fall Creek Regional Waste District appears capable to provide for the collection, treatment, and disposal of human, commercial and industrial wastes within the purposed area so as to improve the health, safety and welfare in an economically feasible manner.

NOW THEREFORE, IT IS ORDERED BY THE STREAM POLLUTION CONTROL BOARD OF THE STATE OF INDIANA:

1. That a regional sewage district, to be known as the Fall Creek Regional Waste District, be organized as an independent political entity of the State of Indiana and as a body corporate and political.

2. That the purpose to be accomplished by said district is to provide for the c ollection, treatment and disposal of sewage.

3. That the territory to be included in the district will include the incorporated areas of the Towns of Pendleton and Ingalls, Indiana.

4. That the district be governed by a Board of Trustees consisting of nine (9) members to be appointed by the Town Board Presidents of Pendleton and Ingalls as follows:

   a) The Town of Pendleton shall appoint five (5) members to the Board of Trustees. Such members shall be residents of said District.

      1) Two (2) appointments by the President of Pendleton Town Board shall serve four (4) years;

      2) One (1) appointment shall serve three (3) years;

      3) One (1) appointment shall serve two (2) years;

4) One appointment shall serve one (1) year.

b) The Town of Ingalls shall appoint four (4) members to the Board of Trustees. Such members shall be residents of said District.

1) One appointment by the President of Ingalls Town Board shall serve four (4) years;

2) Two (2) appointments shall serve three (3) years;

3) One appointment shall serve two (2) years.

5. That the Board of Trustees shall provide sufficient bond for all officers, Trustees or employees who have any power to dispense funds of the district. Said bond, as a minimum, shall be in an amount equal to, plus ten percent (10%) of, those funds anticipated to be received by the district during a fiscal year of the district, divided by six (6), which amount shall be determined annually by the Board of Trustees.

6. That said district shall conduct a feasibility study to determine the cost effectiveness of serving Huntsville, South Anderson and Fortville. If the analysis indicates cost-effectiveness the district shall invite the township trustees of those townships containing Huntsville and South Anderson and the Town of Fortville to petition to join the district.

7. Six months from the date of this order, the Fall Creek Regional Waste District shall file with the Stream Pollution Control Board of the State of Indiana, a detailed plan for the construction and operation of the district's facilities pursuant to the provisions of IC 1971, 13-3-1.1-5 (a).

Dated at Indianapolis this 22nd day of November, 1974.

Oral H. Hurt

Oral H. Hurt, Technical Secretary
Stream Pollution Control Board

RGG/dsc

STATE OF INDIANA

INDIANAPOLIS, 46204

DEPARTMENT OF NATURAL RESOURCES
JOSEPH D. CLOUD
DIRECTOR

March 22, 1977

Mr. Don Bashford
Environmental Engineer
Beam, Longest & Neff, Inc.
8136 Castleton Road
Indianapolis, Indiana 46250

Dear Mr. Bashford:

Please find enclosed lists of National Register properties, pending National Register applications, and sites identified on an incomplete 1972 state survey. These listings are for Hamilton, Hancock, and Madison Counties. Since comprehensive surveys of these three counties have not been done, it is impossible at this time to provide you with a list of all properties within the Fall Creek Regional Waste District that would be eligible for the National Register of Historic Places.

Please find enclosed a checklist which should be answered when you are at a stage to request an environmental clearance for the facility plan.

Should you have additional questions about our policies and procedures, please do not hesitate to contact me.

Very truly yours,

Richard A. Gantz
Ass't. to the State Historic
Preservation Officer

RAG:kj

Enclosure

HAMILTON COUNTY

National Register Properties

John E. Kinzer House

Pending National Register Applications

Conner Prairie Pioneer Settlement
Hamilton County Courthouse
Judge Earl Stone House

Sites

Conner Prairie Farm
Hamilton County Courthouse
Kercheval House
John Kinzer House
Zenos Beckwith House
Judge Earl Stone House

HANCOCK COUNTY

National Register Properties

None

Pending National Register Applications

Lilly Biological Laboratories
James Whitcomb Riley Birthplace

Sites

Hancock County Courthouse
James Whitcomb Riley Birthplace
Hancock County Jail

MADISON COUNTY

National Register Properties

Gruenwald House
West Eighth Street Historic District
Mounds State Park
Wendell L. Willkie School

Pending National Register Applications

None

Sites

Mounds State Park
Anderson's Village Site
Moravian Mission Site
Historic Eighth St. District
Gruenwald House
Wendell L. Willkie School

ORDINANCE NO. 73-76

AN ORDINANCE AMENDING ORDINANCE NO. 2450, AS AMENDED BY ORDINANCE NO. 4-61, ORDINANCE NO. 75-65, ORDINANCE NO. 70-74, AND ORDINANCE NO. 35-75 FIXING THE SCHEDULE OF RATES AND CHARGES TO BE COLLECTED BY THE CITY OF ANDERSON, INDIANA, FROM THE OWNERS OF PROPERTY SERVED BY THE SEWAGE WORKS OF SAID CITY AND OTHER MATTERS CONNECTED THEREWITH.

WHEREAS, the City of Anderson has heretofore constructed and has in operation sewage works for the purpose of collecting and disposing in a sanitary manner of sewage of the City; and

WHEREAS, the City has heretofore authorized the issuance of revenue bonds to provide funds, together with federal and state grants, to pay the cost of improvements and extensions to such sewage works; and

WHEREAS, the revenues from the existing sewage treatment rates and charges established by Ordinances No. 2450, 4-61, 75-65, 70-74 and 35-75, are insufficient to pay the principal and interests on said outstanding revenue bonds together with the costs of operation and maintenance of said sewage treatment works; and

WHEREAS, an equitable cost and rate study has been made with reference to the rates and charges required to produce sufficient revenues to pay the principal and interest on the outstanding revenue bonds, together with the other costs of operation and maintenance of said sewage treatment works, which study has been performed by Henry B. Steeg and Associates, A Division of Howard, Needles, Tammen and Bergendoff, under contract with the Board of Public Works of the City of Anderson, Indiana, and a report based upon said study has been filed with said Board, which report concludes that the rates and charges to be collected from the owners of property served by the sewage treatment works of the City of Anderson, Indiana, should be adjusted; and

WHEREAS, the Common Council now finds that the rates and charges established by said ordinance, as amended, should be adjusted; now therefore,

BE IT ORDAINED BY THE COMMON OF THE CITY OF ANDERSON, INDIANA:

Section 1. That Section 1 of Ordinance No. 2450, adopted on June 23, 1960, as amended by Ordinance No. 4-61, adopted on March 14, 1961, by Ordinance No. 75-65, adopted on November 11, 1965, and by Ordinance No. 70-74, adopted on December 3, 1974, be further amended to read as follows: Section 1. For the use of and services rendered by the sewage disposal works, rates and charges shall be collected from the owners of each and every lot, parcel of real estate or building that is connected to the City's sanitary sewage system or otherwise discharges sanitary sewage, industrial waste, water or other liquids, either directly or indirectly, into the sanitary sewage system of the City of Anderson, which rates and charges are payable as hereinafter provided and shall be in an amount determinable as follows:

(a) The sewage rates and charges shall be based on the quantity of water used on or in the property or premises subject to such rates and charges, as the same may be measured by the water meter there in use, except as otherwise provided in this ordinance. Sewage service rates based upon the amount of water used, effective for all service rendered after the effective date of this ordinance, shall be as follows:

Quantity of Water Used Per Month	User Charge Per 100 Cu. Ft.	Debt Service Charge Per 100 Cu. Ft.	Total Monthly Rate Per 100 Cu. Ft.
First 1,000 Cu. Ft.	$ .41	$ .31	$ .72
Next 2,000 Cu. Ft.	.41	.26	.67
Next 3,000 Cu. Ft.	.41	.21	.62
Next 6,000 Cu. Ft.	.41	.15	.56
Next 18,000 Cu. Ft.	.41	.13	.54
Next 20,000 Cu. Ft.	.41	.12	.53
Next 50,000 Cu. Ft.	.41	.11	.52
Over 100,000 Cu. Ft.	.41	.10	.51

The minimum charge for any user, where the user is a metered water consumer, shall be based upon meter sizes as follows:

100 cu ft = 748 gallons

$\frac{\$.41}{748} = \frac{x}{1000}$ $x = \$.55$ / 1000 gallons

$\frac{\$.51}{748} = \frac{x}{1000}$ $x = \$.68$ / 1000 gallons

	Minimum Monthly Charge
5/8 inch meter and under	$ 4.15
3/4 inch meter	7.30
1 inch meter	10.10
1-1/4 inch meter	21.85
1-1/2 inch meter	33.40
2 inch meter	38.50
3 inch meter	56.50
4 inch meter	68.20
6 inch meter	127.80

The minimum charge for sewage service where the user is not a metered water customer shall be based on the size of sewage service connection, but in no event shall such charge be less than the corresponding minimum monthly water meter charge as hereinbefore set forth.

(b) For the services rendered to the City of Anderson, said City shall be subject to the same rates and charges as hereinbefore provided or to charges and rates established in harmony therewith.

Section 2. That Section 2 of Ordinance No. 2450, adopted on June 23, 1960, as amended by Ordinance No. 4-61, adopted on March 14, 1961, by Ordinance No. 75-65, adopted on November 11, 1965, by Ordinance No. 70-74, adopted on December 3, 1974, and by Ordinance No. 35-75, adopted on August 25, 1975, be amended by adding thereto a new subsection (h) reading as follows, to-wit:

"There is hereby established an excessive strength waste rate, set out in this section, to be charged to and collected from any person owning or occupying real estate connected to the city sewage system, which at any time discharges waste into the system which exceeds in strength and character sewage normally discharged from domestic residences. The rate shall be applicable when such person is served by the city's sanitary sewage system, either directly or indirectly, or is served under an agreement for sewage disposal between said city and any other governmental agency or entity.

The following monthly charges are hereby imposed on the amount of excess suspended solids and/or BOD strength

determined by the application of the formula prescribed below. The formula reads as follows:

S = V_s times 0.00075 times 8.34 times (rate established for BOD which is $.046 [BOD minus 200] together with the rate established for suspended solids which is $.051 [SS minus 250]).

For the purposes of this subsection and the application of said formula the following definitions shall be utilized:

S = Strength charge in dollars.

V_s = Sewage volume in 100 cubic feet.

.00075 = Factor to convert 100 cubic feet to millions of gallons.

8.34 = Factor to convert gallons of water to pounds.

$.046 = Unit charge for BOD in dollars per pound.

BOD = Strength index of parts per million by weight.

200 = Allowed BOD_5 strength in parts per million by weight.

$.051 - Unit charge for suspended solids in dollars per pound.

SS = Suspended solid strength index in parts per million by weight.

250 = Allowed SS strength in parts per million by weight.

The computation of the total charges under this ordinance shall be by the application of the volume rate formula and the excess strength waste rate formula to the monthly waste discharges to the city sanitary sewage system."

Section 3. That Section 3 of Ordinance No. 2450, as amended as aforesaid, be further amended so as to change the third (3rd) sentence of said section to read as follows:

"Except as may be permitted by an ordinance regulating the use of public and private sewers and drains and the discharge of wastes into the public sewer collection system for the City of Anderson and subject to payment of the excess strength waste rate charges provided for by this ordinance, any and all commercial and industrial installations shall be

so controlled and/or treated as to the sewage strength that there effluent discharge to the City's sewers shall have a BOD (Biological Oxygen Demand) not to exceed 300 parts per million and suspended solids not to exceed 350 parts per million at any time, which provisions are in general agreement with the recommendations contained in Manual No. 3 of the Federation of Sewage Works Association entitled 'Municipal Sewer Ordinances - 1949'."

Section 4. That Section 4 of said Ordinance No. 2450, as amended as aforesaid, be further amended by the addition of subsection (c), which subsection shall read as follows:

"(c) Except as otherwise herein provided, the definitions contained in Ordinance No. , the same being entitled 'An Ordinance Regulating the Use of Public and Private Sewers and Drains and the Discharge of Wastes Into the Public Sewer Collection System, and Providing Penalties for Violations Thereof', be, and the same are hereby, incorporated herein by reference and made a part hereof as though fully set out at length herein."

Section 5. That Section 5 of said Ordinance No. 2450, as amended as aforesaid, be further amended by the insertion of the following clause:

"Except as is provided herein for the application of excess strength waste rate charge, computed in the manner provided for herein,"

immediately at the start of the last sentence and paragraph of said Section 5.

Section 6. The remaining sections of said Ordinance No. 2450, as amended by Ordinance No. 4-61, Ordinance No. 75-65, Ordinance No. 70-74 and Ordinance No. 35-75, shall remain in full force and effect and shall not be deemed to have been amended or altered in any respect by this ordinance, but rather said remaining sections together

with said amendments thereto, are hereby reenacted.

Section 7. This ordinance shall be in full force and effect from and after its passage and signing by the Mayor.

Passed and adopted by the Common Council of the City of Anderson on the _____ day of _____, 1976.

_____
Presiding Officer

ATTEST:

_____
City Clerk

Presented by me to the Mayor of the City of Anderson on the _____ day of _____, 1976, at the hour of _____ ____.M.

_____
City Clerk

This ordinance approved and signed by me on the _____ day of _____, 1976, at the hour of _____ ____.M.

_____
Mayor

PREPARED BY:

MARVIN E. CLANIN
City Attorney

Pollution Sample Results

All samples were collected and sent to the City of Anderson chemical lab for testing. All test results were certified by W. J. Turner, City Chemist.

Sample No.	Location	Fecal Coliform count, parts/100 ml
1.	Outfall of 48" Concrete Storm Sewer, at Fall Creek Park in Pendleton	43,000
2.	100' N.E. of Intersection of N. Pendleton Ave. and Fall Creek Parkway in Pendleton. Flow was from a 24" Corrugated Pipe discharging to Fall Creek	2,400,000
3.	Catch basin for storm sewer at John Street and Fall Creek Parkway in Pendleton	230,000
4.	Unnamed drainage ditch on Anderson Pike Road north of Pendleton	21,000
5.	Outfall of 10" corrugated pipe filled with furnace slag into Fall Creek from State Reformatory	4,300
6.	Stream that travels through Reformatory Area. Sample taken near staff residence	30,000
7.	Tributary of Fall Creek near the Development of Mobile Homes northwest of Ingalls	43,000
8.	From draintile outfall at Spring Creek near Baby Farms	430,000
9.	Stream running through Pendle Hill Subdivision	23
10.	Ditch running through Fiddler's Green Sub.	1,430
11.	Storm sewer catch basin in Mara Meadows	9,300
12.	Catch Basin of 21" draintile at Jct. of S.R.9 and Road 900S near Lantern Meadows Sub.	2,300
13.	Open ditch that travels through DeShong Subdivision	430
14.	Open ditch that travels through Sherwood Forest Subdivision	150,000
15.	CC Williams County draintile outfall at Fall Creek near Rose Addition	75,000

Pollution Sample Results (Cont.)

16.	4" draintile outfall at Prairie Creek near White Oaks Subdivision	750
17.	Sample taken from Prairie Creek at Railroad Crossing north of Huntsville	150
18.	8" draintile outfall at Prairie Creek near Candlewood Village Subdivision	15,000
19.	12" draintile to Fall Creek South of Huntsville	210
20.	Fall Creek downstream of Ballard-Norris draintile outfall	390
21.	18" draintile that travels through Markleville at outfall of Lick Creek	210,000
22,	Tributary of Lick Creek east of Markleville near Mobile Home Development	150

NOTICE

NOTICE OF PUBLIC HEARING

Notice is hereby given that the Fall Creek Regional Waste District will hold public hearings at the following locations:

Pendleton Community Center on February 23, 1978 at 7:30 P.M.
Ingalls Elementary School on February 28, 1978 at 7:30 P.M.
Fall Creek Heights Elementary School on March 2, 1978 at 7:30 P.M.

The Facilities Plan, which concerns sewage collection and treatment for the Towns of Ingalls and Pendleton, the State Reformatory, the Subdivisions located South of Anderson and the Subdivisions in the Pendle Hill area, will be discussed at the hearing. The Facilities Plan recommends constructing sanitary sewers in these areas and transporting the sewage to the proposed regional treatment plant.

The Debt Service charge for the payment of the project costs would be $15,960 per month for the District. Other monthly costs for the District are estimated to be $12,570 for operation and maintenance of the Wastewater Facility; and $7,830 for the equipment replacement fund. For the average user in the District, the monthly sewer rate is estimated to be $9.20 per month based on no connection fee. A $10.00 permit fee is expected to be charged to each user to pay for the inspection of the service connection.

A copy of the Facilities Plan will be on display at the Pendleton Utilities Office, the Ingalls Post Office and at the Fall Creek Heights Elementary School on County Road 200 East for review by interested parties prior to the hearing.

The Public is urged to attend these public hearings.

BALL STATE UNIVERSITY MUNCIE, INDIANA 47306

DEPARTMENT OF ANTHROPOLOGY

January 31, 1978

Michael R. Cline
Beam, Longest & Neff, Inc.
8136 Castleton Road
Indianapolis, Indiana 46250

Re: Archaeological Survey, Pendleton and Markleville sewage treatment plants

Dear Mr. Cline:

This is to acknowledge your request for archaeological field assessments for the Pendleton and Markleville, Indiana, sewage treament projects. We have completed our initial topographical and records reviews, but as you know it is impossible for us to do the fieldwork until the snow melts and the ground thaws. We will undertake that portion of the assessment as soon as the weather allows--probably near the end of February, if the season follows its usual pattern.

Thank you for your patience.

Yours sincerely,

Ronald Hicks

Ronald Hicks
Assistant Professor
Registered Professional Archaeologist (SOPA)

RH/ajq

MINUTES OF PUBLIC HEARING
For
Pendleton, Indiana

The public hearing was held at the Pendleon Community Center on February 24th, 1978 at 7:30 p.m. The following people were present:

Keith Williams	President, Fall Creek Regional Waste Distric
Bill Clark	Fall Creek Regional Waste District
Bob Buss	Fall Creek Regional Waste District
Bob Post	Fall Creek Regional Waste District
Ansel Brown	Indiana State Reformatory
Dan Walters	Pendleton Resident
Helen Reske	Pendleton Resident
Ray Rota	Ingalls Resident
Ken Saunders	South Anderson Resident
Robert Jones	Madison County Health Dept.
Tony Demos	Region VI Planning Commission
Walter Johnson	District Attorney
Eric Reske	Beam, Longest, & Neff, Inc.
Dod Nobel	Beam, Longest, & Neff, Inc.
Mike Cline	Beam, Longest, & Neff, Inc.

Keith Williams called the meeting to order at 7:30 p.m. The Engineer presented the Facilities Plan and explained the important points in detail. After the presentation, questions from the audience were entertained. The following pages have these questions and their answers.

Q. Mr. Jones: What degree of inflation is included in your construction cost estimates?

A. Engineer: We "build" inflation into each unit cost estimate, then add a 10% contingency on top of that. To date our estimates have never been too low.

Q. Mr. Williams: Will everyone in the proposed sewer service areas have to hook on?

A. Engineer: The State law and the proposed District Ordinance will require that anyone within 300' of the sewer tie in. If a person refuses to hook on, he will still be charged the minimum monthly sewer rate.

Q. Mr. Reske: When the District expands will the Board Representation change?

A. Engineer: The number of Board Members will remain the same. The new areas will be represented by an appointee of the Fall Creek and Green Township Trustees and the Madison County Commissioners. The number of members from Pendleton and Ingalls will be reduced to accomodate the new members.

Q. Mr. Williams: What about the Adams Township Trustee?

A. Engineer: Since there is such a small area of this township involved, their representation will probably be by the County Commissioner's appointee.

Q. Mr. Reske: What is the legal authority of a Wastewater District?
A. Engineer: It has complete jurisdiction of wastewater collection and treatment facilities within its boundaries. They do have the power to fine offenders. They do not have the power to tax.

Q. Mr. Walters: I own a motel just outside of Pendleton. Will I have to hook on? My septic tank is not working well now.
A. Engineer: Your motel is in an area that was determined to have a pollution problem and that will be sewered and brought into the Pendleton System.

Q. Mr. Saunders: I live in South Anderson and have never had any problems with my septic tank.
A. Engineer: The results of extensive field work in that area are covered within the Facilities Plan. Your particular subdivision has several documented pollution problems.

Q. Mr. Buss: About how many homes and people will be affected by this project?
A. Engineer: An estimated 3200 homes and 15,000 people will be served by this project.

Q. Mr. Buss: Can the plant expand without great difficulty if it needs to in the future?
A. Engineer: Yes - the selected plant is a mechanical plant which will be constructed in units. Space will be alloted for future units at the Plant.

Q. Mr. Post: The biggest pollutant to Fall Creek is Prairie Creek. Will this creek be cleaned up by this project?
A. Engineer: Only a portion of this creek is in our 201 Planning Area. What pollution problems we have found there will be corrected when the Plan is implemented. Any pollution that comes into the creek north of the Planning Area will be under the jurisdiction of either the City of Anderson, the Madison County Health Dep't or the Region VI Planning Commission.

A. Mr. Williams: Mr. Demas of the Region VI Commission is here and plans to give a presentation when this poriton of the meeting is over.

There being no further comments, Mr. Cline advised the group that written comments would be received for the next two weeks and included in the hearing notes. Mr. Demas then gave his presentation. The Hearing was adjourned at 10:30 p.m.

Minutes of Public Hearing

A public hearing was held in Markleville, Indiana March 7th, 1978, to review the Facilities Plan. The following people were present:

Keith Williams	President, F.C.R.W.D.
Bill Clark	F.C.R.W.D.
Robert Buss	F.C.R.W.D.
Marvin Kelly	F.C.R.W.D.
Don Gernard	Markleville Town Board
Everett Huntzinger	Markleville Town Board
Bob McDuffee	Markleville Clerk-Treasurer
Viola B. Phillips	Anderson Herald
Bob Shearer, Jr.	Attorney - Town of Markleville
Dod Nobel	Beam, Longest & Neff, Inc.
Mike Cline	Beam, Longest & Neff, Inc.

Citizens of Markleville and surrounding area:

Alpha Heffernan	Ella Maxine Milburn
Jennie Huntzinger	Dortha Fesler
Robert I. Fox	Betty Shaw
H.V. Nibarger	Dorthy Shaw
E.M. McCormack	Ina Staughter
John A. Fredricks	Eva Anderson
H.S. Hart	E. Christina Markle
M.E. Markle	Mr. Timothy Harless
Michael Gripe	Mrs. Timothy Harless
Cletus C. Fisher	Allan Lewis
L.G. Wertz	Mr. Richard Miller
William J. Spitz	Mrs. Richard Miller
Ruth W. Wertz	Michael Marsh
Mary Dennian	Mary J. Grandison
Nellie Fath	Ina L. Littrell
Frederick Fisher	Robert W. Littrell
Gene A. Voyles	Everett C. Spall
Helen Williams	

The hearing was opened at 7:30 P.M. by the Town Clerk-Treasurer and turned over to the Engineer.

The Engineer described the Federal and State guidelines relating to the wastewater project, explained the purpose, conclusions and recommendations of the Facilities Plan and displayed a map of the area showing the locations of the sewer lines and sewage treatment plant site. The regulations concerning NPDES Permits, the P.92-500 grant program, the concept of the regional waste district, loan possibilities and responsibilities of the Engineer and the public were discussed. The project costs and estimated rates were explained in detail. With an 85% Federal and State grant, the estimated average rate would be $16.00 per user per month with a 5% 40 year FHA loan for the owners portion. All comments from this hearing will be summarized and submitted to governmental agencies as part of the Facilities Plan review.

The meeting was then opened to questions:

Q. Mr. Morris: Who has to hook on to the sewers and who doesn't?

A. Engineer: The State law requires that anyone living within 300' of the sewer must hook on.

Q. Mr. Morris: How deep will the sewer lines be? Can there be basement hook ups?

A. Engineer: The average depth of the lines will be 6-10 feet, although some lines may be deeper. In most cases a lateral from the basement will be too deep for the sewer main.

Q. Mr. Litrell: What restrictions are there on a septic tank system other than lot size? I live on a one acre lot.

A. Engineer: Madison County has a zoning ordinance which sets a minimum lot size for a septic system. In addition to the lot size, soils conditions are used to determine restrictions on septic systems.

Q. Mr. Harless: I live in West Markleville. Do we have a pollution problem there?

A. Engineer: Yes. Your septic systems cannot work properly in the soils in that area Because the septic systems have been unable to work in this area, several homes have hooked onto draintiles which discharge raw sewage to Mud Run Crk

Q. Mr. Harless: Who did the soils test? I've seen several homes built there and I've never seen anyone take any soil percolation tests?

A. Mr. Williams: One reason that there have been no tests done lately is because the County Health Department is very short on manpower.

A. Mr. Shearer: This manpower problem will soon be solved because of an increase in the budget of the County Health Dept.

Q. Mr. Harless: Where will the new sewer go in West Markleville?

A. Engineer: Every effort will be made to keep within the highway right-of-way. The specifications will be written to insure the replacement of any driveways or other roadside structures that may be disturbed by the project.

Q. Mr. Harless: Will this plant smell in the summer?

A. Engineer: A properly operated plant will not have any odor problems. The proposed plant site is over a mile away from any built-up area.

Q. Mr. Harless: What if I refuse to hook-on?
A. Engineer: The proposed district would charge you the minimum rate for this utility.

Q. Mr. Fox: You say there are at least two draintiles polluting Mud Run Creek Yet I sit there and watch cattle discharge into that creek every day. Aren't they polluting it as much as those homes are?

A. Mr. Williams: The County Health Dept is responsible for non-point discharges such as feedlots. These violations will be enforced by that office.

Q. Mrs. Miller: The people on School Street southeast of West Markleville are on the same soil as the rest of the homes around there. Why aren't they being sewered?

A. Engineer: The homes there are relatively new and scattered. We found no evidence of pollution there in our field survey. It is possible that as that area grows in the future it may develop the same problems that West Markleville currently has.

Q. Mrs. Williams: I live within 300' of the pressure sewer between West Markleville and Markleville. Will I have to tap into it?

A. Engineer: The law only applies to gravity sewers. Expensive devices are available if you wish to tap into the pressure main.

Q. Mr. Marsh: What is the price per foot of the sewer? Will these prices go up if we wait to put sewers in?

A. Engineer: Our estimated price is approximately $13.00/foot for the gravity sewer and $6.00/foot for the force main. A 10% contingency provides for any increase in costs between now and the construction of the projects. Yes, the prices will definitely increase if you put this project off. You will also lose the grant monies that are now available.

Q. Mr. Littrell: You say West Markleville is polluting the local streams. Will the new sewers solve the problems?

A. Engineer: It will stop the pollution from the homes in that area.

Q. Mr. Marsh	My wife and I live alone in Markleville while there are 8 people in the house next door. Why should I pay the same as they will?
A. Engineer:	After the project is bid the exact cost of the project will be known. At that time the District will hire a rate consultant who will develop a rate for each user in Town. The rate we have presented tonight is an average rate based on the flow from one home. After the rate consultant has determined the rates, a rate hearing will he beld for public comment. This will be done before construction of the project begi
Q.Mrs. Grandison:	We are currently being required to cut down on our energy consumption. Won't the new sewer system be using even more energy?
A. Engineer:	Yes, just as any utility will. We have tried to minimize the amount of energy by putting in gravity sewers and interceptors wherever possible.

With there being no further questions Mr. Nobel informed the public that there will be two more public hearings concerning their Facilities Plan at Pendleton on April 13th at 5:00 P.M. and at Ingalls on April 18th at 5:00 P.M. The meeting was then adjourned at 11:00 P.M.